NATIONAL LIFE STORIES

AN ORAL HISTORY OF BRITISH SCIENCE

Professor Sir John Houghton

Interviewed by Dr Paul Merchant

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Could you start by telling me when and where you were born, please?

Yes. I was born on 30th December 1931. I was born in a place called Dyserth, which is in Wales, North Wales, quite near Rhyl, which inland from Rhyl is something called Dyserth Mountain, or the hill behind Dyserth. It was on the slopes of that hill – hill I suppose that the village of Dyserth lies, it’s a pretty part of the world. And whether I was – I was born at home I presume, but I don’t – can’t give you much detail about that.

[00:43]

Thank you. And we’ll come back to the sort of places of your childhood, but could you tell me something about your – or anything you know about your mother’s life.

Yes. Well, my mother, her maiden name was Yarwood, and she was – she came from – well, she was born in Manchester, born in Eccles I think, in Manchester, in 1902. Her parents were, erm … well, he was a – in early life he was a carpenter actually, or cabinetmaker I think would be more correct, made furniture, that sort of thing. In later life he had a coal merchants’ business, taking coal round to people, customers. There was somebody in their family who died and left this business, and Frank Yarwood that was his name, felt an obligation really to take it on, so he had this business in – where I knew them, when I knew my mother’s parents, they lived in Lymm in Cheshire, in the country.

He also kept, you know, had sheds full of chickens, he had a little chicken farm, a very small chicken farm. And his wife, my grandmother, came from Bradley Hall, she was brought up in rather a grandish hall in Cheshire, not too far from Lymm where they lived. And, erm, she was a toff, lovely lady, I loved her, liked them both very much. They met at a – they met in a strict Baptist chapel in the area of – in that part of the world. And when they were married, I can’t give you all the dates, but it’s – I could look up the dates of course of when they were born, but I don’t know them off the top of my head.
That’s okay.

But I did know her parents reasonable well. And my mother was, er – became a schoolteacher, taught mathematics for a year or two before she married my father, when she became a housewife [laughs].

[03:34]

Thank you. And anything you know of your father’s life, either what he told you at the time, or that you’ve learned since.

Yes, well he was born in 1899, so he was a Victorian by birth, and also by style [laughs]. He – his father, I don’t know too much about my father’s family because we didn’t see very much of them. His father lived in – but he was born in Salford in Manchester. His father was a clerk I think in an office. He, erm, he died when he was 96, he had three wives I think, that’s right. First one died in 1935, so I never knew her. And then he married twice again after that, and I didn’t really know them very well either, so I can’t say a great deal about them. He was a, erm … a very mean man, very, you know, upright sort of person. He was a Methodist; my father was brought up as a Methodist.

[05:11]

And my father – I’m not quite sure, oh he met, that’s right, he met my mother because my mother was teaching at a school and he became the school clerk. Hmm, so he was, what, three or four years older than she was, and he began to – rather an awkward man I think in his youth. He got to know my mother through, you know, seeing him in school, and quite how he – and she was in her teens of course. And somehow he got invited to my mother’s home, and used to have long discussions with my mother’s father, particularly on theological issues [laughs]. And he was I suppose – he became I think a Methodist local preacher, did some preaching for the Methodist, but as I say he was a Christian man with I suppose rather liberal theology in those days. But having met my mother’s father, he became much more conservative in his
theological views. My father’s mother – my mother’s father managed to persuade him to change some of his beliefs, and, erm, so he became a strict Baptist too, like my mother. The chapel to which they went in was in the country near Lymm, in Cheshire, and we visited them sometimes, I can remember going to that chapel sometimes. It was old style, they sang very slowly I remember. I learnt the piano a little when I was young, and there was an old organ that you pumped with your feet, you know, and they very often didn’t have anybody to play it, so when I was there I had to try and play this. I can remember the first time it ever happened, I played at a normal rate, and got through the first line and they’d hardly got over the first word or two [laughs]. I had to slow down a lot. But it was an interesting place, but very … well old style, both in its Christianity, and of course in its – as far as the world was concerned, the world had gone by quite a long way for most of the people in that chapel. But they were good people.

[08:28]

That was where my, er, my grandmother actually became a Christian in that chapel. There’s a story about how that happened, well I’m not quite sure how it happened, but she was a very, you know, determined youngster, and her family – and she started to go to that chapel for some reason, I don’t know what it was. But she met my – her husband there of course, my grandfather, and they – and she became a Christian there. Now it’s quite hard to become a Christian as a strict Baptist because you were not supposed to really be quite sure about whether you were a Christian or not, you know. Were you one of the elect or not? And people were encouraged to doubt whether they really belonged you see, had, whether they’d really been elected or not, which is a strange – a sad, rather a sad state of affairs for people who couldn’t be sure about their faith, because faith is something you want to be really sure about. And she’d been brought up that way, but then she asked to be baptised, and they didn’t baptise I don’t think many people, because they didn’t have too many people joining them. And she felt strongly about her faith, but then was worried about taking this step in case she wasn’t actually one of the elect. So, erm, so she said to God, because there was a particular verse that came to her, and I don’t know what it was from the Bible which she read, she said, ‘Please will the – please may the preacher of my baptism preach from that verse.’ And she felt so strongly about it she felt if he didn’t preach from
that verse then she couldn’t possibly be baptised. So the day arrived, and the preacher announced this text, and it was the wrong one, it wasn’t right at all. So she said, you know, she couldn’t – she was determined, she couldn’t possibly go through with it. But the preacher had only got – well he got ten minutes or something, they preach quite a long service of course, until he was ten or fifteen minutes into his sermon when suddenly he stopped, and said he was very sorry, he could not continue with his sermon, he would have to change what he was preaching about, and he switched to her verse. So she was a woman of great faith who believed a lot in God, and what he could do for her. And, erm, then had a very strong, strong faith which affected her attitude in all sorts of ways.

[11:43]

They had six children, my mother being one of them, and she was the eldest. The next eldest was – my mother’s name was Vivien, and the next eldest was called Eva, and she became a missionary in Brazil in her – quite a long story about what happened to her, but she was also a lady of great faith. And her mother, that’s my grandmother, used to – she did all sort of things there, quite a lot of land and she cultivated fruit, strawberries, all sorts, to sell in order to support my Aunt Eva’s work in Brazil. She had a home for handicapped children there. And I got to know my aunt quite well actually in the ’60s, if I go onto that, just talking about her, because she was in Brazil during the war, and was – couldn’t be really – have much contact with the UK because it was – that was difficult. And there was a big church in Richmond, Virginia in America that supported her. And when she retired from Brazil, she went to Richmond and lived in Richmond, Virginia, which is not too far from Washington where there’s a – well, there was a very big Baptist church where she became the church visitor who worked for them, and so on. And I was going to America quite often in the 1960s and ‘70s, and I’d quite often go and spend the weekend with her, and I enjoyed her very much. She was a very, very lovely lady. Okay, is that the sort of thing.

*Perfect, yeah.*

The thing you’re after. I’m going off all sorts of tangents.
Wonderful, wonderful. For those –

Do you think it’s interesting to – this is just bits of relations I remember, that’s all.

Very much so. Yes, please continue, yes.

[13:53]

For those listeners who won’t be familiar with baptism and the particular chapels and religions that you’re speaking of.

Yes.

When you said the Lymm Baptist …

Yes.

Was old in its Christianity as well as being old in terms of its – in terms of being old-fashioned, could you say what that might have meant, the oldness of its Christianity or the …?

Yes, well they, erm … I mean, you know, Baptists come in various forms, because you know – and I couldn’t give you a history of the whole – of all the Baptists churches, but they belonged to a particular part of the Baptist church which called themselves a strict Baptist, and that’s because they believed in strict communion. And they only believed that, you know, many churches of course would accept any Christians into a communal service, they would not. They would only accept people from their sorts of churches to have communion, they would only allow people from their sorts of churches to have communion. And they also had this very strong view which – which was their interpretation of Calvin, John Calvin, that you – you know, there were certain people elected, and God was in charge of this election, and unless you were elect you couldn’t be saved. Now – and the way they worked this through was really very – very precise, and definite in their beliefs, which I think is a great
shame. Because, you know, the Christian gospel is not quite like that. But nevertheless they were very serious, very humble, very fine Christian people. But it meant that they weren’t very outgoing as far as the rest of the world was concerned. I had a lot of respect for them, but I did not respect that sort of Christian doctrine, which is just taking certain verses from scripture and using those without looking at the whole thing that the Bible is saying to you.

_I see, thank you._

So that’s the sort of background of my childhood, and my father, was also that of my mother’s.

[16:26]

_Open, have you said that it was your mother’s parents who you knew best out of the two sets of grandparents._

_Sure, yeah. I hardly knew the others, I hardly knew my father’s parents at all._

_Open, you’ve told us about the playing of the – the slow playing of the organ._

_Yes, yes._

_Open, could you tell me any other stories you have of time spent with those grandparents, things done with those grandparents as a child._

_Yes, I remember going to visiting from time to time, their home in – their home in Lymm, which – it was a couple of acres I would think, or perhaps a little more. It was – my grandfather spent a long time in the garden with the chickens, and so I would go round and help him with the chickens, and that sort of thing. And, erm, which I certainly learned a bit about horticulture as well, because he grew things. Also living with them when I enjoyed my childhood was my aunt Margaret who was the – one of their six children, sister to my mother. She was not married, so she lived with them at home. She worked in a bank, and she loved walking, you know, walking in the_
country, so I would go on country walks with her all over the place, around their home, so that was something I did when I went there. Later on in my teenage years I actually cycled over. I love cycling later on when I got a bicycle, gave me some real freedom, and so I would cycle over to Lymm, fifty miles away I suppose from where we lived. And then go cycling a bit round there too if I was free.

*Were there particular places or landscapes there that were significant, or particularly attractive to you, or particularly interesting for you?*

Well at Lymm there was a lake, and that was – with a little waterfall, you know, and it was a nice lake and waterfall. And there was another – there were other lakes quite nearby which – which had rather nice scenery, which I enjoyed. Yes, I enjoyed the countryside as I did of course near my own home.

[18:41]

*Yes, let’s go to your own home, and could I ask you about time spent as a young child, so up to and including primary school age, the sorts of things that you did with your father. Things you would do with your father, indoors or outdoors.*

Yes. [Pause] My father was a very booky man, very, very interested in books, in fact he had an enormous collection of books when he – in later life, 30,000, 40,000, 50,000. Hmm, and he loved books, he was a collector of them, he went around second hand bookshops collecting books. And quite a lot of them were theological books, he was a history teacher at Rhyl Grammar School, that was why he was there, the grammar school in Rhyl. A very good teacher, I mean very – liked teaching and liked educating people. Very shy man, erm, but history was his main subject though he did teach scripture as well. He set up a very big library in the school, this was the local grammar school. And I’m going to the secondary school now.

*Yes, I know. Yeah.*

And – and he – you know, I used to go and wonder round his books, and things. I can remember ‘cause I learned to read at a pretty young age, and – well before I was five,
and I remember particularly he had rows and rows of volumes of the *Boys’ Own Magazine* dating from the early 20th century, late 19th century, so I found lots of adventure stories, and I was just going through the – roving through those things. So that was – I wasn’t doing it with my father, there wasn’t a lot of things I did with him in a way. He would, er – he wasn’t a scientist, he wasn’t interested in science, and – particularly. I was trying to get information about anything to do with science in my life, from an early stage I got – as early as I can remember almost.

[21:13]

My primary school, the – I went to a – was private actually. I went to a small private school not too far away, but wasn’t very happy there so they sent me to a place called Arcville College, which was [coughs] – which was mostly a girls’ school, about a mile and a half away from where we lived in Rhyl. We were not in Dyserth then, we moved from Dyserth when I was two, so I don’t really remember anything about Dyserth particularly at that time. Although Dyserth was a place I visited later on quite a lot, because it was a near place, and there were hills around there, and I cycled around there and so on. The school I went was a place called Arcville College, a lot of girls there as well as – and a few boys, a few junior boys. And I don’t remember an awful lot about it really. I can remember the walk to school, I walked to and fro, a mile and a half each way, on my own. And, er, and my strongest memory of those walks is I had to pass a house where there was what I thought was a horrid fierce dog which would come out and chase me. So I’ve never been very keen on dogs, I suspect that’s part of my reaction to that particular, you know, frightening part of my journey.

And the time you spent with your father indoors, you suggested that you tended to read sort of by him rather than with him, in other words using his – going through his books. But you didn’t –

Yes, I didn’t read with him very much. You know, he was keen to tell me that, you know, tell me about words and things to some degree, but I didn’t do a lot of things with him that way.

[23:05]
Who taught you to read, do you think?

My mother I think probably was the main person who taught me to read, and she taught me to read the Bible of course, so the Bible was an important book right from day one.

Could you say how, it might seem very specific, but could you tell me how and – how and where she taught you to read the Bible, when did it happen during the day, where were you?

[pause]

Do you have a memory of that?

Not – not particularly. No, I can’t really, er … maybe going to bed at night was part of it, but I can remember that. But, hmm, no, I don’t have any strong – I remember reading, and learning to write of course at a very early stage too. I can remember – again this is during my primary school time, yes, we had – I remember going in travelling to London with them on a – staying with some friends in London, Dad was keen to show me around London. And what particular event stands out very strikingly, because he knew somebody who was the – in charge of the Houses of Parliament for a building point of view, in charge of the building. And so we went with him up Big Ben, walked up the staircase, all the way to the top, and stood behind the clock face as it struck twelve, I can remember that now very well, yes. Fascinated by it, and I remember there was a pendulum, at the top of the pendulum you could see, and on the top of the pendulum were some coins. They put pennies, or ha’pennies, or even farthings I think on, particular positions to – to keep the time absolutely correct. And this enormous pendulum, this was the sort of weight at the top, which helped it keep it absolutely right. So that was – I can almost hear it thinking now, you know, it was a very striking thing to me. And when I got home after that I, you know, grabbed some cardboard boxes, and all sorts of things, making my own Big Ben [laughs].
You said that your father was keen to show you London.

Yes.

Why? What about it?

Well he thought I should know about it, that’s right, I think he felt it’s part of your education to go London, and I – I don’t remember much else about that trip at all. It’s possible it’s the only thing I really remember. We also went one year to the Isle of Man by boat from Liverpool, and which was a great thrill and experience. About 1937, ’38, or something like that, when I was about five, six, seven – five or six probably. And I can remember – I can, you know, envisage now leaning over the rail on the boat watching the waves, and those things. This is the little pictures one gets. I remember falling down the stairs in the guesthouse, in the guesthouse where we were staying, which was a crooked – a rather awkward staircase. Again did a little damage to myself, I don’t remember what. I can remember, erm, my parents were saying how they had to bring their own food, which was then cooked of course in the establishment. And so I can remember him going to the – going to the harbour and finding a fishing boat, and buying some whiting for our lunch, or whatever it was. And he gave the man sixpence for his whittings and the man I remember took the sixpence and put it – stuck it in his hat. These silly things you remember, rather than anything very profound. There were also near Port St Mary, we were at Port St Mary on the Isle of Man, and there’s an area called Chasms, I don’t know if you know the Isle of Man, a place called Chasms. This is an area where you have lots of, you know, breaks in the terrain over quite a large area, which of course looked enormous to a small child, known as the Chasms. And I tried to jump these things, you see, of course with help, I was held on a tight rein, but thought it was fascinating to see the way the land was like that. I suppose my scientific inquisitiveness was beginning to come out.

[28:17]

What did you – what did you and your parents talk about while outside on walks, do you remember what was said?
Not very much, no, I don’t remember much about that at all.

*Did either have a particular interest in the outdoors, in natural history, or in …*

No. No, my father – well he was a man who was interested in the world, in nature, that’s right, interested in nature in a general sense. He was not a – he was not interested in any sense in a professional sense. He didn’t know a lot about – he didn’t know much about growing things in the garden for instance. I had an older brother who – who was much keener on that sort of thing. I mean, he had his own little – we had a patch of garden in Rhyl, which was the wild, it was half an acre, and it was essentially – it had fruit trees, and had – it was essentially growing wild otherwise, apart from a bit of grass which my father used to cut just by the house, in back and front. My brother David at a fairly early stage started to make beds and grow things, and, erm, he’s three and a half years older than I am. He also – and he had a … obsessive interest in the weather. And in later life he became – he really went into the Met Office and became one of the forecasters, and took other jobs in the Met Office I can tell you about later. ‘Cause I went there too in the end [laughs]. But he much more than I had, I thought it was interesting in a way, but I didn’t share his obsession with – he had a thermometer on the wall, he made himself a rain gauge, and he used to record the weather each day, and this was – didn’t come from my parents at all, because they had no particular interest in that. But he determined he was going to do that, and did it. He also did other things, he went fishing himself until – which I didn’t join him on, and so on. But er …

[30:37]

Another thing with my father I remember as I had – I was given a book called *The Boy Electrician*, which described simple electricity and wiring and that sort of thing. And I tried to make myself bits of electrical equipment, and it had a diagram I remember of a transformer, you know, with – which you had a magnetic core, then you had a few turns on one side, and a lot of turns on the other. And, erm, if you put a small – you know, so you could increase the voltage of your circuit by putting a transformer in the middle. So I got – found some iron wire, I made myself a core of
iron wire. I can remember doing it. Hmm, you know, three or four inches perhaps across, and wrapped it up into as many turns as this was the core, the magnetic core, I had no other magnetic material, you know, that I knew of that I could fold or make something of. And I wrapped a few turns off one side, and a lot of turns around the other side [laughs]. And then I wanted to connect it to the mains. Well my parents – my father didn’t think that was a good idea at all [laughs], but eventually I persuaded him that this is what the book said [laughs]. So this transformer sat on the chair, and we connected a plug to the end, the number with the small turns, the one with the side of the small turns. And, er … I think that was the – no, we did it the other way round, of course, because we had a small bulb on the one with the small turns. And the big turns had to go onto the mains, you see. So it was duly connected up, and switched on. A good – good loud bang of course occurred and smoke [laughs], and slightly damaged the chair. So my father wasn’t very impressed by that [laughs]. But – and I of course wasn’t impressed either, because I thought I done something which was as in the book. I didn’t understand why it didn’t properly work. But anyway that was, er … a little event in my early scientific career [laughs].

Did you say that your father had bought you the book?

Hmm?

Did you say that your father had bought the book for you? Or that you …

I think I got it – I got it as a prize I think at school actually, yeah. He did buy me odd bits of science, you know, if he found a book, science book, he’d buy it, yes, and give it to me. Don’t remember many or particular book like that.

[33:40]

You’ve mentioned reading with your mother, especially reading of the Bible.

Yes.
Are there other things that you would do specifically with your mother?

… She was rather infirm actually, she was rather lame, so she couldn’t walk very far. She was around the house a lot of the time of course, and so, hmm … I mean, I tried to help her in the kitchen a bit I think, and that sort of thing. She was a – she was a lovely lady, a very saintly lady, and a very loving lady, and a very loving mother. But she had this great, you know, problem that she had a hip which gave her a lot of pain from an early stage. I think she did – developed rather badly after I was born, and she was like that for most of her life. Hmm, oh I mean, in – if I just jump a few years. Well, thinking about that, she, in 1948, she went into hospital, the Royal Infirmary in Manchester, ‘cause she’d been trying to get advice from doctors about what to do about this awful hip that was giving her all his pain. Osteoarthritis is what she had. And she saw a man called – I think he was Sir Harry Platt then, I think he was a well-known – probably top orthopaedic surgeon in that part of the world anyway. And he was prepared to put a pin through her hip to fix it, so that it wouldn’t move, and then perhaps the pain would go. And so she went into hospital, and she was there for six months in plaster after the operation. This happened in those days, and, erm, I remember going to see how from time to time.

I would hitchhike my way up there, I was in my teens. Well I was just – I just went to Oxford I suppose, 1948, yes. It was – no, I quite enjoyed hitchhiking and getting from place to place that way in those days. You wouldn’t encourage young people to do that now, but I don’t think my father was too keen on it, but anyway that’s – that’s what I did. So I went to see her a few times. Then a few years later she had to have it done again, because it didn’t work properly, so another six months in plaster, which was a test to her patience. I don’t remember doing a lot with my mother really. I’m sure I read to her from – when I was learning to read.

[36:35]

And I was scribbling away, doing my own writing at an early stage too on that trip to Isle of Man, I’m – I think somewhere in the house I have my little notebook which is full of my scribble about that holiday, probably about London too, I should have looked up. I don’t know where it is, we’ve got a great archive of things here. I – I
don’t know quite where they are really, these things are. And my writing was very scrawly and not good, and it never has been very good, but I loved scribbling away as fast as I could go with it. Supposedly quite precocious child I think.

You said very early on in the interview that your father was a mean – a mean man.

No, his father.

Oh, his father, sorry.

Yes, my father wasn’t that generous actually, no, he wasn’t. I wouldn’t call him mean in the same way as I would apply that for his father. But he was not a generous man, no, particularly, no.

[37:35]

The first home that you can probably remember in any detail is the Rhyl home, isn’t it?

Yes.

Would you be able to stand at the front door if you like and take us on a tour of the inside of that home? I don’t know whether you remember it in enough detail to do that –

Yes, it’s still there, it’s still there, lies in – in Rhyl. It was a bungalow, quite a big bungalow. As I say, it had about a couple of acres attached to it – half an acre attached to it. Hmm, I suppose when we first went there on one side of it, to one side, there was a field, later was built on. Hmm, I mean during my lifetime it was built on, there was this field became a housing estate. And the field was full of blackberry bushes and, you know, wild, and I remember going picking blackberries with my mum, yes, something we did then. Getting outside. Standing at the front door, there was a porch, then you went in the hall, the middle of the house, then you went down to the left, there was then a corridor which went along the middle of the house – the
middle of the house to the left and to the right. To the left there was a, er – eventually you came to a – you turn left again and you came to what was at one time the lounge, at least in the early stages it was the lounge. And that – if you imagine the front door, of course, the window of the lounge was on the left of the front door, looking up. But that was a room that was hardly used, you see, it was a nice lounge, it was one which you took visitors into, if you had them, and so on, one way and another. Had a fireplace, but I can hardly ever remember having a fire there. And, erm, then if you went straight ahead from your corridor, so turning round to the side view on the house, there was a bedroom which was where my parents used to sleep, at least that was – I think that was how it was to begin with. Then, erm … then you went the other way from the hall, on the right hand side, looking, you know, looking into the front door, then you had the – you had a small bedroom which was then on the left as you turned left along there, and next to that was the bathroom. And then to the right was the kitchen, pointing the opposite, right angles to the – looking straight forward from the front door, and then to its right, the room on the right of the front door, with the window on the right of the front door was a dining room. I think that was broadly the set up as it was when we began. It was altered in various ways during my parents being there. They rented this house, they didn’t own it to begin with, they bought it at some stage during the time we lived there. Hmm … then the alterations that were made, my father made himself a study in the attic, which was his den, surrounded by books and books and books. And, erm … yes, the bathroom was changed too because there wasn’t a proper – the bathroom was very unsatisfactory I think when they first went there. But I don’t remember what it was like at the first stage, but I remember the second. Then on from the kitchen there was a conservatory at the end of the kitchen, ‘cause I think that was added on during their earlier years.

[42:08]

Hmm … and that was broadly it, yes. Later on at the end of – in the ‘60s, my grandfather and grandmother came to live in the house. They only stayed about a couple of years I think before my grandmother died, and they took over the room that was my parents’ bedroom, which was made larger, and had another – had another bedroom in front of that, or the back of it, the back of the house actually. By then I’d left home by then, of course, for sometime, but that’s the house as it began.
Do you remember there being anything in the house that you as a child regarded as being modern – or hi-tech isn’t a phrase that would have been used, but especially modern, any sort of appliances or objects that you …?

Well … [pause] we had a wireless, we never had television there. My father didn’t like television, didn’t approve of television. But that wasn’t on technological grounds, that was on – they didn’t think what you saw on television was particularly good to see. The, hmm … he was a bit interested, to be fair to him, he was a bit interested in technology ‘cause he acquired, via the school actually at one stage, a recording device, so that he could actually record events and voices from school. This was a – looked like a gramophone, it was recording device with thorn needles, and, hmm, or at least that’s how he played them, and you played the recording with a pointed needle, yes, on rather soft metal. So he made gramophone records – you could make gramophone records with it. It was quite a modern device of its time, this is in the ‘30s, and he used it for recording things at school, and playing them back to people for interest.

What sort of things would he record?

Well, he’d particularly record people speaking, he wasn’t – he wasn’t very interested in music. Hmm … in fact his musical interest was very slight really. He was interested in Christian hymns because he was interested in poetry actually, he was quite interested in poetry, particularly religious poetry, but not entirely that. He, er … so what else did he record? He was – people would make speeches, or actors who were practicing their lines, or something, that sort of thing he would do. People – the speaking voice was his main interest. Yes.

And you said that though you had a radio, you didn’t have a TV –

Of course that was a bit early for TVs in those days anyway.
But that your father would regard the things on – that you might see on TV as not being good. Could you elaborate on what he would have been worried about, about having a television, and about the family watching it?

Yes. Hmm-hmm. Well he’d no objection to broadcasting things, and had a great interest in history, of course too. He had an aversion to acting actually; thought that – which partially came from his very narrow background as a – a strict Baptist. Because he thought a lot of plays were not – were not very good things. But he also for some reason, which I never understood, he, erm, he thought because if you were an actor, you are taking on to the extent, maximum extent possible, the personality, the style, and the behaviour of somebody who might be good or bad, particularly bad people, he thought that was a very bad thing for a person to do. So he never went to see plays, he never went to the cinema, at home, from home, or anything like that. That would have been thought, you know, the world in a way that was improper. But it was a very strict home, in that sense.

Radio plays then, were these not listened to, or …?

No, he wouldn’t listen to a play on the radio. I don’t know whether – I can’t ever remember radio plays coming on. Listen to the news of course, and documentaries. But, er, no …

[47:46]

You’ve mentioned that you went to what was really your grandparents’ church, and the playing of the organ, what was the pattern of church attendance …

In Rhyl?

From home, yes.

Yes. Well in Rhyl there was – no, there wasn’t a strict Baptist chapel, but I – there was a Brethren Assembly, you know the Brethren movement. In fact a big – quite a large Brethren Assembly. I say large, it wasn’t large in the – I mean, Rhyl was a
place got lots of holiday people in it, going to it, sort of place with a lot of visitors in the summer, so the population became … and there was a Brethren Assembly which met in a hall. It was the hall of the Boys’ Brigade Movement actually, they met there, and they’d have their meetings there, and that’s where we went to church. And my father being a capable person became really the person who was largely in charge of that for a long time until eventually they were – because of the people who came in the summer, then who felt my father was not a proper Brethren person, which he wasn’t because of his strong Calvinistic bias, as opposed to them who had a more Armenian bias in their theological expressions for the day.

**Would you just be able to explain that distinction?**

Well the Calvin – I mean people who talked about being Calvinistic, believed that the people were elected to salvation, and that the people had no will to choose for themselves. Erm, the Armenians were people who believed that it was entirely at will, it was up to your choice whether you became a Christian or not, and not God’s choice, now. And there’s been a lot of debate about that theologically of course over the years. Hmm, in the Methodist revival Wesley was an Armenian and Whitefield was a Calvinist, broadly speaking. But that’s of course to label people in a way which is – which is useful but it’s also unfair because Christian theology is not that simple, and in fact faith is not simple either. So – but these are the emphasis that people have. So my father has a very, you know, coming from his – the teaching he got from my mother’s father of course, and he picked that up and run with it, and you know he was a great student of the Bible. And he – so, erm, there were people in the – who came in the summer to the Brethren Assembly who felt it wasn’t a proper Brethren Assembly at all because the way my father ran it. And – so eventually he – he pulled out of that, and at that time, that goes into – I was getting I suppose well in my teens by then, it wasn’t very long before I left and went to Oxford. But he then had services in our home on Sunday, that’s how he resolved the issue, which – which was a pity, because he had – you know, he had an ability, and a capability of teaching people which was rather lost on the very few people who turned up to our home.

**And did you go every Sunday then to the, erm, Brethren …**
Yes, I went every Sunday to the Brethren Assembly, yes.

*Could you describe the sort of – the set up there? You said that it was a Boys’ Brigade institution, that was …*

The building, that was just the building. Yes.

*Okay. So could you describe the room that was used for worship?*

It was just a big – a big, erm … not very well built, big hall, actually, big hall. Big room with chairs, and it was all the way this is the Plymouth Brethren, and the way they had their meetings. On Sunday morning meetings they had a table, the Lord’s table, in the middle where – which was – from which they served communion, and chairs were put around it in various rows, depending how many people we had. And it would – what would be typical numbers? What thirty, forty, I suppose on a Sunday morning I would guess. In the summer it would be a hundred, maybe more. And the style of those services, which was the Brethren style, was that anybody could get up and make a contribution, either by expanding a bit of scripture, or by announcing a hymn, or by making a prayer, or what have you. And, erm – so a very informal style you might think, but of course there was a formality that grew it into that informality. And my father played his role in that, and took it seriously, and tried to, you know, inform people, and educate people, and expand parts of scripture in the way that he was capable of doing. And some others were not so capable, and sometimes you got some very strange contributions. Then eventually somebody, and again it wasn’t fixed who did it, they would, you know, go to the table and break the bread and get it passed round, it was passed around, and the wine in the same way. I say the wine, it was not fermented of course wine, but that was what was wine. And it was a – it was a worshipful service actually, I don’t – I didn’t know anything else, so that was fine.

[54:07]

*Could you say something about the development of your feelings about attendance as you grew up? So presumably you first started going as a very young child …*
Yes.

And would have merely accepted the fact that you were going because you were a very young child, and you were going with your parents.

Of course. Yes.

I wonder whether you could talk about the development of your – I suppose the development of sort of independent feelings about going here on a Sunday. Hmm …

Well, I didn’t – I mean, I didn’t have independent feelings about it really, it was part of the family set up. And I was – I was quite a shy boy I think as a boy, and liked doing my own thing, reading, and you know – and then later biking around, which I did with some small number of friends, who were not necessarily people from the chapel, from the meeting. But, erm … no, I mean, not to have gone would have been something quite awful to my parents, and I never – I can’t remember ever rebelling in the sense, I’m not coming with you today. And of course I left home when I was sixteen, because I went to Oxford about sixteen, so I was … and as I say, I was quite a shy boy I think, in my way. So I didn’t rebel against it in any serious way. I wondered whether I was really part of it, or I began to wonder that, and I’ll come onto that a bit later on. But, er, hmm-hmm.

[55:48]

And are there particular, I don’t know, parts of scripture or visual images that came from these sermons that were particularly striking to you as a child? Were there things that people said at these meetings that you remember because they were striking to listen to as a child, or whether that means very wonderful, or very alarming, or very intricate or something? Were there parts of these services that really struck you as a child?

No, it’s a – I don’t remember too much about their content actually in a way. I can remember being some interesting, and some very dull, and some way off, but I can’t put things on those, any more detail on that. Hmm, as I got into my teams I began to
be interested in – I realised there were people who questioned some science on grounds of faith, and questioned the, you know, books like Genesis and the Bible. And that became something I became very interested in, and concerned about. And though my father and I did not agree in the end at all, well we disagreed rather severely on it, but the reality of that disagreement came out really a bit later on from my time at home. Though he was, er, he was not – he was interested in creation, he was interested in the science of creation actually, because he was – it was relevant to Genesis I, and he accepted the science of creation, and that we could find out from science how it was done. He had no problem about that in a way. But – and recognised that Genesis I was not a piece of straight literal history, and the days in Genesis I were not days of twenty-four hours, as people today – some people today would say. So he was quite relaxed about that sort of thing. But he was not relaxed about the theory of evolution. He’d been brought up as a young man to believe in evolution, and with a connection to philosophical ideas as well as to science, you know, evolution’s a great progress of [phone rings] [break in recording]. Well he had – my father was, you know, interested in the origin of the world, of course, and from his early connections with Methodism, and so on, but he picked up evolution as a – not just as a possible, as a possible scientific theory, but also as a philosophical idea. And, erm, now that we’re evolving to become better in other ways too than biological, so it wasn’t just biological evolution, it was a philosophical idea of the world getting better and this was evolution of a great – great overarching principle. Right. And, erm, with his … you know, with his, with the fact that he became a much more conservative Christian, and basically he would call a real Christian, he felt that was quite wrong. And that evolution was in no way a substitute for God. And because that’s the way it was often presented, he said he completely objected to the idea of biological evolution. Hmm, I didn’t know much biology, I never did biology at school, so it wasn’t anything that was a great worry to me when I was going through my school period. But it became – you know, I became aware that – of this problem with something that looked like a piece of science, and erm … I certainly I began to read things in that area, scientifically and theologically, and realised that this was a – a non-problem, as far as I was concerned. Obviously God was creator and that was what, er, what God did in making the whole thing. The whole of creation was there for us to discover, and the way he did it was for us to find out. Now in fact that turned out to be an evolutionary process of the kind that Darwin had described for instance,
then that was no great problem to me at all. And it wasn’t in any way contradicting what you find in Genesis because Genesis was not a story written in this sort of form, as it quite obvious even to a very cursory observation, because the sun itself didn’t appear until day four, although you had evening and morning on day one, and so it was more poetry than it was science. So I’ve never had a problem with saying that the Bible account is a wonderful account of creation, it’s a marvellous piece of poetry that’s telling us that God created all those things. And – but it doesn’t give us a timetable of a detailed – detail of the scientific processes that went into it. My father could never accept that. And I remember – remember going to see him actually when he was – when he only had a day to live actually, it was the day before he died when he said, ‘You know John, there are things – some things which we’ve never agreed on,’ [laughs], and it worried him. So I said I was very aware of that but what was important was not the things we disagreed on, but the things we agreed on, there are lots of things which we did agree on, from the Christian faith point of view. And those are very much more important than any of the things – any things we disagreed on. But it worried him to his dying day that I was a rebel on that particular issue, and other issues of a similar kind.

[1:03:09]

*Could you now give me any memories that you have of your first school, which you said was the – predominantly the girls’ school, but do you have any memories of teachers or teaching there?*

Not a lot, no. I don’t have a lot of memories of that really. I can hardly remember any of the teachers actually, as I try to recall it now. No. I don’t think that’s a very easy one [laughs]. I mean, I think I learned, you know, properly there, and …

*Then if we move then to secondary school, we’re beginning to think of you in terms of this interview as being an older child, and I wonder whether as an older child you had any perception of your parents’ political engagement? I think I’ve got a sense, quite a good sense, of their religious commitments, and so on, but what about their political leanings, life, commitments and so on.*
We never talked much about politics at home, I was not very aware of politics. The
difference between different parties was not of any great importance to me, or to them
I guess. But of course at that time it was very dominated by the war. Hmm, and I can
remember – I can remember my mother weeping when Paris fell, she heard it on the
news. I can remember the German bombers coming over on their way to Liverpool.
And, erm, you would hear them come overhead, then go across North Wales until
they could see the lights of Dublin, they would then turn around, and come back along
the North Wales coast until they got to Liverpool. And you could hear the drone as
they went over, and the drone as they came back twenty minutes later, or something
of that order. And this had happened during the night, of course, and I can remember
now hearing this and being very – finding it … not interesting, but very worrying of
course. It was not – because as we looked out on a clear night, across the – to the
eastern sky, Liverpool was only, what, twenty miles away as the crow flies from
where we lived, across the Dee Estuary, and then the Mersey. And there was a –
during these periods when the Germans were bombing Liverpool, there was a red
glow in the eastern sky, very pronounced red glow of Liverpool burning. And that –
well, I found very interesting, you know, as a observer of the nature of those things,
but also very worrying of course, what on earth was going to happen to us all, when
the Germans came and took over, whatever they did. My father was – he was too old
to go in the army, he was actually in the First World War, he served for six months at
the end of the First World War, going back to his history, in the army just for 1918.
He never went – he was considered not healthy enough to go to the front for some
reason, I don’t know quite why it was, to go to France, so he didn’t go to France. But
as a result of that, of course, being in the army at that time, when he came out of the
army he was able to go to university, free, to do a degree. So he went to Manchester
University as a history degree, which is how of course he became a teacher, and at the
end of that period when he got his degree, he – of course there were lots of people
applying for jobs, and he applied for 144 separate schools [laughs] until he got the
post in Rhyl. And he stayed there for the rest of his life. Going back to the Second
World War, he was in the Auxiliary Fire Service, and had to go on exercises to play
his part in the – for the war effort, which he was perfectly happy to do. And, erm …
what more do I remember about him? He never wore uniform in doing that – doing
that sort of thing, but he had his equipment of course as a fireman. It was – there was
never any real damage in Rhyl, there were two bombs that fell in the area, stray
bombs. One which dropped in the back garden of somebody’s home, almost in the town, and we all went to look at it [laughs]. There was another one that dropped in a village which was some five miles behind Rhyl, just quite near Dyserth actually, and again we all went and had a look at it you see.

*What do you remember of what you saw on one of those visits?*

Well, just a big hole in the ground, big crater. Both of them had big crater, sizeable craters.

*Both had detonated then?*

Uh?

*Both bombs had actually …*

Oh, both bombs were actually blown, yes, that’s right. And the house was – the house in whose garden it fell was only a small garden, the house was quite badly damaged, but it was still standing. The one in the countryside was just in a – in a wood I think, the one that – so there was nothing very noticeable about that. I remember going to see it. I must have cycled there I suppose, you know, that was the sort of – an outing to go and have a look at the crater [laughs]. And then other things about the war, there was a school in Liverpool which was – which was evacuated to the Rhyl area and used the same premises as the grammar school. How long that happened for, I’m not quite sure, but they – I can remember we had to try and share the building, so they would, er … yes, they I think worked on the holidays, and they also worked during the weekends, and the rest of the week was disrupted by when we could go and they went. I don’t have any real recollection of how that happened. But it was the way in which the school was used as two schools actually, for some period. I don’t think it was very long while that happened. I mean the other big impact on a family was that there were some army camps around Rhyl, quite big army camps, which had been there quite a long time, so we had a lot of soldiers training in the area. Some of these soldiers would come to our Sunday meetings, so the Brethren meetings, and they would automatically get invited to lunch at our home, if they cared to do so. So we
had soldiers of different kinds visiting, coming to our home for Sundays. And my mother was – you know, my parents were wanting to help these people, take them away out of their barracks for the day, and just let them come to a home. So they did. And they were fed on pilchard sandwiches [laughs], bread and scrape as we used to call it, because we had no spare butter of course, or anything like that. They had to put bread – bread in the early days was not rationed, later on bread was rationed, yes. So – and so my mother, anyway, did what she could to give them bits of food and so on.

[End of Track 1]
We'd got – you were talking about –

During the war, weren’t we?

Yes, the Second World War, and I was wondering what your parents were saying about the war while it was going on, to you, or to each other.

Yes, and they were obviously very concerned about the war. Hmm, and about the politics of the war, I don’t remember really – my father was a historian of course, so he knew about wars and things. They were very, obviously, worried about the possibility of Hitler invading the country. But … getting on with their jobs, that’s, you know, as they could, getting on with helping the soldiers in the area actually, which they felt concerned about, or anything they could do for the war effort, they… [interruption by third party]

And did the fact that the war was on feed into the meetings at all on Sunday?

I don’t really … I don’t remember any great connection, I was not making any great connection I don’t think, except we were praying for, you know, praying for victory and praying for peace. I mean that was the obvious thing to do [laughs]. I remember they were – they saw Dunkirk of course as a tremendous answer to prayer, which it was. I mean people prayed about Dunkirk and Dunkirk, you know, was a great – the weather was good, and all sorts of things went right about getting people off. And people thought, well, that was God helping this country. So that was a perfectly sensible connection to make.

At this age, and we’ve got sort of to secondary school age, would you have believed that, would you at this time have believed that that the weather being good in Dunkirk was prayer?

Yes, I believe that, I believe that. Yes. And I would still believe that actually, I think, if I … you know, that God is a God is a hands on God, he’s not a hands off God, and
so God does work in the world through creation and so on. The nature of God’s activity and how he does it is rather more complicated and perhaps talk about that later on if you like. I’ve no great answers to all of it, but I will accept – accept now as then that – that people prayed about this, about Dunkirk, and God answered those prayers through natural means. I’m not suggesting there was anything unusual – anything, if we really could have looked at all the weather situation, in all the, you know, in the greatest of detail we would not have found anything contrary to the – what we understand about the workings of nature. But that’s – we can talk about that later on if you like. I would not have tried to address the – what that really means in terms of – in terms of causality, and so on, with that stage in my life.

[03:24]

And were you at this time contributing to the meetings yourself as an older child in terms of readings, and bits of scripture, and interpretations, and that sort of thing?

I was not contributing to interpretations in any way, I might have been asked to read, you know, passages which others would have chosen. So, no, I was not contributing as a – as a contributor.

And apart from the attendance of Sunday meetings, how else was the faith of the family expressed at other times? Were there times in the day when you prayed?

Yes.

Or did things as a family concerned with faith?

Yes, we had family prayers every day, in the evenings. Sometime in the evening we would have, erm – I think earlier when I was younger – younger, we used to sing a hymn and we used to – and the Bible was read. Or we’d read round actually, you know, verse a piece round the family, or any visitors would join in, whoever they were, and my father would pray. Hmm, later on the hymn got left out because it was not exactly very harmonious always. I think it was my older brother possibly who
said he didn’t think it was [laughs] – didn’t think we were up to it, so we stopped singing hymns.

[05:05]

You mentioned that there was a certain strictness at home earlier, and I wondered whether you could say more about your parents’ rules and expectations concerning the conduct of you and your brother.

Yes. Well we were expected to obviously be obedient children and so on, and we weren’t always, and there were normal situations with children who want to do their own thing. And, erm, so my father was a very … you know, he believed very definitely about things, he also believed he always right, a slight overstatement, but he was essentially always right. So if you disagreed with him, then he was right, and you were wrong, even if it was something that was a matter of fact in my line, and I had some battles of that kind. Hmm …

Can you think of one?

… Oh, I mean, I think there was one where there was a question of whether of I’d said thank you or not for something, and I said I had, and he said I hadn’t, so I said I had, and he said I hadn’t. So I was sent into my bedroom where I engaged myself in various ways for a long time, and I was not allowed – he said I couldn’t come out until I apologised for not having said thank you. And I said I couldn’t do that because I had said it. And, erm, my mother came in the end and somehow resolved it without my having to [laughs], so I remember that particular collision.

And not going to plays is one thing that you were not to do, were there other things that you, erm, weren’t allowed to do, becoming an older child, becoming what are called now teenagers, but weren’t then, that sort of age. Were there things that you shouldn’t do, or …?

I knew there were plays being put on at school by school, you know, we had nice [inaud] every year at school with things going on at school, and we could – we
weren’t pulled out of plays at school. We could watch plays at school, that was all right. But we were never taken out to a theatre or a cinema, or not allowed to go out to a – to a cinema.

_Were there other things that were specifically not allowed, leaving aside the seeing of plays or the seeing of films, were there other things?_

Oh, there was no alcohol in the – well, there was no drinking, you know, nothing – no alcohol in the home. We had some amusement when my grandfather came to live with us, and my grandmother was very ill, was really not well, she used to take whiskey. And, erm, my father didn’t like having whiskey bottle in the house, he was essentially tea-total. Well, he was completely tea-total, yes. And so he took the label off the front of this bottle and labelled it Granny’s Medicine, which amused us greatly [laughs], as you might imagine. There was also how you behaved on Sundays was – he was a very strict sabbatarian. My mother was less so, and er … so there were things we were not supposed to do on Sundays, and some – mostly on Sundays, on Sunday afternoon we’d often go walk, we’d go off walking actually in the country, that was approved of, that was all right, and we could have a walk and do things in the country on Sunday. And we did that with other people sometimes. We had some lovely countryside round us, so we would go in the country and enjoy that.

[09:27]

And I did a lot of cycling in the country too, I was always going cycling round. And I was given fair freedom to do that with – with other friends I had at school. Well one other friend in particular was the headmaster’s son, who didn’t go to the grammar school, he went to another school up the coast. And we often met up and doing things on Saturdays or whenever.

What other pastimes did you have at this older age, whether indoor or outdoor? Things done I suppose when not doing schoolwork or doing homework. _How did you entertain yourself?_
Well, as I say, a lot of what I was doing, I loved going around the countryside, and I knew every lane and every, you know, every part of the countryside around where we lived for some twenty miles I would think at least. Er, and I, you know, got interested in birds and things, and watched birds and other things in the countryside. Then later on in my school as I got – possibly even to sixth form, I’m trying to remember I’d be thirteen, fourteen, I got interested in classical music, had a friend at school who was a very good pianist, and, name of Alfred Schlesinger I seem to remember. I remember his name oddly, yes. And he – he introduced me to Beethoven, and other classical, and I just loved it, loved Beethoven. So I would, you know, listen to music and begin to collect records as far as I – to some degree. Much more when I left home of course. But my father was not interested in classical music [laughs], and thought it was a waste of time [laughs]. What else did I do? I collected stamps and things, I had a stamp collection, and I read of course.

[11:41]

More and more was reading things about science, you know, James Jeans sorts of books, remember Sir James Jeans who wrote popular science in those days, popular science.

Do you remember any of the titles, or any of the subject areas of those?

Well some of it was astronomy, I got interested in astronomy, reading about stars and the like. Interested in, you know – when I say quantum mechanics, it makes you sound too fancy, I was interested in physics, in how the world was made, and how it worked, and elementary books of that kind I remember reading. I’m trying to remember names now. But, you know, nature books and astronomy books, and how the universe operated books, I devoured, yes.

Where were you getting them from?

Well some from the school library, you see, my father ran the school library, so that was – the school library to some degree. And in fact that was basically my greatest source, he set up a big school library, a very good school library using some of his
own books at stages but of course other teachers and so put books in the library too, so it was a very good library.

*And this might be a question where I'm assuming too much detail, but among the James Jeans books of popular science, do you remember any particular images or ideas, or diagrams even, that were particularly – had an impact on you at that age, if you like, that were striking in that way?*

No, that’s a bit too particular I think for my memory to cope with. I mean, I can remember the general tone, stars and galaxies and pictures of these things, I can remember them in general terms. But I’ve no particular diagram that hit me in a big way, no. That I can remember, no, right.

[13:48]

*What do you remember of the teaching of science at secondary – at Rhyl Grammar School?*

It was very good. I had some excellent teachers, in particular physics teacher was a man called Cledwyn Williams who was an older man of course ‘cause he hadn’t gone to the war of course. And he – he really enthused me with science. And what do I – I mean the thing I remember most is when I got into sixth form and I just did maths and physics for Advanced – for Higher School Certificate it was in those days. And there was another boy called Ivor Jones who was also doing maths and physics only. And so happened that the year before was quite a big year in the sixth form, and the year after was quite a big year. So the teacher was concentrating on those years.

[End of Track 2]
So Ivor Jones and I were left very much to our own devices, with guidance from the teacher who … and we, erm …and the school had just had, in 1941, it had a new building put up, and a lot of science laboratories, new science laboratories. It had been quite an old building, and this new building went up, and we had a new science lab. So you had the old science lab with all the normal things, you know, in the – in the teaching room, but then behind the teaching room there was a little room which held all the bits of equipment and things. And, er, so we used to go and sit in that little room, the teacher allowed us to do that. And allowed us to play with the equipment as we liked, just do what we wanted. And much of our time was done in – we were both quite good at learning from books, rather than from teachers, and then we had some advanced textbooks with sixth form text, with lots of, you know, problems as set by Oxford and Cambridge, and entrance exams and things. So we just solidly went through these examples at the ends of the chapters, and played with the equipment, and enjoyed ourselves lots really [laughs]. Kind of – and then after school we went to see the teacher with all the problems we couldn’t solve, and he, poor man, couldn’t solve them – often couldn’t solve them either, so he had to give notice of his answers [laughs]. So it was a wonderful way of learning physics.

Could you describe one thing you did with the equipment, one set up, or experiment, or demonstration? [phone rings]

Now that I find difficult. I mean, people have asked me that sort of question before when I’ve mentioned this, say, ‘Tell me something you did.’ Because we did some things of course in class, there was a few things we did in class, but the – what sort of equipment? I mean, there was a sort of Fletcher’s Trolley there, I seem to remember playing with, which is an experiment, which is about Newton’s laws of motion. And I can vaguely remember playing with that. How you, you know, forces mass times acceleration, sort of stuff when you have, erm … you have a device that wobbles, so the thing goes along, it makes – it makes sine curves on a piece of paper to tell you how fast it’s going, and so on. So we were playing with things like that, there were things like springs, playing with springs I seem to remember, Hooke’s laws … we went through standard – some standard experiments. And I can’t remember all the
stuff, and there was, I suppose, a Wheatstone’s bridge, and we were looking at, you
know, playing with electrical things a bit. So we went through quite a lot of things.
But I can’t remember a lot of detail really. ‘Cause I’ve done things in later life which
have I think blotted out the memories of those things in those days. But it was a good
– you know, we really were, you know, felt very pleased we didn’t have to sit in all
these boring lessons.

And this was physics. Presumably at Rhyl Grammar School you encountered physics
for the first time, unless you’d read something about it outside. And in general terms,
can you say, hmm, how physics was presented, what it – what, as a child at that age,
physics seem to be about in the presentation of it through teaching at secondary
school?

Well how things worked, I mean we did – there was quite an emphasis on
experiments, or demonstrations from the teacher who were giving experiments, doing
your own thing.

[04:32]

Because one thing I do remember, which is of significance, I remember arriving early
for a class one day, I think this was before the sixth form actually. I found the teacher
with three test tubes, each of which contained a nail, which a week before he had put
into these test tubes, one full of water, one full of air, and the other with a mixture of
water and air. The object being to demonstrate that to rust the nail [laughs] you need
not only water – not only air, but you need water to get the chemistry going. And
there he was putting fresh nails [laughs] into the one with water in, and to one with air
in [laughs]. I said what on earth was he doing that for? [Laughs] He says, ‘You
wouldn’t believe me otherwise, would you?’ I think I was probably polite at the time,
that was a lesson to me about the integrity of science, and that when you were doing
experiments you were supposed to do them properly, and just record what you saw. I
didn’t take the teacher to task over it, I was too, you know, too shy, or too … but –
and that’s often stuck with me as an example of, you know, trying to get the answer
you think you should have rather than observing what there is there, and using that as
your information base. So that was, I think, a useful example. A useful experiment in my career, yes.

*Yes, he wanted to make it – to make something that was true seem clearer by …*

By fiddling the – by fiddling the data, that’s right, which is not unknown in science [laughs]. I might even have been guilty of it myself sometimes, but I try not to be. And what else? Anything else about that sort of teaching from him?

[07:00]

I obviously did chemistry of course at O level, I didn’t do chemistry in the sixth form. I can remember we had a stand-in chemistry teacher who came because the teacher was away, and he was a young man who was playing with phosphorous in front of us [laughs] on a desk, and managed to set fire to the bench, which we thought was quite fun [laughs].

*Any biology?*

No, I didn’t do any biology. I think for some reason there wasn’t, erm … I could only do – to do three sciences for O level – for school certificate, was not easy to arrange, and I was happy enough with my physics and chemistry. I wasn’t, for some reason, as interested in biology as a science although I was very interested in nature, observing nature was something that was important to me. But didn’t seem very mathematically based I suppose, and I was quite a good mathematician, so …

[08:11]

*Are you able to say what you think appealed to you then about maths and physics, over other subjects that were on offer at school?*

Well it was the way the world worked, I was just very interested in how the world worked, simple as that. It’s not a – and I found I could, you know, understand the concepts that were being put over, all made sense to me. And then there was
problems to be solved, and all these wonderful scholarship type examinations, questions, were, you know, really taxing the mind. And that was something I enjoyed very much.

*To what extent were there particular laws that were particularly interesting to you at the time?* Particular, I don't know, observations that had been made in physics that were being presented to you through teaching that within this interest of seeing how the world works seemed to you to be, I don’t know, particularly interesting or counter-intuitive, or …

Hmm-hmm. I don’t remember that sort of detail actually, for some reason, but I don’t. It’s been …

*Probably, as you say, because of subsequent degree and …*

Subsequent stuff.

*PhDs …*

It’s just got blotted out by subsequent stuff. ‘Cause I do remember the, you know, I remember it being a time I enjoyed very much, especially, you know, doing it myself, this learning process at my own pace, and in my own way. I had another chap, you know, chap who was very – you know, doing it at the same time. It would have been very difficult without him, I think possibly. I would have been lonely, wouldn’t I, I suppose, yes. But the two of us together, rub each other up very effectively. Hmm … but he died quite recently, I kept – well not completely in touch with him, but partially in touch with him over the years.

[10:17]

*Was this an all boys grammar school?*

How do you mean an old boy?
Sorry, all boys, was it single sex?

No, no. It was a – no, we had girls there too, yes. It was a mixed sex.

To what extent then was science mixed in composition? For instance, at A level, boys and girls taking maths and...

Mostly boys actually. Mostly boys doing physics. Some girls did do maths I think, but I don’t – can’t honestly remember any. I’m sure there were girls in the physics lot, but I don’t remember. There were a few girls at the mixed school, but I don’t remember any actually in the science lot I don’t think.

And what do you remember of the teaching of other subjects, geography, and English literature, and so on?

Well, here is commentary on your teachers of course. I remember … there was a geography teacher, sorry I’m blinking a bit but it is – no, it doesn’t worry me, if it doesn’t worry you.

No.

There was a – one of the geography teachers was one of these old style masters who didn’t know a lot, but he was quite a good teacher, but he also told you stories of how he won the war, or something, first World War, and he got [laughs] involved. He was a very extrovert chap, and I can remember him. But there was not much depth to his teaching. We had another geography teacher who was much better at geography than … but not as amusing as this old fellow. And we tended to get a bit tired of, actually, because he would just rather spend the time telling stories, rather than doing his teaching, he had a loud voice too, big command voice.

I did Latin, and the poor Latin, er … the Latin master was … was very good at the language and so on, but he didn’t – his teaching was disorganised. And going back to the O level, I can remember, erm, you know, doing O level Latin, or I say School Certificate Latin, and going to him two or three weeks before the exam. I said, ‘Look
here, you know, we haven’t done – all this Virgil stuff, we haven’t done at all.’ So he said, ‘Well’, he said I’ll… I said, ‘What sort of passages do you think are going to come out of that?’ So he said, ‘I’ll tell you.’ So he went to Virgil and he marked up, he said, ‘they have to be, you know, the passages you will get have to be sort of rounded and about this long.’ [laughs] So he went through and he chose about half a dozen pieces of Virgil and said he thought those might well come up. So I said, ‘Okay, I’ll go and learn the English translation.’ And I had – in those days I had a very good fast memory, didn’t last a long time, but I could remember things very well for a short time. So I learned his passages, or some of them, and out of the three that came in the paper, two of them were his passages. So hoping that I’d got the start and the finish correctly [laughs], I just wrote down the English, and got through that one, for instance. And that was – but he was not, erm … suppose he was quite interesting in his way, but he wasn’t a – he wasn’t an effective teacher. Who else was there? The maths teachers, yes, I had two good maths teachers who were good, very good. Got on with quite well. Hmm … I don’t think there’s anything else. And of course I was not in my father’s set for history, which is sensible of him to arrange it otherwise [laughs]. But again I was quite good, I had a very good short-term memory, I really could remember. And as for English literature, you know, I could recite about half of Macbeth for instance [laughs], which of course I quoted at length in the papers. I was just, you know – nothing else particularly stands out except that I obviously got on pretty well with all the subjects, except I couldn’t do art. I gave that up at an early stage, I can’t draw, still can’t draw. Hmm … subjects of that kind I couldn’t do, but I wasn’t as … and languages, I was not – again my knowledge of languages came through my – the only skill I had at languages came through my ability to remember, without becoming fluent. I didn’t become fluent in French or Latin, and I didn’t do either of them, the A levels. I’ve never been fluent in languages. I find it hard to tune in to the actual language, you know, to be able to speak it, tune in to what people are saying. I’ve always had that difficulty a bit I think. Hmm, although I could learn the grammar very easily, I couldn’t actually tune into the conversation. I got through my viva exams in French perfectly all right, but I got distinctions in all subjects except Latin and French. I did ordinary level, that level.
Did you …

But I mean in terms of – in terms of High School Certificate, which is just the maths and the physics, I ended up with the best High School Certificate in Wales, hmm, which opened the door to this scholarship at Jesus College Oxford, which was given to the best High School Certificate in Wales, called the Meyricke Scholarship. So when I was sixteen, when I did High School Certificate, I was two years ahead the whole time, which was I suppose from a maturing point of view, was not ideal but it – I coped with it I think pretty well really. And that of course was not known until, what, was September of the – after those examinations. I’d already got a place at Manchester University, which is where my dad went, you see, to do physics. But the college in Oxford called me up for interview early in October, and, you know, offered me this scholarship, but thought maybe I should wait a year before I came, you see. And I wasn’t at all keen on that. I said, ‘Well what’s the point of doing that because I’ve gone as far as the school can take me, and I’d just be marking time, I don’t want to do that, I want to get on with it. So I’ll go to Manchester, thank you very much.’ [Laughs] So they said, ‘Oh, well perhaps you can come up next week.’ So I did.

So you were – so you took the High School Certificate two years early.

Yes.

And got the highest mark in Wales for that year.

That’s right.

So you went up to university aged …?

That was across the board I think actually. It was the best examination, best paper I think that anybody had in Wales, any subject, sorry.

And so you went up to Oxford aged?
Sixteen. Well, sixteen and two thirds, yes, or three quarters, yes. Sixteen and three quarters.

*What – apart from suggesting that you delay …*

Yes.

*What did – what did the tutors at interview have to say about your age, you know, of coming to Oxford at sixteen?*

Well they didn’t seem particularly worried about that. They didn’t try hard to persuade me, I suspect I was not – I was fairly brisk with them, I don’t know. But I said, you know, that really wasn’t – I didn’t want to do that. And I knew very little about Oxford really, because I’d had no contact with Oxford or Cambridge University. It seemed to me they were just universities, I didn’t know they were anything special about them, except, you know, they were a peg up somehow. I didn’t know what that meant, and nor did my parents, ‘cause they had no real contact with a university of that kind or calibre, Oxford colleges. Hmm … oh, I can remember the interview now, I can remember, you know, they sort of – I can’t remember how. They were obviously having a bit of a huddle about it, well do we take this chap, or don’t we. But – at this stage, but they obviously didn’t want to lose me, so they were perfectly, you know, nice to me about it. And my father had gone with me actually to – he wasn’t in the interview, but he was, you know, just waiting in the college while I was interviewed. And they did ask, ask him in and say, ‘Did he mind me being thrown to the Oxford wolves, whatever it was, at this early age.’ And he was, ‘No, no, fine. Yes.’ So he was not trying to persuade them otherwise.

*How did your mother feel about you going up to Oxford at sixteen?*

Oh, she was very thrilled about it really. And, er, the Christian she was, she just committed it to God, that was it, that was – and he would look after me, and he did actually, yes.

[21:57]
How do you think that he looked after you? What made you say that he …

Well, erm … so I went home and I collected some stuff, and a few days later turned up in Oxford a bit late, actually, because I couldn’t get there on – for the first day when everybody else got there. So I was a bit late, and that was a big awkward. But, erm, there wasn’t a room for me in college, because they were all full, so I had to go out and live in some digs. But my father knew somebody in Oxford who put me up for a bit, a few weeks, till I found some other digs. And – so I had to make my own way into Oxford and into the college, and the tutors were very kind to me. And, er – but they’re not people of course – well there was one particular man who was the tutor for admissions actually, called John Griffiths, who became a friend right from the start, and he was a – he was the classics tutor, his father had been a physicist, and he had a tremendous interest in science. And was a lovely man, and a very friendly man, and so on. He helped me on various things, finding my feet, and er, the tutor – and it was decided that I should do maths for the first year and not physics, because they thought I would be wasting my time doing physics, I should learn some maths you see. So it was a good idea, so I did physics for my first year. The tutor called Edward Thompson was a brilliant mathematician, but tutorials with him were very silent. I would – I would go in and he would just lead me through the sort of stuff I should be doing very quickly, asked me, you know, what lectures I was going to, and the answer was not very many because I didn’t like lectures, I liked books [laughs], didn’t seem to worry him. And there I would take to him problems I couldn’t do you see. And he would make very short shrift of these in just – like this, without doing it, just telling me how to do it, and so on. So that in ten minutes or so out of the hour we’d be finished. He would then light his pipe, and puff away at it for five minutes before he said anything. Then he didn’t always say anything. So I said, ‘Well, if that’s all, Sir, perhaps I should go.’ ‘Yes, good idea, yes.’ [laughs] So we had very silent tutorials. But he was – he was very clever, and very – and I appreciated his skill, but he was not a man to cry on his shoulder or anything. But I didn’t need to do that. So tutorial wise I went to some lectures, and that sort of thing. What else did I do? I joined the Boat Club actually, as a – because I was very light, small and light, so I was a good cox they thought. So I coxed third eight in the first torpids. But I didn’t stick at it because it’s not exactly sport of a kind where you get any exercise.
And shouting your head off to men in a boat in the middle of winter on a damp river, really gave me – you know, I had terrible laryngitis, so I gave up on the boat side. But it was a way of getting to know some people in college. There was also a strong Christian Union in the college. Mostly older men, because a lot of the college was older men, who’d come in from the war. You know, I was a very strange person who didn’t yet have an adult ration book, I had, whatever it was,, blue ration book, ‘cause I was not eighteen. And it doesn’t matter, it was just one little thing that was interesting. I think there was one other person in the college that had a lesser ration book, still wartime things, and still all these – all these memories of war. And, erm, and quite a number of these chaps in the Christian Union were people who’d been in the war, older men. And I got to know most of them, because of my background as a sort of Christian. I was wondering what sort of Christian I was, you see, I was wondering whether, you know, in the great world outside, was I going to stay that way, or was it going to go – was I going to do anything else. Not that I knew I wanted to do anything else, but I was thinking, ‘Do I really believe it, you see. Am I really serious about it?’ But these chaps were very kind to me, helpful, and, er, not pressurising me in any way, just you know trying to help me on my way. And then of course there were meetings which were the flavour of which I was quite used to in a way from my home background. But most were open, you know, discussions were more open and the Bible was treated in a more thinking way, I suppose, than I’d been used of course in the old – in the Brethren Assembly in Rhyl. And I found that very interesting. Hmm, there was also a very strong branch of the Student Christian Movement in the college, which was the more liberal theological end of the Christian world, Christian student world, much more, you know, much looser in their theology, and their beliefs and so on. But nevertheless they were serious people, and I had some interesting meetings. I used to go to some of those too, you now, heard things of the kind I’d not heard before, you know, which my father would considered real heresy. 

Such as?

Such as what – well, the nature of the Bible, and how accurate it was, or – or even to the nature of Jesus of course, was he really God, or was he somebody else, something else, and was Paul right and this sort of thing, he was putting that forward. So there
was that sort of – discussions of those issues going on, and I was quite interested to – just sort of listen to some of these. I was not enamoured by those actually, because they seemed to me to be very woolly compared with the sort of much stronger material which I have at home, or which I got from the Christian Union, and people who really, you know, who really led Christian lives in the sense that trusted in God for their daily living, and they were devout. And I wasn’t a particularly pious person, but I was used of course to saying prayers and things. So, erm, I began to throw in my lot I suppose, I got used to these very nice chaps who were really – they were great fun, you know. They had … I remember two or three of them were very keen on reading *Winnie the Pooh*, they thought this was marvellous stuff, you see, we had these *Pooh* readings sometimes in the evening [laughs]. You know, just sitting round and enjoying it, or musical evenings, and so on. I mean, we’d listen to music or what have you, or, erm, partying. There was – they were not a drinking lot, but – which is a good thing really, ’cause there were some people in college who were drinking a lot, and I was put off then because – really put off then, because I thought well that’s not the sort of life I want, because they got drunk, and they’re not that pleasant when they’re drunk, so I didn’t like that. So I was not at all enamoured by joining the world in that way. But to enjoy, you know, fun with the groups, and doing fun things. Not necessarily religious things at all, was good, great, you know.

[30:53]

What else did I do? I took – I played some tennis and squash, learned to play squash, which I enjoyed playing. I enjoyed playing tennis too. I played some tennis at school actually back in Rhyl where again my father thought that was a waste of time, he thought, ‘You don’t want to play tennis, why do you want to play tennis?’ My mother was keen, ‘A lot of people play tennis.’ But Dad didn’t like it at all, he was not – he was not out for fun, enjoying yourself. But I had some good tennis partners when I was, you know, in the upper school in Rhyl, I used to go out and play tennis quite a bit.

*So just that you’ve mentioned that about your father, you also said that he thought Beethoven – that he thought Beethoven was a waste of time as well.*
Yes.

*What might he have recommended to you as sort of worthwhile things to do with your time, if you weren’t playing tennis, or you weren’t listening to Beethoven? What did he think were sort of …*

He was a great worker of course, you know, he was very – he sat at his desk, and he worked a lot of the time. You know, he liked – you know, he was a very conscientious teacher at school, and he had all various jobs at school, you know. He became deputy headmaster, and indeed when the headmaster died he became the acting headmaster for a bit. So a lot of his time was spent in study, and he believed that was, you know, the right thing to do. That’s what he enjoyed doing, and he enjoyed that for the rest of his life one way or another. I mean, he didn’t – he never gave up on his reading, and his work. And I understand that, ‘cause I like working too, you know. And so he thought I should be working hard, which I didn’t have to work too hard you see, and still get by, so do what I wanted to do, but, erm … and he also did things, he also kept the garden, well he got a bit fixed about the garden at one stage, trying to get the garden tidy. He was not interested in plants, he didn’t plant, it just had to be tidy. And he was miserable about it, I remember. He hated doing it, and thought we should be helping him when we weren’t. So I had two brothers, I had an older brother, three and a half years older, David, and I had a younger brother too who was eleven years younger, so that’s going back to my previous … so I spent quite a lot of time with Paul, my younger brother when I was still at school. And eventually in due course he came on walks and cycle rides and things with me, we spent a lot of time cycling around together when I was on holiday, vacation from university, we would go out together a lot actually. And I still see him quite a lot. He did physics eventually in Oxford, got a fourth class degree, which is pretty unusual [laughs], but it didn’t do him a lot of harm, he went on and did other things. Hmm-hmm.

[34:08]

*The – when you first talked about the Christian Union and first going up to Oxford –*

Yes.
You said it was some kind of doubt about the kind of, erm, Christian that you thought that you were. Was that a doubt about the kind of Christian you were, or about whether you were a Christian at all?

I don’t think I distinguished between those two positions, I don’t remember distinguishing between them. Hmm … I mean, I doubted – there was a sort of, of course, a bit of a hangover from the old strict Baptist days I suppose when, you know, you had to be sure you were a Christian. And was I sure I was a Christian? I wasn’t really sure at that time. But it didn’t – I don’t think emerged in my – the way I tossed ideas around with either … I thought being Christian was obviously probably a good thing to be, and most of what I saw around the college led me to the same conclusion. You know, these very kind ex-service chaps whom I enjoyed being with, and played games with and things, and er, I suppose to see to the more dissolute people at the other end of the spectrum possibly, which didn’t attract me at all. You know, I was a serious student of course, so I was … no, I don’t think that – but it did – it came to a head a while after I got there, because to join the Christian Union you had to state that you were a Christian, that you actually believed in God and you believed in Jesus as your saviour, your Lord and God I think was the words. And I had a think, and I had to sign a piece of paper which – asking for membership. And I kept that around I think for a few days before I put my name to it, because I decided there was really – I’d be stupid from my living point of view not to join in with this lot anyway, and I’m sure I felt deep down that it was actually the right thing to do, yes.

As you moved through the years at Oxford of your degree, where did you live, you said that you had some temporary digs, and then some – another set of digs.

Yes.

Where did you live throughout your time, in the same …
No, I mean I lived for about three weeks I think with this friend of my father’s, who was a minister of a church in Oxford. But then I think I was – I was playing chess one evening, they had a chess club in college, and I was playing chess with a chap who was looking for somebody to share his digs, to share the cost. And I – so I joined up with him actually, a bit further out in Oxford, but I didn’t want to carry on living where I was because it was a bit too – well it wasn’t – you know, it wasn’t meant for students, it was all right to begin with, but it wasn’t, I wasn’t going to carry on there, and no expectation I should. So then that was my first year stayed in those digs with this man called Peter Marshall, I can even remember his name. And then, er … and we shared a bedroom, and shared a sitting room actually, that was the arrangement in the place. We got our bed and breakfast sort of things, and then in my second year I was in college, both of my next years I was in college.

*And any other clubs and societies, for instance literary clubs, political clubs, and societies?*

No, I didn’t join a political club. I went to the union, you know, on the days, but I’ve never joined the union. I didn’t feel a very political animal. Hmm, I was interested in music, so I mean I was involved not as a player really, although I could play the piano a bit, I was not a very skilled player, but I enjoyed the musical events that were set on in college. The Boat Club I have mentioned, but I didn’t stay with that, and I played some squash and tennis, not to a very high standard, but I did I think play for the college once or twice in squash. And I think that was about it, I didn’t … other meetings I did turn up at of a general kind sometimes, I was not … and the Scientific Society I went to sometimes, yes. Yes, interested in some of the things they put on.

[39:11]

*So was it in your second year that you started to read physics?*

Um, hum. Second year I did physics.

*Who lectured on physics at that time, that you remember having?*
Hmm-hmm. Well … I’ll first tell you about my tutor who was in college, man called Claude Hurst, H-U-R-S-T. Who as I realised later was actually probably the best physics tutor in the university. He was not a great research person at all, he’d been teaching without doing any real research probably for ten years before I went – I got there. But he was a very – very good teacher, took great interest in his students, quiet man, very high standards. I remember going to him and he gave me an essay to write on some physical subject, in week one I think or two. Took the essay to him, you know, for him to read of course, the style. He looked at it, just commented very briefly, he said, ‘We’ll have you writing better essays than that in a couple of weeks.’ [Laughs] Which I remember. I thought it was quite good, I went to see – but the way he said it and the way he treated me, I mean, it was very – so he was a good tutor. In fact, later on, I went to help him as a tutor in the college, as a second physics tutor, 1960, and I did some homework on his – on the record of his students over the previous fourteen years, from 1948 to ‘62 I think. And the top first in physics in the university had come from Jesus College in seven of those fourteen years, which is a pretty good statement of his competence. He was a great – very good tutor. And he would tackle anything, you see, if you – his knowledge of physics was very wide, he was a good theoretician as well as – didn’t know about practical physics in the experimental sense. But he knew about all the ideas very well, and he was an able man. Lectures, I again didn’t go to so many lectures. I remember Charles Coulson, who was a professor of physics, chemistry and mathematics. He went through, he’d been – sometime in his life professor of physics, professor of chemistry, and professor of mathematics. I don’t know if his name means anything to you, but he was a very well known more theoretical chemist I suppose, which was his great strength. Nicholas Kurti, who was lecturing in low temperature physics, he was one of the low temperature people in Oxford who gave very good lectures. There was Lord Cherwell, of course, who was the professor of physics, who was – who spoke very quietly, and you could hardly tell what he was saying, mumbling away. I went to him just because he was Lord Cherwell I suppose, and not very comprehensible and his audience diminished to half a dozen very rapidly. So I remember him, yes. Who else do I remember? Then there was, because this is relevant to my later existence, a man called Gordon Dobson, who was the professor of meteorology, or meteorological physics I think it was called in those days. He was a personal professor, who’d – who’d done all the classic work on atmospheric ozone in the 1920s and ‘30s. He was
the person who knew about ozone and the atmosphere, absolutely brilliant instrument builder, and a brilliant experimentalist. His work was all done in his house at the top of Shotover Hill, he had a big lab at home. He didn’t come into the lab very often, but he came to give lectures, and I went to listen to his lectures because I was interested in my nature study side, you see. Was interesting to me, how the world worked in the physical sense. He was a physicist who was really learning about the natural world. It appealed to me. I also of course had a brother who was very keen on meteorology, which I’m sure rubbed off a bit. Then there was a man called Alan Brewer, who was working with Dobson on meteorological problems. I went to his lectures, because I found them stimulating. He was again a very great experimental man, building instruments to observe the atmosphere, to put on aircraft and things like that. And, er, so I went to his lectures which were I thought interesting. A bit off the normal beat of the physics syllabus, it didn’t really have much relevance to the physics syllabus, but nevertheless I remember going to his lectures. Who else was lecturing? There was Bleaney, who later became professor in the Clarendon, who, er, was a very good solid state physicist, and so on. Hmm … I can’t just recall any, again, particular lectures I went to. Oh, Sydney Chapman, yes, Sydney Chapman. Who was a geophysicist, you know, famous for the Chapman layer and again the high atmosphere, but he was a mathematician essentially. Hmm, if you didn’t understand mathematics, you couldn’t make much of his lectures. And again he wasn’t a very good lecturer. He was, you know, assuming you knew things that you didn’t know, and things like that. But there was a mixture of things there, people – well, people like Coulson because he was a very good lecturer, he lectured on straight forward physics, like physics of waves, physics of electricity, and so on, which he did, he was a very good lecturer, excellent lecturer. And there was Nicholas – people like Kurti who just talked about his experiments, and that was interesting because he was telling you about what he was doing. So those were the sort of opposite ends of the spectrum of the sort of physics teaching.

[46:22]

Within the – well, I’m going to ask you more about the kind of meteorological physics in a second, but within the sort of more traditional theoretical physics, were you
encountering here ideas, and images, and equations, that were – that were kind of new or striking in any way?

Well there was the whole quantum mechanics of course, which was a new sort of – sort of mathematics for me as well as physics. So I found that interesting, yes.

Could you describe what that involved, and your sort of own response to it? For – bearing in mind that people listening may not have encountered quantum mechanics before. So I wonder whether you could say what – what quantum mechanics as taught at Oxford –

In those days.

In the late ‘40s and ‘50s was, and then how you responded to it.

Wow. [Laughs]

Sorry about that.

That’s a challenging question to describe quantum mechanics simply because – because a lot of it’s very counter-intuitive, and you know, the principles of uncertainty, the fact that you cannot identify the position and the momentum of a particle both together. If you know one, you don’t know the other. Erm, the fact that particles look like waves, obey wave equations sometimes, but not always. Hmm … and of course in those days, also the structure of atoms which was, er, you know, looking like solar systems, as they did under the old Bohr theory. But then the Bohr theory was getting a bit out – a bit old hat by the time, well no, it wasn’t actually, that’s unfair. Niels Bohr was still going strong I think in the late ‘40s, and, erm … the Bohr atom, and then the idea of wave equations and so on. No, it was a fascinating new area to explore and to understand. Hmm …
Was there any relationship at this time between these kinds of things that you were encountering through physics, and your Christian faith? Any relationship at all really?

Well, apart from a very basic one that I believed that God is the creator, had made it all, and I was discovering all these things that he’d made, all that he’d put in place. And, erm, and it was very wonderful. And, erm, and that science was a voyage of discovery to the way the universe worked, and that it was God’s universe, then it was studying the works of God, and that’s something that stuck with me – stuck with me actually very strongly. I say very strongly, yes, pretty strongly, you know, from my late school days, right through my university time, and right up to the present day. I mean, I still think that the science I do is God’s science because it’s here. He’s the creator of it all. And I see no reason whatever intellectually to question that statement, in fact I would strongly disagree with any statement that says you’re cutting God out of it, because you’ve got some science to describe it by. Because the science is something you’ve discovered not invented, it’s not human invention, you’re discovering what’s there, so what’s there has come from somewhere. And one description of that somewhere is to say it’s God’s universe and God’s creation. And that’s I think a simple statement that I would – I would die for, you know. And so the modern stuff that suggests that science has got rid of it, is just seems to me, erm, not only quite wrong from any standpoint of a religious kind, but from any standpoint at all because, erm … philosophers would say it’s – they would say it’s a category error, you know. You’re talking about two things that don’t – you’re trying to attach to – you’re trying to devoid – avoid talking about God in any way, because you’ve got science. You can’t do that, because science as science has nothing to tell you about that. It doesn’t tell you where it came from, it can’t do, impossible. Hmm, right [laughs]. So I had no – never had any problem with that really. I mean, the science idea I just thought was remarkable stuff and very fascinating, very wonderful. Hmm, I kept on asking the question, I’m sure, as I always have done through my life, I suppose, how does God work in the world? God is a good God, and a God who makes things happen, where does evil come from, and all those things? So you have a lot of theological questions that are added to that when you begin to put a moral dimension to it, and so many of those questions, of course, still remain. But that’s another story, like with the basic science story, which is the more science I’ve known
at every stage, the more wonderful this has become. And the more amazing really the whole thing is to see this remarkable … there it is.

[52:28]

*Were any of the lecturers, or tutors, themselves presenting science as something, physics as something, that could reveal the way a God created the universe worked?*

Yes. I mean, a very abhorrent person in those days was Charles Coulson who was this brilliant – the best lecturer we had, and one of the best known, and the most distinguished scientists around in Oxford in those days. He was a very keen Christian, was President of the Methodist Conference, and who wrote some of the early books on science and belief actually, in the 1950s, which I found very helpful. It was rather new to find books on putting the two things together, Charles Coulson was one of the first person who did so, and he was a tremendously active man. Hmm, so I respected him a great deal, and found his books – you know, simple books, the sort of things I believed so strongly, which I thought was very helpful.

*Was that link that he was making apparent in his lectures, or just in his books?*

I don’t – I never heard him making that link in his lectures. His lectures were about, you know, maths, physics, chemistry, whatever they were, as you’d except them to be. He didn’t all of a sudden say, incidentally – I never heard him refer to any sort of Christian belief, or other religious point in those lectures. Nor would have I expected him to do that. When I started to lecture, I’ve never done that either in my standard lectures on these things.

*And were you able to talk to him about that as a student, with him as a lecturer, about his books, or about his …?*

I don’t think I ever talked to him as a student, I can’t remember doing so. I must have been later in life a bit, slightly a bit, but I didn’t know him very well.

[54:30]
Could you tell me more about Gordon Dobson’s lectures?

Yes.

I know a little about him in the sense that he designed the Dobson Spectrometer.

Yes, sure.

But could you describe, as far as you can remember, what he was saying, and showing, in lectures.

That’s a hard question, ‘cause of course I knew him any way later and what he’d done, so I can’t remember any – exactly what went into his lectures. I don’t remember his – I don’t remember his lectures as being particularly well put over, or crisp lectures. Hmm … I think, you know, his delivery was not, er, was not crisp in the way that Coulson’s would be, for instance, completely – not like him it all. But nevertheless he – and he would – but they were well prepared in their way. I can’t remember their content to any – as distinct from what I knew about him later. But, er, as he was telling us a story of ozone and how it was measured and so on, and of course he was a brilliant designer of instruments, and brilliant – you know, he built a double beam ultra-violet spectrometer, erm, the first of its kind ever, and using detectors, and using materials, and filters and all sorts of things, and ways of recording the data which were completely novel and just very – some of them very simple, in terms of their physical construction. He was a brilliant designer. In fact his instruments, as designed in the ‘20s, were still largely the same until the ‘70s or ‘80s actually, in terms of, you know, their basic layout and the materials and the things which were in it. Of course other things came along, and improved various parts of it, but you know, you recognise it as a Dobson instrument.

When did you come to know him later?

Well I joined actually, I joined his department as a research student, and I became Alan Brewer’s first research student when I got my degree. I was looking around at
what was going on in the research lines in Oxford, and … there was another area, incidentally, I did find interesting that was nuclear physics. Of course Denis Wilkinson was the Professor then in Oxford, and he was a good lecturer, and I enjoyed those lectures. But I also didn’t really want to go into that sort of field as a research field, it seemed to be full of great teams of people doing things [laughs]. Hmm … and where was it going anyway?

Yes, how did you feel about that question, about the use of …

Well, I was I suppose keen without being terribly well formulated to my mind, I wanted to do something which was useful, not only interesting but useful. And the natural world seemed to be a place where the things we needed to know for our existence as human beings on earth, and if I could advance knowledge in useful parts of that, that was a good thing to do. I don’t know that was the strongest driver, it’s hard to remember now, but it was certainly one of the drivers in choosing a research subject. Hmm, the – some of the other drivers, as well, I was – you know, to join a small team doing – I was quite keen to build things, I didn’t know a lot about construction, know advanced levels of construction of apparatus or anything, but I quite liked sort of designing things in my mind, building various things. The idea of actually making instruments quite appealed to me, or making measurements of a kind that hadn’t been made before. So I remember going to talk to Brewer and Dobson, and they said, you know – and they said, you know – Brewer had ideas about making measurements in the atmosphere, and I thought that sounded an interesting thing to do, and possibly making them off aircraft or for balloons or what have you, and that sounded interesting. Working in the field, back to my love of nature, sort of partnered with that in that sort of way. And anyway, such nice chaps, you know, very genuine, very – very keen on science, very sort of strong in their love of what they were doing. And, erm … so that appealed to me, and it was a good choice.

[1:00:02]

You know, I joined Alan Brewer as his first research student, so he gave me a lot of attention, and my knowledge of experimental techniques was, you know, construction techniques, was very elementary really. I’d never gone round – my knowledge of
workshop techniques, and how you made things, and how you put them together in electronics, and all these things, was not – not strong at all. But he had a great feel for – well, a great knowledge of experimental techniques, and also a great feel for the atmosphere and how it behaved, and how you might – what you might do in it, and so on. So I could describe, you know, the tasks he gave me, if that’s of interest to you.

Yes, let’s go – so this is now, this is now post –

If you’ve finished with the –

I may come back to these. But I think as we’ve naturally moved into this, this is your postgraduate?

This is my postgraduate work, yes. So I joined – I got the top first in physics in my year, so I had a choice in a way, I had no difficulty in persuading some people to take me on.

[1:01:10]

Did you have a view on the morality of the bomb, the use of science in order to produce the bomb?

Hmm … trying to remember when I really thought about it in those days. Hmm … I don’t – you know, there was a war on, and all sorts of bombs were being shot into the air, and all sorts of things of that kind were happening around the world. There were these enormous bombing raids where people were dying by the thousand, and, er, I don’t think it seemed to me – and I don’t think I knew much about the, you know, the atom bomb as a bomb. I mean, I knew a bit of – but the nuclear physics we knew then of course was not very much in the syllabus I don’t think, we weren’t talking about making bombs, I don’t think that was part of what we did as undergraduates in those days, that came later, a bit later anyway. Well I suppose the bomb had gone up, so it was known how it worked, yes, that’s right. No that’s not quite right. But I – didn’t bother me particularly insofar as it would help to win the war, and so, erm … and that was sufficient to me for some moral justification at that time. And it didn’t
seem to me out of scale for that purpose. And I would still feel that, I think. You know, given the decision to, what would you do about it now? A terrible decision to have to make, but not different in principle from decisions that Churchill and others were making almost every day about bombing cities in Europe and so on.

[1:03:05]

*Thank you. So you started I think your postgraduate work in 1951.*

*Correct.*

*And you’re working with Dobson and Brewer?*

Well, I was working with Brewer actually. Dobson – I was Brewer’s research student, Dobson was still working largely at home. So, erm, still by himself [laughs].

*Did you – did you at any stage visit Dobson’s laboratory at home?*

Yes, yes. I mean …

*Could you describe what you remember of Dobson’s laboratory at home to start with?*

Yes, I suppose so. I mean, later, later on I used to go and see him quite often. When I became Brewer’s successor as head of that department, and Dobson was still alive, I would go and see him every couple of weeks, every couple of weeks or so, just keeping him up to date with what was going on, and he was still working away well into his eighties. Hmm, so some of this comes from that really.

*Okay, that’s fine.*

He had – he had an observing – he had a lovely house on the top of Shotover Hill. A beautiful location, erm, quite a lot of land around it. He had a laboratory, brick built laboratory, almost on the top of the hill, well up the side of the hill, going towards the
top where he had a workshop, where he made things. You know, a good workshop, good mechanical workshop, and erm, and where he did his observations. He still made observations, was still making observations right until the end, and altering his instruments and finding – and keeping in touch with the whole ozone world. Hmm … I don’t know that I ever really spent any time when he was actually working in the lab, I suppose. You know, we’d sit with coffee in the lab [laughs], and talk about things. But he was still reading the literature, and still in – even right into his eighties, interested in what was going on, and what we were doing in the lab of course as well. I, er … I remember him once, him asking me, had some radioactive material at his home, in his lab, in a lead-lined cupboard, and he thought he shouldn’t be – he should get rid of some of this, and could I help him get rid of it. And I said I’d do what I could, so I got hold of people at Harwell actually, and gave a lot of it to them, but it was quite radioactive actually [laughs]. ‘Cause he’d been using, erm – what was he using it for? Hmm … oh, ionisation in cloud chambers at one stage I think, for instance. I’m trying to remember what he was doing with it. He had some other project which involved using radioactive elements, I – I can’t remember now. But that was a fairly powerful box of – box of tricks, you know, you’d keep a – well right away from it now. So I took it away from him and put it – got rid of it as fast as I could, yes.

*What else did he have in his lab, aside from this lead-lined cupboard?*

How do you mean, what else did he have?

*Well, I mean, many people will not even know what you might expect to find in a physicist’s lab, but – so even the very basic – the most basic objects, when you walked into his laboratory, what was – what would you see?*

Well, you’d see a bench with his – probably one of his own instruments on it, which he’d be working on, so he’d have, you know, your normal electrical type of – you know, electrical meters and things to measure anything electrical hanging around. You know, your Avometers as we used to call them, measuring energy, electrical current, or electrical continuity and all those things, you might need for electrical work. He would have screwdrivers and devices for taking things to bits. He would –
he would have, erm – whether it was in the same room or not, I can’t remember, but he would also have of course drills and – for drilling holes, and for making bits of metal, metalwork. Saws, and normal things for metalwork, of one kind or another. What else would he have? He was also of course interested in making ozones, so he would have had something – some chemical, some means of making ozone, this would involve flasks and tubes, and things you might find in a chemistry lab, and so on. Yes. Well just like any normal universal laboratory with all the bits and pieces laying around.

[1:08:41]

Why did he – why did he have this laboratory at home, rather than using the physics laboratory at Oxford, at the university?

Well, one, he was trying to make measurements in the atmosphere, and he wanted to get out of the Oxford smog, onto the top of the – the layer at the bottom of the atmosphere, which was a very good reason for trying to make measurement away from the lab. Secondly, I think he liked the independence of having it at home, he’d always had his lab at home, I think, I don’t think he’d ever really had a lab – work in the lab very much. Hmm, I mean, he came to Oxford, and Dobson’s history was he came – he worked at Farnborough, First – during the First World War, with Cherwell. Hmm, they were working on aeroplanes, and doing research on aircraft and how they – and how they flew and stalled and so on, why were they stalling, and how could you stop them, that sort of thing. And then he, hmm … and then Cherwell went to Oxford and Dobson joined him there, and his first work was to – was again Cherwell’s idea, that we could find out something about the very high atmosphere by looking at meteor trails, meteor trails and meteorites in the atmosphere, observing their brightness, and the height at which they were at. So getting the density up there, and the density gave you something about the temperature up there. And this was Dobson arranged for, you know, people to lie on their backs and look at the sky at night, look for meteor trails, then you had to plot out with the star – against the star background exactly where these meteor trails were. Hmm, then he did the geometry, worked out the height, and got their brightness, and he worked out the density levels of the order of fifty-six kilometres, discovered there was a warm low up there. In order to get the
density right, it had to be warm. How did it get warm? Hmm, perhaps ozone was the problem, because of these – whether Dobson or Lindemann had the idea of that I can’t remember, but one of them. So that’s how that happened. So Lindemann went to join – ah, Dobson went to join Lindemann in Oxford in about 1920, and he stayed there until he retired of course in 1962, which is when … anyway, when – no, sorry, 1958. He retired in ’58, when Dobson became the reader in meteorology, because Dobson’s proper job was just a readership, not a chair, he had a personal chair. Alan Brewer became the reader, and I became the lecturer [laughs]. That’s ’58. And then in ’62 Brewer left for Canada because he always wanted to go to Canada as a professor, and I took over as the reader, and was given a personal chair in 1976 I think. But that’s jumping ahead.

[1:12:23]

Thank you. So in 1951, what were you – what did you decide to make or do, or what were you tasked with making or doing for your postgraduate studies?

Would you like some more food?

Yes, please. [Break in audio] So if you could describe your – what you were asked to do, or decide to do, for your research student post with Alan Brewer?

Yes. Yes. Well [pause]. Well a bit more about Alan Brewer then. He had, erm, joined the Met Office in the early 1940s, and had been given the job at Farnborough, as you know, of trying to investigate contrails as coming from – coming behind aircraft flying in the sky, which were a great nuisance of course to the military because it showed exactly where the aircraft was. On days when you saw lots of contrails, then the aircraft was very vulnerable. And so what made these things, and could you get rid of them? So Alan Brewer began to make measurements on aircraft with the, er, such that were available at that time, military aircraft, of temperature of course. But he needed to make measurements of humidity with accuracy, in order to sort out the data and wonder why these contrails were formed. So he and Dobson, Dobson was also working – interested in problems that were of the military kind, he was on committees that, you know, were looking at these things, built a Frost-Point
Hygrometer. Because the air is very dry, some levels in the atmosphere, which consists of a thimble which would cool by putting liquid – solid carbon dioxide at the bottom, cooling this thimble down, polished top of the thimble, and then you have an optical system that sees where you get – when you get a frost on that thimble as you cool it down in the testing. Brilliant piece of design. And so they were able to measure humidities anywhere in the atmosphere with this device. It was eventually made automatic so you could – didn’t have to, you know, to pump the – were they using, I suppose they were using – or was it using liquid nitrogen to cool it, that was perhaps a later version. But anyway, they were cooling it with some either solid CO2 or else liquid nitrogen, or liquid oxygen. And they measured – they got into the stratosphere eventually, which is above, you know, the region where the temperature stops going down, with height and goes up, because of the ozone layer higher up, and discovered if you got through the tropopause part of the atmosphere between, the air became extremely dry, and, erm … with a, you know, extremely low humidity. And that was very interesting, because you were wondering how the atmosphere was circulating and working. And Dobson – Brewer did his work on the contrails and discovered – discovered the conditions under which they would appear, and enough about the structure of the atmosphere so the military people could guess the cont – the conditions under which contrails would form, so that part of the work was in a sense done. But then why was the – why was the air so dry at those levels? Brewer – Dobson for his part, had been measuring ozone of course and discovered that although ozone is created in the atmosphere by the action of ultra-violet light on oxygen spitting off and – oxygen atom, and which join with a – an oxygen molecule. And so you’d expect to find most ozone over the equator, where you’ve got a lot of sunshine. Dobson over the ‘30s had been making measurements all over the world of total ozone of the atmosphere with his spectrometer on the ground, and discovered that in fact the maximum – there was a lot more ozone over the poles, especially over the winter pole, than there was over the equator. So – so Dobson and Brewer got, er – let me get the detail exactly right. So they wrote, this was all written up in a paper by Dobson, with Brewer, the late – the late ‘40s. Dobson gave the Royal Society a Bakerian lecture putting these things down. And, erm, and then in 1949 Alan Brewer wrote a paper on the – why the stratosphere was so dry, and suggesting it was because of an overturning circulation, you probably know all this anyway, do you know all this?
No.

I see, the air goes up over the equator because the rising air, the warm surface, gets beyond the tropopause into the stratosphere and then it goes pole wards, in both hemispheres, and sinks over the poles. This was a very big overturning circulation of the whole atmosphere taking place, which was determining the structure of the atmosphere above the tropopause in the stratosphere. And, erm, and was taking the ozone from the equator regions and putting it in the polar regions, ‘cause ozone is also destroyed by sunlight, so you’ve got to get it out of the sunlight to make more of it, so you’re getting more of it over the poles. And also because the temperature was so low at that part of the atmosphere, because of this rising air, the air was dried to become extremely dry, to the temperature of tropical tropopause, which is a lot lower than the temperature of the mid-latitude tropopause, the air then went pole wards. It’s very dry air, which has been dried over the – over the tropical stratosphere. A very simple idea in a way, because Brewer had asked the question where could this dry air come from? It’s got to come from somewhere, where the temperature is equal to the frost-point we’re measuring in the – when we measure the humidity. Otherwise there’s no other way of drying it, so that was basically [inaud].

[1:20:50]

So when Brewer and I were talking about what we could do as a project, Brewer wanted to get more of a handle on this situation, and, erm, so this air is now going pole wards where it will all come down, some of it comes down over the polar regions, some of it comes down in the temperate regions too, so it’s just going up and down. Part of it coming down at these latitudes or not. Anyway it is sinking, then sinking air warms up. So he argued that there should be – if you measure the radiation exchange in the atmosphere, the air is warming up the air, has to lose that heat, and it’ll lose it by cooling, by radiation, it has no other ways of doing it, no clouds up there. So if we could possibly measure the upward and downward radiated fluxes in the infrared at those levels in the atmosphere, you could measure the speed of rate of descent, because there has to be an energy balance. That was his idea, why didn’t I have a go at that? [Laughs] Making radiometers that would measure infrared
radiation up and down from an aircraft and at those levels, and could we measure it accurately enough, with sufficient accuracy to do it? So that’s what I – so could I construct radiometers that could do this, which were … and it was his simple – his idea that the simplest radiometer you could think of making would be to be a black surface isolated from all other heat sources or sinks, put that out in the atmosphere, and measure its temperature then you would measure the amount of radiation coming up or down. ‘Cause that – the surface has to be in equilibrium with the radiation string.

*Could you – I don’t quite understand, so you’ve got a black surface insulated from other …?*

Completely black surface, and you can imagine in a vacuum with an entirely bright surface below it, there is no energy exchange with the bottom of it. But then open completely to the atmosphere above, except you’ve got to put a perfectly transparent window in front of it to keep the vacuum in, otherwise you lose it fall through the air, you measure the temperature of that surface, and that will give you the, erm … the amount of radiation that’s coming down. I mean, just as you are, you know, you may look at the surface of the moon, measure the amount of radiation that comes from the surface, and that tells you which temperature. Or by biometer, if you measure – just look at the radiation coming out of a furnace, tells you how warm and hot it is, and the amount of energy you make. So – but of course we’re now dealing with temperature levels which are minus eighty, or whatever it is, thereabouts, so you haven’t got a lot of energy to get through. And you also want the whole infrared insofar as you can get it. So I went away and tried to think about how I could make a surface and measure its temperature and so on. Which had to have a small capacity, and so on, so I – I knew – got to mount it in a way that it’s isolated from its surroundings, as far as you possibly can. So that’s what I tried to do. And then you have one looking up, you have one looking down, and you – you have to keep a perfect vacuum, which we did by having just connecting them, you know – surroundings to – into a glass surround, which had a bulb which contains charcoal and liquid nitrogen, and that mops up all the air very effectively, gets rid of all the – anything that might leak. It has to be a high vacuum, because if you’re going to lose all the heat conduction, and there are window materials that are transparent through much of the infrared, but not all. So
you have to make allowance for the radiation going through the windows in the parts of the infrared to which was – which was opaque, and so on. So that’s what I had to make. I spent three years doing that, and Alan Brewer helped me with, you know, all sorts of physical ways of building things, or making things, making bits of objects and things. Hmm, so I learned a great deal about experimental, how to set up a radiometer, that kind …

[1:26:25]

Where did you build this over three years? I mean, where precisely …

Well, this was in the Clarendon Laboratory in Oxford, in the Department of Deteorology it was then called, and there were four or five of us in two little rooms. Alan Brewer was there, I was there, man called Roy Kay, who was doing work on ozone with Dobson, and of course Stanley Mossop, who was doing – who was also one of Dobson’s students, he was doing work, technically anyway, although Alan Brewer gave him most of the help. He was making measurements on the freezing of water, and how – and the purity of water, and how cold it would – how cold – how cold it had to be before it really froze, cooling it down and seeing what – so that you would get super cooled water, as you do in the atmosphere. And what the impact of certain – all the nuclei you’re getting in all sorts of sources in the atmosphere help water to freeze, and what impact does that have on cloud physics. So that was a marvellous piece of work that Stanley Mossop from South Africa was doing, and Roy Kay was there. And a man called Henry Palmer, who had been working on some cloud physics. But he was – who had a bad accident on a motorbike, he had only just come back into the lab after spending three or four years from starting his doctorate. And, er, that was the few of us who were there in the lab, doing quite different things. But having a good time together actually, got on very well.

And …

We all helped each other with whatever we could, and the – and of course we had to go to Farnborough to the – mount this on a Mosquito aircraft, which was – this was called the Meteorological Research Flight, which – which had a Mosquito attached to
it. I don’t know if you remember the Mosquito aircraft, which is a little two propeller, double propeller, fighter-bomber made of wood, plywood. The whole body was plywood. And you could screw things to it [laughs].

I remember going down to Farnborough with Alan Brewer taking the first version of my thing, and we had some holes we had to fit in, holes in the aircraft, but it didn’t fit of course because we were given the wrong information. So I can remember now Alan Brewer sitting astride this thing with a brace and bit [laughs], drilling holes into this aircraft. You couldn’t conceivable behave in that way now, visiting scientists going to a place like that, behaving that way, but it was great fun. And, er, so I flew with the thing, in the aircraft, we had – not every time, because I wasn’t allowed to fly above – to fly very high, because you have to be – go through – pass the chamber tests and so on, I didn’t get through those. So there were people there at Farnborough in the met research flight who flew the highest levels for me. And … so it was very interesting and great fun, and, er …

When would you have attached the first version to the Mosquito do you think? In – you started in ‘51, finished on this research project in ‘54 I think.

‘54, yes, I finished ‘54.

When do you think the first version was ready for installation on the …

On the aircraft? Oh, eighteen months probably I would think, I would guess.

And where on the plane was it attached?

Oh, outside to the fuselage. There was a tube behind the – it had a cockpit right at the front, which held two people, pilot and a observer, and a little seat made with bungee rubber for me [laughs], or whoever was operating this equipment with straps of course to tie yourself in. So the cockpit was about this high, sitting round you, Perspex, so you could really see the world in a marvellous way, it was terrific. And the propeller was just buzzing round here [laughs]. Hmm.
And at this stage, with this sort of mark one version, what did the instrument itself look like?

Well I can find you a picture of it I suppose. Would you like a picture of it?

Yes, please. Yes.

Well I have to find it, but –

Well just a description of it from memory, if you like. I’m not really sure what I’m imagining, what –

What did it look like? Well the top would be a disc with the window, the window was about – it’s a red looking thing, because it absorbed in the red. Hmm, but the infrared was made of thallium bromide, I think it was a mixture of, erm … and it was about that diameter I suppose [demonstrates], and the window was on top, and then underneath you had – you had a half-hemisphere roughly, which was gilded on the inside, so that it was completely reflecting. Hmm, and that was – and that was in – surrounded by glass, a glass thing which had a flange on it, which of course had to be tied to the window, which way – you had an o-ring rubber, rubber o ring, erm, which would keep the vacuum in. And – and the little black surface had a very fine wire, platinum in it, so it was platinum resistance thermometer. And then it had to be attached to the side with three, again, very thin wires of nichrome I think, because it had to be very low carbon activity. And, erm, but sitting within this space, but surrounded by the gilded hemisphere, with the window in front. And then there was a tube down – down here which went into – which had a bulb of charcoal at the bottom, and went into a dual vessel where you put liquid nitrogen in it. The vacuum, and then you had some wires coming out which of course went to a, what was essentially, a Wheatstone bridge, but it was a fancy – very fancy one. Then there were a box of electronics, as they were in those days [laughs], very elementary electronics, which would actually measure the resistance of that platinum, therefore for its temperature. That’s what it looked like. And there was another one that looked the other way.

And so not –
Sitting on an aircraft.

*And so not very large, yet – the object that you are holding in order to demonstrate the size of it is only about ten centimetres across perhaps?*

Less than that probably, it was only about three inches across I would think at the top, two inches perhaps.

*Hmm. So one looking up, so therefore I assume on the top of the plane?*

That’s right. And one on the bottom.

*Right. And what was …*

Open to the atmosphere. I mean open to the, you know, view.

*And what was it necessary to do as the scientist on board while – during flight if you like?*

Well you were actually had a – we had a bridge actually, Wheatstone bridge, with a balancing resistance, and you’d measure the resistance to moving this, hmm … as I remember it’s a disc – I mean a disc over like a – it wasn’t a long wire, it was a round wire, so you had a disc which was making contact with this wire, and balancing the again standard resistors. Hmm –

*Were you …*

And then measuring with, hmm – I don’t know what it was now, I’ve forgotten all the detail, see [laughs]. Anyway, that was the, er …

*Were you writing something down, while you were – while you were there, in the plane, was it necessary to record something?*
Hmm … I mean, when I left Oxford I went to Farnborough to build a spectrometer to put on a camera, and we had much more elaborate equipment then. It was automatically recorded. I’m trying to remember what we did on the – I guess we were writing it down. I think we were writing it down in different levels, yes. Recording it by hand, yes.

And …

And the end result of it, of course, we got these measurements which were lots of measurements. I remember on the July 20th and 21st of 1951, that was – my time was running out [laughs]. But we had two very good – we needed clear nights, you see, because could bugger it all up. We wanted something which was very four clear days, hmm, clear nights actually, we’d do a lot of it at night, because we didn’t want the sun to muck it up. And, erm, got two nights in a row where we got a very good set of measurements, both nights, then I went off home to my home and I sat solidly for a summer writing the thesis. The end result was – I mean, we – we got some perfectly good measurements, but the accuracy of those measurements in absolute terms was not adequate to determine the rate of movement of the air through the change in radiation. You could not – largely because of the variation of the atmosphere itself. You know, the atmosphere is not that uniform, so we were trying to measure over a little bit of atmosphere somewhere, and how do you infer what is really happening over a much larger area? And that just was not possible to do. Anyway, I learned a great deal about how to build instruments, and I learned how to use data, and, er, something that Dobson did was actually during that, which was interesting. He came and looked at it one day, I remember in the lab, asked me all about it, what was going on, and how I was making the corrections for all the things you have to correct for, you know, little bits of leakage round the wires, and radiation from the window, and so on, the fact the – the hemisphere wasn’t perfectly reflecting, and you had some, you know, correct for a lot of things. And I had, of course later looked at black bodies in the lab at different temperatures to calibrate it, but nevertheless you still had to make corrections then to show. And I was trying to explain all this to Dobson, and he said, ‘Ah, you know what you should do, you really want to test what you’re doing, you build two of them as different as you possibly can, and all the things for which you have to make corrections, so make two instruments with – with corrections which
are very different to each other, as far as you can make them – make them that way, put them side by side, and see if you get the same answer.’ A brilliant suggestion actually, to really give you confidence that you’ve got the thing – because the accuracy was what it was all about. If I couldn’t make it accurately, I was not doing the job at all. As it happened, I didn’t do the job at all, because it wasn’t – the atmosphere was not uniform enough to really give us answers that meant anything very much in terms of the Brewer theory. But in terms of my measurement accuracy of the thing I was building, I had to be absolutely sure what it was, so that’s what he told me to do, suggested I did that, I thought, good idea. So I did that precisely. I got the same answer from the two different – different radiometers. But, erm, but it was – you know, there’s your seasoned experimenter, who’s looking for real answers, and checking everything that you could conceivable think of checking. And all of that of course was tremendous training for me as I later went on to build things for spacecraft, and trying to make very accurate measurements for spacecraft. And really learned to – to query everything in a way, and then try and find ways of checking absolutely everything you were doing to get the best answers in the end. So that I, you know, I consider that as a significant part of my training, just as finding my school master putting clean nails in, [laughs] much earlier on was part of my training.

[1:39:58]

**What was the role of technicians in building – laboratory technicians in building?**

Yes, we had a lab technician who helped me with building various parts of it. Of course, the glasswork was done by the glass blowers in the Clarendon Laboratory. And, erm … and then there was a technician who was – who made various things, yes. But a lot of it I had built myself. I mean, Brewer – Alan Brewer built his own stuff. Hmm, I had to learn to build everything, you know, you didn’t go off and buy things, you built them. So I learned a great deal about experimental techniques. I don’t think I was a particularly – you know, I wasn’t a brilliant mechanic, or doing my metalwork and all those things, I did it adequately, not – not brilliantly, but I was adequate just for the purpose. But I really learned all about how to build instruments. And it was great fun [laughs].
So that was mark one, the one that you took on the first flight, how many marks of this instrument did you make before the end of this postgraduate research? How many versions of this instrument?

Well I think – I mean we had to do an awful lot before we got on the aircraft, you couldn’t put it on the aircraft until you had something that you believed in. So I made various device – various ways of making this thing, and measuring the – resist, measuring the temperature of course. That was all done in the lab. We didn’t go to the aircraft until we really had the – essentially the final instrument.

I see.

Hmm …

[1:41:49]

And so you wrote up this research, and what was the next – the next stage then in your career, what happened – what happened next?

Then, after I finished in Oxford, I went to – I went to Farnborough. I was still – still liable for National Service, so I had to go and work for a defence establishment, or I had to go in the army, or go in the forces. I thought well it’s a better idea to go to Farnborough, and work in a defence research establishment. And, er, I got a research fellowship at Farnborough because of a man called FE Jones who had been at the Royal Radar Establishment at Malvern, who’d gone to Farnborough as a deputy – deputy director, I think. And he – and he was an infrared man, doing infrared research. Of course infrared is a powerful military tool because you are looking for the heat – heat coming from whatever as a way of detecting all sorts of things. And of course you – if you’re going to detect things then you have to work at wavelengths where the atmosphere is transparent and not a lot was known, in a way, by what the transparency of the atmosphere was, because we didn’t know the spectrum of all these molecules and all that sort of thing. And FE Jones would talk to – he used to talk to Alan Brewer a bit, Alan Brewer was involved in various, you know, talking into other researchers elsewhere, especially the Met Office too. And, erm, and it was suggested
that, erm, I might like to go to Farnborough and build, you know, start measuring spectra to give a handle on the infrared, have a handle on the composition of the atmosphere, and on transparency in the infrared. And a group had been set up under a man called Trevor Moss, who had also come from Malvern, the radar research establishment, and, erm … he set up an infrared group there. And so I – off I went to Farnborough on this research fellowship, for three years I suppose it was. Anyway I had to stay there until my twenty-sixth birthday, whatever, otherwise I would have gone in the forces. Hmm, so I in fact stayed there until the end of 1958, that’s right. Five, six, seven, eight – yes, four years. I was four years at Farnborough I suppose.

*Where did you live at that time?*

Hmm?

*Where did you live at the time that you were working at Farnborough?*

Well I left Oxford and I went to Farnborough. I was at a Farnborough Outstation called Ambarrow Court, which was an old country house, in a lovely bit of National Trust property near Sandhurst. And I found some digs near there actually, which I lived – in which I lived all my time at Farnborough. It was a … oldish house, with a family who lived there, and I had a couple of rooms in that house, and that’s where I lived. Hmm … the – Ambarrow Court was – it was a nice place to work actually, small establishment. We had to go into, of course, the main part of Farnborough for all sorts of things, but we could get on in this lab in this place, and there were, what, half a dozen of us working there I suppose, in the – Trevor Moss’ group.

[1:45:52]

*And what did you – what did your work involve day to day, what were you doing?*

Well I was – the object was to make some accurate measurements of the spectrum of the sun, as observed from an aircraft flying at different levels, so that you would get the absorption spectrum, as measured right across the – as far as the infrared as we could go sensibly. So we – so I thought would build a, you know, the best
spectrometer I could think of [laughs]. And we had to of course home in on the sun, so we needed a sun finder, spectrometer, and detectors, and, erm, grating spectrometer was built. Process facilities there were good, we had very good workshops to – to do all these things, people to help me build the detection equipment, and the electronics, people to help with putting things on the aircraft and building bits to – bits that were appropriate to that. It was a Canberra aircraft we used, which you would know about, because it’s almost a plane that’s still flying, Nimrods are advanced Canberras, jet aircraft, which would go of course, we wanted to go high into the stratosphere, and, erm, so I got on with that job.

[1:47:20]

There were other people in the group, which was – you know, a lively group of its kind. And there was one particular person there was very important in my life, later on, then – called Desmond Smith, who was an expert on – a semiconductor man, knew about interference filters for filtering out different wavelengths and the infrared. And he was on the same sort of jaunt as me, almost exactly my age, in fact he was eighty last week [laughs]. And, erm, we used to talk a lot about the atmosphere, and meteorology, ‘cause he was very interested in the atmosphere too actually in those days, lively man, so he was one of my great friends. I shared an office with a man called Evan de la Perelle I remember, who was working on some more classified information that was going on for making measurements of – of heat sources of one kind or another. Hmm … and there were others there too to do various things, in the infrared part of spectrum. So that was quite a sizeable task.

Yes, what did your – what did the spectrometer that you – firstly what was it called, I think I missed the name of the – the name that you gave the spectrometer that you designed...

Grating spectrometer, it was using a diffraction grating to separate out the wavelengths.

Grating?
Grating, yes. Diffraction grating is a – is a – is a surface that has a lot of lines drawn on it, which reflect – which cause interference if they reflect off the surface. So these are very fine lines drawn close to each other in a – making what was called a diffraction grating. And so the spectrum that comes off is like a prism, only does exactly the same sort of thing as a prism does, except it’s just interested in reflection, so it doesn’t absorb anything another way. No it’s, er – they’re still in use, the deflection gratings, yes [laughs].

And what did the instrument – you describe very well what the – the first instrument you designed and made looked like. What did this one look like as a – this grating spectrometer, what did the whole thing look like as an instrument, the thing that ended up being attached to the plane –

Well, it was a box [demonstrates].

You’re showing a box about a metre long and half a metre wide, is it?

Something like that, something like that, well maybe less than a metre long, it was two feet long I should think, by eighteen inches wide maybe, that sort of thing. When you – you had mirrors to reflect the – to focus the infrared light, erm, from a slit source. Radiation coming in through a slit. Imagine it’s in the optical part of the spectrum, you’re shining the light in, the light comes in anyway, because – well it comes in from the sun in this case. So had a slit taking the sunlight in, and, erm, spherical mirrors which focused onto the grating, taking the gratings, taking light off the grating, and then you’ve got a spectrum, just like a spectrum in the normal way, to the far end of the box. You have to – then you have detectors, which have to detect the radiation in the infrared. Hmm, I’m trying to remember the detectors we used in that instance, now. I’d have to look up what we actually did. Whether they were semiconductor detectors, or heat detectors, I can’t honestly remember now [laughs]. ‘Cause I’ve built other instruments for spacecraft, I don’t remember. And – and then they sat behind the cockpit, it had to have of course a clear view to the sun, we didn’t want any windows in the way, you know, because of – because of absorptions so we had – but we couldn’t fly it with a gaping hole, it had to have a mesh, rough mesh over the surface to keep off anything that might hit it, or something. Hmm, and, hmm
… and then after a couple of years we started to fly it, and got a lot of spectra one way or another, right across infrared which, and published an Atlas of this spectra. Then I tried to interpret some of it in terms of composition, ‘cause we were getting – I’ll find you that Atlas if you like tomorrow.

*Okay, thanks.*

I’ll show you what it was, yes.

*And so finding the infrared spectra at different levels in the atmosphere.*

That’s right.

*How was it possible to interpret the composition of the atmosphere…*

Well you looked at the spectrum from this level, and the spectrum from this level, and the difference told you how much was in between it.

*How much … what does it tell you about the atmosphere in between?*

Well how much of the gas you had in between, you had a longer path obviously from the lower level, [inaud] path from the upper level, and therefore it was more transparent, so the lines were weaker, the lines were stronger as you were going down. So you were just measuring between the two, and that told you how much gas there was there, and also, erm, what the transparency was if you were trying to use military devices to observe heat radiation from sources. So it told you about the atmosphere, and it told you about the spectrum. And the first time I think anybody had really got a comprehensive set of spectra in the atmosphere of that kind.

*Was it necessary to sign the Official Secrets Act to work on this, given its military…?*

I’m sure I had to sign the Official Secrets Act on going to Farnborough, yes. I’m sure I signed it, yes. And – but what I was doing was an unclassified project, so I could talk about it, and I could publish it and there was no problem about that.
And how did you feel personally about working on something that had a military application?

I didn’t – well, again I was not worried about it, I thought, you know, we – I mean the army was an important tool in the world I’d been – I’d been brought up in. And of course science has been an important part of the way in which we managed to win the war, the radar and all these other things, without any of those things we would have been, you know, under Nazi Germany, and that would have been awful. No, I had no, no real worries about that. I mean, no worries in an absolute sense. I was – I didn’t want to spend my life doing that, I was clear about that, I was not – didn’t want to stay there working in the military thing for a long time. I had no – no great push that was driving me to improve the military position, but I was perfectly willing to work on it while I was there. In fact I got involved in various other things while I was at Farnborough, as an expert I suppose of the atmosphere. I got pulled in to do other things, and I mean there was a whole question about the – you know, the British had a hydrogen bomb programme. We were – we dropped a hydrogen bomb, test bomb, in the Pacific while I was at Farnborough, and there were questions about how the transparency of the atmosphere would affect the safety of the aircraft and things of this kind. And I got involved in some of those questions. Hmm … I actually saw top secret papers for the first time in my life [laughs], some of which were not worth reading, but [laughs].

What were the top secret papers on?

Well they were on – just scientific – the theory of how the, you know, the bomb flash would be seen at different parts of the atmosphere. But because it was about the bomb flash, therefore it had to be a top secret paper of course because people, the general public, was not aware of – or people at large were not aware that this was going on. But it’s all public knowledge now, the fact that we did it. Hmm …

Were you involved at all in any of the satellite observing work that the theory of which began before ‘57, and started – I think Desmond King-Hele’s work at the RAE at the time.
Yes. No, I was not involved in that in any sense, I remember – no. I think I knew Desmond King-Hele when he was there. I guess we overlapped at that time, yes. But I didn’t see much of his work, no. Hmm …

[1:56:58]

But a key event during those days for me was, what was it? The 4th October 1957, when the first Sputnik went up, and that was – let me just shut that window and keep the heat in a bit. [closes window] Hmm … it was – no, that was a remarkable thing, you know, imagine this thing going up out of the earth’s atmosphere, circling the earth. And it was – no, Des Smith who was there too, and I used to talk about it, said, ‘What a – what a remarkable thing. If only we could mount an instrument on that sort of thing, looking down at the atmosphere, and measuring things in the atmosphere that were important. What a wonderful device it must be.’ And that was really set us thinking about, er, what you could do if you could mount an instrument, a suitable instrument, whatever what it – to observe the whole atmosphere from space.

Did you have any suspicions that there might be such an instrument on that, on Sputnik? That it might have already been done in other words?

No, I don’t think we thought – it was obviously wasn’t carrying scientific instruments as far as we knew and in any case was obviously a difficult thing to do because even to measure remotely from a much larger device than you could possibly mount, and it was so far away anyway, it was going to be a tough job. But we began to think about what we could measure – what could be measured from space. And I can’t remember the detail now, just how the – how that discussion went, except I remember the – being very hit by that event, challenged by it in a way, you know, inspired by it. Hmm, because that’s what I went on to do [laughs], and Des did too, we did it together. So that was a partnership that really blossomed because of the, er, all the time we spent toying with the idea of what could be done from space.

[End Track 3]
Now yesterday we’d got up to the launch of Sputnik, and we’d been –

Yes, uh-huh.

We’d been talking about your research and professional career for some time, and I wondered what had happened in your life outside work by this point. So by the time we’re getting to 1958, let’s say, what’s happening outside of work in terms of relations with parents, friendships, key relationships, that sort of thing.

Yes. Hmm, I mean, in general terms, not a lot I suppose. I got married in 1962, so that’s, hmm … what that’s significant, that’s when I started a family and so on. I went to, when I was at Farnborough, I had – I lived in digs, and I had some friends of course. We played – I continued to play tennis, and I belonged to a church, and so on, but that’s nothing terribly – nothing … and of course my younger brother was growing up, and my older brother was – I think he was probably in the navy. Was he in the navy at that stage? Hmm … no, he’d gone to the Met Office at that stage, yes.

How often did you go home to see your parents?

I went home on a regular basis, yes. And I of course love North Wales, and I do a lot – walked in the mountains a lot. I loved climbing, climbed Snowdon several times a year, and so on. So there’s that sort of existence, yes.

[1:38]

And by this time you’d been – you’d been a voting adult, if you like, for a number of years, for about eight years I suppose. What was the sort of pattern of your voting, or your sort of political allegiance over that period?

I think it varied a bit. I was never – felt very satisfied with any party I think really. And, er, a lot of my votes would have gone I think to the Liberal party, or whatever it was called then, on the basis that I liked – I would have liked to see something …
more flexible in the whole political system I think, was a general view I would have expressed at that time. But I think that’s about all, I was not an active politician.

*What do you mean by more flexible, in what way?*

Well you had two parties which on the whole were at loggerheads with each other, or going at each other, and I thought that was a pretty unsatisfactory way of governing on the whole. And I thought – so that it would have been a good idea to [laughs] …

*I see.*

So I was not a great – I was not a political animal, no, I wasn’t very bothered about politics at that time.

[2:53]

*And we left you in yesterday’s recording with a colleague sort of almost dreaming about what could be put on a satellite.*

*Yes.*

*The satellite has gone up, and you were thinking about the potential for observing the earth from above.*

*Yes, sure.*

*And you then go to the department of physics at Oxford –*

*Yes.*

*In 1958, could you sort of tell the story of how you began to in fact actually put things on satellites?*
Yes, okay. Well, first of all Desmond Smith, who was my sort of sub-partner I used to talk to, I used to discuss it at great length with him. He also left Farnborough and he went to Imperial College, and through conversations with me I suppose, he’d become very interested in meteorology, and he was offered a research job in meteorology at Imperial College. And Professor Peter Shepherd, as he was in those days, who was a very good, you know, a good friend of mine really by then too. And, erm, so he learned – he only spent a year there, he decided he was going to go back to – and then he went back to Reading University, physics department, and carried on with his work on infr, on infrared things, on filters, on bits of semiconductor work, and so on. And also dreaming with me about how we could get something on a satellite. That was – I suppose that was the year ‘59 probably, I’m not quite sure which year he spent in Imperial College. It might have been a little later, I’m not sure, can’t give you the exact date. Then, hmm …

[4:40]

Oh, another important occasion in ‘59 was the – there was an important scientific meeting which was held in Oxford, a joint meeting between the International Radiation Commission and the Ozone Commission. The union of – International Union of Geodesy and Geophysics, you know the big body that joined all these things together, it’s been slightly – it’s been reorganised in a different way since, but this is how it was organised then. There were these commissions which were dealing with particular issues, particular things. They had a commission dealing with measurements of radiation, people measured solar radiation of the earth’s surface, a lot of people, routine measurements, and the interpretation around that data was important. And the sort of thing I’d been doing on the aeroplane of course was linked with that, ‘cause those were radiation measurements, a very difficult kind from usual, but – but … so I knew about the Radiation Commission, and people were trying to calculate radiation transfer in the atmosphere by a variety of means. In those days there were – not having computers, people invented graphical ways of integrating radiation across the spectrum, which I’d really in writing my thesis had a lot to do with, because I was trying to use these graphical – graphical things. There was a few people around the world, a man called Elsasser in the United States, a man called Yamamoto in Japan, who were top people in this sort of radiation theory sort of stuff
too. Oh, a man called Richard Goody, who left – perhaps that was a little later, Richard Goody left Imperial College in London to become a Professor at, erm, MIT, or was it Harvard? Not sure, but he finally went to Boston. He wrote a big book on atmospheric radiation, the standard text on it eventually. And, erm … that – when there was this conference was held in Oxford at the lab, and was very well attended, lots of people came from all over the world. And we had a lovely week of weather actually, we had it at the Lady Margaret Hall, if you know Oxford, by the river. So – and Des Smith came too, and he ran the bar [laughs], and it was a good meeting all round. You know, and it was I think a way in which we could meet all sorts of people. Hmm … a particularly interesting area, a political interest if you like, was there were a couple of Russians there, who’d never been out of the Soviet Union. There was a man called Budyko, Professor Budyko, who was the most, I suppose, respected person in climatology in the world at that time. And a man called Kondratiev, who was Director of University of Leningrad, very powerful man, powerful politically too. And, erm, and we needed to know both – Kondratiev was a – was a radiation expert, so I got to know him very well really. And, hmm … I remember at the end of that week we – Alan Brewer, who was also of course at the conference [inaud], we asked Budyko and Kondratiev if they’d like to go – you know, go on an outing, we’d take them to – drive down the Thames Valley to London, you know, and give them a day out. And they were a bit sheepish about it, because they had a minder [laughs], but in the end the minder – what happened to the minder, I’m trying to remember? Did she come or did she not? No, I think they managed to get away from the minder, yes, by some means. So they came, and they’d never been in England before, hardly ever been out of Russia, and they were – I can remember Budyko saying, who was great – a great anglophile actually, loved English novels, and English books. He loved, you know, English literature, and his idea of London was it was just a smoky mess, you see. He said, ‘All of England is so beautiful’, he said, as we drove on this lovely day. Anyway, we stopped off at Henley on the way because Kondratiev’s wife at that time had actually rowed at Henley as a rower, so we rowed, got a boat and rowed on the river. And then we went to – went and had dinner in a nice restaurant somewhere. I’m trying to remember where now, and then dropped them off at the Embassy Hotel in London, which is the Russian – actually the Russian Embassy. And about eleven o’clock at night they walked in very sheepishly. We wondered what was going to happen to them, they didn’t appear again. They had
various appointments the following week, and they didn’t appear again until Thursday or Friday I think. They were being, hmm, punished for stepping out of line. Although very senior people, you know, that was interesting actually [laughs]. I kept in touch with Kondratiev, he died not too long ago, kept in touch with him most of his life. But he was a tremendously energetic man, hmm, and a very strong party man, in his way. Hmm, just one other story about him which just comes to mind. It was some time a lot later, the fall of – what was it, Czechoslovakia, the big event. Was it Czechoslovakia or Hungary? I’m trying to remember now these things, it just disappears from your mind. But it was a [pause] … the Soviets had been put down an uprising in, was it Hungary or Yugoslavia? I’d have to try and remember, but I could look it up. But anyway, we were both at a conference in Norway, in Bergen, first day of the conference and everybody was, you know, terribly uptight about what had gone on, and what should we do with these Russians, you see, and so on. And, er … and Kondratiev stood up and he said, you know, how pleased he was to be at the conference, and words to that effect, and so on, and he was – and it was such an open meeting, and he was going to be fighting for freedom and democracy, without making any reference to what was going on, except to point out that he too was not on the side of his masters, which I thought was very interesting. Because he was – he was a very strong party man, very powerful in his way. He knew how to twist people’s arms. And then, this is again we were at a conference in Russia in 1964 I think, one that we went to, tell you some stories of that too, but [laughs] …

Yes, please.

[laughs] Do you like Russian stories?

Yes [both laugh].

I remember Kondratiev was the – was the, er – what do they call them? I suppose the Chief Scien’, or the Head of the International Radiation Commission, what was their name, the people who were responsible. But he was the, hmm – I want to call him the chief scientist, but he was called the – he was the leader of that Commission anyway. And he wanted to give up and hand over to somebody. And, er, he rang me up in my hotel at three in the morning to tell me I really should take this job on, take it
from him, and would I please do it? ‘Cause I’d hinted to him previously that I wasn’t interested [laughs]. He phoned me up in a weak hour of the night [laughs]. I still said no, which was – disappointed him greatly, but it was – I recognised the Soviet tactic, finding people when they were weak. But it was interesting to go to a conference, go to Russia, it was another meeting of the Radiation Commission, hmm, this must have been ‘64, that’s right.

[14:24]

What evidence was there of security on – in the conference?

Oh, of trying to get information, you mean? Yes, well, right. I remember one evening we – the people – there were six or seven of us from Oxford I think who were there. And Alan Brewer came from Canada, ‘cause he was then in Canada, and he joined us of course by [inaud], we had an Oxford evening and we, you know, joking and recalling, reminiscing and so on, about things done in Oxford. And of course you get your meal so slowly in Russian restaurants. Went in about six and we didn’t get out until about eleven, talking all evening solidly. There were flowers in the middle of the table, I can see them now actually. And we joked about the flowers and said, ‘What’s under those flowers?’ [laughs]. And right at the end of the evening, as we were – one of the waitresses came up, who spoke a little English, with a piece of paper on which was written the words Powerpak, P-O-W-E-R-P-A-K. ‘Tell me about Powerpak’, she said. So we said, ‘Well Powerpak is the thing you put – is a device that puts power into operators of various kinds in the right form so that you can do – test – you know, all the equipment has to have power supplies, and they’re all different, and some have very special ones.’ And she was, you know, a bit non-plused by it, so she went away, and then we thought, Powerpak, what on earth did that come into her mind for? And we cast our mind back to about three hours before when we actually spent quite a long time talking about a particular Powerpak that Alan Brewer had made in the lab in Oxford for a particular purpose. And for some reason it hadn’t worked properly, and I can’t remember the story now, but it was a long story. And we thought, oh, you know, the chap behind the wall was filling in his book at the end of the evening [laughs], wants to know what a Powerpak is. But then we were worried, we thought what else had we said? And we remembered much earlier on in
the evening we’d been talking about a Russian girl, a Russian girl student who had sort of been crying on the shoulder of one of us, about how awful things were in Russia, and they really were awful for her one way or another. And we’d talked a bit about her, and we’d hoped that – can’t remember her name, it was a pretty common name, her first name was a pretty common name, but had we used her other name? And we certainly hoped we hadn’t, we didn’t think we had, but we certainly hoped we hadn’t. That was a pretty solid piece of, you know, information gathering on our part too, realising that we were being listened to, which I’m sure everybody was. But it was an impressive place, but we made some good friends.

At any point did the Russian scientists talk about their situation? Russian scientists that you met in conferences, or …?

Not the senior people, no. Some of the students would talk to us more loosely, and getting things off their chest, yes. How they were, you know, restricted in all sorts of ways. And how their bosses of course also clamped, they told them what to, you know – kept them in strict – they weren’t allowed to – their minds weren’t allowed to move out of the groove of what their boss believed. Very strict regime in a way. If you want stories on that, we’re wandering off a bit but Budyko, you know, this brilliant man, he invited us to his home one evening, I remember, and we – and he had cupboards, serving locked cupboards, full of English novels and English books. He was very interested in England. And very, er … it was a home with a lot of very heavy furniture, very Victorian in style I suppose we would say. But he was, you know, a brilliant fellow in his way. But when I joined – when I was working with the IPCC, and we were trying to produce evidence from the past which related to the present, he was a great expert you see on climates of the past. And he was writing material which – or writing books, and papers, trying to compare climates of the past with climates of the present. And he was using variations of climate in the past when the temperature [inaud] was varying of course, and what seemed like a global basis of course, it was only ever part of the world, to try to make forecasts for what would happen with human induced climate change by using templates for – of past climates. And he published a lot, quite a lot on it, and because he was a powerful man in Russia, all these – all the Russian scientists who came out, who were working with IPCC, all brought the Budyko stuff, and tried to push the Budyko line. And, er, and
eventually we had a meeting in Bristol in the UK, with – with Budyko and some of his scientists he brought over, thinking he had a marvellous case, and other people from the UK and elsewhere in the world, to discuss this whole problem of – of how climates of the past build templates for the future. And, erm, and of course the big problem there is that you’ve had other things varying in the climate system, particularly in the orbit of the earth. The reason for the big changes of the ice ages, and lots of things that have happened in the past, is that the – the earth’s orbit around the sun has been different. There are three wobbles, there’s the wobble of the eccentricity of the orbit, which varies from time – with varies about 100,000 period – period – 100,000 years period. And then there’s the tilt of the earth’s axis which varies between, what, 21 and 25 degrees, or thereabouts, I can’t remember exactly what it was, with a period of around 40 to 45,000 years. And then there’s the latitude – longitude of perihelion when the earth is closest to the sun, which most of the years it’s closest to the sun, and that varies with the period of around 20,000 odd years. So you have these periods and they – they alter very substantially by well over ten per cent or more, the amount of energy reaching the polar regions. Then you put those – those three wobbles, they all make a very wobbly line of course when you to the past, and – and those are the major reasons for the earth – for the climate changing in the past on periods of thousands of years, hmm, 100,000 years or more, there have been ten ice ages roughly over the last million years. And so you cannot use, without a great deal of care, climates of the past to directly try as templates for climates of the future. And Budyko did not accept that. And his chaps, you know, his people, of course came to this meeting and they had their eyes opened, because they listened to all the papers [laughs], whereas before they’ll only listen to the big man. And they were thrilled to bits with it [laughs]. And poor Budyko was left out in the cold actually, even by his own people, insofar as they could do that, and he was tremendously upset. ‘Cause I got to know him quite well really, and I can remember sitting by the table in the restaurant with him, and he said – he said, ‘You know, John,’ he said, ‘I never thought I would come to hate you so much.’ I said, ‘Professor Budyko,’ no he didn’t call me John, what did he – I can’t remember what he called – did he used to call me John? I didn’t call him Mikhail, which was his name. Anyway I said, ‘Professor Budyko, I don’t – I don’t hate you at all, why should I, you see? All I’m doing is trying to do some science and come to the truth. And, er, and that’s the whole business of the IPCC, and what we’re doing here. My friendship with you is in
no way disturbed by, er – by where the science goes. I’ve no vested interest in any of it.’ But he was tremendously upset, and er … and felt it very personally, thought I’d really undermined him, you see, setting up a meeting which was killing his whole reputation, and I could understand that, and I felt sorry for him. I told him so, [laughs] but it was interesting that, you know, he was a big man, and his word went absolutely. Hmm. That’s a little story of Russians, and the climate.

**Approximately when was that, that particular issue with Budyko and the IPCC, which report would it have been, or roughly which?**

Well this was the first – I would guess it was the first report, it would be early ‘90s, early 1990s, yes. So that’s moving twenty years on from the first meeting with him in ‘59, or thirty years perhaps. And he was a much older man then, of course. He was a relatively young, you know, very – prominent of course in ‘59. Yes. All right?

_Fascinating, thank you. Wonderful._

[25:30]

That’s the ‘59 conference. Hmm, then … in 1960, or something that happened to me in 1960 of – was I became a Tutorial Fellow of Jesus College, erm, in physics and helping Claude Hurst with his teaching. And – which was rather demanding actually, I had to learn a lot of physics that I never really knew properly so that was quite a demanding thing for me. I had been living at college ever since I went back actually, when I went back in ‘58, Jesus which is my old college, they had acquired some property in the street opposite to the college, hmm, where they were putting students and they wanted somebody to live in this building just as a – even though I had no responsibility other than I was this sort of senior minder [laughs]. So just keeping the – an eye on the place, and, er – which was very nice. So I got free accommodation from the college and membership of the senior college. And, er, so I got back into college life at a senior level. Hmm, so some of the tutors I’d known before of course we were there, and so that was a nice thing, a nice way of getting into Oxford again. Hmm, as far as the – my work in the department was concerned, my scientific work, I was still working on results from the – the spectral, spectra, as in that Atlas, yes. No,
because the actual – in particular trying to find, hmm … trying to do what would be
called an inversion calculation. You take a spectrum of a few lines, and try to infer
the, erm … taking lines which are of different strength, and try to infer from what you
can find from different lines in the spectrum what the distribution of the gas is above
you. Because, erm, the pressure is varying with height, of course, and so different
lines get – and lines are broadened with pressure. So the lines are narrow or wide,
depending on what the pressure of the – which they are is, so you can try to make –
infer what their distribution is above the level you’re looking at. We were very
interested of course in the distribution of the stratosphere, so I tried, particularly water
vapour, so that was one of the things I was trying to do.

Was it necessary to do experimental work in order to interpret the – in other words,
was it necessary to do laboratory experimental work in order to interpret the data
that you got from –

Yes.

Observing –

I was also doing some of that kind, yes. We had a – this was at Farnborough, there
was a big chamber with – you could put different gases in and do what you wanted,
measure of the spectrum of that. So we were getting laboratory spectrum as well as
spectrum from the aircraft, yes, sure. Hmm, so that was something I was spending
quite a lot of time on in, oh ‘59 I suppose, ’58/’59.

[29:15]

I was also thinking about what we could do about – about measuring from space, and,
er, there was a very key paper on that subject in 1958 I think, in the Journal of the
Optical Society of America by a man called Lewis Kaplan pointing out that if you
took radiation from the atmosphere, emerging out to space in the – in the carbon
dioxide band, emission band, you could choose various parts of that band, and, er,
infer the temperature at different depths. Because the radiation comes from different,
you know, if the band is very opaque at the bottom, and fairly transparent at the top in
some parts. So you can – you’ve got a history of the temperature structure depending on the emission, where the emission comes from. You can choose the parts of the band and choose therefore select part of the atmosphere below you, called remote sounding, or remote sensing, of course, it’s become a big subject. I mean it’s not dissimilar in principle of course from this sort of thing Dobson was doing in the 1920s in measuring ozone from the ground. Ozone was up there, and you had to try to infer the ozone or where it was, and all that sort of thing, from observation on the ground. So it was an important paper by Lewis Kaplan which pointed this out, and you could look at the carbon dioxide emissions, which were strong of course, one of the strongest absorbers in the infrared, and infer the temperature structure of the atmosphere below. Lewis Kaplan was not an instrumental man at all, so he didn’t know how it could be done, but he pointed out that it could in principle be done. And Des Smith and I saw this paper, of course, and we began to think how can we get measurements of carbon dioxide band. The problem is that the – that on the whole if you take a trunk of a band, which will include many hundreds of lines, ‘cause you can’t – from a simple instrument that you’ve got to be very small. If you try to use filters, you can’t hardly find room for a spectrometer, indeed if you did the amount of energy you get out of it, and the signal you can get out of it with a very tiny instrument would be so weak you couldn’t measure with any accuracy. Because if you’ve got to measure – if you’re going to measure variations in temperature, and the atmosphere, you want variations of the order of one or two degrees as your accuracy. Otherwise you’re not getting very much, and you’re not telling the story. So we’re not finding out how the atmosphere is behaving. So you have to measure accurately, and that means you need enough energy hitting the detector, you can’t use cooled detectors in space, or you couldn’t at that time anyway, they have to be uncooled detectors.

_They have to be?_

Uncooled detectors, radiation detectors, which means devices a bit like – not unlike the thing I was making of course in – I tried to make an absolute radiometer, but you couldn’t have a black surface which receives the radiation of which it can alter its temperature, its resistance, depending on the radiation input to it. And there was that, erm – then you can’t put these in – well you couldn’t put them in vacuum, a vacuum.
and so on, so you could try to make something a bit like the things I was doing. And then you’d have to calibrate it by looking at black bodies and things, you can do that. So – but again they were very insensitive really to radiation, so how could we collect a lot of radiation of the right kind, and we were trying to think of ways you could actually do that. The first idea we had was to say, well, erm, if you take the fifteen micron band of carbon dioxide, you have these rotation/vibration lines all with different transitions, in the rotational energy, and the same of course in the vibration. The vibration is like this, and the rotation, that allowed quantum of rotation added to that. So you have a spectrum that looked like, er, well, since I’ve got the thing here … [laughs], let’s find a band that looks a bit like that [pause – looking through papers]. Well those are – those are all water, water lines. There’s a typical band of carbon dioxide probably. We were not, er … some of this was being resolved at different – different places. I’ll find you something else to look at. [Pause] There you are, these are these – that’s this carbon dioxide band, you see, the lines of carbon dioxide were, you know … these are separate rotation lines. Hmm, all in – hundreds of them, that’s just part of it.

So this is – we’re looking at a chart in a paper published in the contemporary 1970 Royal Society …

Yes.

Paper on the selective chopper range and results.

That’s right. I’ll tell you come onto selective chopping in a bit, but I was saying about the first idea we had since you want the whole story?

Yes, yes that’s right. But I’m trying to understand myself what we’re looking at, because to me what I’m seeing is a very – very variable wiggly line.

Of course.

On a chart, and I know this is concerned with carbon dioxide and the radiation that emits.
Yes, sure.

But beyond that what are we – we are we looking at in terms of this very …

Yes, I’m trying to find a – somewhere we’ve got a – I’m looking for the paper which this is the predecessors of that. This is number one. [Pause – looking through papers]

There we are, that’s now you can see this is the first paper on this subject. Hmm, here’s the – this is wave numbers, or around fifteen microns which is here, this is centre of the carbon dioxide band, the fifteen microns, and the infrared, that’s fifteen microns of wavelength, and wave number 667. And, erm, there are … three branches there, there is – these are, if you’ve just had a vibration only, you would get the lines mostly on top of each other right in the middle there. When you’re adding different amounts of different rotational states, transitions also occurring, then you get the lines in the band which occur like, separate like that, in the two branches of the band.

What’s rotating, what’s the rotational …

It’s the rotation of a molecule.

Right, okay.

The rotation is quantised.

Okay, yeah.

The rotational energy of the molecule is quantised, just like the vibration is quantised, and then you have different rotational states. The rotational states are much closer together than the vibrational ones, the next vibrational state will be in the garden [laughs].

Okay, yeah. So …
Hmm, so these are the – these are the positions of the lines, which occur in these two branches of the band, depending on the amount of rotational energy which is – which is being added to the vibrational one, vibrational energy. And the – and this is just a diagram showing where the lines are, okay? And, erm, then if you take …

*Sorry, the number 670, 680, 690 …?*

That’s wave numbers, yes. Inverse centimetres.

*Okay.*

It’s the – it’s the, er, wavelength, it’s one of the wavelength. What else have we got? [looking through papers] Find you something else to … what is – what a line looks like.

*I’ll just say on the recording what we were looking at there. This is the Meteorological Significance of Remove Measurements of Infrared Emission from Atmospheric Carbon Dioxide, Quarterly Journal of the Royal Met Social, 1961.*

Yes.

*So you’re looking at the behaviour of carbon dioxide molecules in order to indicate the amount of energy that they contain?*

Well carbon dioxide molecules in the atmosphere are vibrating, they’re vibrational energy, and the amount of energy they have of course depends on – or the amount of radiation that comes off it depends on their temperature. The, erm, the – in other words, the number of atoms in that vibrational state which are able to jump up and so on, so that’s – so if you can measure the – measure the radiation leaving the atmosphere, it’s a given wavelength, and it’s say in the middle of one of those lines, then you could infer the temperature structure below. But it’s spread out over the region of course, because it’s all comes from – comes from a variety of levels. Because lines get saturated, you see. When you start off with a depth of carbon dioxide now, radiation comes from each – each molecule will get out right from the
top, as you go down some of it gets absorbed on the way out, by other molecules on the way out. And if you’re far enough of course then nothing gets out because radiation is all absorbed on the way up. So you have what’s called a waiting function, and for a line with a given strength, as an absorption coefficient, of course you put in an absorption coefficient, then that radiation will come from around a given level but it’s – this level’s about – the whole width of the curve is something like five to ten kilometres wide, so it’s getting rather course in its way. Then you can choose different lines of different strengths, and you can get curves that go up in the atmosphere, like the ones in this paper I suspect, they’re there. Well that’s a set of weighting functions from the instrument we flew, this is – and I’ll explain that to you in a bit. This is looking at different parts of the band, that’s a height of – that height is around thirty kilometres. Hmm, sorry, that height is about forty-five kilometres, and then we come down to surface. So you’re getting six pieces of information to describe the temperature structure all the way up.

[41:55]

Now – now the instrumental problem is that you can’t look at single lines because there’s not enough energy in a just a little bit of the spectrum, you need to add up the signal from a whole lot of lines in order to get enough energy to go on a detector. So somehow you’ve got to have some way of selecting from all these lines. Now the first idea, you see, is to say, okay remarkably these lines are equally spaced, because they’re determined by the rotational – size of the rotational quantra, you can have several of them all done. So very – quite well equally spaced on the whole, but it’s more complicated because there are other lines, because you have isotopes CO2 there doing slightly differently, and so on. But our first idea was, okay, we’ve got this band radiating, and, erm, and supposing we’re trying to look at the middle of each of these – each of these bands, then you can imagine get an interferometer, Fabray-Pérot interferometer, which has – which will let light through at exactly that sort of spacing. If you space the distance between your Fabray-Pérot interferometer – do you know Fabray-Pérot interferometer?

No.
Well this is a couple of reflecting plates facing each other. Hmm, the radiation, the light bounces between these plates, and can, erm, can interfere constructively and ... well, how do you describe it? I haven’t done this sort of thing for a long time, in describing things like this for a long time [laughs].

Yes, it must be quite difficult to describe it for listeners without a background in physics.

Of course, yes. Hmm, well, once you shine light onto a Fabray-Pérot interferometer, the light that comes out of the other side comes out only at certain wavelengths. Because the wavelengths have to – have to constructively interfere to allow it through a given width – given spacing between the plates. And as you change the spacing, you change the frequencies that come out.

So it allows you to select certain wavelength bands?

Select – sizes you select, you know, the transmission curve of this thing will be a – will peak at certain – you can arrange for it to peak at the essential parts of these lines. And so you’re adding more energy into the system. And then by moving – slighting moving the plates apart, you then scan across like this. And so you can scan across these lines. Now each of these lines, of course, is not just a single absolutely single frequency because the lines are broadened by the – by the motion of the molecules in the atmosphere, called [inaud], by the, erm ... and by the collisions that are made, number of collisions they make with each other, and how long they’re radiating for, or absorbing for between collisions. So they’re very narrow lines at very low density, they’re much broader lines at high density. So that’s also – adds to the complication in trying to get the radiation from the levels you want, if you’re going to get the temperature structure of the atmosphere. Okay? So that’s the idea of – so we decided to work on a suitable Fabray-Pérot interferometer which might be able to do this thing in a small, very small, instrument on a spacecraft. And that was –

This may be a naïve question, but why choose carbon dioxide as the molecule that you’re going to use in order to determine the temperature at different levels of the atmosphere?
Because carbon dioxide is very uniformly distributed through the atmosphere, the consideration of carbon dioxide everywhere is very close to the same value, of course carbon dioxide is not destroyed in the atmosphere at all, it’s shared with other reservoirs, like the oceans and the biosphere. So the amount of carbon dioxide is anywhere in the atmosphere the same. You take any other molecule and you’ll find that you don’t know how much there is at any given point, and that throws the whole thing out, because you want know the level you’re looking at.

*So in simple terms, are you looking at how energetic carbon dioxide is at different levels in the atmosphere as a way of telling what the temperature of it is?*

What the temperature – what the temperature is at different levels, okay.

*Yes, but it’s complicated by the fact that you’re looking down through the whole atmosphere.*

That’s right.

*And any energy emitted by carbon dioxide right at the bottom ends up being absorbed by stuff further up, you – it’s difficult to see what’s going on at the bottom.*

Of course it is, but then you can choose a weaker line you see, ‘cause all these lines haven’t the same strength. So more likely there’s – this is because of the – because they involve transitions between different quantum levels, and you need more energy to get some levels than others, the rotational levels need a certain amount of rotational energy, and so on. So you – and some of them are therefore much stronger than others. And, erm, so of course to get on the edge of the band, you see, you’ve got to have a lot of rotational quanta coming in, as well as the vibrational absorption. You’re absorbing at different numbers of rotational quanta, well the chances of doing that get less as you get to the edge of the band – as you get to a long away from the central position. Okay?
Hmm-hmm. *Sorry what is the central – what makes the central position central, why …?*

Well that’s the fundamental – the vibration level you’re looking at, that’s this fixed frequency of – of 667 wave numbers, which is the middle of the band, and that’s – occurs when there is no change in the rotational value, the rotational quantum. You can absorb without changing the rotational quantum, and that gives you the Q branch in the middle of the band. You change the rotational quantum, as well as the vibrational one, and the chances of doing that depend on how many rotational quanta there are, what levels you’re going between, and all those things. You’re getting transitions between all these levels on the way up, so that’s all varying. So the strengths of these lines it varies from the centre to the edge. So if you want to look right down to the bottom of the atmosphere, you take the edge of the band, where it’s – where you have rather weak lines, and you’re just getting into this band. I mean if you take the spectrum of – I should have the spectrum of one band of carbon dioxide in here, where is it? [Pause – looking through papers] Well, that is a band, I think it’s one of the combination bands of carbon dioxide, it has more than one vibrational frequency associated with it. It has the intensity of the rotational lines, these – the shape of this, that’s the middle of it, there’s no Q branch there, there’s no, er – that would be a water vapour line band I suppose. That has two branches only, which is the central frequency there, and then you’re changing rotational quantum as you move through here. But you’re not resolving the lines of this, not resolving the individual lines, ‘cause the lines are much closer together in water than they are in carbon dioxide. That’s the overall shape of the band, and the overall shape of the fifteen micron carbon dioxide band, rather like that, except it has a peak in the middle, big peak in the middle. Hmm … but we’re getting away from the sort of thing you want from me I suspect, are we?

[50:47]

No, no. *This is – we now need to – I think we’ve been thinking there about the sort of the theory of the …*
Yes, that’s okay, that’s right the theory, yes.

*And you go on at Oxford to begin to build instruments to do this?*

That’s right. Well, we first – the first idea was we were going to try and use interferometers, and Des Smith was helping in Reading with that, because he’d have to coat these – you know, make the interferometers actually, ‘cause he was the man who could – had the optics capability to make things in the right sort of effective coatings and all those things. And we began – I began to think about how to interpret the measurement from a device of that kind. That was the first idea we had. Then, erm … then we got to some designing actually instruments that looked like that, and we actually wrote to NASA I think about 1962. I’ve got some notes here on this period, actually, which I – let me see – perhaps help me to remember. [Pause – looking through papers] Yes, we were, you know, we began to think about the optics, we began to think about the detectors we could conceivably use, and get some experience with those. Hmm, my research student joined in 1960, Jim Williamson by name, who’s a very good experimenter. And we – he built – he used a balloon instrument, erm, balloon carried instrument, he was making a simple radiometric device, radiometer actually, hmm … to measure radiation from water vapour from above. In the six point three micron band of water vapour, he had a filter which was covered that band, and which would select radiation from that band. We had a piece of dope germanium, which is a detector which was sensitive in that part of the band, and, erm, had to be cooled with liquid nitrogen. So we got a dual vessel with liquid nitrogen in it, we immersed the whole instrument in that, point it off to the sky, and in this particular band of water vapour, measured the amount of radiation coming down from above, and sent that up on a radiosonde balloon, the little balloons use by the Met Office every day to measure routine things, just one of those. And we got some good measurements actually. And that was quite good fun, trying to use simple radiometers on balloons. It helped us with that, in the meantime we were also trying to, as I say, think about the interferometer, and how we – what we could do with that. And, erm, the – I’m trying to remember the exact timing of all these things. Hmm …
Something else I did around that time, 1960, was to go to – Alan Brewer was making radio – making sondes, balloon borne sondes, radiation instruments – not radiation instruments, chemical instruments for measuring those in the atmosphere at different levels. He was trying to get measurements around the world. I spent – I went and spent a month in Tromso in Norway with a batch of his balloons flying these things from a high latitude. And, erm, which was interesting, I’d never been up to Tromso before in the middle of the summer, so called. It was bad weather, I’d never seen – never saw the midnight sun once. Although we were flying at night, the – flying at midnight virtually, but I never saw the midnight sun once, it was such bad weather. But anyway, then we got some good measurements, hmm, and although there weren’t many of us, so it was not – it was working a bit slowly in some ways. Hmm, if I can sort of try and put things in chronological order, I think they are here. [Pause – looking through papers] Four, five … yes.

[55:39]

Yes. Hmm … well at the time, there was the question, if we were going to go into space, we’d obviously need support for this. And in July 1960, the Government gave to Harrie Massey, Sir Harrie Massey, who was, wasn’t Sir then, Professor Massey who was a – a London physicist, hmm … Imperial College, was he? Not sure, I think so. But he was a man who was very interested in making measurements from space, this is astronomical measurements, or measurements of the outer – all the particles around the earth, you know, the magnetosphere. He’d been looking into what these satellites can be used for. And so he – he was given I think six million by the government, almost personally to him, or it was under his control, to begin to make scientific observations from space, erm, either using rockets for, you know – which weren’t going to last long in space, of course, or by trying to get rides on, you know, spacecraft. So the early work was done with rockets, and so a commission was formed to – of scientists interested in space to see how this could be done, see what could be done. Desmond Smith went and sat on the committee because he was Imperial College at that time, to get it started. He sat on for Professor Shepherd, and he was – and Alan Brewer was invited to join, but Alan Brewer thought it was a waste of time.
Why?

He just thought – thought it wasn’t going to get anywhere. And it seemed something very big to him, I think. You know, big, and he liked doing individual things, didn’t like doing massive – getting involved in big battalions, or anything like that. So he decided that there was no future in it, didn’t believe there was a future in it. So I felt rather squashed by that because of course I was in his – in his department. So we had no formal input to that committee except through Desmond Smith of course, so that was a point – so our ideas were being talked about. But of course we hadn’t got anywhere near building an instrument yet, but the idea that we might need some money one day was being – was being noted, and otherwise the committee consisted of astronomers, and particle scientists, people who were doing plasma outside the earth, and that sort of thing. That was the early 1960s.

Then something else that happened then is in 1961 somebody called Professor Walter Hitchfeld came to Oxford on a year’s sabbatical, McGill University Montreal, and he was looking for a year off, and looking for doing something interesting at Oxford. And, erm, so he and I started to work, and he was a cloud physicist actually, a cloud man rather, but – but he helped – he joined with me in trying to do some computing. Oxford had got its first computer of any size, Mercury computer, and I was interested in the possibility of doing radiation calculations, numerical calculations, integrating radiation streams across bands that look like this [laughs], but very difficult to do by hand because it’s far too long.

*Integrating, meaning a kind of step-by-step calculation?*

Step-by-step calculation running across a band, or using whatever you can – however you can do it, to – some of the lines – the band of ozone which we tackled actually, is a much more complicated band, because of the way its – the possibilities of transitions within the ozone molecule. And so it’s a very complicated band, and, erm … and if you’re trying to do calculations of the amount of transfer of radiation in the atmosphere, then between different levels, due to ozone, or due to anything actually,
but due to ozone is particularly difficult, because of the lines are all falling all over each other for different transitions, and it’s complicated. We, hmm … I thought, marvellous, we could just integrate these radiated transfer equations, integrate them over of the spectrum, and also integrate them over height, in order to calculate the movement of radiation. So I remember going to see – oh, what was his name? Professor Fox, he was called Fox, that’s right, who was running the computing lab, and asked him, you know, I would like to do some calculations on his machine [laughs]. So he asked me to explain what I wanted to do, so I tried to explain to him just what I wanted to do, and we tried to work out exactly how many calculations the computer would have to do to do it properly, you know, in its crude way. I imagined this thing was all-powerful. So the first set of calculations I would like to, presented to him, you see, he did some sums. ‘Oh’, he said, ‘that will take you about a million years.’ [Laughs] So we had to cut it down to size, and we had to find ways of putting different lines together, and sorting them out and doing little bits of it, and saying this bit of the spectrum looks rather like that, so we’ll do some – some sample parts of the spectrum, all that sort of thing. Which was very interesting to work through, and we did some – the first radiation calculations, I think possibly the first ever of any – of any complication done by computer means. And Walter Hitchfeld was very – plunged into it very enthusiastically, and built a lot of the programmes, and so that was an interesting thing to tackle.

[1:03:08]

*How practically did you have to input this – these calculations into the computer?*

Oh, it was punched tape.

*So could you take me step-by-step through having a calculation that you want to do, and then how do you actually approach the computer with that? What do you do in order to make the tape, or insert the tape, and run the tape, that sort of thing? How do you use the computer to do that?*

Well you have to use language, of course, so it was the language we were using, I can’t – it was Mercury Autocode. Simple instructions were fed in, just as you feed
them into a computer today, with a – instead of writing it down in terms of words, or in terms of numbers, which is what you would with do I suppose with a computer now. You had codes, and these codes were fed in giving the computer instructions just like you do today. But much more crudely, and then you had to feed data in, input data, you know the starting data, and then the reintegration, how many steps you wanted, and how you – take – do it step-by-step, the integration process all the way through the band, across the band, and then across the atmosphere. So was the – what – what we had to do. And we – and that was a very, you know, it was my first of course approach to computers, but it was very important to learn about computers and what they could do, because there were lots of things you want to do with them.

*And where was the computer?*

The computer was in South Parks Road, Oxford, in an old house. It was valves, not of course anything else, batteries and batteries and batteries of valves on different floors in that building. And it was constantly, er, going wrong in various ways [laughs], having problems.

*What problems did you experience during your use of it, in terms of the sort of running of the computer?*

I don’t honestly remember now actually. Hmm … Walter Hitchfeld was doing most of the running to and fro, but I did some of it. Hmm … I can remember just silly things, you know, sometimes you wouldn’t have – your take was not – was not quite adequate for the purpose or something. I’m just going to shut that door, it’s getting a bit cool. Then there’ll be a long tape you had to feed in. And – and if it wasn’t correct, of course, it might stop and refuse to go on, or it might just run through at the end and disappear, and you hadn’t finished, so you had to abort what you’d done. And, er, and there was a period when it was always running out of – running out at the end, and it ran out at the end, you – then you had everything was just, you know, didn’t get anywhere with it. You had to start again with the computer completely, and that – that seemed a poor thing to do. So we started adding bits on at the end just in case it run out [laughs], to stop it running out. And it was hot towards the end, to right at the end where you got these arbitrary numbers, but at least you would have
kept what you got before. And so that’s helped us to not waste so much time I remember. I can’t remember a great deal more actually about it really, but it was—and always blowing of course, these valves were constantly blowing all the time. And most often of course it didn’t matter, ‘cause the computer managed to sidestep it. But sometimes it really did matter, and then you shut down, and then you start again. Very big clumsy machine by today’s standards, but rather fun in those days, ‘cause a completely new experience. But that’s something that we did, and that was written up and we wrote a paper on radiation transfer about in the, er—nine point six micron ozone band, which I think was the first of its kind. I don’t …

[1:07:52]

Then in 1962 of course Alan Brewer went to Toronto and I became the head of the group, but it was only four of us then actually, when he’d gone. Who were we? Myself, there was Jim Williamson … Walter Hitchfeld had left, and there was a man called John Shaw from the United States, came from a Higher State university, who was a radiation man too. He came for a year off. And a man called Peter Abel who was another research student just starting, and he began to—put him onto this business of how to build a space thing. Hmm … that was ‘62, and that was the year I got married. And in the summer of ‘62 I went to, with my new wife, to Boulder, Colorado, spent the summer there at the National Bureau of Standards doing radiation calculations on computers [laughs].

Could you describe—could you describe the set up there in terms of computing in 1962 in Boulder?

Wow. I don’t remember, I can’t remember what computer they had. I got very involved in these computer things, but there was a team of people you see, and—and I brought my experience from the ozone band, just how to do it. And I was very involved in creating the procedures and the mathematics and so on, but I was not involved in running the machine, running the computers, or you know, taking things from computers or anything like that. A man called David Gates who was the head of that group, who was very interested in radiation, but he was a biologist as well. His father had been I think the director of their own big, hmm … a very big botanical
place in – in, where was it? In middle America … it’s a very famous big – very botanical gardens. Sorry, I can’t quite recall it now. And he – but he wasn’t there very much of the time, he was totting all over the place all the time, and his secretary was, erm, was responsible for covering up for him all the time, marvellous lady, yes. Even signed his name, you know, and lots of things. Something was sent back which said they didn’t believe it was his signature, it was the only one that was – actually was his [laughs], for instance. He used to run this outfit which was – they were trying to do various atmospheric things in the Bureau of Standards, hmm … that was something else had happened that year, and then … I met somebody called Bill Benedict actually, who was another very good radiation expert from John Hopkins University.

[1:11:30]

And, hmm … and then John Shaw came, was in Oxford the following year, and he – and he and I worked on the carbon dioxide – the carbon monoxide band, trying to see if we could actually construct that, make measurements of carbon monoxide absorption, very precisely. And see whether the calculations which we did from all the parameters that were thought to be known about the band, actually agreed. It was a simple band, and it was a simple molecule, and we were interested to see whether we could really reconstruct the strengths of all the lines, all that sort of thing, to get them – to get good agreement with what we actually observed in there. We did actually on the whole, but it was a useful checking procedure to see whether we really understood what we were doing.

[1:12:30]

And I think it was that year, it was possibly ’98 – er, ‘63 when Lewis Kaplan came to Oxford. And Lewis Kaplan was the man who wrote that paper in the Journal of the Optical Society of America. When I was in America in ‘62, I met him in the Jet Propulsion Labs where he worked, worked in NASA in the Jet Propulsion Laboratories in California. And he came to spend – he and his family came to spend a year in Oxford. And that was a very, very important thing, ‘cause not only was he clever guy, but also he had – he worked for NASA and he knew the NASA system.
And, erm, I think it was ‘63 he came, that’s right. And we – and he learned about what we were doing, and what our aspirations were, and of course it was trying to do the thing he’d started off with his paper in the Journal of the Optical Society. Around that time we actually wrote to NASA actually, made a proposal to them to fly an instrument, in our very early sort of idea using the interferometer, and – I should check these things really. My knowledge – I think that’s what we did. And they wrote back saying, you know, that it was all very well but, er … I don’t know whether we wrote to them before or after the selected chopper invention, but we did write to NASA and said – and they wrote back and said, you know, very interested in what we were doing, but we were very green as far as doing space experiments were concerned. We had to learn to do them in the field, and when we’d flown something on an aeroplane, or on a balloon, or some other way in the field, and making measurements in the field of a kind we would make some space, then – then they would look at a proper proposal, maybe. So we were on hold in fact as far as NASA was concerned in that sense. Then a very – a very …

[1:14:51]

And also that year I think we, yes, Alan Brewer had gone, so there was a position vacant, so a man called Desmond Walshaw came from Cambridge, who was a … expert in ozone actually. He came as my replacement as [inaud] replacement, and he – and also from Cambridge he brought a research student with him called Clive Rodgers, who was a very key person also in that satellite work later on.

[1:15:24]

Then in ‘63 Desmond Smith and I went to a conference in Stockholm, which I can’t remember whether it was about things in space, organised – a European conference I think. And as we flew back, coming back on the plane, we were talking about how we could – talking about the ideas of the spectrum of CO2, and in particular I was, you know, pressing him to say, ‘Well, how could we really isolate the Q branch, because the Q branch is – the interferometer might do these other branches, erm, with its spacing of transmission between the positions of the lines. But then, erm, what about this very intense spot in the middle where you have no – no rotation changes at
all, but all the vibrational levels with no rotational changes all lie on top of each other? Could we possibly get something which is no more than one wave number wide? And we tossed this to and fro between us, and I – and I remember Des saying, ‘Could we use – could we use carbon dioxide gas in some way as its own filter?’ And that was the brilliant idea that – it was not a completely new idea, because there was something called gas correlation spectroscopy, which I think had been invented before then, but this was a way of getting what you wanted. And it was, erm, you know – if you got a path of carbon dioxide itself, the spectra of – you know, in a chamber, with windows on the end of it, that’s a filter, that acts as a filter of exactly the kind you want, because it absorbs the – the carbon dioxide in it will absorb exactly where you want to measure. So if you have two cells, side by side, one of which contains nothing, the other contains carbon dioxide, you have a ready, you have a stream of input, you know, optics defining these two paths swapped between those two paths, with some sort of chopping device, the effective transmission is precisely the sort of effect you want over the whole band, integrating of the whole band. And it really does, erm, provide a very simple way of solving the problem of selecting the radiation you want.

*Of particularly selecting the radiation from carbon dioxide?*

Particularly selecting the radiation from the carbon dioxide lines, some from every line. Radiation comes in – depending of course – and you can vary the positions you’re actually looking at by altering the amount of carbon dioxide in the cell which is the one which is controlled in the absorption – the absorption, and therefore the effective transmission of the system. It’s removing, you see, the radiation from that part, all the radiation gets to the other part, so you’re just selecting exactly what that is absorbing, selecting the spectrum exactly what that is absorbing. So that’s called a selective chopper, hence the name Selective Chopper Radiometer, and you know from that moment we switched – well I switched very fast, ‘cause I realised that it would – had all sorts of potential. Des was a little more cautious, we’d only just had the idea [laughs]. So we started to switch from our interferometer, forget about the interferometer completely, said we’re going to do it this way. And that was a powerful idea, and it – we were able to vary the effective part of the atmosphere we were looking at by having a very simple system, which consisted of – [looking
through papers] there’s the selective chopper. I’ve got one here somewhere. That was the balloon borne, that doesn’t – that will just confuse you. That’s the one on for the satellite. [Pause – looking through papers] There it is, that’s the device, here’s the – here’s the radiation coming in from space, pointing at – coming in from the earth rather. No, that’s the space view, that’s right, there’s the radiation’s coming here from the earth into the system, and you can put in a calibration mirror too, a calibration system as well if you want to put a calibration system, mirror that points at a black body, just so that you’re measuring the radiation from something with a known temperature to calibrate your gain in the system. There you have two cells, one with carbon dioxide, one without, and, erm, you have an oscillating mirror here, sends the radiation either blocks which is looking at space actually, on the side of the instrument, got it on the side of the satellite and just looking out at space. This is coming up from the earth, that’s pointing sideways to space, so that’s zero, so you are selecting what comes through here plus zero, which is coming from here [laughs], then you put it in the other – the mirror opposite position, it’s coming from that cell. So you’re swapping between the two, and you measure the alternating signal that comes from the detector. And you’re selecting of the whole band so you’re getting the maximum amount of energy you could conceivable get.

[1:22:31]

*And how does this – I can see how it would measure the radiation coming from the carbon dioxide spectrum.*

Yes.

*But how does it then determine the amount of radiation that carbon dioxide has at different levels in the atmosphere?*

Well different levels, you put different amounts of carbon dioxide in the cell, and you can actually have two cells with two different amounts if you want, ‘cause that gives you a further way of doing it. And these are the levels. This is the – we call these the waiting functions in the top channel, we were getting most of the radiation from that level, but bits of radiation from all over that amount, ‘cause it’s not a simple function
in the atmosphere. And then that’s different amounts, and so on, all the way down to
the bottom. And in fact to, er – you can also use – you can have a bit of carbon
dioxide in the other cell too, you see, so you can be swapping between two different
lengths of carbon dioxide which gives you a variable spectrum, a variable
transmission curve across – or variable sensitivity curve right across the spectrum.
And you need some calculations of course as to, er – computing from the known
spectrum if it was known very well, you can determine these with high accuracy.

[1:24:05]

And what was involved in having designed this, in having it made to start with, and
then I’ll ask you about how you managed to get it onto the satellite. Having come
with a design, how was it made at Oxford, if it was made at Oxford?

Well the first experimental devices were made either at Oxford or Reading, we both
made some actually. We competed at it [laughs]. And we made the first cell I think
we just swapped – I’m trying to remember the first one, I’m not sure it wasn’t just a
single – a single thing with a division in the middle, and a round thing which just
twiddled round. Hmm, it went through and then the, er – rather than have it
oscillating, we had it just moving round. And then a detector, these were barometers,
they were these – just resistance thermometers adapted to measure radiation. And,
erm, otherwise it was mirrors in the system, because that was the best thing to use in
an infrared in a fifteen-micron band, so this sort of idea, yes. Good [both laugh].
Okay?

And what do you remember of practically actually building – let’s take the first one
that actually – the first model that actually was attached to a satellite. What do you
remember of building that particular selective chopper?

Well now, the whole process of getting onto the satellite is a long one. First of all we
obviously tossed and made simple things up in the lab so that it worked. Happy with
that, that was good. Hmm, we … were just measuring very simply, then, erm, I
imagine we also put it in with the – we checked it against – we checked it in the lab
first of all, that’s right. And then we had – we had to – these interference filters which
were just discs of course with multi-layers on them of different – of different crystalline materials, which Des Smith was a great expert at, which would select certain parts of this band that had the sort of shape of, you know, which was shaped … where is it? [looking through papers] You know, the parts of the band you wanted to select, a weaker band, weaker parts of it, and so on, each selected across the band. Didn’t get the whole band in, erm, because that was – in principle we could have used carbon dioxide, that’s supposed to, itself, do most of it but then it was – that was, er … that was cutting – that wasn’t as good as selecting certain parts of the band to do the bits we wanted. Select with the maximum accuracy the sort of these weighting functions, I’ll show you one. Right. Then – and then we clearly before we could go to NASA properly, we had to, erm, we had to put it on a balloon, or an aircraft. And it was going to be, you know – it was going to be bigger than anything we built for a balloon, the things that Jim and I built the first instance, the very simple thing on the radiosonde, was going to be much bigger than that. And so we were going to have to go into a bigger sort of level of activity, and we also applied to the space funding body for some money, and we wanted quite a lot of money to help us on our way. Can’t remember exactly the – the amount at the moment, but the first thing we had to do was put it on a balloon, and we asked for some money for helping us do that. They were very – rather reluctant to give it to us, because it was, you know – money was important to all these other people too. So what was arranged was at that time the Atomic Weapons Research Establishment at Aldermaston was being run down, and – or diversified rather, they were looking for things – looking for things to do, or projects they could help with. So we got some help from them, instead of money we got the use of the magnificent facilities at AWRE to build our balloon device. And the balloon device is [looks through papers] ... is there, there it is. This has some optics and so on, and selective chopper of course in the middle of it, and so on.

*So this, erm, is a sort of a drawing of it, a Remote Standard of Atmospheric Temperature from Satellites, Royal Society 1970 paper with Abel, Matley and Williamson.*

Hmm-hmm.
Could you describe then the laboratory facilities at the Atomic Weapon Research Establishment where you – where this was made; did you go there to make this yourself?

We didn’t go, we didn’t make it ourselves, we designed – we helped in the design of it, of course. We knew all the ideas, the scientific ideas, which went to it. The optical systems and all the rest of it, we designed it, but they went and built it in their – in their laboratories, in workshops. It was built in the AWRE workshops. And, er … so the actual – we were not involved in the actual building, as I don’t think any part of it was built by us actually. It was all put together there too.

[1:31:00]

Now eventually we managed to fly it. And, erm, there’s a story of that too. Because this had to fly of course, it was quite a big device, well big box.

Sort of a metre high, and …

It was best part of a metre high I should think, that’s right. And eighteen inches diameter all wrapped up in polystyrene, things to keep it uniform temperature, and all sorts of things. And it was going to go on a forty-foot diameter balloon, a rubber balloon still – rubber balloon, it was forty-foot in diameter. Think about forty-foot when it took off, it would get much bigger as it went up. Forty-feet? Yes, that was it. I don’t remember the numbers rightly. And for that we went down to Larkhill, which was the, erm … which was the – belonged to the Royal Air Force of course and was used for testing balloons, and things on balloons. And the Met Office we knew quite well of course too, they had radiosonde – they had a radiosonde station there too sending the routine balloons up every day. And it was 1964. ’64 when we – when the thing first flew? [Pause – looking through papers] Sorry, ‘66. That was – it took us best part of three years to do all that. And it flew on 9th of June 1966 from Larkhill. We’d been trying to fly it in May, but it needs of course a perfectly still night, because that’s the time when you get the least wind. It had to be a very, very, er, very still night. And for one reason or another we didn’t succeed in getting anything there, and there was a critical date which we were trying to meet, which was – which was the
10th June 1966 when – which was the date that proposals had to go in to NASA for the next – for the next space launch, the Nimbus 4, which we wanted to get on. And we daren’t send them a proposal without a – evidence that we could do it in the field [laughs]. So without giving you all the details, I’ll go to the 9th June, which was the night before the 10th June, we’d written the proposal, we had – to send to NASA, I could probably find a copy of it here, if you wanted to look at it. It was a … and we had slips of paper ready to insert in each copy of the forty copies that had to go, saying we’d had a successful balloon flight on the night of the 9th, and the results would follow in due course. This was all packed ready and Des Smith who was at Reading was going to take it to get on the nine o’clock PanAm flight to Washington. The critical thing was we had to get the balloon up in the air. So I remember being – filling, you know, holding the pipe that put the hydrogen into the balloon, that was fed in through a – it had a ring at the neck through which the hydrogen entered, and which held the balloon together at that point, which was a point of aperture of course into the system. And there was a bag of weights, which had to be lifted which was the weight of the equipment, plus – plus a little bit, so that it would have some lift. And had to fill this balloon such that it floated ready to take the thing up. I’d flown little balloons before, but never anything on this size, and so, er … of we started, we filled it, it just got full, just about, it was just lifting the weight, it was almost ready for action when all of a sudden there was a great noise, swish, the whole balloon parted from its neck, and disappeared into the sky [laughs]. So we thought, what on Earth’s the problem, perhaps it was just a [inaud] problem. So we thought we have three balloons, that’s all. So balloon number two comes out, we did the same thing with balloon number two, get to the same point, and swiff, off it goes again [laughs]. So then there was balloon number three, and we thought, well we got to do, there’s something wrong. And there was a bucket with these weights in, which was being held by two strings to the neck of the balloon. And therefore as the – you know, there was a slight bit of wind, as the thing was lifting off the ground, obviously there’s some stress on the neck because – because it was being held on two points. So we thought that can’t be right. So we connected it up differently, we had the central pivot point connected up with string, that was all, making a knot in the string right below the balloon. And then the bucket could swivel from the pivot point, and the balloon could – no stress would be put round the neck. So filled the balloon number three, and off it went, and we got the measurements back, and we sent them off to NASA very soon afterwards. And
the whole thing got to them, and they were a little impressed by this workmanship, and also we wrote quite a professional looking proposal. So that was an important day.

*Who was with you on this balloon launch?*

Well the people from Oxford, there was Peter Abel there, Jim Williamson would be there, I think Brian Matley was with us there, who were the people on this paper, because that’s the balloon one. Brian Matley was there, electronic engineer. And there were others of course from Larkhill, and this happened about three in the morning. So rapid message to Desmond Smith to get his stuff on the aeroplane.

[1:39:23]

It was a very important personal time for me too, because I was expecting our second child at that point, and the question with my wife was, are we going to get the balloon up first, or is the baby going to come first? And the balloon went up on the 9th, Peter was born on 16th I think, yes. Though he was expected a bit earlier in fact. So that was an exciting time for me at home too.

*How had you met your wife?*

Well that’s a simple bit of story really. I met her – my older brother got married to a medical student from Guys Hospital. He had done a – he did a physics degree in Manchester and then went on to Imperial College to do a MSc in meteorology, or research division in his first year. He married a girl called Verna Firth, who was a medical student. And her great friend was Margaret Portman, and I first – I think I might have met her before but, er … my first real meeting with her was at David’s wedding, when we walked down the aisle together. I was the best man and she was the … not that we got together very much after that for a bit. But for a variety of circumstances we met again in, er, about 1960, and began to hit it off. So that’s how I met her. She was a medical student, became a doctor.
And what sorts of things did you do together in the lead up to becoming married?

What sort of things, erm, what do you remember of time spent with her in that period?

So this was between 1960 and 1962 when you were married?

Yes. Oh, wow. What did we do together? So, and … well I mean she was the other end of the country, so there was the problem of – of meeting. I’d either have to go to her home, I went to her home. She was a daughter of a mill owner in Colwyn in Lancashire, run a big cotton mill. One of the big mills of the area actually, and they had a lovely home in Barrowford in Lancashire. And I first went up there one – after Christmas one year, and, erm … what would we do? We’d go and walk in the countryside, we’d obviously go and meet relations and friends, lot of time spent with relations and friends. And then she’d come down to Oxford sometimes when she could. She was working up in the north. So she’d drive down for a weekend, and come and see me in Oxford, and we’d, erm … we’d go out and have meals, and meet people, and so on. And we were both Christians, she was a Christian girl, so we would both go to church together too. That was important to both of us. And, erm, and then eventually we got married in ‘62, and then we went off to Boulder Colorado together of course, and had a marvellous summer in the mountains of Colorado.

Where did you live when you came back having been married?

Well we – we bought a piece of land in Begbroke, outside Oxford, and we started to get a house built on it, designed it, and that was great fun, with the help of our college – the college surveyor from Jesus College, he helped us design a house. And, erm, we got a builder, a local – a little builder, a local builder, and with instructions for him to build it so that when we came back from America it would be ready to go into. And I remember coming back from America, and we got back to Oxford in the dark, we went to look at this – the house in the dark, and of course it was nothing like finished. The roof was on, just about. The rest wasn’t, wasn’t up. And so, one, we had to find somewhere else to live, and we started to – we went into the – the university had something called Halifax House, which was a place for senior – well, for not graduate students, all the staff, junior staff to live, or people from overseas and so on, so we got a room there, imaging that the house might be finished rather fast. But then we – then the problem – we discovered the problem, the problem was that the builder himself
had gone sick, so he was not around. He just had a few chaps who didn’t really know what to do [laughs], with no instructions, and some certain things were going badly wrong. So I rapidly learned a lot about building [laughs], and had to keep the – had to use these chaps as if they were mine. He seemed happy with that, and I had to go and buy things in the builders’ merchants, charged them to his – charged it to his account, and really try and get this place finished, and rectified certain mistakes that had been made, and so on. So I learned a lot about building. And eventually it took us longer than we expected, erm, took us, what, three or four months to actually do that. And we moved into it about the middle of January 1963, just before the very cold winter clamped down, in fact roughly the day before I think, we got in. And, erm – which was very nice to get into it, and of course a lot to do. And the person next door, who’d sold us the land, was an old gentlemen and his wife, they had a bungalow which was not a – which was a not good building in a building sense at all. They – and it wasn’t very long before they completely froze up in the house, they got no water in at all, ‘cause the input also froze. So he would come over every day through a hole in the fence to collect water from our – from the outhouse where we had – where the boiler was for the heating system. He would come and collect his water every day, several times perhaps, in order to keep going for about two months, every day for about two months before he – it thawed enough for him to get water into his house again. Anyway, that’s a little local information.

And did your wife find a post as a doctor in Oxford?

Yes, she did various things as a doctor in Oxford. I mean, she was specialised in handicapped children actually, and that’s what she did for most of her working life in Oxford. She was eventually a part time doctor for – looking after handicapped children on a reasonable scale in the place, in the – for the local authority. Hmm …

[1:48:00]

And what as the effect on your career in science of this change in your life of now being married, and from, er, was it 1964 when having your first child.
No, the first child came in – yes, ‘64 that’s right. ‘64 was the first child, and ‘66 was the second, yes. Janet came in ‘64, a daughter in ‘64.

*What change – what changes in your working life followed from this?*

Well, I had a home of course, rather than living in college, so instead of eating dinner in college of a night, I would go home. At least most nights, I had dinner in college occasionally. So a man in college seemed to eat dinner in college almost all the time, but I wasn’t going to do that. So that was a big difference, having a home and children of course coming along, and helping to look after them and do things with them, and so on. So that’s quite a big change in my private – what I call my private life. And also of course my working life I suppose. I was still working very hard, I guess, putting a lot of hours in, but I was putting fewer hours in because I was spending time with the family, yes, sure. Hmm-hmm.

*And …*

My parents, as you know, also came to live in the area about that time, they left Rhyl came to live at Charlbury, north of Oxford. So we saw a bit of them from time to time. But my mother was still very infirm, and that was – so we didn’t see an awful lot of them.

*To what extent did you discuss your work with your wife?*

A lot I guess, I always have done, with my – she was my first wife, she died in 1986 after ten years of cancer. I married again, who was the lady you met yesterday.

*Yes, yeah.*

But it’s – you know, part of being married is to share what you’re doing, and I shared a great deal with her. I mean, she was – wasn’t a physical scientist, but she knew enough about science, being a doctor, to – and was very supportive, extremely supportive of what I was doing. Hmm, she came from a family of working people, because they were all mill connected [laughs], with a very strong work ethic, you
know, if you were an able bodied man you worked. If you were an able bodied woman, you looked after your man I think was the general style [laughs] about it. But I was keen that Margaret should have a job and do things with her medicine, and she did. And we had to put the – do things, we had half an acre of land, which we – which is wild, and which we enjoyed putting together in some shape. Took us about best part ten years I think to get the model of the garden [laughs], make it civilised.

*And what do you remember of time spent with your children when they were I suppose in the late ’60s, but very young children?*

Yes, well we – I can remember holidays with them when you’d go to the seaside, seaside holidays with them, which was typical seaside holidays with children, building sandcastles, and doing that sort of thing, at that stage, I guess. Making things with sand, or you know, digging and running and playing, ball games, and so on, all the things children normally do. That’s what we did at home too to a large extent, until they started to go to school. They both went to school, pre – pre-schools, and, er … we had a nice garden, so we had – we’d go off and play in the garden. Hmm.

*And …*

We had sandpits, you know, where they could play and so on. Yeah.

*And how was work and home separated? Did you – to what extent did you work at home, as well as working at…?*

Well I had a little study at home, yes, so I could work at home, and I – you know, obviously took work home and did it when I could. And, erm … I was also travelling a certain amount to conferences, or when we were building the satellite test, I travelled over to the States about four times a year I suppose during all the ’70s. Because there were things to do, to be organised, hmm … where we were working closely with the Goddard Space Flight Centre to put the whole satellite thing in together. Hmm …

[1:53:14]
Yes, we’ve left you with the balloon successfully launched on the third attempt, and the proposal’s gone into NASA. What happens next?

Well it went into NASA and NASA eventually said yes. And I can’t remember how long that took actually. So we then had to – we’d done the balloon thing, we then had to really design and build the satellite, and we had to get the money for that. I can’t remember all the ups and downs of getting the money for it, but we were asking for quite a lot of money, £100,000 or something, that sort of order, to build it, looking for suitable contractors to build the flight instruments, because we didn’t have the facilities for building space qualified electronics or anything. So, er, we also had to calibrate the instrument out of a tank – out of a vacuum chamber with the appropriate bits of optics in it to check the instrument itself in – in the lab. Hmm … we found an old tank from somewhere, some old labor’, big vacuum tank [inaud], so which served a great purpose, quite a large chamber, vacuum chamber, where we could pump the whole thing out and test it out. Then, of course, satellite space instruments have to be tested both by vibrating them, frightening thing to watch the thing on a vibrating table, because under launch they get very severe vibrations, make sure it didn’t fall to bits. And also in what’s called a thermal vacuum, so you are, er – they have a test in a high vacuum chamber, and you – and you cycle the temperature between quite high values and low values to see if it doesn’t break up in that circumstance either because it’s being cycled temperature wise in space too. And – so these are tests you have to do on the thing. So there was a lot of testing to be done when you got the instrument and had to work through it. So there were quite a team of people involved in it, both in Oxford and in the contractors, who were Elliotts, they joined with Marconis in the end, they became Marconis after that, but they were Elliott Brothers, and they were doing this sort of thing for space instruments for universities and for otherwise. And so we had to learn to work with contractors, and learn to do things in a professional way, which was very demanding actually, and we had to do it of course. Once we had the yes from NASA, then there was a launch date fixed, I suspect it drifted out some of it, but not a lot. And so we had to build something we’d never built before for a certain amount of money, and no more, and for – and to arrive at a certain date, if it wasn’t there then everything would be lost, ‘cause it would go without it.
And what was the first – the first flight 19 …?

1970.

Nimbus 4.

8th April 1970 was the launch date [laughs].

And so Elliott’s built the, erm, the instrument?

The flight instrument, that’s right, yes. We built bits of it in the lab of course, trying – trying things out, but they essentially put it all together.

[1:57:09]

And how did it have to differ from the balloon prototype in order to become a space instrument rather than a high altitude balloon instrument?

Well it was very – it was going to work in a vacuum of course, it was going to be much smaller, it had to be much smaller. The balloon instrument was just one channel, so, erm, we wanted a six-channel device on the spacecraft so you would see three little boxes on there with two instruments in. And so – well two channels of this very simple kind you’ve seen there. The … getting the zero on the instrument, you know, having a zero was very simple of course, you just looked at space, that was no radiation, so that gave you zero. That was easier than the balloon thing, where we didn’t have any – anything quite like that. And then of course the size of the balloon didn’t matter too much, but the size of what we were doing, and then it had to also work on very little power, the power constraints were very tight, I can’t remember exactly what they were now, but I could … and no, we were talking about a few watts at most, the whole thing had to work on a few watts.

And was it necessary to go to visit NASA before the launch date, for yourself to visit NASA?
Oh, I visited there at least once, twice a year at most – at least actually, yes.

Running up to 1970?

When it got to 1970 I was there, yes. And of course the – then the instrument, once we’d taken the – I took the flight instrument over actually, very worried about taking these things over, you know, about getting them to there, to America, without them getting broken on the way. And then we had an arrangement with British Airways to put them in the cabin, you see, but we didn’t realise how large they were. And [laughs] I was at Heathrow with the – and there was these enormous boxes which had been made by – sent from the Elliotts you see with all these things in, they didn’t go through the door. So they said, ‘Well, we’l have to put them in the hold, you see’ And I thought, well, they’ll have to go in the hold then, I had no option [laughs], so I watched them go in the hold, and then with instructions that I should see them come out of the hold the other end, sort of thing, you see [laughs]. But of course that didn’t happen at all, they just got them dumped with all the other luggage [laughs] in the usual place. By the time I got through immigration there were these enormous boxes waiting to be moved, and I had no means of moving them. I had to find ways of – people to help me get them – get them out and through customs, all those things, but that … you know, we were really very elementary, we didn’t understand how things were done, I suppose, in lots of ways. But we were learning all the time, yes. But trying to be very careful, trying to do it properly. And then of course the instrument was tested over there, final test it was put on the spacecraft, and the test on the space – the whole spacecraft went, thermal vacuum and vibrations and all these things, was a long programme of testing all sorts of things. So we had to have people over there for weeks on end actually going through this process. And being around, being our representatives with their team in America.

Were they people from Elliotts, from the contractors?

We shared it I think. Elliotts had somebody – there were generally somebody from Elliotts, and always somebody from either Oxford or Reading, yes, through all that process. Yeah. Because we obviously had to liaise very carefully with – between us and Elliotts. We had problems with how – with the costing too, because Elliotts were
used to defence contracts, where they could just up the – up the money without any difficulty, you know, just cost more. But we couldn’t do that, we – I didn’t have extra money.

*What other things were Elliott’s making then, including those involved with defence contracts?*

Hmm, well I don’t remember terribly well now. They were making – making things for rockets [inaud], making – a lot of defence contracts, yes. Making things for military devices and so on, I can’t remember too well.

[2:01:56]

*And, erm, on one or across the visits that you made to NASA, what did you see there? I mean, what at that time was – this was the NASA Goddard Space Flight Centre was it?*

Well it was Goddard Space Flight Centre which was the centre of their – you know, their satellite observation, operation in science of this kind. But then the work was actually done by the, erm, by the General Electric Company which was at King of Prussia, Pennsylvania, had a big factory there, a big factory of the General Electric Company, they were the contractors for doing all the spacecraft. So the satellite was built there, satellite was tested there, and we had – two people had to go to King of Prussia, erm, inland from Philadelphia to, er … to put it together, help to put it together and help to test it, and all that sort of thing. Hmm-hmm.

[2:03:01]

*And what do you remember of the first flight of this instrument, and the, you know, the data gathering that followed?*

Well, the other thing we had to do, of course, was to get the data out, and that was a – you know, we saw that as a very broad operation. Hmm, because we wanted to – we recognised we were making meteorological type measurements, so all the
measurements were important. We were looking for the – for trying to make sure the climatology, if you like, in as much detail as we could, particularly we were very interested in the upper channels, actually, the stratospheric launch, because they were the new ones. They were new of course, the ones that were lower atmosphere were not so important, and no so easy to interpret of course because the clouds get in the way. So we concentrated very much on the upper channels and the stratospheric information, which had never been seen before in this scale, with this – with this vertical resolution, or anything like that. Now, erm … so how did we turn ourselves into a sort of weather data laboratory too, but taking in all the data all the time, and checking it out and making sure it was right, and all those things. And Jim Williamson was an enormous help on this because he was in charge of that, and we – and we first had to persuade the people with money that we had to do this, and therefore we needed money for doing it, and they said, because they were astronomers, and people who just dealt with bits of data out there, and throw most of it away, you see, just interesting bits of data, ‘Oh, you won’t be doing it like that, you don’t need anything – anything special at all. The data will come down, you just look at bits of it and that will be it.’ We said absolutely no, we are going to be using all this data because it’s all important. And eventually because there were people like Peter Shepherd, who was a meteorology professor involved in that committee, he knew all about it, so he was a tremendous support, and we got enough money to buy a PDP8, which was an advanced sort of, but small, computer at the time, which was adequate for the purpose. And, erm, was beginning to look a bit more like a modern computer looks these days actually, I can’t remember how many bits per second but it wasn’t very large, but it was enough to cope with our data. And we were then – had to find some room in the lab in Oxford to put the data operation, because we were bursting at the seams terribly, had people all over the place but we had no – no room. But we found an attic room in an old building off the physiology department which wasn’t too far away where we put all our stuff. And I can remember being there on the 8th April 1970 waiting for news of the launch, waiting for the first data to come in. Came in quite soon, the first bits of data came in quite soon.

How did they come in, how did they get to you?
Well we had a – we had a link to – we had a link to NASA, I mean there was a data link between us and NASA, and we also had a link with NOAA, the National Oceanic and Atmospheric Administration, ‘cause the – I’m trying to remember just how – what the details of all these things now. I haven’t talked about it for a long time. But we had a … they were involved too, because, you know, the data, some of the data on satellite was essentially meteorological data, they wanted – they wanted that data. For some reason they, er … I know there was a man with a motorbike every night who drove tapes from NASA to NOAA, or the other way round, in order to enable us to get data on a regular basis. I’m trying to remember exactly why that was the case [laughs] . I’m don’t actually remember, but that was all part of this data link – data link process, ‘cause there were no – oddly there were no links, no data links then between NASA and NOAA. Hmm … but the Nimbus data came down to NASA, that’s right, and, erm … why did we have to get – we got the data via NASA I’m sure, via a data link from NASA. But why did we have to … we may have had to go to – yes, it may have had to go to NOAA in order for it to get via the meteorological data – international meteorological data links to us. I can’t remember. But there were various things had to be set up. We were determined to be doing this on an – looking at this every day in a proper operational way, at least getting it down every day, even if it took longer to look at it.

*And what form did it come – I see you in the attic room.*

Yes.

*And you’ve got this new computer. Hmm, I’m still not sure what you get in terms of data. I mean, do you – is it a telephone call, or a sort of some other sort of transmission that comes in, or …?*

Well it came via a telephone line, yes. I mean, we didn’t have data lines like we have now. It’s hard to remember back – remembering what we did have. We had a telephone line, yes, dedicated telephone line I guess. Hmm, well whether it was dedicated or partial, we could phone up to get it or whatever it was, I don’t remember. Erm, so that’s the way it came in, and then we would store it in different ways, either we could store it on tape, punched tape I guess was what it got stored on in those
days. And, erm, or we could plot it out graphically, or by – or by, you know, numerically whatever it was. There were means of getting it in printed form. Then it stacked up, of course, we got lots of it, yes [laughs].

*I suppose in terms of amount of paper, how much per day were you getting of …?*

Oh, I don’t – I need notice of that question, I can’t remember actually.

*And how long was –*

It wasn’t an enormous number of course, we had – we were making measurements every, er … what was the time course of the instrument, it was – I suppose it was every few seconds. Probably … how long did we integrate over the – making measurements for the radiometer. [pause] I don’t know, ten, twenty seconds it would be that sort of order I guess, because the satellite moves in that time, and we’d have six numbers, plus other calibration numbers, and other things too, coming through the instrument on that sort of basis. So it wasn’t – by modern standards, it was very trivial.

*And how long was the satellite in orbit for with your instrument recording?*

Er, well several years. I can’t remember when it – when it died on us, but then we had – we had another satellite of course went up in 1972, or ‘73.

*With a similar instrument?*

With a similar – it was a slightly different design, yes.

*But this was also a selective chopper?*

It was a selective chopper.

*On Nimbus 5?*
It didn’t have a chopper of an oscillating kind, it had actually cells that switched round every second, I think it was every few seconds. Putting the cells in and out slow motion – slower motions than that, so it was slightly different idea. And, erm … and there’s a story about that too, because how are we doing for … I haven’t offered you any coffee yet, we’ve been talking …

[End of Track 4]
Track 5

… Nimbus 5 in 19 … which went up in ’72. And we had a problem getting money for that [laughs]. ‘Cause we had to apply for the money for that before Nimbus 4 went up. And of course that’s pretty hard when you had never measured anything, never got nothing to show for it at all, and you wanted another large sum of money, hundreds of thousands. So – but NASA of course were running the Nimbus series, and they – wasn’t their – you know, the spacecraft wasn’t open to everybody, it wasn’t a very open – open process, getting things, but you know, having – having then got on Nimbus 4 they asked us if we wanted to go on Nimbus 5.

*So it wasn’t an open process, it wasn’t as if anyone could apply to have instruments put on?*

Well they could in principle, but in practice – I mean, they didn’t publish open access, open – they did not publish to the world, ‘there’s room on this satellite, would you like to come on board?’ It was all done more, erm … more limited numbers of people got involved. But I mean things weren’t anything like as organised as they were later on in the space business, but it was a very sophisticated satellite actually for those days to have actually that size of satellite with that amount of power, and with all three actually stabilised, that was a – that was a tremendous platform. We were very fortunate to be on it, because we couldn’t have done it without, and a very good team, of course, too. It was a brilliant series, so Nimbus 5 went up in … so we made the proposals to the committee to give us, you know, I can’t remember the amount of money now, you know, to do the Nimbus 5. And they turned us down. Hmm, I’m trying to remember the year – which year that would be now, but it was just before Christmas I remember we got this thing saying, you know, you must do something on Nimbus 4 first before we give you any money for Nimbus 5, I mean this is not unfair, lots of people want this money, and so on. So Desmond Smith and I wrote a longish letter to Bernard Lovell, who was chairman of the main board of what was then the Science Research Council, the whole thing, this space thing, was now under the Science Research Council. And, erm … explaining that, you know, we’ve got this wonderful relationship with NASA, and they’d – you know, they were helping us in all sorts of ways, we were getting along with a first instant, and there was a possibility
of a follow up on the next Nimbus. And we wanted to stay in business getting measurements, because the measurements are important all the time in meteorology, and it’s – having done them once, you keep on trying to improve them of course, and also extend the lifetime. Because we’re looking at an ongoing process in the atmosphere, or the climate, and this was important. And – and just saying as strongly as we could, if we say no to NASA now, that’s the end of our career in space with NASA, clearly, and do you really want to kill us off at this stage? [Laughs] So Bernard Lovell was very good, and took that seriously, and that decision was in the end reversed.

[4:08]

So we could begin work on Nimbus 5. And we had other channels on Nimbus 5 with some channels trying to measure cloud cover, what sort of cloud it was, and that sort of thing, there were other datasets to be – come out of that too. But I don’t remember it so poignantly as I remember some of the Nimbus 4 stories [laughs]. Then in 1976 Nimbus – we got onto Nimbus 6. That was a different device, I say it was a – a different device from these selective chopper on Nimbus – Nimbus 4, which, er … which occurred to us in Oxford actually. So Des was not really involved in Nimbus – he was absolutely part of Nimbus 5, the Nimbus 6 proposal went from Oxford, not from Oxford and Reading. And Des was doing lots of other things anyway, besides space, he was not dedicated to space research, but he was dedicated to his – all this instrument work otherwise. And so a simple development of the selective chopper was to – was to have one cell with carbon dioxide in between the detector and the source, and to alter the amount of carbon dioxide in the cell by having a piston in a cylinder moving the amount up and down. And that had the advantage that we were just moving the gas in and out and there was no other – no optical arrangement which might, of course, produce distortions in the way in which the difference was being taken with the selective chopper. But it gave it you enormous versatility in putting different amounts of gas in that cell, and moving it in and out. So we called it the Pressure Modulator Radiometer, PMR. It was simpler than what we had flown on Nimbus 5 certainly, and on Nimbus 4 in some ways, except we had to make an oscillating – the piston and the cylinder was moving this stuff up and down, in and out, at some appropriate frequency. And we also thought it could – because we could
get the amounts of carbon dioxide rather small in this cell, and the detectors might be getting better – were getting a bit better, we might be able to move the height of the – the top height of the measurements to quite a bit higher than we’d been able to do before. ‘Cause we could take the whole band in now of carbon dioxide and just – and just get an effective spectrum of a response which was over a broader part of the whole band. Hmm, there was a further thing that we didn’t realise at the start of doing that, of putting – of producing the PMR, erm … there was a – we suddenly realised when we’d got quite a long way into designing the instrument that – that as you were – because we were going to scan the instrument, scanning the direction of view actually, we were talking of scanning direction of view, to get better coverage. And we realised that if we move the direction of view from directly straight down, either front or back, that we were introducing along the line of sight some of the velocity of the satellite, which meant there was a doppler shift of the lines coming in from the atmosphere compared with the lines in the cell, which were stationary as far as the instrument was concerned. And that in the – in the first sight seemed a problem, but in fact it was a marvellous – the potential – we realised the potential of that, because by scanning the instrument along the line of sight, we realised we were actually scanning the spectrum of the – the absorption spectrum of the cell across the original spectrum coming in from the atmosphere. So we were just scanning these lines across each other, which was exactly what we wanted to do in order to vary the height at which we were looking. So we could vary the height at which we were looking now, not only by altering the amount of gas in the cell but by scanning the lines, by moving the instrument forward and backward. Quite a simple way actually. So it was a – so we had a more sophisticated instrument and we were able to make measurements right up into the mesosphere, up to eighty or ninety kilometres, with that instrument. And, erm … that went up in Nimbus 6. The, erm … and the person who first built one of these Pressure Modulator Radiometers was Fred Taylor, who came as a research student I think in ‘69. Fred Taylor was important because he became actually – he took over from me in charge of the department later on in 1979. Then he became the Professor of Atmospheric Physics in Oxford, and was running the space work. He’s not too far from retirement now but he’s done a great deal of space things in Oxford since I left, when I went to the Met Office and other things. Hmm, and then there was a man called Peter Curtis who was a research student who was brilliant in putting
things together, and he built the space instrument. Well, I say he built it, he did a lot of that work for it.

*So were these instruments now being designed – sorry, being built in Oxford by research students rather than going to the contractor for …*

No, the contractor was building the … well, I’m just trying to think. The contractor was putting it all together. I think the cells were actually being built in Oxford, you know, the core part of the instrument, was actually now being built in Oxford. Hmm … because we got in there, we were getting skilled at that sort of thing. There was a man called Guy Peskett, if you’re looking for names of people, who was also in Oxford. He was a post doctorate sort of person to begin with and he stayed on, he’s still there actually, still working away [laughs] at various things in Oxford. So – so it was quite a team of people in Oxford, so I – some of the core instruments were all – well certainly the parts were made, but it was all put together of course by Marconis in the – of course Elliott Brothers became mocked up by Marconis. And that was an instrument that enabled us to observe all the weight of the …

[12:00]

Now there’s some of the Nimbus 5 results, and so on, there’s all sorts of things in here. [looking through papers] Where’s the Nimbus … here’s the Pressure Modulator Radiometer, with Peter Curtis’ name on it, that’s – that’s what it looks like. You have this vibrating piston, which is just a – mounted on a spring, sort of circular type of springs at each end – each side, moving in this cylinder, and there’s the – and there’s the cell with the gas going in and out. That’s what it was. Oh, and there was another part of this which was a molecular sieve was attached to all this, something called a molecular sieve, which would mop up the carbon dioxide, or would contain a lot of – which would – a porous material contained a lot of carbon dioxide, and if you wanted to alter the pressure in the cell you just alter the temperature of the molecular sieve. So we could alter the temperature, and alter the amount of gas in the cell, and therefore alter the part of the atmosphere you were looking at [laughs]. So it was a very versatile device.
And then, as you say, you could also alter the part of the atmosphere that you were scanning by the movement of the detector?

By tilting the radiometer, yes, that’s right. And it’s – I guess that’s all written up here. There’s the – well, that’s a typical spectral line, erm … that’s a typical spectral line, a weak line here. And when you take the difference between the two amounts of – the absorption, these are the two positions of the piston, A and B. The difference between A and B is C, so that’s what the effective sensitivity of the instrument is regarding that spectral line, but when you doppler shift it, by movement of the … you get a movement to there. So you’re moving this across there all the time.

[14:16]

And in general terms, without attempting to reproduce what you’ve written in papers, and for our listeners who aren’t physicists, what was – what were all of these measurements, four, five, and six, beginning to show about the temperature distribution of the upper atmosphere that wasn’t known previously? Could you summarise what was being – what this data was revealing?

Okay. The – as far as the Nimbus 4 and 5 were concerned, they were restricted of course, this is Nimbus – this is Nimbus 6, this is the weighting functions, now we’ve got some weighting functions right up to here, about ninety kilometres you see, with Nimbus 5. So we were getting now, with Nimbus 6, we were getting temperature structure right into the, what’s called, a mesosphere, up to ninety kilometres more. And that had never been seen before on any – apart from individual rocket measurements, different places had never been seen before on a global scale at all. So that was quite new. The measurements down here, there were other people flying cruder instruments, which gave some global picture of the stratosphere’s temperature. If you were to take those, for instance, those very sudden warmings, you can pick up that sort of signal from a cruder instrument on other satellites who just had filter radiologies. But the structure, its structure over the globe, and the height structure was something we were getting for the first time, so you could study these stratospheric events, trying to find how they were linked with things in the troposphere, because there’s a link between the two, and how it was moving – and
also discover how it was moving various constituents round in the stratosphere where
the ozone is contained and what’s the – how much was the ozone moving, how much
did these waves, erm … interact with the mean flow and the movement of different
gases in the stratosphere and so on. So they were, you know, giving people a great
deal of information, new data.

So temperature structure allowed you to see movement, atmospheric movement?

Temperature structure, you, er … does tell you about the vertical motion that’s going
on because air that’s moving up on the whole is colder and air that’s moving down is
warmer, so that gives you a structure. So you can link the temperature structure to
your understanding of how the overall thing is moving, so the circulation of the
whole. And the circulation of course moves gases around, moves constituents around,
and also interacts with mean flow so that you are – you can slow mean flow down or
you can accelerate it actually by different – by the way in which the – transferring the
added energy into the mean flow, so that’s an important part – very important in that
part of the atmosphere. So you’re trying to understand particularly the way in which
the stratosphere deals with minor constituents like ozone, water vapour and other
things up there, and also what the interchange is with the troposphere glow. Hmm,
and it’s helped enormously in a lot of studies of that part of the atmosphere, and
particularly the – I grew a particular interest in dynamics of the wave structures, what
sort of waves have you got up there, how are they generated. Some will be
propagated upwards from the troposphere, other waves could be generated into, you
know, the stratosphere itself. So, erm … so there’s always a lot of papers involved in
that. I wrote a paper in the mid ‘70s actually which was a sort of summary of the
conclusions, presidential address to the Royal Meteorological Society published in the
quarterly journal of the Royal Meteorological Society in … let me [looking through
papers] – I must not get these too much out of order otherwise I’ll have a job putting
them all back again. I don’t know whether it’s still here, seventy-four. It’s in the next
lot of papers, I think, but I’ll – wait a minute… it’s the… no…

And how was this work, using satellites in order to observe the atmosphere from
above, connected to organisations like World Weather Watch, the Global
Atmospheric Research Programme, international projects going on at the time
concerned to better understand all sorts of things about the atmosphere, including the sorts of things that you were finding out?

[0:19:48]

Of course, yes. Well, the Global Atmosphere Research Programme began, erm … around 1960, the early ‘60s, and the stimulus of course was the observations from space, because we were – not only – we were concentrating on the stratosphere and what we were doing, there were other people concentrating on the lower atmosphere and we could still get measurements actually from the lower atmosphere but they were crude compared with what other people were doing on the whole. NASA were putting a lot into that and NOAA were starting to send – to get measurements from places from the lower atmosphere.

Were there any British scientists working on satellite observations of the lower atmosphere?

Not – there were people working on the data, yes, but there wasn’t anybody doing the instrumental work. We were the one instrumental group in this area, which – which we – it took a very long time actually for the accuracy of the lower atmosphere measurements to be really valuable in atmospheric models for weather forecasting.

[0:21:06]

Really reliable enough because of the way in which clouds get in the way. And you need very – you know, measurements to be really rather accurate. Nowadays it’s a very important way of getting data in from space but you have to go back to the – but you go back to the early ‘80s, for instance, it was not really very good then. Or, you know, the ‘90s, it was not adequate because you couldn’t throw away all the radiosondes and all the other ways of getting measurements, but that’s beginning to happen with the – it’s coming largely from space but it’s taken a very long time to happen. And interpreting the data in ways that are – it’s reliable enough to run through an operational programme, the weather forecast, is – has taken a long time. You know, the retrieval techniques to recover a temperature profile is a very
sophisticated business because you’re getting – you’re only, you know, with instruments of this kind, with two or – four or five channels. You’ve only four or five numbers to define the atmosphere’s temperature structure from the surface up to, say, the stratosphere and – and you have quite a lot of information from other sources, from your knowledge of the atmosphere, to say, you know, roughly what the shape of it is so you can use all of that information, average information to say what it roughly looks like, you believe. And then, you know, put those functions into your retrieval process so that you come up with the best possible result using the information you believe you have already and the new information from the satellite. But putting those two things together is not easy and it’s taken me an awful long time to do, especially realising that clouds muck it all up because they radiate too. And they’re the – but there’s a lot of it’s done in the microwave part of the spectrum now, where clouds are that are not so – not so noticeable.

*And so what was your personal involvement in the Global Atmospheric Research Programme?*

Hmm … I mean, I was … I knew about it, I was interested in it, I went to one of their – you know, the – they now have the joint scientific committee, which was running it, chaired by Bolin in the first – Bert Bolin as the first chairman. And I went to one of their meetings in Nairobi, I remember, in about the early ‘70s, talking about space measurements and things of that kind, contributing in that side of things. So I began to contribute to the way which the [inaud] data was used and set up and so on, getting involved in the data process, but we were – and we were feeding, of course, data in from our – from the Nimbus series into the – trying to feed that into the global system, global meteorological system. I got involved with the Met Office during those years too, I was on their research committee. Hmm, I can’t remember when I went on and when I went off but I went on sometime in the ‘60s, I think, joined the research committee of the Met Office. Hmm, and was very interested in the whole story, but Oxford was not contributing a lot of – we were contributing some data, particularly of the stratosphere, but we were not very involved in the whole process of – there was the numerical modelling of the climate started of course in the ‘60s, of the whole atmosphere and then of the climate, and became important in the ‘70s, particularly through the work of Syukuro Manabe at Princeton, Princeton University. And I was
Aware of all these things, I met people at conferences and so on, but my own involvement was fairly small during the ‘70s. It became much bigger later on. Well, I’ll go on with that, if you like.

Well, first of all what was your view of these – these first efforts at numerical modelling of the atmosphere?

Yes, did I talk to you about that before?

Off the recording.

Mm?

Not on the recording.

Not on the recording, oh.

[0:25:36]

Well, I got interested in weather data and the whole weather system, in fact of course I wrote a textbook on *The Physics of Atmospheres* in 1970 – 1976 it came out. I was lecturing about it in Oxford and I put them down – put it down in a textbook. Hmm, I wanted to write a textbook that looked like a physics book and not a geography book, you know, with all the basic mathematics in it and all the basic structure of the – of the way in which you solved the equations of motion and the way – the sort of way forecasting was done to some degree. I was not a great forecaster, although I had a brother who was a very good forecaster, but I tried to write up just how the atmosphere was behaving, what we understood about it and put all that down in a physics textbook. And first edition was 1976, third edition was 2003, so it’s still going actually, still sold and still used. Hmm … so I was very interested in the whole process. And I was never a numerical modeller in the sense of doing my own – building my own model but I was very interested – we were very interested in making models of it actually. In fact I realised in the ‘60s, in Oxford, that we had no atmospheric dynamics in the group, no dynamists, no one who knew about dynamics
in the group. And I tried very hard to get a position from the research council of somebody who could do the dynamics. It took me an awfully long time. I tried the Met Office for money, I tried all sorts of people for money, to get some dynamical work going on in Oxford. In the end I did get some support and a man called Bob Harwood came and joined us, who was a – who was trying to model the – who was particularly of course interested in modelling the constituents of the atmosphere and the way they were moved around by – in the stratosphere, the ozone chemicals and so on. Kenneth was involved in ozone and he was a man who built a two dimensional model, it had no east and west in it, it was averaging around latitude circles in that way, but it had the vertical dimension, of course, and the – and the latitude. And I was – and this was a dynamical model, solving the equations of motion averaged over the thing. It was a very effective means actually of trying to understand the way in which gases are moved around in the atmosphere, the way in which the atmosphere behaved as a – we took a cross section of it from pole to pole. So we began to learn some dynamics, I began to learn some dynamics which enabled – I went to Bob Harwood’s lectures and it helped me to write my book [laughs]. Hmm, trying to write it down in a form that physicists would be attracted to rather than mathematicians on the one hand or geographers on the other, and so … well now I began to learn a bit about numerical weather prediction. Of course it was not for good then, it was not – it was providing general information but if you had to actually make a weather forecast that way, the forecasting and the – it was being tried in the Met Office, and it was not working that well because it was too crude at that stage. And it was too coarse, the grid was too coarse. And in order to improve it you’d have to improve the data going in, you’d have to improve the resolution enormously and it would need a lot of work on it, and I just wondered personally whether we’d ever really replace the human being, ‘cause somebody who really understood different scales of motion. The very small scales, of course interact with the very large scales and these computer models can never describe the small scales in any detail, they were just treating it as friction or something, you know, below – you just tried to average it all. And that was going to be a big challenge in order to – to first of all get the resolution, improve the resolution, because you needed much bigger models, much bigger computers. How we were ever going to really describe what was going on between these different scales of motion – and so I remained a bit sceptical, I think, about its – about numerical modelling actually replacing the human forecaster and how much it would
actually contribute to understanding the climate if averaged over a long period. Hmm, it doesn’t mean I was negative about trying it and doing it but I was cautious about saying this is the answer to – to all about it.

[0:31:05]

Of course the numerical modelling goes back to the days of LF Richardson work in the 1920s, or in the First World War. Hmm, LF Richardson was a brilliant mathematician who, er … who was in the Friends Ambulance Unit in the First World War in France. He took with himself a large rule and he actually – in his off moments from doing his medical work with the French [laughs], he actually tried to solve the equations of motion in a small part of the atmosphere to see how it developed. Took him six months for his first calculation, which was about six – which was for a six hour forecast, I think, something like that [laughs]. It was doing the integrations of these equations by hand. And he – he didn’t get a very good result but that didn’t deter him. He carried on with that work and then he – he had a dream. His dream was that he would have St Paul’s Cathedral full of people and runners with bits of paper and actually doing these things in real time. He wrote a book called *Numerical Weather Prediction* around 1920, which is an absolute classic of its kind, imagining that this could actually occur if you got enough people working away efficiently to compute the weather using numerical techniques. And why was he doing that, he realised that the only way of adding together all these non linear processes, you couldn’t do it analytically very well at all, you’d have to have a numerical way of integrating the equations, the only way you could do it. And that’s absolutely fundamental to this idea of numerical weather prediction. It’s not – you’re not – you’re not using empirical sort of modelling, empirical ideas, as economists might use for their forecasts, you’re actually using the real equations of motion, albeit truncated of course at the size of your gradient after feeding empirical components for describing things you can’t describe in the model, but the basic thing is you are – it’s all very – the whole process, dynamical process, is a very [inaud], the way in which dynamics interact with other dynamics in the atmosphere or anywhere else within the – in things that move in that way. And of course Richardson never saw that dream come true, it didn’t come true till the ’50s when Jule Charney at MIT began to – to
produce a first model to – on early computers. Hmm, so that was something I was interested in, I wrote about it in my textbook.

[0:34:18]

In 19 … we’re moving out of the ‘60s now, out of this – where are we, 1979, there as a World Climate Conference, which I went to I remember, that was an important event in trying to – there was the Global Atmospheric Research Programme had been going and I’m sure I went to some meetings concerned with that. That – and then the question was asked, can we do the climate. Not just the weather but looking forwards long periods, and in particular what are humans doing for the climate. Hmm, so my own involvement – I go back to ’67, I gave my first lecture on global warming to the British Association for the Advancement of Science, pointing out that the greenhouse effect was a well known thing and saying that we were now putting carbon dioxide into the atmosphere in large quantities and it was – the atmosphere might be warming by possibly one degree or something, if you take simple calculations, and we had no idea what that was doing to the climate. But it was certainly a matter of scientific interest. And – and people were beginning to wonder of course then what we really were doing for the climate, well we didn’t really know at all. There was the group at Princeton who started with their climate models in the ‘70s and they were producing good stuff, I mean, interesting stuff, but it was still very crude of course. It was suggesting that it was really going to – all this carbon dioxide really was going to affect the atmosphere. The feedbacks were not well known except there was a strong water vapour feedback, which is fairly obvious because you increase the temperature and you increase the water vapour. Water vapour’s a greenhouse gas so you make the thing bigger. Hmm, so those climate questions were beginning to be asked internationally. There were other climate questions beginning to be asked. There was something called the Nuclear Winter. The possibility of a nuclear exchange worldwide was – was frightening in the extreme but would that in fact cause – ruin the world’s weather, all this dust going up and dust and debris into the atmosphere, was that going to keep the sunlight out and, erm … and prevent human life continuing. And there was a great debate about that in the ‘70s. After all, was it 1815 when there was a year without a summer because of the big volcano that erupted in those days and, erm … so was this going to be a major problem. I didn’t contribute a
lot to that because I – the initial models were very crude and alarmist, suggesting that, you know, there really would be – the summer would be cut out for a long time and you wouldn’t be able to grow things and so people would starve and so on and so on and so on. So that was really thought to be their major problem. But a lot of those models hadn’t got any water cycle in them and of course if you have a water cycle then this washes out the dust. None of – they were crude in the extreme and they weren’t really sufficiently realistic to … in any case it seemed to me odd that people should be arguing against a nuclear exchange for a meteorological reason [laughs] when in fact a nuclear exchange of the size being envisaged was, you know, an absolute disaster in its own right, why did you have to add to it something else that was making it worse [laughs], or supposedly making it worse. But that was raising public interest in the – in the climate. There was a second World Climate Conference in 1979, I remember, and was set up rather like the Global Atmospheric Research Programme effort was set up, er – organisation was set up internationally between – this is between the World Meteorological Organisation and, erm … ICSU, who are the International Council for Scientific Unions, and IOC, the International Oceanographic Commission, I think they were the three people involved in – involved in GARP.

[0:39:27]

Moving onto – we’re getting into the 1980s now, 1981, I became chairman of the Joint Scientific Committee for the World Climate Research Programme. I was the second chairman to a man called Joe Smagorinsky, who was a big modeller at Princeton, ran the Princeton group, a very able man indeed. And I was asked to take the chair when he left and move the World Climate Research programme on its way, which was a big task. And – but it’s surprising looking back, a surprising task for me in a way because I wasn’t that much of a climate scientist compared with some other people in the world. But anyway I was seen as somebody who was doing the space stuff, very involved in the space things, which was clearly very important and … and I suppose I was seen as a chap who could try and move things in. So that was a big challenge to do that. I remember the first meeting of that committee I went to. I sat down for the committee meeting, there was a man called Bo Doos, D-o-o-s, who was a Swede, who was a director of the programme and the – working in Geneva with the
World Meteorological Organisation, and a good scientist and so on. And he handed me a letter, a resignation, which I hadn’t seen before, knew nothing of it. So my director was resigning before I’d even taken the chair [laughs]. And I can’t now remember too well his reasons for telling me he was resigning, it was nothing to do with me, but … but it meant of course we had a major problem, we had to find a new director. And, erm … I can’t remember too much about what we did at that meeting otherwise – other than trying to say we’ve got to find a new director as fast as we can. There was a man called Pierre Morel, M-o-r-e-l, from France, who’s a very dynamic man, who had been largely responsible for the French Meteorological Society programme and he’d set up Meteosat, which was the first geostationary satellite, but possibly the first one flown, I need to – I’m not sure of that fact, whether it was the first – whether the Americans had done it or not, this is – but he drove the programme for the first European meteorological satellite in geostationary orbit, which was taking cloud pictures of course over the whole world. And he was a meteorologist of some, you know, with wide – I’ve forgotten who he was working for now either, I did – and we’ve said a lot of things about him and I was going to talk about a great deal, but he was a very dynamic man and he … and he and I plotted together on how we were going to run the – what we were going to do with the World Climate Research programme. And Pierre’s ideas, which I felt were very good, were we needed some sub programmes which were real experiments, you know, going for real parts of the system, understanding parts of the system. We set up something called TOGA, which was Tropical Ocean Global Atmosphere, which was because there was a lot of interest in that time in the El Niño effect, what was really happening in the Pacific Ocean, which was the biggest climate vary – variation which was occurring in the world and had done for a long time of course, and if we didn’t understand that we weren’t going to understand much else. And there had been – and GATE – and GARP had a programme also called GATE, Global …?

Atmosphere Tropical …?

No, the GARP, GARP Atmospheric Trop – GARP tropical experiment, GATE. GARP Atlantic Tropical Experiment. They’d done an experiment in the – in the Atlantic making measurements, trying to discover just what the influence of the Tropics was on the whole global climate and the interaction between the two. And
they chose the Atlantic because it was easier to get observations there and so on. But it was realised that of course in the – the Pacific was very important because there was all this El Niño stuff in the Pacific, which – which probably propagated to the Atlantic anyway, but that really needed to be understood. So TOGA was the – was one programme of the new World Climate Research Programme. And the other one was the World Ocean Circulation Experiment that was trying to discover just how the oceans are really circulating. So we need data addressing the needs of those two wings of our World Climate Research Programme. And thanks to Pierre and – I mean, I supported him of course, I – we both drove it along very strongly and, erm … and tried to, you know, get support for these things.

[0:45:27]

And Pierre Morel was a great – a great person getting the resources and doing things. But he was not everybody’s cup of tea.

Why is that?

Well, he was a very strong person, had to have things his own way and, erm … didn’t suffer fools gladly or didn’t suffer anybody else gladly in a way. Not an easy man to work with, especially if he didn’t think anything of you, if he didn’t think you were very good or very much good, then he would have no time for you at all. And that of course in an international programme can be very destructive and there are ways in which he was a bit destructive, and I’ll give you an illustration later on of that in another context. But, erm … I also remember getting a very strong letter from Joe Smagorinsky, who was no friend of Pierre Morel’s, you know, the first chairman of the committee, who was absolutely amazed and aghast, the fact that I’d appointed Pierre Morel to the director post. And he was terribly upset about it, absolutely the wrong thing to do, quite the wrong person to put in there. He’d obviously had, you know, bad experience of Pierre Morel. And it was – but then Joe Smagorinsky was the person of his own – you know, wanted his own way too [laughs].
And were there any British scientists involved in either of the two wings of the World Climate Research Programme, which you were pushing through, either the Tropical Ocean Global Atmospheric Experiment or the World Ocean…?

Yes, yes there were. Hmm, I should answer that question having some homework, of course, but I – to be fair to the people involved, I mean, in the World Ocean Circulation Experiment, for instance, John Woods, who is now at Imperial College and was – I’m trying to remember where he was when we were there. He was a member of the committee and he helped to drive that very much. In fact he was the main driver, I think, in that particular programme. Hmm, on the TOGA side, I’m trying to remember who they were now. Hmm, and I do need notice of the question, as I can’t remember too – I can’t remember well enough to describe.

No, we can easily – they’re details that can be easily found. But more generally at this time, who in Britain was work – you mentioned Princeton being very important in terms of both modelling weather and modelling climate, but where was this happening at Britain at this time, in the ‘70s? Hmm –

Well, the Met Office was beginning to – had been doing weather modelling for some time and they began to do climate modelling in the ‘70s. They were behind Princeton in the sense they didn’t have the same resources and they weren’t as sophisticated models but they were doing some good work. John Sawyer, who was their director of research, was a good, you know, a very good scientist and he knew about modelling. And John Mason of course was a man who had lots of drive, very keen on it. And I think – I remember John Mason saying that the reason they were doing it, it didn’t – because the Met Office is weather and not climate really and there’s always been a distinction drawn there between the two, but nevertheless they were doing this work on climate because the – you know, the powers from the MOD at the time were worried about the possibilities of climate being – or climate alteration being used as a weapon as – being used as a military weapon. The idea that you could change people’s climate was being put around, linked of course with things like the nuclear winter work. You know, we had altered the climate perhaps in enormous ways and really used it as a military weapon and it’s going to be used on us, we need to know about it. So a fair programme was started at the Met Office in the ‘70s on modelling
the climate too. Hmm, so they were one of the other main modelling groups in the world, I suppose. I think there was also a group in Australia at that time too and elsewhere. But, erm … I can’t give a completely consistent account of all these things because I don’t remember it all too well unfortunately. I’m just telling you what I remember –

*Yes, yes, that’s perfect.*

And not of course what I don’t remember, and that’s spotty. So this is not an official account of everybody involved because there were lots of people involved in it – these things one way or another.

*Yes.*

I’m telling you about my particular recollections, which of course include the particular involvement I had in these things.

*Yes, I understand. And something else I just wanted to take you back to, the World Climate Conference in 1979, the second World Climate Conference, you said you attended this conference?*

[0:50:57]

That was the First World Climate Conference in ’79, First World – did I say the second? There was a second on in 1990.

*Ah, okay. So this first one in ’79 which you went to …?*

In Geneva, yes.

*Could you give me your memories of that in – I think there were some workshops associated with it in Austria, I don’t know whether you – Villach, is that right?*

Oh, that was – yes, they came later, they came in the ‘80s.
Ah, okay.

They set up these workshops, I think, at Villach in Austria. I didn’t go to – I was not involved in those. So, er, they were important meetings actually which occurred in Austria in the ‘80s and there was a – in particular a volume published by SCOPE, which was a Scientific Committee – Scientific Committee … SCOPE, on the environment – this is an ICSU committee. And SCOPE, the twenty-ninth volume in their series of doing things is the – is the book on climate, which is a significant book. Bert Bolin chaired that meeting and other people were there who were involved in the climate and how it was interacting in the world. And that was the first, you know, decent complete summary of what we knew about global warming and climate change due to human activities at that time.

What are your memories then of the World Climate Conference itself in ’79?

I don’t have a lot actually as of now, so … [laughs] I’d have to remind myself what went on in ’79 at that conference. Hmm … there was a particular person I remember well who was – whom I collided with, either at that conference or one in 1990. There was a Professor Yuri Israel from Russia who was a – head of the Russian Met Service, a big man who believed in himself more than anybody else I’ve ever known. Hmm, and was a … was a very difficult person to work with on committees in any way. And he was – I’m getting to my Met Office period now and I won’t say any more about him till then. But I think what I’m thinking about is 1990, not 1979 actually, as far as he was concerned, at a guess. What else happened in that period? Hmm …

[0:53:56]

19 … 1976 I became – I was given a personal chair at Oxford. 1979, erm … I was still at Oxford of course and wondering what we – oh, there’s another satellite experiment I should describe first. I’ve been – done Nimbus 4, 5 and 6, there was a Nimbus 7. Let me do that first. We’d done the – you know, we’d done the middle of the atmosphere, we’d done the top of the atmosphere and we tried to think of something really big to – really grand to do the – not only do measurements of
temperature but also measurements of composition, again using our pressure 
modulators. So we devised something called the stratospheric and mesospheric 
sander, which was going to look at radiation from the earth but instead of looking 
straight down we were going to look on the atmosphere’s limb, was going to scan the 
limb. As you scan the limb you scan the height and we were going to look for 
different constituents. By putting gases in pressure modulators and looking down the 
limb you really get the spectral sensitivity and selection that we needed to actually see 
what was happening. So we built this thing, which had a lot of channels. [Looking 
through papers] I doubt if it’s in this set, it probably moves onto the next volume. 
Where are we? Do you want to see a picture of it? But it’s … hmm [pause] no, I 
can’t find it, I’ll have to … uh-huh. But you can imagine, you know, it was more the 
size now of the balloon instrument we’ve got for – you know, it was a sizeable 
instrument which had ways of splitting different parts of the spectrum up as well as 
different radiometers putting – attached to different detectors. So we were looking for – 
we were measuring water vapour, we were measuring methane. I’m trying to 
remember what we were measuring now altogether, measuring water vapour, 
methane, nitrous oxide I think … I need notice of that, can’t remember. Awful that I 
can’t remember, but anyway, we had a fairly complicated instrument measuring 
atmospheric composition on the limb. And we got a result with cool detectors as well, 
like a cool detector by using radiated coolers, and that went up in ’78.

[0:57:53]

Hmm … then in ’79 I was asked if I’d like to go and become director of the Appleton 
Laboratory. I, perhaps foolishly, I invited – his name’s just gone from me, I’m 
hopeless at remembering names. I know him terribly well, he’s the chairman of the 
SRC, Science Research Council. Geoffrey Allen, Sir Geoffrey Allen, invited him to a 
dinner in Jesus College one evening, and later on he said how about – how about the 
Appleton Lab, we’re looking for a director. And the Appleton Laboratory, which was 
the old radio research laboratory in Slough, where Watson Watt had been in the ’30s 
and invented radar and so on. They’d done the work on the various ionised layers in 
the atmosphere, scientific work. A very good laboratory, done all that work, but it 
was largely done actually, as far as people needed to know about the atmosphere and 
radio propagation and the ionised layers. And the SRC had acquired the laboratory,
I’m not sure who had it before, I can’t remember, but they wanted to turn it into a space science support laboratory and they also wanted to move it from Slough to merge with the Rutherford Lab at Chiltern. And it is now the Rutherford Appleton Laboratory. And would I like to go and do that? So I told him I thought he was off his head, why should I ever want to go and do something crazy like that and leave a lovely place like Oxford and so on. But of the course the idea stuck and I realised that as far as space was concerned, working with Americans in space, the future was a bit bleak, because NASA was now building shuttles, putting all their money into building shuttles, and a programme like Nimbus had stopped, Nimbus 7 was the last. And although there were talks of an upper atmosphere research satellite and so on as the next one in line, that wasn’t going to come anyway until, you know, for many years. In fact it didn’t come till 1991. The next satellite in line from the Nimbus series, looking at the atmosphere in the earth, was 1991. And I thought, well, that’s the end of the satellite era in a way, and I don’t suppose in any case I’ve been doing it long enough now probably, somebody else needs to take it over. And I reflected on, you know, people who stayed in their – became heads of departments at a fairly young age, what happened to them in later life, you know, they couldn’t keep up momentum very often and often their departments declined, and so maybe this was an opportunity for me to go and do something else. But I was very interested in the idea of a space science support laboratory because that seemed to me a marvellous thing to do anyway. So eventually, I won’t go into the history of all the negotiation, I said, oh okay, I’ll do that. So I went to the Appleton Lab and I had this tough job of moving chaps who didn’t want to move at all, who thought they were being eaten up by the great Rutherford tiger, you know, one of the really top laboratories in the country and they were seen as rubbish by comparison, you see, so what chance had they in this new world. So that was a very interesting assignment, I learnt about management I suppose. And I soon realised that I – I mustn’t go into the Appleton Lab and talk them down in any way, I had to talk them up because they were good people and I was their boss so I had to, you know, present them to the Rutherford tiger [laughs] as great outfit. And further I also realised that I hadn’t got to go round – and I had to go and find out what they were all doing of course, but in no way must I rubbish what they were doing because that would be even more death to them. I had to show – and they were doing, you know, perfectly good stuff in its way but not very interesting, I thought, not very forward looking and rather old hat to them, I was sort of dotting Is
and crossing Ts but it wasn’t my job to stop them doing that in the first instance, my job was to attract them to become involved in new programmes. So we generated some new programmes and I had some people from outside who came to help me with – in a deputy post and so on. John Harries came from the National Physics Laboratory to run the earth observation side of a new programme which was going to have earth observation as an important part of it and also going to have astronomy and other space things involved as well as also part of that programme. So it was a lab with, what, 200, 250 people in it and – and we merged with the Rutherford Lab under Godfrey Stafford, with Geoff Manning running the Rutherford part of it. I could tell you some stories about that but [laughs] perhaps we should move onto – that was a – and so I became extremely busy of course doing that. I couldn’t run the Oxford department at the same time so I had leave of absence, eighty percent leave of absence from Oxford. I was still a twenty percent professor.

And what decisions did you make about what a space science support laboratory ought to have or be?

Well, the decisions were to some extent of course made by the space community in the UK. We were there to support, we were not there to set up a completely new place which was doing its own thing, although we could do some of that but our main job was to support work going on in the universities in the UK, to help them do the things they wanted to do. And to organise – help to organise programmes and to, you know, give a really professional look to all this space work, join people together in what they were doing, produce new things that they wanted to be involved in and so on. So it was – it wasn’t doing a lab with a completely clean slate, it was producing a lab’, laboratory which was supporting existing work in space and trying to move it on in the right sort of way. And that was a very exciting thing to do really and a very good thing to do, that was the point of that whole laboratory at Rutherford Appleton was to support university research, as it still is. And, erm … so I got – and then I thought as far as Oxford was concerned somebody had to take over from me as head of department and run the Oxford end of things. And there was a man called Fred Taylor, who had been a research student, he did the – built the first pressure modulator and he’d gone to JPL, Jet Propulsion Labs, in the United States where he was working, and I suggested they asked him to come and be acting head of
department while I was away, I was going for three or four years. Four years actually it was talked about, with an intention of course of going back to Oxford after that, a real intention. And, erm … so we set up these new things, new programmes, which were good and the one thing – the one instrument – new instrument from the earth observation point of view that came out of that was the Long Track Scanning Radiometer, which was a way of observing the sea surface temperature very accurately. Sea surface temperature, a very important meteorological and geophysical quantity because the temperature of the ocean surface determines how much water vapour you’ve got in the atmosphere, and it varies quite a lot and you need to measure it to better than one degree, much better than one degree. How can you do that in an atmosphere that gets in the way and absorbs and changes? And the long track scanning is just to observe the earth surface – the surface of the ocean at different angles in the infrared or indeed wherever you can observe it. And – and so you can correct for the atmospheric absorption by varying the path of the atmosphere between you and the ocean. And that took a lot of working through but it is now, what, thirty, forty years later. We had the anniversary recently to celebrate forty years, I guess. No, thirty years. Or was it? Wait a minute, no, no, no, whatever the anniversary was, twenty-five or thirty, yes.

And you say it came out of that, how did the development of this scanner come out of this period working with these two laboratories combined? How did you bring it about?

Well, I mean, the – the Appleton part of Rutherford – we were two divisions but in the Rutherford set up, between what had been the Rutherford set up, one was on earth observation and the other was on astronomy and the rest of space work. And so we were, you know, we were substantially independent of the rest of the lab as far as the work we were doing was concerned. The ATSR got produced as a joint project between, erm … I mean, Oxford were involved because Jim Williamson was a bit involved. There were people – there was somebody called David Llewellyn-Jones, who came and joined the Appleton Lab and he was very influential in it. Other people - there were people at Imperial College, there was a number of labs that actually joined in that instrument. And it was very much John Harries’ baby too, who’s the head of that division. And it flew on the – its first flight was on the ERS-1, which
was the first European robot sensing satellite that flew in 1991, I think, for its first flight, but it took an awful long time to grow and develop. So while I was there there was only a small amount of, you know, it only got a small way along the line but it turned out to be a very good instrument, not only because it was very well built from an instrument point of view but the way in which the data was interpreted was – had a lot of clever things in it to try and make sure it really was accurate. And so it succeeded because it had some very good people working on it, it really succeeded in getting very good answers in the end.

*Why couldn’t it have been built at one of the universities that contributed to it? In other words, what was the role of the Appleton Rutherford Laboratory in bringing this about? Why couldn’t, I don’t know …?*

Well in principle, of course, it could have been built in a way at one of the universities. And in fact universities were involved in building it. But, erm … it showed the role of the new laboratory was to get different universities working together and the – what the Rutherford Appleton was doing, we were coordinating work going on in universities and helping them to develop joint programmes in a way which was essential actually if we were going to move forward in this whole space business, because it was outside – much of it was outside the competence of a – of a single university department. We’d been very fortunate at Oxford in getting it right on the ground level with the Nimbus series, erm, and without the experience and all the rest of it, we had no experience at all. Where did our experience come from? It came from NASA actually, it was working with NASA that provided the, you know, this space knowhow that we really needed to get hold of. And without NASA we wouldn’t have succeeded at all. And I suppose what RAL was doing was to – was acting as a sort of NASA to people who were working with the European programme or whatever. They were providing the, erm … and so we had to have people in this new outfit who really knew about satellites, about space hardware and about space components, about all the things involved in putting things into space. Things that had – that we had acquired knowledge of incidentally because we were working with NASA for those years. So that was the crucial thing in setting that up.
And what was the relative status of earth observation and other kinds of space research, including astronomy, within this laboratory, and the relations between the people involved in each of those?

[1:12:47]

Well, they were on the whole working in different – with different sorts of instrumentation. But when it came to testing of course, the satellite connections and so on, there was a lot of synergy there and they worked together very well, so – they were roughly the same size. I think the astronomy and the rest were rather larger than the earth observation in fact because there were more universities involved in – involved in that. But on the whole we’d much smaller instruments at that time. They got much bigger instruments later on but at the beginning they were – because they were small departments they were making – they were simple measurements for things like x-rays or gamma rays and things in space with simple detectors and so on, much less sophisticated than we were with the earth observation actually. Hmm, they didn’t have the same accuracy requirements either because you didn’t need high accuracy and so on, the measurement – absolutely new measurements they were making for astronomical reasons and so on.

[End of Track 5]
Track 6

The pressure modulator was the thing with the … in the ‘70s was, er, we sent one to Venus.

Right.

Fred Taylor who was – you know, who was at JPL, Jet Propulsion Labs then, of course that was the – where all the NASA planetary work was done and he, erm … so we built a … he was – running an experiment to go to – go out and go on the pioneer Venus orbiter, which was launched I think in ‘78 and we agreed we’d put a pressure modulator on it for him, according to another sort of design we had, to make measurements of the atmospheric temperature on Venus. So that was duly launched and lasted for several years and we got measurements for Venus.

Did you yourself receive and process those?

No, we didn’t, no it was all done by Fred actually, so we didn’t get the data, no we didn’t do any of that. But we just built the instrument for him and, er, and Venus of course is a carbon dioxide atmosphere [both laugh]. Hmm … 100 atmospheres of carbon dioxide – 100 – no the amount of atmosphere is 100 times our own but it’s almost pure CO2 and, erm so there’s an enormous greenhouse effect on Venus, the temperature of the surface is about 500 celsius, double that heat, because of that, it’s a bit closer to the sun than we are too and there are all sorts of other things about Venus that are different, but it was a, erm … and we didn’t do – really do much about the – what it was doing to the measurements made on the Venus atmosphere but – which was all of course very high in the atmosphere which he was observing. It was rather than exciting thing to do, we thought it was probably the most way out piece of British hardware at the time [laughs].

[02:28]
... And while – while all of this work that you've described going on in the ‘70s in terms of satellite instruments and your involvement in various other programmes for earth observation,

Yes.

Could you talk about key developments in family and personal life, over the ‘70s?

Yes, hmm-hmm. My mother died early in the ‘70s, ’74 I think. My wife Margaret’s mother died in ’76. My father was still alive and he was – of course was living in Soulbury, north of Oxford, he used to come for lunch most Sundays, that’s what we saw of him. Hmm … the children were going to school in Oxford, at least Janet was going to school in Oxford, Peter was dyslexic, or was found to be dyslexic and he found it very hard to read … he was unusually artistic, as a member of the family he could easily draw – you know, he could sit down and sketch people and all sorts of things, something I couldn’t begin to do. And he could put – take that image and put it down on paper, but giving him words – given words to read he struggled like anything trying to read them. I’ve never understood how his brain was, you know, giving him lovely pictures he could draw but he could not recognise words. Anyway he was at the Dragon School in Oxford which is a prep school and they’re a good school but when he was about nine he was heading for the bottom of the class and the school were being very – you know, rather nasty to him really, told him he was idle and wasn’t doing his study and all the rest of it which of course wasn’t true at all and he – so he got very upset, said, ‘Please send me to another school,’ every morning, ‘Please send me to another school,’ [both laugh] so we looked around looking for schools that might be suitable for him and in the end we sent him to a school in Llandudno, here in North Wales, called St David’s College which specialised in dyslexic children and had a link with the – with Bangor University studying dyslexia and, er, we didn’t really want to send him away to school particularly but that’s what happened and he was delighted to get out of where he was, he really was. Become a very – you know, he was a active boy, loved sport and those things but he was just getting very depressed. And the first thing they did to him at St David’s was to put him in a boat, and he took to it like a duck to water. I remember he became a very competent young sailor, hmm … sailed for Wales schoolboys and all sorts of
things, so that really helped him ‘cause he got his confidence, something he could really do. And then he went in the end to, erm … he got his English O level at the fourth attempt I think but he went into – did design and art for his A levels and went into jewellery design, did a course in that and then went to work for – in the – as he got to working age he went to work in Phillips Ant – the antique people in London, so he was working in one of their sale rooms as one of the helpers. He got in charge of one of their sale rooms before too long ‘cause he was quite bright, keen and … to give you his total history he – he met a – there was a valuer at Phillips who was starting up a business in antiques, Peter’s granddad had left him – who died of course in the ‘70s, left him some money and so he set up in business, in the antiques business [laughs] and enjoyed doing that very much, he had a real eye for art actually and … but then the early ‘90s that – that dropped out, stopped because of the depression and his money had run out and his partner’s hadn’t, so Peter had to quit. He went to the South of France where he knew one of two people who were sailing and wondered if he could get a job down there [laughs], he ended up – well he ended up after some time getting a job helping to ferry boats from Bermuda to Florida and, erm, and then he got a job in Florida as a – at a boatyard and really learnt the – learnt all about boats, everything involved in boats, he couldn’t learn from books at all easily, but learning from the job was – was fine and he became a – you know, a man with a lot of expertise in these things. And … and he went on to become – he was looking after sailing boats for rich Americans, and that’s what he’s doing at the moment, he’s in fact in the Caribbean as we speak [laughs]. His – his boss is an American surgeon who has made a lot of money out of orthopaedic devices and has lovely boats, some very fine boats, one racing boat and he loves racing and – and another luxury yacht and Peter is his – looks after his boats for him and helps him in all sorts of other ways.

Hmm, so that’s – well he got married, he met an American so he could be a legal American [laughs], or legally enter the country and, erm … they have two boys, and … that’s his total, they’re doing well.

[09:23]

My daughter became – oh how old was she, she went through school and went to … trying to remember, oh dear, my memory. Went to school in Oxford, anyway, it’s a good school and then went onto Guy’s to do medicine … and married another medical
student who was at Kings and she went into – so became doctor – became a doctor. They now have five children, live in Norwich, she does sort of GPing, her husband is a consultant radiologist. The oldest son is Daniel who’s in Oxford, now is doing – doing classics, doing very well, he’s twenty and Hannah is eighteen and she’s doing – she’s at Cambridge … and the others are doing fine and the – the unusual one is Johnny who’s number four who, erm … who became last year the – the youth juggling champion for the UK, you can imagine that [laughs]. Having learnt to juggle without any – any teaching, just taught himself, off the internet and he can juggle with seven or eight balls – eight balls at once without any trouble, remarkable, absolutely remarkable. But that’s the family.

*And, erm –*

We also bought a holiday home in this area actually, which is in Aberdowey, that’s – we bought that in ’76 after Margaret’s mother died with the money she left and so that was a good place to come and sail, we did a lot of sailing in Aberdowey as a family. And I’ve sailed here, I have a sailing boat still which I keep in Aberystwyth now.

[11:49]

*And what was the nature in – what was the kind of extent of your children’s interest in your work as they grew older and knew what you were doing?*

The answer to that is not a lot … they were busy people and they – they knew what I was doing but they were not – neither of them showed any great interest in my work.

*And what – what about the sort of – the sort of church attending of your children as children while sort of under your influence as parents?*

Yes, well Janet came with us all the way through and she’s – she’s kept her serious Christian faith all the way through and she’s a very serious churchgoer now, as are most of her children. Top three have been confirmed, seriously confirmed and … and Johnny shows sign – you know the, er – the juggler, is also now showing a real faith actually, and so is Jemima actually, they’re all a remarkable family. Peter for his part
was – went to school and St David’s was a Christian school, you know, Christian foundation in its way and he, erm … his sailing teacher whom we admired enormously was the school chaplain so – but he didn’t take it – he didn’t accept that quite so seriously and, er … and never has actually, he doesn’t revolt against it exactly but he doesn’t see its relevance. Hmm …

[13:38]

*You said when you first went up to Oxford that you felt that God was looking after you.*

Hmm-hmm.

*How would you say that he’s helped you – or helped you through the ’70s or supported you or, if that’s not the right way to put it, how were work and faith related in the ’70s for you?*

Yes, well – I mean I continued with this interest in science and faith, and how they were related. And the basic relation I think I explained yesterday was, you know, science is the science of creation and it’s God’s creation, it’s God’s science and I – I’ve maintained that and have never – haven’t weakened on that in any way, I’ve – all my experience has helped to strengthen it rather than the opposite. And there are lots of questions of course you ask about why the – why is the world as it is, why do we have evil in the world of the kind we have, and all those things and we have – I have no answers to those basic questions, nor I do – nor do I believe do we – can we expect answers to those basic questions, of … real answers. But I’ve also now increasingly realised the – the importance of Jesus, the person of Jesus, the towering figure of Jesus. Amongst all the people who’ve ever lived, he stands out amongst everyone else more and more in my thinking and experience. And the basis of that of course is that he – I believe his death was very important and he died in order that we could be forgiven. The theology of that is people have different – all sorts of ways of expressing that, all of which probably have some – some meaning and, erm, but the fact that I’m a – I’m a sinner who needs to be forgiven, and that Jesus died to forgive me is something very basic in my understanding of the whole faith. And … and the
result of that is of course that I’ve increasingly I think felt a connection with the person of Jesus, which you can only describe as I say a relationship of I suppose love like you feel very close to him, sometimes, not always, you know, it’s – it’s something that’s – I feel more strongly sometimes than others, but also my … you know, in hit and miss sort of ways you go through life. Hmm, sometimes more – sometimes more concentrating on it more than at other times but – but also committing to God – to God and to Jesus the whole of my life, so that I’m able to do that. And that includes my work. And, erm … and I believe that, you know, particularly very much in retrospect, it’s not always in prospect of course but in retrospect I can look back and see the way God has helped me to do a variety of things and has also answered prayer in regards to the way my scientific work has gone. Not only in my prayers, but other people’s prayers too and, erm … you know, the remarkable balloon flight is something which … in retrospect of course I – I see as God helping me to do something which – which is very important in my career, but also announcing to me that he was helping me by the way in which that particular event occurred. If that makes sense to you.

*How did he announce that he was helping you, by the fact of the first two failing?*

By the fact that we were right on the edge and there was – you know, it had to work whatever – the third one had to work whatever and it did and without that I wouldn’t have been – I wouldn’t be here today I don’t suppose in the sort of way I am, and it’s one of those, you know, absolutely pivotal points. And in other ways too, in small ways, smaller ways perhaps, not quite so obvious. Hmm, I can remember occasions when things could have gone badly wrong but didn’t, and for which I was very grateful. It’s hard to explain some of these because they’re rather personal sometimes but – nor do I remember them all, but I … now you may say of course you’re – I’m a scientist and therefore believe in the laws of nature and all those things, yes I do and I do believe that it’s a very orderly world and we have a orderly God. So I ask questions from time to time and try to study but, you know, the place of chance, the place of – place of chaos, you know, finding things that are terribly sensitive to initial conditions and all these things, and this is God manoeuvring in some, using, and some people suggest, people like John Polkinghorne who suggested God can find room for – for manoeuvre in this world, because he knows it all anyway, he knows it all,
absolutely all that can be known. And there are built into the whole fabric of the
universe as we see it, as we understand it, there are principles of uncertainty and there
are – there’s the way in which, you know, chaos operates, things that are incredibly
sensitive to the initial conditions, ridiculously so so you think, well is – he has – he
needn’t break any rules if you like, God needn’t break any rules on the way. And I’m
not terribly satisfied with that answer because if God is God, then, erm … perhaps he
has – he’s trying to find room for him to manoeuvre, he’s a rather, you know, trifling,
piffling sort of way of looking at it because I don’t know enough about the universe,
anything like enough about the universe, to make statements of that kind. It seems
rather arrogant to be trying to find little ways in which God might be manoeuvring in
ways to help people who pray to him. I think it’s – God has a much bigger picture
than that. On the other hand God has given us freedom, freedom to hate and freedom
to love and it’s, you know, it’s a lovely means freedom actually, means we have to
have freedom if we’re going to operate as independent agencies, independent of God
too and God has made us like that. And he wants us to love him genuinely and there
are lots of things that could be said along these lines and if that love is going to be
genuine then it has to be genuine with free choice, so we’re not being manoeuvred by
God into particular positions. On the other hand as I read the Bible and the New
Testament in particular, the way Jesus talked about partnership with him, he wanted
his disciples to be his friends and his partners, said so. And so he’s prepared to come
alongside of us, wants to come alongside of us in a relationship of love and of
assistance and help and all those things, and friendship, and erm, although I’m a – I
mean I’m not a very good Christian in a sense of being terribly good or terribly nice
or what I shouldn’t do, not – not as nice as I should be and not as good as I should be
and all sorts of things, I have lots of failings, but then that’s the way it is and I want to
be forgiven for those and I want also to – to have this – to improve and increase this
relationship with Jesus. So when I – so I try very hard – I try hard if thinking about –
or asking the question, how does God work in the world and how do things happen in
the world, things happen to my friends sometimes and others who I just don’t
understand at all ‘cause it seems so … wrong. But then I can only ask the question, I
can’t expect answers to all the questions, all I can hope for is to get some answers as
far as my own situations are concerned and I, erm … I believe that … no, God really
is there and does want us to partner with him and he – in whatever way he finds it able
to do so. So that’s a little story.
Thank you. Aside from the – the third balloon flight, can you think of other occasions, as you say looking back, are there other things in the ’70s that you now think indicate that you’ve been helped by God?

Well a lot of these things are quite small things and ones I’ve never written down, or written or feel imprinted on my mind so completely. Hmm, but it occurs sufficiently often in small ways that I feel that – you know, I feel this relationship working out. If you go to the IPCC then there were much – there were very big occasions when I had to chair very big meetings, very tough meetings, extremely tough meetings, and I remarkably got through some of those and, erm … I felt that I was – I need to be careful how I say it because it’s, you know, you sound a bit arrogant or something but I felt I was being helped in a way that was beyond what I was capable of, to actually get through some of those particular meetings. Now … now I know of course other people in the world do chair tough meetings and get away – get away with all sorts of things but I don’t know what their experience is, I can only speak to you about the fact that I prayed about things before and I also had – and knew that various people were praying for me, who were other Christians involved in the IPCC and a few of us met together during some of those times just to – in very simple ways to – to ask God to help us with this – these particular meetings, and that was – that was a great strength actually, to realise that there were others there who were also partnering with God in this process, which we believed was a God given activity. And – ‘cause it was very important for – you know, for the world at large that we succeeded. And if we’d failed it would have been a great shame and also, erm … you know, that we wouldn’t be moving on the way we are, so … it’s quite hard to – you know, to describe things of this kind without appearing to be either too pious or too over believing, erm … but then when you’re looking at events in your life, you can’t stand outside your life and look at them and try to weigh them up, you can only look at those events within your experience. You were there, it’s all part of you and when you are talking of your relationship with people, members of the family or with people like Jesus, then that’s not something you can stand outside of and weigh up and say was I being helped then or not, anymore than I can do that when I might be with one of my relations, or other
– or colleagues. I am part of the play, I can’t stand outside it and weigh it all up in a cold way, I have to – but nevertheless I can, I believe, still speak sensibly at least to myself and to other people who are sympathetic to such a point of view to – so the world might understand it too. And other Christians do understand it, do understand the sort of things I try to say when I’m talking to you now. Hmm, but other people of course would just think I’m – I’m some sort of crazy guy who has some sort of spirituality that’s nothing to do with my science, but they’re not divorced in that way, they can’t be … because we’re talking here of the creator God whose science it is, and science is of course is a tremendously honest activity, you have to be absolutely and utterly honest. You mustn’t manoeuvre your science to try and help God because that would be a crazy thing to – absolutely wrong thing to try to do, thinking you’re helping God because you’re distorting the science or something, but you’ve – you have to look at it absolutely honestly and when you do that and you believe that God is absolutely honest too, you don’t understand all his ways at all or all the things you think he might get involved in and so on, but – because, you know, he’s up there and we’re down here and it’s – I say up there in a very – you know, in a sense of being much greater than we are. Sorry, does that make sense to you, I don’t know –

Yes.

Are you a Christian?

No, but I mean – but it still makes sense and in fact I – especially the argument that science reveals something that is created by God and therefore that faith and science aren’t separate, I follow that totally yes, I don’t think –

Well that’s – I mean seems to be a very strong thing to say whatever your beliefs, actually in a way.

But –

Because you’re bound to believe in something which is outside science, because the creation is outside science, it doesn’t exist within science, it’s science is interpreting it or measuring it or whatever it’s doing, so there is this entity which is outside science.
Yeah. Hmm.

[29:30]

And were there – I don’t know whether praying in your case is as specific as this, but were there times in the ’70s when you would pray for help with specific aspects of your scientific work? Perhaps I may have the wrong idea of what praying involves but would you – were there times in the ’70s where you prayed for a particular thing to happen in relation to your work?

I mean it’s not as cut and dried as that in a way, I don’t know … my memory of these things, I’ve often thought I should try and write some of these things down as soon as they occur to me, ’cause I should have a list of all these – long lists of ways – ways in which I felt near to God in prayer and so on. And there are Christians who do put things down in writing and that I haven’t done that and I’m not that sort of person, I don’t think – I don’t write things down like that in a way but, hmm … there are … I mean of course if I – if I know – I think as a Christian and somebody who believes in partnership with God, if I get stuck in a situ – stuck with something which I don’t know how to do, get out of or I don’t know what to do, I ask for – ask for help there and then. Without – I don’t ask for specific solutions, necessarily, I might try a solution on but knowing that I, you know, that’s not my job entirely, that’s my task, you know, I’m just there to ask for help to do the right thing. Sometimes it’s very hard to do the right thing because all the – all the choices you have seem to be wrong or seem to be – so please help me to do the right thing, yes, I would say that I’d mean it and I’d – and afterwards I’d – going quite frequently I would feel, thank you Lord, I felt good at doing the right thing, that in retrospect was the right thing to do. I can’t say it happens every time but it’s of a – it’s a natural sort of process of my relationship with the Lord. And that’s not in a … that’s not asking God to manoeuvre in, you know, manoeuvre in ways that are, erm … that are improper in any way or that are asking for the laws of nature to be changed in the normal way but, hmm …
My first wife died of cancer over ten years and that was a difficult time, it was a good time in many ways, we had good years really, good – but it was tough. It’s not a nice disease and it’s a … and of course there are Christians who do talk about God healing outside of medical practice and so on, and er, we’d have loved something like that to happen if it was possible but, er … but we did pray with, you know, a small group of Christians from time to time about it and just leaving it with God, asking for his help in whatever way he could guide us, and there were some remarkable things that happened were during that period, as far as the illness was concerned. We actually got out of the blue some very good medical advice, to go down routes that were really going to be helpful rather than a route that was going to be unhelpful, didn’t know that immediately at the time but there was, er … no Tamoxifen was a drug which was – which was fairly newly used at that time so they didn’t know how to use it entirely, the consultant she was under in Oxford didn’t want to use that for the reasons he didn’t explain at the time, but he wanted to use other things. Quite by, out of the blue really Margaret came into touch with an old colleague of hers – old student of – friend of hers at college who was at the Royal Marsden, and she actually went to see her as a result of that chance contact and she looked at her and said, ‘Ha, you looked at her,’ – you know, looked at all these lumps and things, said, ‘Oh you must go on Tamoxifen right away, it’s the right treatment for you,’ so Margaret went back to Oxford and said to the consultant, ‘Please put me on Tamoxifen,’ explaining why and – and he did and that really worked for Margaret too. So the consultant explained afterwards the reason he hasn’t put her on it was that the two previous people he’d put on it both died rather rapidly, so it was not a – you know, the – the knowledge was not there to know when to use it or when to not to use it, but we – we felt grateful for that and felt that was in answer to prayer, other people might say well that’s just a chance occurrence but then if you’re Christians you say, ‘Well I don’t – chance occurrences are God’s opportunity to do things to help you.’ And then there were further things downstream, other treatments which she tried to have some laser treatment later on which, hmm … which helped to prolong her life and … what Margaret particularly asked for was that she might long enough to see Janet qualify as a doctor, and she lived about three weeks longer than that occurred. Because it happened just before she died, two or three weeks beforehand, Janet was qualified. And that was again a thing which – the other thing about Margaret in the end was, though she was a good Christian lady and so on but she never – she wasn’t wearing her faith on her sleeve or
anything, always talking about it or anything like that, she was a very practical person, a very – a very nice person, a very kind person, fond of people and all of that sort of thing, hmm … and helpful to lots of people but she … the last few weeks were spent in a hospice in Oxford where they were keeping the pain down, and they were enormously triumphant weeks for her, and I mean she really was unusual. In the way she reacted to people, the way she loved people, the way she talked to them, the way she talked to them about where she was going and the way – it was just so naturally and so absolutely, erm, triumphant. Which I found amazing because, you know, it was a – not quite a different Margaret but it was a – you know, she was on top in a way which was remarkable. And it was a great help to me of course in the end in helping to get over the – the whole business of her going, which was not nice. To realise that, you know, in some strange way there was a planned component to it … funny indeed at her funeral, some of whom some of the doctors turned up actually, which is pretty unusual for the people who die in hospitals and things. And she’d been so helpful to the hospice actually, in helping, you know, helping people to be positive and all those things. So that was a – another part of experience which my faith – her faith in particular and mine I suppose in a sense too played a part in – in something which had a bigger – bigger element to it, bigger connections which were remarkable.

Thanks.

Hmm-hmm.

Is there – could you say more about why in particular you felt that your relationship with Jesus Christ increased, it may be related to the sorts of things that you’ve been talking about, but you said within faith in particular you’ve increasingly felt close to the – to Jesus Christ?

Yes, well I mean the sort of experience I’ve just been talking about, made that much more real. As they were bound to, or at least not bound to make them more real, they might have made them less real in some ways if it had been – if I’d – you know, been – my attitude hadn’t been – very different. But – but Margaret and I were facing it together and not knowing what the outcome would be and praying that it wouldn’t be
as bad as we’d feared … and – and in doing that you get very close of course in the – so … in – in the way you talk about these things. And when Jesus is involved for both of you, and Jesus is a partner in the conversation and so, erm sure, then I think that’s – if you read the Bible, as I read the Bible, that’s absolutely inline with the experience of Christians in the Bible and throughout the Christian history of course, you find people who’ve had very – much more remarkable than me, experiences of – genuine experiences of Jesus being with them and helping them do things. Some of the – some of the great names in history of the church have really done big things, you know. People like Wilberforce and slavery, all these things, you know, we – really done big things and very much in partnership with – with God or Jesus. And I don’t think that rules out that you can’t do it without [laughs], you know, people do good things anyway and without any apparent faith and that’s fine, I mean that’s, erm … I would probably try to argue and say, well that’s God’s generosity of course and the way he’s made – made creation, there are ways in which people can, you know, rise above circumstances and all sorts of things. That’s possible even without knowing who Jesus is but – but I don’t know of course how those people are feeling, but I know how it hits me, that I’ve been privileged to be brought up in a way I was brought up which has helped me in that I guess and of course other people may not have had that but nevertheless that’s – that’s a great need for – for faith in the world actually, the world desperately needs. I would argue strongly that there were – you know, everybody needs accountability, needs to feel they’re accountable to somebody, or something, or whatever, otherwise you’re drifting without being accountable to anybody so you need – and we all have of course seemingly innate feelings about right and wrong but that’s – that’s sort of accountability, but I’m talking about, you know, personal accountability which is important and, you know, God being a person and I think that’s important part of it. And … and something really to believe in, actually I suppose, is to – trying to answer the question why are we’re here or why – what am I doing in the world and what should I be doing in the world, how should I be helping the world, what – what should I be – what’s life all about and – and faith brings meaning to those sorts of things. And other things don’t seem to do that [laughs].

Well thank you, that’s – that’s a very – very full account of personal life in that period, thank you.
If we then focus again on your – on your work, we’re looking now in the early ‘80s at a new post as director general of the Met Office.

Yes.

And could you say – describe the origins of that, how that came about, how you came to be the director general of the Met Office?

Yes, well – well I was drifting along quite happily as director of the Appleton of course and intending to go back to Oxford but … and John Mason was the director general of the Met Office and I knew him very well, and we talked from time to time about all sorts of things. I don’t know if you’ve ever come across John Mason, he’s a … very self assured person, erm … and he’s a very good lecturer and was a good head of the Met Office. And it was he who approached me and said – asked me if I’d be interested in the job, not that he could give it away but – but at least he could encourage me to apply. But I said to Godfrey – not Godfrey, as I said to Geoffrey, what was his name, earlier … the head of the SRC, when I was approached about the Appleton job, the – I said to John Mason, I said, ‘Oh I want to go back to Oxford now, I’ve done all this,’ done – worked very hard at the Appleton job, very demanding of course to do that and have a lab that was in two places and moving from [inaud] all the rest of it. So I said, ‘It was interesting and all that but I’d like to go back to Oxford please, I don’t want to,’ [both laugh] but anyway of course, erm, I weighed it up in a similar way to the way in which I weighed it up before in saying, well how can I get back to Oxford, there are people who move away and then try and go back, which isn’t always very easy anyway, and – and maybe I should look at the Met Office, so I – so I talked more to John Mason and I just told him I’d applied and, erm … thing I most remember about that was I was interviewed by Michael Heseltine, hmm … and he’d been given to the piece of paper to sign as the Secretary of State for my appointment and – and he looked at it and he said, ‘Oh, who’s Houghton,’ you see and he was told I was a scientist, ‘Oh we don’t want a scientist, we want a businessman,’ you see [laughs]. So anyway he was eventually persuaded to see me so
I was told before I went, so I heard all this story, ‘And he’s going to see you,’ [laughs] so I had no idea how I would get on at all. But I remember walking into the room where he was standing behind his desk, he had a long – quite a big room, as I walked towards him he looked up at me and he said, ‘Tell me why does the Met Office need 2,500 staff?’ So I was completely taken – you know, no hello, no anything else [laughs], just asking me a question I could not answer straight out of the blue, so I obviously didn’t answer it. Just carried on walking in and eventually he said, ‘Maybe that wasn’t a fair question,’ I said, ‘It wasn’t a fair question at all, how could I answer it, I’m not at the Met Office, I don’t know how to answer a question like that,’ ‘Oh,’ [both laugh]. Hmm … so – so we then sat down and he talked to – he asked me about the European Space Agency which he’d helped to set up, rather proud of setting it up and wanted to know how it was getting on and so on, so we talked about space which pleased him and pleased me [laughs]. And eventually he leaned back in his chair and he said, ‘Tell me, how do you make a weather forecast anyway?’ [laughs] So I thought, oh, breathed a sign of relief [laughs] and so we started talking about how to make weather forecasts and of course eventually these people came in and said, ‘Ooh,’ so had it stopped and out I went. Hmm, but I was determined I was not going to ask Michael Heseltine to the Met Office [both laugh] in the future, I could – you know, early – any early stage because I was, er, sure he’d have ideas about what the Met Office should be and as a – you know, commercial agency or private agency, whatever it was, and there were all sorts of talks about privatising it anyway. I thought he’s not the man to talk to about that because that would be very dangerous and [inaud] so – and that was very much his style of interviewing, try to knock people off their course before he began. Hmm, so I went to the Met Office and, I probably told you earlier, I had 100 – did I tell you, I had to get rid of 100 people on day one, no that was somebody else I’ve told that. John Mason had had this demand to get rid of 100 people and of course this was ’83, the MoD, which was a permanent department in the Met Office, had got a lot more money from Margaret Thatcher when she became prime minister, she was building up defence and so they started to build – all sorts of equipment, procurement on the way to get new things and all the rest of it. But by ’83 of course the downturn in the economy had become very strong so the MoD was told to cut lots of money and they were looking for ways of cutting money like anything and I was a sort of green new boy and obviously could be beaten into doing things that they wanted, they thought [laughs]. But I resisted very strongly,
I said, ‘I’ve only just come, how can I do that?’ and I, er – I said, ‘We need help from the … the second permanent secretary,’ who was always largely looking after me, and – and some game was invented whereby we were – we were nominally losing 100 people but keeping the staff by calling them something else [laughs], so that was fine. And, erm … it was a very good – it’s a very good organisation, it’s been looking after pretty well by John Mason, in particular recruited very good people because of the – he was there for eighteen years, I was only there for eight … but he had gone around the country giving lectures and he gave some very good lectures on meteorology and so on, and invited people to apply to the Met Office if they were absolutely top for this class, he didn’t want anybody else, any other sorts of people. And he – lots of people applied in his day and obviously because of his influence and his – and his … you know, they thought he was a … well and the interest which he aroused in his audiences, and so – so recruited excellent staff and they really had very good people there. Hmm … I remember arriving at the Met Office on day one … in must have been January ’83, January – yes, January ’83 and, erm … was it January that I went, trying to remember exactly when I went there, no, it wasn’t, it was later in the year, it was October – October ’83. And [laughs] … it was in Bracknell, you know, a big ‘60s building, 1960s building which was standing up there, very big 1960s building by a big roundabout, that was the Met Office roundabout, so I walked into the building and there was a big notice at the front saying, ‘Beware of falling masonry,’ and so I looked out, I thought, that’s a poor sort of joke or perhaps it’s a good sort of joke [laughs] because my predecessor had just left [laughs]. But it wasn’t a joke at all, it was a genuine thing, the building was falling down [both laugh] and chunks of concrete were dropping off it because of this alumina cement problem of the ‘60s and the reinforcing rods were – were rusting and so all over the building we were getting masonry falling off. So I had to spend, what, three million on the building to try and put it in some sort of order actually, before we could use it and then it’s had to – by the end of the century the building was condemned and it’s now in Exeter, that was after my time. Day one also I was taken out to … taken out to lunch by two – the two directors, who were going to be responsible for me who were – who said, ‘Now – now John, you know we [laughs] – don’t imagine you’re going to come here and,’ I paraphrase, ‘Don’t imagine you’re going to be here and run the place, we don’t need anybody to run the place, we run the place, you know, John Mason he went round giving marvellous lectures and doing all the external work for the Met Office
and doing it very well and you’ll do that very well too, but don’t think you’re going to rule the place,’ [laughs]. So I listened but I said, ‘That’s not my style, you know, I’ve come here, I’ve not come here just to play around at giving lectures and things, I want to know what’s going on and I want to have some part in how the – how the offices moves on.’ And I insisted on – well I – not insisted, I just did, I walked round the building and walked in and out of offices, without invitation [laughs] and asking people what they were doing and trying to find out what was going on and learning of course from the people at the workface, which in a way I’d learnt to do in my job at the Appleton, got to get to know other people and you’ve – it’s not just the top people you want to know, you want to know everybody to some degree, there were too many for me to know them all but I went around and tried to find out as much as I could about them. And of course I had to travel, the Met Office has all sorts of outstations, I had to travel out and look at these things, including people on RAF sites and aerodromes and all sorts around the country, so that was all very interesting.

[53:30]

And, erm … oh there were challenging things to do … the biggest – one of the biggest challenges was to see, er, the Met Office had begun to get a bit commercial in the sorts of things it did and making money, making bits of money for selling forecasts, you know, and the like, but there were people in the office including one of the directors who didn’t want to – that sort of thing to happen at all and, erm – but on the other hand we were obviously very short of money and – and I soon realised that people who were – who worked with a commercial vision or for a commercial reason, when they were handing, you know, the forecasts over were presenting them very much better as if they were, you know, real things worth something, than the people who were just handing out information without being asked about forecasts or what the Met Office was doing, they – you know, the people who were being honed in the commercial world [laughs] were much more professional on the whole, and this is a – an overstatement of it but anyway much more better on the whole than people in their – in getting this message across than people who were just working in the office for the sake of the results, without worrying about where it was going. And for other reasons too, I’ve got involved in the World Meteorological Organisation of course as a member of their own executive committee by – almost automatically and – and
there were, you know, moves towards Met Offices doing commercial things as a way of making money, but also a way of getting themselves known and so – so I quite soon set up a commercial branch and – proper commercial branch and made my brother the marketing director [laughs]. David had been very involved in the – as head of the London Weather Centre at one time in selling forecasts to offshore oil people, offshore people on the rigs and so on, preparing forecasts for their benefit. Of course there was money to be made there too, doing these properly, and he did it – he’d done it very well and felt rather frustrated by the sort of support he was getting from the office so I – so he took that job on and did it well. I was – I suppose I was a little – talking about my brother, I was a little worried before I went whether this going – jumping out on top of him [laughs], would stall our relationship, ‘cause we had a good relationship, very good relationship actually and I didn’t want it to do that. In fact I told myself that if it really was going to do that it wasn’t worth doing, but I had a good talk to David about it but he was – he was keen I took the job but said he really wanted – wanted to be sure there was somebody really good at the top and he believed I would do that well and so on, so – so we got on very well actually and he was very respectful [laughs]. Although my older brother, and knowing in a way much more about the routine weather forecasting than I did, he – he was a real weather man, knew about the weather in a way which I’ve never known, I mean I knew a lot about other things but – a lot of other things but I didn’t know about the, you know, normal way in which the weather behaves. So we began to set up in our – in the weather centres around the country with trying to get people to do commercial things and sell forecasts and arranged for that, hmm, which meant you had to reorganise in certain ways, but that was a good thing to do. I also went to BBC early on and talked about – looked at their – and moved that along too, because they were in the process of developing new weather presentations on the TV and I pushed that along very hard because I thought that was terribly important for us, it was these outside things that really mattered to people at large, and was – so we set up a special working party to improve the presentation of forecasts on the TV, that occurred in my first few weeks. So I got involved in all sorts of other things that I hadn’t been involved with before, but that was interesting. The – the big organisational thing that came along as a result of the … of the government’s finances was – came from Margaret Thatcher who was trying to, you know, get more, erm … more professionalism again into government of a sensible business kind, and she saw a lot of bodies in government who were just –
who were not properly accountable in a serious sense, and should be – and should be
given, you know, much more freedom of action. And one of the – so she set up
something called Executive Agencies and the Met Office was one of the ones on the
early list to become an Executive Agency … and that sounded to me a very good idea.
When I got to the Met Office to began to realise I had, you know, was supposed to
have complete control of the programme but I had no control at all of the money …
there was no money I could hand out in any way, well that’s not true, absolutely true,
I did have a very small expenses account, entertainment account [laughs]. Which –
which I tried to overspend lots of times but I wasn’t allowed to overspend it because
they always put more money in as it was about to become overspent [laughs]. And,
erm … the object of the agency was to – was for the Met Office to have its own
budget, have its own programme, costed programme each yeah, and just like any
other business, and to have aims and intentions and all these things and also to have –
have targets of different kinds. And … the whole process of turning it into an agency
took ages, didn’t happen until 1989 [laughs]. So it took five years. MoD
headquarters had to work – MoD, of course people in headquarters were working it
out and I had people involved in the working out, though I wasn’t involved personally
except insofar as I poked my nose in pretty seriously from time to time [laughs]. And
it was a difficult – difficult problem because as far as the MoD people were concerned
they didn’t want to lose control of the Met Office so they were determined that the
framework for this executive agency would somehow [laughs] maintain their control
over the office. Which of course was not the idea at all, the idea was that the control
would be devolved to the Met Office and the budget would be set by the – by the – by
MoD in consultation of course with the Met Office and so on, and then it would be up
to the Met Office, up to me in the end to determine how that money was spent. And
we’d be alright providing we made – we kept to the rules and also that we … brought
home the performance criteria that were set down to begin with. And there were
some big battles on the way, the biggest battle I remember with MoD was on the –
‘cause this whole thing had to be written down of course in some detail what we
needed money for, how it was allocated, how it was – we had to draw up [inaud]
budgets and where the money was to come from, who was paying for what and so on.
And of course it was fairly complicated because the Met Office is not only serving the
Ministry of Defence of course, as the army and navy and air force, but we were also
serving civil aviation, one of the big – one of the two world meteorological centres as
far as aviation is concerned worldwide, so civil aviation had to pay into us, pay into it. And we were also serving the public of course, and we had a bit of a commercial wing, and how all this was going to be financed and that was a problem too, you know. Was MoD going to look after all this money or was it going to come in other ways and … and that discussion has gone on ever since I’ve left because the Met Office has moved on from being an Executive Agency to becoming a Trading Fund which was the next stage to determining where all this money came from. But in the first instance it came from the MoD, that was the proxy for the national – the national weather service and so on. The biggest battle I had was – concerned R&D, we had a sizeable research department which was doing research into – into weather, into forecasting, into climate, into other things, trying to improve instruments, trying to improve measurements, trying to send satellites up and trying to do a whole lot of things in order to maintain our top position in the world. We were generally believed to be the best met service in the world, there were – and we still are – it still is actually, has that sort of reputation, and to knock that reputation down, it had been – I argued very strongly that we must not lose reputation because whatever you’re producing, when you’re number one in the world that’s a good position to be in, it’s the – the start of a sales pitch. If you come down from that then you are much less valuable. So if you’re number one in the world you try to stay there, providing it doesn’t cost too much, so I had lots of arguments about how much it cost to be number one of the world, which is – I engaged in that particular battle. But then there was also the R&D battle because if we’re going to maintain our position then you have to do research and maintain a research effort and development effort and, erm – oh and then at a very early stage I – you know, I told people who were trying to do this that – who – they were all saying in MoD about the research, ‘Oh the Met Office doesn’t need to do research and if it does any research that research will be paid for by the customers,’ the customers are the people who used to pay for the research, not the Met Office. And that was a very strong line that was being put over by senior people in MoD. And I said, ‘Well you’ve got a Rolls Royce, do the customers pay for the research, or have a Rolls Royce that spends fourteen per cent of its budget on research and development in order to maintain their position, and they move forward in the way they do things,’ they have to do that so it’s asking the customers to do that, to pay for them for doing that, because why should the customers pay them anyway if they’ve paid them for the products, they don’t pay them for – for making those
products in the best possible way. So – but I was ignored for a very long time, but I kept batting – bashing away at this and I wrote once, I must have written 100 times and – and in the end [laughs] because I was making the commercial argument, if I was Rolls Royce or whatever, I used other examples too, then you know, I wouldn't be in business unless I was spending money on R&D. And in the end we began to get documents and the Met Office of course is like any good commercial organisation, must have a research budget [laughs]. And I’d – I think something like twelve per cent of our budget went on research and we maintained that through the – through these arguments. And then there were a lot of arguments too which – well the big argument really over performance criteria, erm … we were asked to invent – or suggest ways in which we could be measured, and that’s not easy actually if you’re turning out forecasts. Hmm, well we’d say, ‘Okay, we’ll try and improve the accuracy of forecasts by a certain amount, whereby we’ll try to come up with formulae for improving accuracy for us each year,’ that was a reasonable thing to expect. Quantifying that is not easy of course, then – and so on, so there are a number of criteria of that kind – that kind set up, which I wasn’t entirely happy with, nevertheless you had to go along with this sort of stuff that goes on in the commercial world, and is very dangerous in a way because you could so easily distort what you do. Hmm … like the American – like the Russian nail factor, you know, you’ve probably heard about the Russian nail factor, they were producing nails and they were paid by the number of nails they produced, so they produced lots of small nails [both laugh], easily met their criteria and then they’d go home for the rest of the afternoon. So they changed the rules and said, ‘Oh no, we’re going to make it different,’ and they were charged by the weight of the nails they produced [laughs] and that was real easy too you see, they went away and made a very small number of very big nails [laughs]. So you can easily distort what you do by having crazy performance criteria, we tried to avoid that as far as we could. But then right at the end, towards the – we had a vesting date for the – for the agency and in March, I suppose ’89 probably, April ’89 when the minister was going to come and start this whole thing off, open this new agency you see. And – but there still seemed to be some problem because the – there was a – in the agency document they were all trying to work to, it was stated that all agencies had to increase their efficiency by two and a half per cent per year. So I was faced with a letter that said, ‘Please sign at the bottom and please sign to promise that you’ll increase your efficiency by two and a half per cent a year,’ [laughs]. Well I
could have I suppose signed that and then invented measures of efficiency which were inevitably going to increase by two and a half per cent, but I thought that’s crazy, why should I do that, why should I just accept that sort of con. So I said, ‘Well how do you measure efficiency?’ so they said, ‘Oh that’s easy, that’s output over input.’ ‘Fine, so what’s the output and what’s the input?’ And – of course measuring the output is not easy ‘cause you’re producing forecasts, is it the number of forecasts, is it the accuracy of the forecasts, is it this – the content of the forecast, what is it you’re trying to increase, and so on. And so in – well – so everything we tried to suggest to them, you know, to them of course makes – you couldn’t do because it was a nonsense calculation. Because you could distort the calculation to make it whatever you wanted very easily and so we – there was nothing there suggested by anybody in MoD of what it should be, but they said, ‘You still have to sign it otherwise you can’t be an agency,‘ [laughs]. So – so I said, ‘Okay, well if it’s like that, maybe we can’t be an agency,’ [both laugh], knowing full well the minister was going to come and start it off [laughs] on a certain day. So I said, ‘I wasn’t in the business of signing things which were – which were phoney or, you know, just silly,’ and, er, anyway eventually they – I agreed to sign that we would work towards increasing efficiency by two and a half per cent a year and we would try to find measures of efficiency which would help us to make that – make that decision. So that storm went away [laughs] in that form. But it was – yes, an eye opener in a way to see how – how civil servants are prepared to run through all sorts of nonsenses in order to satisfy demands of government and, er, so we became an agency and that was very good and …

[1:11:24]

I could carry on from that slightly because, er, we hadn’t been an agency very long and we had a framework – a document setting it up with the budget laid down, and under headings of course and all that sort of detail for the budget, and details of the performance criteria we had to meet. And that money was for a year, their first year budget was laid down and that was my money, I believed. Now the people in my accounts office and so on in the Met Office didn’t really believe that at all, because they’d always worked for these people in the MoD you see who looked after the money. And the people in the MoD didn’t believe it either because they said, ‘Well it’s our money, we don’t – we don’t take any notice of these changes at the top,
absolutely not.’ [laughs]. So the accounts people were working to the people in the MoD, in the same old way just to a larger extent, as large – as far as they could because they knew nothing else in a way, they certainly never – never asked me for any permission to do anything. So – and it wasn’t long before a message came down the system saying, ‘The MoD has to – taken certain cuts so the Met Office budget will be cut by one million as from now.’ So the people in accounts office and so on came up to me, ‘Your budget Sir is cut by one million, where is it going to come from?’ I said, ‘Our budget has not been cut at all, not been cut by anything, our budget remains the same,’ ‘Well,’ they said, ‘we have this letter from MoD, senior man in MoD finance.’ I said, ‘Well I’m now in charge of the budget, not him, if anyone changes the budget I have to agree them, or they’d have to come from me.’ They didn’t really believe that of course but – so they went back and told the MoD that, sorry, the chief executive wasn’t playing ball, and so they said, ‘Oh that’s alright, we’ll find – we’ll get somebody else to tell him you see, directly you see,’ so who could tell him, well the only person who could possibly tell me to cut a million pounds off the budget was the permanent secretary. So they said, ‘You’ll get a letter any time now from the permanent secretary saying you haven’t got a million – a million pounds.’ I said, ‘I don’t believe I’ll get it but if I do get it of course I will write straight back to him and say, ‘Well if I’ve lost a million pounds, that’s the end of the agreement between us, that’s the end of all our performance criteria and I will carry on without any – without any constraints at all on the system as far as that’s concerned ‘cause the agreement’s been broken,’ and of course I never got it [laughs]. But you can see the sort of, you know, government trying to carry on the same old way and, er … but it was a very good thing to do and we then got a budget and prospect instead of – instead of in retrospect, I mean money wasn’t easiest, erm – wasn’t easier to come by necessarily, but at least we knew what we had and play our own, we could, you know, do our own business about how we used it. And – whereas before we were at the whim an opinion of anybody who might have a, junior people in the MoD. Hmm … and it helped us in order – you know, to organise our things, ourselves much more – much better than we had to of course, to make forward planning and all the things that go with creating budgets, we never had before. And was completely a Byzantine, you know, system [laughs]. So that was – that occupied more of my time at the Met Office than I cared to have, but anyway that was all part of it, that’s the organisational
side. And we had various reorganisations of different kinds, trying to put people and money in the right places as the time went on.

[1:15:30]

Hmm … during my time there was of course – the biggest event during my time was in – on the 16th of October 1987, you may remember.

I had a day off school.

[Laughs] When we had that big storm which hit … which hit London at four o’clock on the Friday morning that week and we had given a very good forecast out on the previous Sunday actually, Bill Giles had appeared on the telly and said, ‘Oh England, you’re gonna get – watch out for next Thursday because there’s a big storm on the way,’ very unusually actually. And Monday of course the same was being said, Tuesday the same was being said, Wednesday the – the forecast was looking much more difficult and it looked as if – looked as if the storm would go further south, probably not hit the south of the UK – the low countries and the – and the – the continent, but it didn’t seem to be hitting us quite so badly, and – and comparing all the forecasts available from different agencies we – it seemed to be much more iffy forecast. And by Thursday evening it – the forecaster came on and was emphasising the rain rather than the wind, as far as the south of England was concerned, we had a force twelve forecast for the channel and you – for the wind over the channel, which is very unusual to get a force twelve, the maximum wind possible. So the shipping was all forecast for properly, but somehow the wind wasn’t properly mentioned, wasn’t really mentioned on that Thursday evening forecast and of Michael Fish at Thursday lunchtime had said, you know, this lady – lady phoned up and said about ‘A hurricane’s on its way,’ ‘Well I’m sure there isn’t,’ he said [both laugh]. [Clears throat] Excuse me, I’m talking too much … and so [clears throat], excuse me, let me just get on some water. [Break in recording]. So that was – it wasn’t very well forecast on that Thursday evening, television forecast. People – then people of course got up the following morning and, oh, fifteen million trees were down over southern England and you couldn’t get into London so easily, as you know – you know all about that. And – and of course by Saturday the daily newspapers were making a big
fuss, why weren’t we warned, massive headlines in the *Daily Mail* for instance and our newspapers were hitting out at the Met Office and the – I had been in Geneva all that week actually and I came back on the Thursday evening about nine o’clock into Heathrow and, er, had a bumpy ride in, I thought, oh yes, we said there was going to be a storm, that sort of thing you see. Went back to Oxford and I was not aware first thing on Friday morning about it at all ‘cause the people at the Met Office weren’t expecting me back till the Friday, Friday afternoon and I wasn’t – they thought I was still in Geneva, so they were coping with whatever was happening, and I wasn’t – and I wasn’t immediately involved in that, although it soon became clear to me [laughs] from the messages – I was working at home actually, I had something to write and I wanted to write it so I was just sitting down working hard but things kept coming in so I – I learnt about it myself at that time. The … then on the – and then on the Friday evening there was the annual Met Office’s dinner dance near – near Bracknell and, erm … and Sheila and I were going to that, we were – we were married then and we went of course, we went to that and so did other people in the Met Office, fortunately the – the press didn’t learn about that event, otherwise [laughs] we’d have really been in trouble, there they are [laughs] all dancing around and enjoying themselves [both laugh] and they’ve got all this – all this misery in the country. As far as the forecasters were concerned they were working on the, you know, next bits of the storm, there was some very tricky forecasting to be done afterwards and, erm … then this – and as far as the forecast – and the forecast was not a – not a good forecast as it happened but the nobody else did it, no other met agencies did it well either, although the press tried to say that they did, they said the French got it all right and we got it all wrong, which is absolutely untrue. We had a visit from some of the senior people in the BBC afterwards and we complained that, er, no they had completely misrepresented the Met Office, and they were very unrepentant actually, they thought the French story was a good story, a nice story, of course a good story and it goes over well, you know. Wasn’t right [laughs]. Anyway I – we were – I was at home over the weekend of course and Sheila was there too and the – these people kept coming and I tried to explain to these press people who turned up at home, now they’d just got around and – all about what had happened and how, you know, how you made forecasts and how the forecast had been absolutely right for the – for the sea areas and also for the – all the emergency services were warned well in advance at four in the morning, erm, of this storm coming along because we knew why – we knew it was
coming and it was going to be bad by later in the day, really later in the day. So there was no problem with the emergency services or anything like that and it – there was no way we could have stopped it so [laughs]. But I was being blamed for it very seriously and they were trying to blame me for it and, er, over the weekend there was some environments minister – Department of Environment minister who was asked if I should be sacked and he thought I probably should so [laughs]. Hmm … so by – and then by Sunday of course they were still camping – almost camping around the house, looking – trying to get photographs and things and we were drawing the curtains and disappearing upstairs [laughs]. But no, not entirely ‘cause we had people for lunch on that Sunday but by Sunday afternoon they were – they were still looking at photographs and things, the media people. Monday morning was – The Sun had a blistering account of the Head, the Director’s of the Met Office at home with – entertaining his rich friends in his luxurious home on the outskirts of Oxford, ignorant of course to how the world – the country was suffering and etc, etc, and, erm … and how his now resignation was being called for and – and so here is a number you should phone if he should keep his job and here is a number you should phone if he – if he should be sacked [laughs]. So they had a telephone poll as to whether I should keep my job or not. The Met Office for its part of course, I mean you know, we had no press office at that time at all, we just didn’t have one, anybody could talk to the press, we were often talking to the press, all sorts of people were talking to the press about the weather and that was part of our job, we never – we had no control over it at all officially. There were no rules about who could or could not speak to the press. Hmm, it’s very different now. So I went in early Monday morning and I thought, well I’ve got to, erm … try and explain to the press what – what happened and set up a press conference of my own. So I went in and immediately tried to set up a press conference in MoD. But ran into trouble because apparently a notice had been – the permanent secretary had said, ‘Nobody, including people in the Met Office, must talk to the press about this business because it’s all got political, I must be sacked if,’ [laughs] so I said, ‘That’s – that’s ridiculous, we can’t not talk to the press, that would be a way of caving in, absolutely caving in, ridiculous,’ so I set it up in the London Weather Centre which was my – under my control. The permanent secretary had asked me to go and see him about it all so I – he was at a funeral in the morning and the early afternoon I went to see him and, erm … he said, you know, I knew him well enough of course, he said he – ‘Now the first thing I should say is [laughs] we’ve got
a press conference at five o’clock,’ I think it was, he says, ‘But I told – I said nobody will talk to the press,’ I said, ‘I know that, I know that, but we can’t not talk to the press, absolutely impossible, it’s just not possible. That’s the way of the – giving into everybody,’ and he was pretty cross actually, as you might expect. Anyway so he’s told me what happened so I had to explain it all to him, how we’d – you know, there was no – you know, all the presentation on Thursday evening was unfortunate that we hadn’t mentioned the wind of course for London and so on, but it was – there was no problem with emergency services or anything like that, we was nothing we could conceivably have done, and in fact if you were looking at it in a very pragmatic way you’d say that the fact that England wasn’t told about the details, was – didn’t know what was going to happen early in the morning, but they all went to bed knowing about it, that was the way of really saving lives actually [laughs]. It wasn’t an excuse but nevertheless only eighteen people – I think eighteen people were killed as a result, whereas it would been far more if people had been wandering around looking – [inaud] or whatever it was. So – so we went to see … the Secretary of State who was George Younger and so I had to, erm … yes, George Younger, is it George Younger? These names disappear from my mind, but anyway he – whom was perfectly nice about it, he said he quite understood and so on. So I went away and we had this press conference and – and then it, er, it turned out to be Black Monday … and so the press had lost interest by the afternoon, it had all gone away. I wondered whether the … there was a link between the storm and Black Monday, for any reason because of course London was cut off very badly as far as making decisions, but it all started – the Black part in Monday [ph] started in New York so there was no – no real involvement of London in that – in that crash. So the stock market crash took all that thing away from the … for which I was very grateful [laughs]. ‘Cause they’re nasty, they really are nasty when it comes onto this sort of thing now.

Was this another occasion when you felt that you might have received some help?

I mean the answer to that is yes of course, but I’m … whether I didn’t – I didn’t – felt I deserved receiving special help but nevertheless it – I was helped, yes of course I was helped. The circumstances were such that I was saved a great deal of, er – very difficult circumstances I guess, what could have been very difficult. So I was very
grateful and I’ve … now why it happened that way, I don’t know, but I was very grateful for it as you can imagine [laughs].

*And now that you – you’re an agency, does that mean that if the MoD wanted something from you that they would have to almost buy it from you, buy a service from you?*

No, that wasn’t actually, but can I just finish with the storm, finish on the storm.

*Sorry, of course, of course, yes sorry.*

Because it’s – I mean it was a very interesting storm and we – there was an investigation into it organised by MoD, as you might expect, through what was called the Meteorological Committee which was chaired by Peter Swinnerton-Dyer who was a prominent scientist, mathematician and – so we wondered whether it was actually forecastable, you know, whether we – whether if we’d done a better job at forecasting, whether we could have done it and what – what would have enabled us to forecast it correctly. And that was very interesting from a scientific point of view because what had really happened on the Thursday as far as the model was concerned was that this tiny, rather small but very intense storm was developing so fast that the – the whole process of feeding the latest data into the model, ‘cause you update the model with the latest data you see and the data which was coming in of course through – well away from where the model was, so the whole pros – whole problem of dodging this mathematical description in – in ways bigger than it wanted to ingest. And was causing – causing a big problem, that was why it was so hard – so bad on the Thursday. And so we … we wondered if there’s any extra data might have really helped and there were I think several bits of aircraft data – data from aircraft which comes in automatically, you know, into the system, but it’s – some of it had not arrived early enough to get into the forecast at noon on the Thursday. If that – if the stuff from the aircraft had actually got there, or this aircraft data got in it would have actually turned out there was only two or three items, but that would have made a big difference to the forecast result. So there was a problem with adequate getting – adequately getting the data in. And then we had a lot of – some work going on which we’ve pushed along faster which was on data assimilation, how you assimilate data
into the model, instead of putting it in big chunks, have this – six hours or something we’d put it in more gently or all the way through, that was being worked on and creating algorithms to do that. And – and after a year or two of development we tried running the whole thing again and – and got an almost perfect forecast actually, using the extra data and using the better methods of assimilation. And in fact in the early months of 1990, January, February, those two months there were four occasions in the UK when – when storm force winds were of the same kind, as big as those actually in – as were in the storm in – in ’87, across the country, none of them were – London wasn’t involved in those, but the Midlands and places towards Scotland and so on were involved and some very – there were some – some very serious storms. I remember one of them because I was – I couldn’t get off from Heathrow that day for something [laughs] ‘cause they couldn’t take any aircraft off at all, so it was a very unusual, very strong storm. And we got all those absolutely right and there were not any other occasions when we forecast storms without them being – without their – when there were no storms. So … so we had improved the situation quite a lot and nobody noticed any of that [laughs]. Of course you wouldn’t expect them to, we got it right. So we opened – we learnt a lot to actually – so on from that event. Which helped us on our way in later – later forecasts. But it still stands in people’s memories as a – the reason why all the trees came down was that it was, you know, the ground was very wet and very soft and the leaves were all on the trees, ‘cause it was October, had it happened in the middle of winter it wouldn’t have been so bad …

[1:33:10]

But it made us also set up a press unit in the office and some of us went off to have television training, and I had a session of television training with John Humphreys. I – well he [laughs] put me in a chair, and gave me a – a gruelling interview of the storm [laughs]. He then picked me up off the floor [both laugh] and told me how I should have answered it, what I should have done. Which was very helpful of course, you know, don’t answer the question they’re asking necessarily, just make the statements you need to make and all sorts of things like this, all sorts of things how – and also sit up straight and look at the cameras and don’t look, hmm, slouch and all of that sort of thing. But that was a good thing for us to do, but the press has got, you know, more and more difficult in many ways, since then. Some people would say it’s
a good thing because the press exposes things that need to be exposed but, erm … but I also learnt from that of course that in a way they have no morals. They didn’t – if they’d destroyed me, they’d have been very happy. Whatever the grounds they’d have found for destroying me, very happy indeed, that was what they wanted, they liked putting people up there and then knock them right down and whether – and they’ll tell any number of lies, or falsehoods in order to get what they want, especially when it’s destroying people. And politicians have a – I recognise the danger of being a politician in a world where the press is so selective and so vicious … hmm.

Before you left the Met Office did you have the opportunity to put the John Humphreys training into practice through inter – through being interviewed on television?

I think I was interviewed, I think I – I never like being interviewed on television particularly, I don’t – I don’t enjoy television interviews. And looking to a camera, looking into a camera is not a nice thing to do, and especially if you’re not talking to anybody. You know, when you’re offline or somewhere, you’re in a studio and you’re just looking at a lens and … oh no. But – so I try to avoid those things, but I did a fair amount of television work, yes.

1:35:43

And what did you do to improve – what practically specifically did you do to improve the appearance of the weather forecasts, the BBC weather forecasts that you –

At the beginning?

Yes.

Oh there was this new, erm … new symbols actually presenting the data, I can’t remember the differences now, too long ago because there have been changes all – but created a new presentation of trying to make it look more interesting and more informative and so on. And also we had – training the people involved was important and that was done largely by the BBC but … it was a joint thing which – I think the
key thing that I did was to set up the – a joint – a formal joint arrangement, whereby we discussed how it was done and so on.

[1:36:40]

*And what – during your period at the Met Office, what work was being done in relation to Ministry of Defence interests?*

Well we … something what’s – what proportion I can’t remember now, what proportion of the staff were on RAF stations or – or military stations, it’s quite large actually because we were making forecasts for – throughout the country of course and also abroad. Hmm, the, er … did the Falklands conflict occur during my period, I think it did actually, yes it did, yes. First thing we – we were doing, we were forecasting for the Falklands, which is right, it came in ’83, wasn’t it ’83? Am I right?

*As far as I remember, yes, though might be wrong.*

Yes, okay, I think that’s right, yes we were forecasting for the Falklands and trying to get data, trying to get information and, erm … and there was also a … no, I wonder if that’s correct. I remember when I was at the Appleton lab, before I went to the Met Office, they were looking for – no no, it was before ’83, ‘cause my connection with the Falklands was at the Appleton lab because –

*Ah must have been ’81 then?*

The Appleton lab had – had radio work, you know, the old style Appleton work had radio stations in the Falklands because – because of the relation to the geometric pole, so we had observatories in the Falklands and many – quite a lot of the people at the Appleton lab had spent significant periods in the Falklands – in the Falklands and, er … and the MoD were looking for information about the Falklands [laughs]. And there was one man in the Appleton lab who had been there who had photographs of every house – every house in Port Stanley [laughs] … for which they were very pleased to have because they had never – very information – very little information
about what really was there on the ground, in Port Stanley for instance. So it was information that we could give them about the Falklands and what was going on there. I don’t know whether that’s classified information or not but [both laugh] I don’t think it matters now. No, no, the Falklands didn’t come before then but I – it was an interesting – interesting connection, the military connection. Erm … then we weren’t there – I wasn’t there during any of the major conflicts was I, no, don’t think it effected me that way. But I did go around the, you know, the military places and I have the equivalent rank of a … of a air marshal and, erm … which was a – you know, more than a higher rank than many of the previous – almost anybody in the normal RAF station, so er, not that I wore a uniform or anything but I was treated well [laughs] and expected to do things that only people of that sort do [laughs]. I remember the people who were responsible for it in the Met Office coming to me, ‘cause I may seem a rather informal sort of fellow you see and they were worried about this because they said, you know, ‘You go to a – these military stations, the RAF stations, you need to behave as if you were an air marshal, you know, you ought to look the part, don’t let us down. Please!’ [both laugh]. But some very good people in these – in these stations. It’s gradually got less, rationalised over the years ‘cause you didn’t need quite so many and you could share information in different ways and so on, but it’s … it of course has been over the years, it’s been an enormous help to the military we’ve got, especially working overseas, to have really good weather information, which is absolutely vital for the sort of things they do and it still exists, of course, that sort of connection. Hmm-hmm.

[1:41:30]

And what was going on in terms of the modelling of you – you mentioned that the storm was predicted, or not quite predicted, using a – I think you said using a model which I assume to be a computer model at –

Yes.

That time, can you say in detail what the – what the modelling at that time involved in forecasting consisted of at the Met Office? I suppose one way of thinking about it is what does a – what does a computer model look like in terms of the numbers of
computers and the numbers of staff involved? So rather than talking about it at a kind of theoretical level, you know, a grid with data put in, what –

Well there was a massive computer which would hold, you know, which was many cabinets, going – computers on the whole have got smaller of course but the big computers are still very big because they have to hold an awful lot of, er, components and writing and so on. And we had – I’d need to look it all up, which computers we had when, I don’t remember exactly, but we had very large amount of computing power. The fact is as a result of the storm we got extra computing power because we asked for it, we said, ‘You know, we’re – we could do a better job if we had a bigger computer power so we had higher resolution,’ this is the resolution between sort of the grid points in the model you see, which will be – in those days I’m trying to remember what they were, I’d probably get the numbers wrong but, erm, we would be talking about typical grid length – grid size of, what, 100 kilometres or something. Fifty kilometres for, you know, limited air view model, for global model it would have been 300 kilometres, for the climate model, 300 kilometres between grid points, so that’s – so that means on the whole British Isles you’ve only got about four or five points you see [laughs]. So it’s a – and that’s the climate – the climate forecasting was worked on a – on a global scale. For the area around the UK and across the Atlantic, which was what the weather forecasting model was, you’d have something more like fifty kilometres I would guess at that time. Hmm …

And were those two models that you mentioned being run on different sets of computers at the Met Office, on the one hand the weather forecasting model covering the British Isles and the Atlantic, and then there’s also the climate modelling which is the atmosphere and oceans.

Sure, yes.

How were they physically distinctive, if they were, at the Met Office, those two?

Well the – I can’t remember the answer to that at that period, but – but during the ‘80s there were – they were separate models, a model for weather forecasting and a model for the climate was actually set up separately, started, you know, all the algorithms
would prove – a lot of the algorithms were different, and of course with the climate you have to bring the ocean into play too and – and you have to deal with things differently, there is much longer timescales and the atmosphere you have to do all those sorts of things. Have to deal with the land lying differently and with the ice, and the Arctic and Antarctic differently and so on, and so the climate model has all sorts of extra things added.

[1:44:50]

One of the things that was set in motion when I was there and just about finished actually when I left I think, was to – was to set up a unified model, ‘cause it was crazy when you wanted to put improvements in, to have to put the same improvement in the weather model and then the same improvement in another model, that was crazy and the two could – because you needed the same sort of things, you needed to improve them both and it would have been much sensible – much more sensible if you are under exactly the same structure and the same algorithms. So the unified model was – was determined and people determined that this unified model, you know, was a great deal of effort, enormous amount of effort went into doing that because it’s – needed a lot of – a lot of software. But it was finished I think before – and now there is this unified model which is – which saves an awful lot of effort and of course enables you to do experiments with different things. I mean you can compare one model with the other directly and see which – what things are different, one – one model with the other and, er, oh it’s a very big computing outfit is the Met Office, in fact when I went there in the early ‘80s it was – we had the biggest, erm … I’m trying to remember whether one of the biggest computing complexes in Europe apart from the military … just say one of the biggest is probably, save my accuracy [laughs].

_Actually at Bracknell?

Actually at Bracknell, yes.

[1:46:28]
And of which there is another body which is important to mention that’s to – that was the European Centre, is the European Centre for Medium Range Weather Forecasting, which is a big modelling centre, weather modelling centre at Reading. It was on Shinfield Park which is a base that was owned by MoD – MoD where the Met Office had its training college, where we trained all our people, er, just south of Reading.

And they – they were there from the ‘70s I think weren’t they, yes, that’s right, they were – see their aim was to get better medium range forecasts in the order of see how far you can get the forecasts out beyond a few days, to a few weeks, or a month or more. But they were not supposed to do climate forecasting, they still aren’t. But they became a very good outfit, full of very clever people from Europe and making, you know, making models and making forecasts which were as good as anything coming from Bracknell. In fact the two, Bracknell and – and the European Centre, used to almost compete with each other, you know, and rub each other up actually. You could run – they had a different – a different type of model, they – it was not a grid point model, it was a, erm … it was one which used fourier transform of the grid in the – as a basic structure. In other words the number of wavelengths you had around the thing, so it was structured in a different way. And – and it’s basic formulation, probably the same thing in a way but it was just a different geometrical way of describing it and, erm, the – so you could actually make runs of the same – same observations on the two models and see what differences you got, and that was tremendously valuable actually. I used to argue with the – well the reason why we have – why the Met Office at Bracknell remains about the best in the world was that it was very close to the European Centre which itself was of its kind the best in the world, and was also very close to the Department of Meteorology in Reading University which had been set up in the … ‘70s by people who left the Met, er – the corporation of the Met Office, but was again one of the best university departments in the world, had some very good, very clever people there. So these three bodies within cycle ride of each other worked together, and also competed, you know, and rubbed each other up in a way which made all three, and kept them in the place as being the best in the world. So that was a remarkable synergy operating between those three – three places. And it’s, you know, people – meteorologists love meeting other meteorologists.

And do you know why –
It’s a great – it’s a great sort of, you know, community project.

Hmm. Do you know why the European Centre was established there as opposed to somewhere in France or somewhere in Germany or –

Oh that was because John Mason tried to – he didn’t want – if there was going to be one he wanted it in the UK, so he fought for it when he was there in the Met Office. And the Met – and the British government made a good proposal and, erm … which was a – a very good thing to have there actually; there are very few European centres in – European scientific centres in the UK, very few of them actually. The IMO is – well that’s not so much science actually, that’s in the UK isn’t it? There were very few international bodies in the UK.

[1:50:29]

And –

But another – I mean concerning that when I was there the, erm … you know the meteorological satellite business, European Meteorological Satellite Organisation was being formed to run the, erm … you know, the French meteor site I mentioned earlier with Pierre Morel and – who was wanting to become a European project because this – you know, over Europe you’re getting observations so it’s – on the whole of Yorkshire join in and so a body called the European Meteorological, EUMETSAT, Site, European Meteorological Satellite Observing System, was set up in Europe and – and needed a home. I missed the opportunity in a way because I didn’t act fast enough, it occurred to me that when I started in the UK why didn’t we make a bid for it but I didn’t get on with it, whereas the Germans did so it was a – but still – but it was still up for grabs when I put in a bid for it, but a lot of people were supposing it was going to Germany. And you really have to get at these things right at the beginning, if not in at the beginning you’re really lost. I mean I thought I’d have a go and put it to the government of the treasury, can we have the European Centre brought to the UK and what’s the price of doing it? Well you have to – you have to put up a building of course, get a building and, erm … and so on, so there’s quite a bit of set
up costs. But then the – you have all these people working in the UK and they are paying tax in the UK and the – return to the UK comes very fast. And you – you know, continues to benefit the UK economy further, so why don’t we do it? Hmm, I thought it was very hard, you know, good case for the treasury to look at and make a bid of it, make a proper bid. And I remember a meeting with treasury officials, you know, people at very senior level saying, ‘Why don’t we do this?’ and I think I explained that, you know, the UK economy would really benefit, so I was quizzed, ‘Well how does the UK economy benefit?’ I said, ‘We have all these tax coming in which will really, you know, pay – pay to the UK,’ ‘Oh there’s tax benefit for the UK economy,’ they said. And I said, ‘Obviously does,’ [laughs] and they said, ‘Well that’s nothing to do with us from the treasury, we have nothing to – that’s the Inland Revenue, we have nothing to do with the Inland Revenue, we’re the treasury. So it was will cost us a lot of money and we’re not prepared to put it forward.’ I said, ‘That’s crazy, absolutely crazy.’ I got nowhere [laughs]. Such is the dissection of our government setup, marvellous illustration of how things have concrete walls between them and somehow we never – they never act as a – you know, as UK limited in the way they need to.

[1:53:49]

*And could you tell the story of the establishment of the Hadley Centre, which –*

Yes.

*Happened within your –*

Yes, now okay, well I’ll move onto the … move onto the IPCC shall I in that case?

*Would – would that entail a move to the –*

Yes.

*Had – well the Hadley Centre you set up within the Met Office?
Yes of course, but the IPCC was key to that.

*Fine, yeah.*

Right. Well of course I got involved with the World Meteorological Organisation as a – as head of the Met Office and part of our executive committee which was about thirty members around the world, and played a part in that. And, erm, what’s … I mean did a number of things through the – what’s worth talking about. I mean the Met Office is a very important – joins with other Met Offices through that body and it’s that body that deter – that organises exchange of data between nations, technical – from the technical point of view as well as the political point of view. It organises exchange of information of all kind, science information, and erm, even commercial information, so on, so it’s a, you know, commercial exchange of stuff that has to be negotiated through the – through WMO, it’s a very good organisation, ‘cause it’s been there a long time and meteorologists love each other ‘cause they love having all the data, they can’t do it any other way. Hmm, they have a – a – it’s a congress of the – of the WMO every four years held in Geneva, big meeting, they all get together and it’s a very, thre’ – used to take three or four weeks actually, going through all the, you know, bureaucratic international type politics but, erm, gradually got a bit more streamlined. And, er, but it was very good meeting these people and getting to know them and … I’ll go straight to the IPCC I think, I might come back to some of the others things in WMO afterwards but, erm … but I did mention earlier I think the – the … that meeting and the – and the work done in the early ‘80s is by scientists, and it was at the 1987 WMO congress that it was proposed that there should be a body set up jointly by WMO and UNEP, that’s the United Nations Environment Programme, to assess the climate and climate change, and human induced climate change in particular. And … there was a man called Jim Bruce who was the – had been the head of the Meteorological Service of Canada, Canadian, who was then the deputy secretary general of the WMO, the secretary general was a man called Obasi, who was a man from Africa, and you know, did quite a good job really. And – but he didn’t – he didn’t delegate work to his staff at all well, it was not a – not a well run system, but anyway Jim Bruce was a man who Obasi trusted absolutely, one of the only few deputies he ever had, whom he trusted absolutely. And Jim could do almost anything and it was Jim Bruce who set up the mechanism for their Intergovernmental
Panel on Climate Change to be formed and he – and it was also done in equivalent manner in the UNEP structure and – and I played some part of the formation of the WMO negotiations, negotiations with WMO, I was very interested in that. And in 1988 three important things happened regarding the climate, erm, business. The first of these was in June 1988 when a conference was set up by the Canadians, and I’m sure Jim Bruce had quite a hand in that happening too, which was a ministerial conference, they invited ministers from all governments to go to a meeting in Canada to discuss what should be done to cut emissions because of human induced climate change. I went with the British minister from the Department of the Environment, and it was a bit of a shambles of a meeting in a way because the Canadians were trying to get, you know, a – a document at the end which really was very tough on what the world had to do, but nobody knew enough about it to begin to make that sort of commitment and – but it did raise the political … raise it as a political thing, it brought it to the notice of the political world in a way that perhaps nothing else could have done. Second thing that happened in ’88 was the, erm … just going to put my jersey on again actually, it’s getting a bit cold here. [Pause]. The third thing that happened – the second thing was that in September of 1988 at the Royal Society’s annual dinner Margaret Thatcher, Prime Minister, made a speech, she’s a scientist and loved it to be thought of as a scientist and her speech contained certain scientific things, including, er … some remarks about the greenhouse effect and the fact of climate change and how the world had to take it seriously. Some people think that I must have had something to do with that, I did not have anything to do with it actually, I think Crispin Tickell who was the, erm … UK … in charge of the UK mission to the UN that time, ‘cause it was a different matter, he was very interested in the climate and wrote a book all about climate change and politics in the 1970s. And I’m sure … he did – he certainly sent material into Downing Street to help her write that speech, but I think there were people also within the Downing Street office who pitched up and helped her write – helped her put that forward, and certainly met one or two people since who claim to have been the source of that. But that had quite an impact and in fact there were headlines in The Times the following morning, on the front page saying, ‘You know, global warming is a problem,’ or whatever it said, I can’t remember particularly. But that also raised the awareness of this issue. And then November 1988 the IPCC had its first meeting in Geneva and I went to that meeting, as a UK representative, so did David Fisk who was a chief scientist at the
Department of the Environment, because it was of course very much a Department of the Environment matter, not a Met Office matter. ‘Cause we had no responsibility for taking control over climate research in general, in – you know, or in particular I should say. No, there were bits of work on the climate went on in the Met Office in a sort of research way but only incidentally, we had no remit to make statements on the environment at that time. And no, erm … so Bert Bolin was there, you know who chaired this meeting earlier in Villach and also was a great figure of course in the – in the GARP, and – and so on, and he was a very respected person as chairman of meetings or as director of things and he – was, you know, everybody believed Bert Bolin should take the chairing of the IPCC. Which he wasn’t too keen to do actually ‘cause the job he really wanted was running the scientific assessment [laughs]. But they asked me if I would take the scientific assessment onboard and I said, ‘be delighted,’. I really wanted that, I didn’t want the chairmanship. [laughs]. And I wouldn’t – you know, I wouldn’t have done a very good as chairman of the whole thing compared with Bolin who was much better than me – I’m sure in, in reality that was the right way round, but from my personal point of view I was very happy with – very glad to take that on, probably a very challenging thing to do and, erm … so I discussed with David Fisk and other people from around how it’s going to happen because, you know, I was head of the Met Office, I had a perfectly good job, busy job and to do the sort of assessments that many of us were talking about at that meeting, a very thorough one, one involving all the scientists in the world we could find, because it was a world – global thing, all countries involved, if you were going to get people to follow what you do and take it onboard and own what you do then you have to have them involved. And, er, so it was going to be a big organisational job to do this, rather than just collect a few scientists together in a corner, and that wasn’t the idea at all to – to it. On their own, ‘cause that wouldn’t have taken any more notice of than the thing that had already been published. So … obviously the Department of Environment had instructions from Margaret Thatcher to support this sort of stuff, you know, and get the UK right onboard in this in a big way and that whatever way they could. So there was no problem with setting up a – setting up a secretariat in the UK, or technical support unit we called it, technical support unit to help me to get all the people together and get it written and get it organised, the discipline of the writing and all the rest of it. Hmm, which cost, hmm, half a million a year, I suppose that sort of thing, perhaps more than that. It’s the sort of cost of the outfit, you know, a few
people who had to be involved. So – so I went back to Bracknell, I set that up, I talked to my – some of my senior staff about this and said, ‘We’re going to do an assessment on climate change,’ ‘Oh you must be off your head,’ they said [laughs], ‘Well why did we want to do that, we’ve got one from Villach you know, we’ve,’ they said, ‘why do we need another one?’ So I said, ‘Well it’s not just for scientific reasons but that’s part of it, you know, part of it but we have to convince the world about this and it’s a – you know, so there’s a big political reason for doing it too, not … we have to tell the world what we know and because it’s a big thing and we have to make sure it’s – it’s done absolutely accurately and properly and we’re starting of course with a clean slate, we’re not going to say where we start from, we’re going to start from scratch.’ So I got some very good people in the Met Office doing – helping me with it and, erm, so we started off and in our first meeting I remember in – I’m now on IPCC story, okay.

[2:05:57]

Started off with a meeting at Newnham Courtenay in Oxfordshire … I don’t know why it was there particularly but anyway it was a place where we could meet, seventy people I think, seventy scientists from around the world came to the first meeting early in ’89 and the idea was to scope our report and … there were some people there – a significant number of scientists at that meeting who said, you know, ‘We don’t know enough to say anything, you know, we’re not – we don’t want to stick our necks out to say things that we don’t know enough about and, erm … why should we be doing it anyway, what’s the point?’ Because it’s a complex business, a very complex business actually really, and what we knew then of course is very much less than we know now. But, erm … so we argued loud and long about that in the meeting and I tried to argue that we had to – we had a responsibility to say what we knew with a reasonable certainty and also what we didn’t know with any certainty, divide the field between anything we could say under reasonable certainty and things we couldn’t say. And I can remember using the illustration of a – you know, a TV weather forecaster, you know, of a man comes on the forecast, you know, on the television at night and says, ‘You know, the weather tomorrow,’ and he explains what he believes the weather tomorrow will be, erm … he may feel a bit certain about it or he may feel very uncertain about it, but he’s – that’s the job he does, if he got up and said, ‘I’m
sorry, I can’t give you a weather forecast tonight, ’cause I don’t know enough to give you a forecast for tomorrow,’ then he’d be – he – you know, his credibility of course would disappear. But also he wouldn’t be doing the job he was there to do unless he – he could always give them his best estimate as what’s going to happen tomorrow and also explain if really necessary, because you don’t have to explain too much about the uncertainty ’cause people know about the uncertainty of weather forecasts, we get them every day. So there’s a general uncertainty about it all, sometimes he’s right and something not very right at all and he – so he doesn’t need to explain that too much, unless he wants to. But we were in that same sort of position, the world needs – want – need to have the best information they have about the future of the climate and whether it’s – you know, this possibility that it’s going to do really damage is really true or not. And we as scientists here have to try to discover what we can about that and write it down. So I – in the end we all agreed we would try and do something and write a – essentially a book on it and, you know, divided the chapters up into different headings and what they were going to be and so on and set to work. The, erm … and the support unit was trying to get scientists from all over the world, the question, we had to get them – you know, authors for the different chapters, had to have lead authors who would really deliver something written in English on a given date [both laugh] and, erm, nobody was paid anything, it was all voluntary work of course, nobody – no contracts for anybody to do it. But there were people around the world who were very willing to help and some of the best climate scientists around were very willing to help this, and so it moved on. And – and the chapters groups met in, you know, their different ways to get their chapters going and, erm … and there was groups of people who met to discuss certain things and so on, I can’t remember all of the detail of that, I’d really have to go into the system to try to find out what we did.

[2:10:00]

But, erm, the meeting I remember most was … was in 1990, March 1990 … erm, when we were really putting the – putting the whole thing to bed and the – we were going to go have the final meeting in May 1990, that was already arranged, near Windsor, at a conference centre in Windsor. And so March we were putting all the chapters, finishing touches off and … and somebody who came to that meeting, really first one – first meeting he’d come to, was Syukuro Manabe from Princeton, the arch
modeller [laughs]. Japanese by origin but of course living in America and it was he
who was dealing the world in computer modelling of climate and – and he brought
with him results from the – you know the first really credible atmosphere-ocean
coupled model, you know the atmosphere drives the ocean circulation, the circulation
for each term drives the atmosphere, it’s the wind over the surface of the ocean that of
course moves a lot of the ocean currents and it’s the water vapour input to the
atmosphere of the water input of the Earth that comes from the ocean of course which
provides a great deal of the – the weather information – or information for the
atmosphere and its circulation. So this was a – you know, a very big breakthrough
really. Before that day almost all models of the climate had been run with a – with a
fixed ocean, a swamp at the bottom, that’s all, no movement in the ocean and, erm,
the flux for, you know, the exchange between the atmosphere and ocean, was not built
into the system, so you had to have artificial fluxes of water vapour coming from the
ocean and so on. Well no, water vapour you got from the ocean by fixing the surface
temperature, but the momentum, there was no exchange of momentum across the
surface which mattered of course to the atmosphere as well as the ocean so there were
a lot of deficiencies in the – in the models up to that date, although they had a – a
swamp ocean which allowed for heat capacity of the ocean, of the surface where the
ocean was rather than the land, the dynamics was not at all affected by the ocean and
that – that was obviously a great weakness and, erm, and they had to be coupled
together, you get a sensible – sensible final answer. So this was the first – first of its
kind. And you know, you could begin to see how the ocean was influencing the
atmosphere and the other way around in – for the first time, it was very exciting,
tremendously exciting, everybody gog’, googled over this stuff you see. But of
course fortunately we didn’t have very firm rules about what the information we could
use or couldn’t use in the report, we could only – well we were supposed to use peer
reviewed literature you see, not things that hadn’t got to that stage, so this was entirely
new stuff. On the other hand we were a body of 100 odd people who were peer
reviewing it if you like [laughs] because we were there and looking at it and we
thought, we can’t ignore this, we must put some results from this into our – into our
report. And, erm, so – so we had a difficulty with the man who – the chap who’d had
to go in, erm … was not at all sure about this, ‘cause he’d written the chapter and it
was his, you know, in a sense his chapter and his cohorts, they didn’t want to have it
disturbed with all this new stuff because that was – as he said it was too late, he
couldn’t possibly put that in now, it’s all done. ‘Ah,’ but everybody said, ‘no no
[laughs], you know, we have two months yet and we can do it, we must do it, put it
in,’ and – and so we did actually and he … threatened to resign and went off, didn’t
come back for two days, but then he came back and said perhaps he should join in
after all [laughs]. And – but in the end he didn’t, he quit actually, finally, but no there
was no bad blood there really, he was upset but everybody was thrilled to bits with his
stuff and it was very interesting how, erm … you know, particularly how the – the
ocean circulation was being driven by the – by the atmospheric momentum and also
how variations in the ocean surface conditions were really effecting what was going
on in the atmosphere, and some of the, you know, very early data showed this – these
things happening. And so we put that in and I remember at the end of that meeting,
you know, we all felt, you know, tremendously inspired [inaud] and by it and Hans
Oeschger who was a Swiss man from – whom I know many years, an older Swiss
scientist and he – he came up at the end and shook both my hands, both, he said, ‘I
have never been to a more exciting scientific meeting,’ he said, I said, ‘It wasn’t
meant to be a exciting scientific meeting, it was just meant to be doing a job,’ but he
said, ‘Oh [laughs], it really was, you know, one of the great scientific meetings I
actually ever remember,’ when the excitement of something new coming into
something like that. So we finished the report, have you ever seen an IPCC report?
Hmm [both laugh]. Let me go and find one. Few copies of things to show you
[laughs].

[2:16:12]

[Looking for paperwork]

_Gosh._

Right, that is the 1990 science report, reproduced in 1990.

_And which is the chapter which integrates the Manabe?_

Oh, it’s the chapter that – 76 … that’s the one, that’s right. [Passing papers]. He was
the original lead author, he was taken over by these three people. Now …
And out of these three here, John Woods as the British –

John Woods was a British, yes he was a –

These two?

Bretherton is a … he was an American, Kirk Bryan, Australian. Think there Syukuro
Manabe was a –

Yes I see.

So these are the people who finally wrote it up and … well this is the – this is
involving the – these are some of the … diagrams of the average climate. The
increased changing climate, that’s right, two times CO2 in temperature, you double
CO2. This is the … that was a Canadian centre model, this is I think the Manabe
model, that’s right, that’s the one that includes the oceans.

So this is figure 5.4 in the 1990 report.

That’s right, yes. Well no this B.

Yes, and B specifically, yeah.

B specifically, that’s the one that’s involved with the – the oceans and you can see
there are lots of differences between that and that and that [laughs].

Yes, and what was the – who produced the – which was the third one?

That was the UK Met Office’s model, that was the Canadian climate change model …
and that was for December January February average, this is of June, July August
average, and so on. This is precipitation, that’s temperature, this is precipitation …
there was a lot of difference, well enormous difference between those two, I couldn’t
expand it to you now, off the cuff now but that’s – that’s [inaud]. And then [inaud]
and so on, and that’s the chapter that has all that in, describes it all. And that’s – that’s 1990. Hmm, I should really have brought you the – well I brought you the 2001 one ‘cause I was still involved with that [laughs] and 2001 first three reports, so the fourth report came out in 2007, was not my – the – this is the second – this is the third one and you can see it’s a lot thicker, there’s a lot more in it and there are … well you can see it’s full of material.

_Hmm._

And then of course now the front of this report, in all these reports there is the summary for the policymakers, you can take that away with you if you like, that’s the first summary for the policymakers, that was produced in 1990 and this is – this was our executive summary, which we – was agreed at the – where have I put it, I was talking to your microphone now, talk about that – talk about some of these things. Hmm … so the IPCC reports consists of however – the first report in 1990, I can’t remember how many pages now, many chapters, but it was quite a thick volume, A4 pages, going into, what, twelve chapters probably, and by different authors in different countries and different places and the, er … about twelve chapters I think is it there.

Yes.

And with many thousands of references to the scientific literature, all very careful written, very cautiously written and not – we didn’t want to in any way alarmist or hyping things up, we wanted to be absolutely accurate and if in doubt you erred on the side of caution. Hmm, the – the front of it there’s a – then a summary of the chapters written which was about ten pages long, I’m guessing now how long that is, which was – which was written by the scientists, some of the chief leading author scientists from the chapters, and the object of which was to inform policymakers of the main report, main content of the report. Now that – the summary … had to go through – had to be agreed at an intergovernmental meeting where we had representatives, I’ve forgotten how many nations but later reports we certainly had about 100 nations, probably more like fifty or sixty I think for the first report, it will tell you in the front of that somewhere how many people were – how many countries were represented.
They were mostly represented by scientists of course ‘cause it was a scientific meeting, wasn’t a political meeting. The object of the meeting was to agree that the report was, as far as the meeting determined, scientifically accurate and also clear and understandable and was relevant to the policy process. So people could make comments about its, erm, consistency of the science, or they could quiz the scientists about the science who were there to be quizzed. Or they could say they didn’t believe it for scientific reasons, or they could say that it wasn’t clear, or that it wasn’t – there wasn’t consistency in the whole document or that they should have put things about all sorts of policy or something, it wasn’t relevant to policy in certain ways or whatever it was, so they could make all those comments and – and then – then we had to then get agreed text from the meeting, of these government delegates to – to agree the whole thing. But that turned out to be possible, it wasn’t obvious it was going to be possible to get everybody to agree, UN style, in a finite time, but that turned out to be possible and so we have the – that – I was responsible for three of these reports as the chairman of the meeting and … and for trying to make sure we came to closure on these – on these documents. And the wonderful thing was that after each of them, you know, I sat down and looked at what we’d produced [laughs] as a result of the meeting, which was a very demanding meeting indeed, later meetings had even – had more delegates and also more controversy, but people hadn’t really learnt what it was all about at the first of these so much. But, erm, every time when I read the final – final document it really was read much better than the initial document we started with which had been put together by a scientific – local group of scientists and – and it was clearer and it was more accurate and it was – read better and so on and it’s – was a good process. And that’s – and that was the toughest scrutiny we really could have actually for the document, because we were going through – it had to go through this body which consisted of going – representatives of governments with very different agendas of their own, don’t think – the most vocal I think were very often the oil states, Saudi Arabia and Kuwait and – and countries of that kind, Venezuela and so on, who were trying to weaken it in whatever way they could. That was their agenda, quite obviously so in many cases, but they couldn’t of course argue for any pol – a political argument, weren’t allowed, they had to be scientific arguments in order to change the text, but they did their best on that. There were other countries, some European countries who wanted it greener, who wanted to have it more, erm … you know, saying more definitely that this was a big issue and we should do more
things and so on and so make it – hype it up more than we did. And so we had these various elements in the – in the audience and we had to try to come to closure on it – on these things, which was possible.

[2:26:29]

Where would you place the British – you’ve mentioned the oil states and certain European countries wanting it be greener, where within that is the sort of – the British style of science, where would you place the British contribution?

Well the British were keen to – to have it as good science, you know, their – there were British people there whom I knew of course [laughs] who were scientists and who wanted the science to be right and accurate, and not over done in any way, not exaggerated in any way but nevertheless conveying what we knew. And so I – you know, was on – although I was not involved by the … by the departments, political departments in any way in – in my work in the – with the IPCC, they believed I should be completely separate from them so they didn’t discuss climate policy with me at all, or during my time in the IPCC. They wanted me to act as an independent chairman without any political affinity for them and I didn’t get any and I didn’t get any involvement with them and I didn’t want any, and that was very important to maintain the integrity of the – of the work that was being carried out.

The – for instance at this – for the first – the discussion of the first summary document.

Yes.

Were there then scientists from other countries who had been influenced by the political agenda of those countries, you say that you – you were completely separate and there was no attempt to influence you.

Hmm-hmm.
But you said that the – there were the oil states who were attempting to make changes in certain directions.

And they had briefs from their governments in – in general terms, yes, that would be –

But they were science – they were practising scientists?

Some of them were scientists yes, not all of them actually, not all of them were scientists. And the man from Saudi Arabia, they – in later – I can’t remember who was there for the first meeting, but later meetings, the man from Saudi Arabia was a lawyer actually, I’ll tell you all about that downstream. But, erm … no they weren’t all scientists, from – particularly from countries of that kind. Hmm …

And what –

But it was a – it was a meeting in which everybody could have a say actually because there were quite a lot of people for instance from developing countries who didn’t really know a lot about the science, but didn’t understand what the report was saying and they’d get up and say, ‘I don’t understand this, tell me what it means,’ and you had to try and explain to them and sometimes they would say, ‘Well, you know, it doesn’t say it at all clearly,’ or, ‘this bit doesn’t actually agree with this bit so can’t we change that in some way?’ so all sorts of changes were made for clarity reasons and it was – so everybody went away and they owned the document and they’d go back to their ministers and say, ‘Here is what we’ve agreed,’ so you will never find, I don’t think you’ll ever find any official statement from a – any of the governments involved saying, ‘This is about a report,’ ‘cause it’s their report, and not even Saudi Arabia has ever said, ‘It’s about a report,’ or the American government under George Bush [laughs].

And among those countries who were sending scientists to meet for the IPCC rather than lawyers or delegates who weren’t scientists themselves, were there detectable differences in the kinds of science that different countries were bringing? So for example were some countries more likely than others to have modelling as the kind of science that was being put into the report, were certain countries were more involved
in, I don’t know, ice cores, certain countries more – more using tree rings, were there detectable differences in the kinds of climate science coming out of different countries?

Well of course and because the delegates were different experts in different parts of it and they might be arbitrary, not necessarily chosen for any reason from the country because the country has a science but because they happen to be scientists from different areas and – but all these things of course were brought into all the things you mention, were part of the process and part of the input into the whole thing and – and some countries of course were particularly concerned about where they were in the world, how – how were they going to be effected and very concerned about, you know, what might happen to them, as you might expect and quite rightly so. Hmm, no, it was a very – a fascinating, very stimulating process, I – I felt very privileged to be part of it actually and to be trying to lead it, hmm …

Do you remember a specific example of – of someone standing up from, I think perhaps a nation and saying – who weren’t scientists and saying, ‘We don’t understand this particular part of the report, the science of it.’

Hmm-hmm.

You talked generally about that happening, I wonder whether you can remember in particular a delegate from a particular country who –

No, nothing that comes to my mind just this minute actually, I mean there were lots of examples of that, lots of them actually but I can’t recall any particular ones now. I have a complete transcript of the second of these meetings which you can read if you like [laughs]. But I’m not going to let you take it away [laughs]. It was the second of the meetings that raised a lot of difficulties in some regards …

[End of Track 6]
Track 7

At the beginning of today’s session could you tell the story of your role, which I think was central in the establishment of the Hadley Centre for Climate Prediction and Research, which I think was in 1990, so it falls within your service as director general of the Met Office.

Yes, indeed yes, just a minute … [looking through papers] a whole lot about… okay, this is a … well that all ties up with the beginning of the – really the beginning of the IPCC of course which predates the idea of the Hadley Centre. That began in 1988, November, I think I talked about that last time.

You did, yes, we –

Just I think.

We just started talking about the IPCC which is probably why we missed the Hadley Centre.

Okay, well I was just repeating what – repeat a bit of what I said last time.

Yes.

That in 1988 there were these three events which triggered off a lot of political interest and the first of those was the – was the conference organised in Canada by the Canadian government, and so it was a ministerial meeting and I went along with the minister for the Department of the Environment, whose name I’ve forgotten now I’m afraid.

You mentioned it last time so that’s on the recording. Is it David Fish, am I –

No no, no I didn’t mention it last time ‘cause I couldn’t remember it last time either so [laughs].
Okay, well we can look that up and – yeah.

So this is the minister responsible in the Department of the Environment for climate things, and this was in June 1988. And – and this was a meeting that the Canadians had set up because the Canadians were very keen on acting on climate change, there was a – somebody called Jim Bruce, who I think I mentioned last time too, who was the secretary general – their head of the met service who became deputy secretary general at the World Meteorological Organisation in Geneva in the fairly early 1980s I think. Probably about five years before ’88 at a guess. And he – he was someone who – who did that job in Geneva extremely well, he was – he was a man who was really trusted by Professor Obasi who was the secretary general of WMO who’s a man from Africa, and he didn’t trust many people but he trusted explicitly Jim Bruce and Jim Bruce got on very well under his – under his leadership and was given a great deal of freedom, unlike many of his predecessors. And one of the things that Jim Bruce was very keen to do was to – was to move the climate change agenda on and, erm … I think I mentioned last time again the – the Scope 29 meeting which was very – the ICSU meeting which was called by ICSU in – in about 1985 I think which produced a volume about the very good sensible detail, scientific volume on what we knew about human induced climate change and saying that it was likely to be a substantial problem and – and that volume had been – had got around and – and Jim Bruce and others in Canada in particular picked that up and they were very keen to get the world to sign up to twenty-five per cent cut in initial sort of carbon dioxide by the year 2005. All that was very new to the politicians who turned up at this ministerial conference that was called in Canada, although the Canadians tried hard to persuade people to sign up to a statement of commitment that didn’t succeed and it was really in some ways a shambles of a meeting in terms of this organisation and the way – and everybody wanted to, you know, people couldn’t speak when they wanted to know, it all sorts of things were wrong with it in a way, but it raised the political agenda. It put the whole idea of climate change and doing something about it on the political agenda. Then in September ’88 Margaret Thatcher gave her – gave a speech at the Royal Society’s annual dinner in London and dealt with a number of science – she’s a scientist, she wanted to raise scientific issues and one of the issues she’s raised was global warming and climate change. I think the person who had most to do with – with getting her to do that was Crispin Tickell who was the ambassador in
Washington at that time. And he – he sent a – oh no, things in the diplomatic way people do, and gave them material which he used in that – on that occasion and there were headlines in *The Times* the following morning, the front page, made front page news – news and so again the world was made aware of it. Hmm, I think there was also somebody within her cabinet office who was very keen on this also, but anyway that she picked that up and she ran with it. And then in November 1988 there was the first meeting of the IPCC, the IPCC was formed – was set up at the 1987 World Meteorological Congress, that’s the meting of the four – the four yearly meeting of the World Meteorological Organisation in Geneva when it all – when they set their programme for the next four years and – and the resolution had – the congress had passed a resolution forming – setting up the IPCC as a body to assess and to study and to say what should be done about climate change. And in doing that they had joined together with – with UNEP, the United Nations Environment Programme headquarters in Nairobi and – and that had been largely instigated by … by Jim Bruce was a – the head of UNEP was a man called Tolba, Dr Tolba who’d been there some time and he was also very keen on getting something moving on the climate change issue, in fact he’d helped to set up I think the ICSU meeting early in the 1980s. So the first meeting of the IPCC took place in Geneva in – in November ’88, I went along as head of the Met Office.

[07:20]

And not that the Met Office had any remit really to study climate, because weather was our business, not climate, but of course we were – we were running our climate model in the Met Office, we had a big modelling programme which included climate and it included climate, again I might have possibly said this last time, but included climate because erm … oh in the 1970s there was interest in – in climate as being a possible military weapon and – and the – there was also a great discussion in the late ‘70s of about the nuclear winter, the possibility of you have a big nuclear exchange that the dust in the atmosphere would be so thick for so long that in fact many more people would get killed by the lack of sunshine and the lack of crops and the lack of food, due to the nuclear winter, than they would get killed by the bombs. And that – and that again the Met Office got involved in as a – modelling what would happen if that happened. There was a lot of controversy over just how bad it would be, a lot of
hype about it. It … I mean the first mistake that people made when they were running
the models was – very simple models was just putting dust into the atmosphere and –
and letting it settle by its own gravity, but forgetting that of course there is – rainfall is
an important – important meteorological phenomenon and rainfall tends to wash out
these things in the lower atmosphere. So I mean – so some of the results were really
quite crazy. But it nevertheless of course had a lot of – and a lot of the dust would
have gone onto the stratosphere where it would have stayed for a year or two and –
before it fell out and so it – it could have become a major – major disaster if the
exchange had been big enough. So the Met Office had been doing that and in – and
also it had been raised in the MoD I think the possibility, well maybe we’ll – will
people start using climate as a possible military weapon, so that was another reason
for getting modelling – climate modelling going on in the Met Office. And I – and I
was very keen on it when I went in the – joined the Met Office in ’83 because I
realised the potential of modelling and the importance of modelling in settling the – in
dealing with the whole crisis of human induced climate change. Hmm … so that was
the – the background to the – into the Met Office’s interest in climate.

[10:18]

Now at the – at this meeting in – in November ’88 there was Professor Bolin came
along, invited I think by UNEP particularly of course, there were the – a few heads – a
few representatives from, only about twenty nations I think, or twenty to thirty nations
joined in, that was all, that particular meeting. And – and it was agreed at that
meeting that there should be, you know, the IPCC dealings, its first job should be to
do a – an authoritative assessment of climate change and – and just what it would be –
what it could cause and that this must be a very good scientific – in the first place the
science of it should be as good as it could be, so that people really understood about it,
and should involve as many scientists as we could. Because it’s a global phenomenon
and we therefore – this wasn’t to be a – just a few chosen scientists who were put in
the corner and told to write it up, but it – because we were an intergovernmental body
it clearly had to be something that governments got involved in and scientists from as
many countries as we could could get involved in it. And that was very important.
And the … and three working groups were set up, one on the science, one on the
impacts, human communities in particular but also on eco systems too, and thirdly one
on policy options. And, erm … I – I was asked if I would chair the first of those, which I was very pleased to do … it was the job that actually Professor Bolin wanted in a way because he was very keen to do that scientific work but then he was all – he was the only person really who could chair the whole – the whole of the organisation, ‘cause of his experience and because of his style and because of his ability in that area. And I would have been nothing like so good as Bolin in doing the chairmanship so I was very happy to do the, erm … do the scientific assessment. Hmm, Yuri Israel from the Soviet Union, who was the head of the met service in the Soviet Union, took the – was asked to do the impacts job and Fred Bernthal I think, B-e-r-n – is it Bernthal, t-h-a-l, from the United States, a nuclear physicist actually, took the policy post. Hmm … the – David Fisk from the Department for the Environment was – who was the chief scientist for the Department of the Environment was there and he was very important because of course he – I said to him, ‘You know, I have no remit at the Met Office for doing this work,’ so as a piece of climate work, human induced climate change, that’s, you know, DofE’s responsibility and – and he agreed that they would – and also I said, ‘I’m running the Met Office and I can’t – won’t have a great deal of time to – to work on this, I need a team of people who will – because we’re going to involve a lot of scientists, it’s going to be a major undertaking and we need a secretariat of – a good secretariat to do that,’ and I asked him if he would support that and he – he agreed that DofE would support the technical support unit at the Met Office, and that was set up very rapidly after that. Hmm, I got some of the best people in the office actually to help in that, it was a small group, about three of four people who had to do – run the organisation, had to get – get the scientists onboard of course and – and help with running meetings and help with – and help with the writing programme and monitoring the whole writing programme, monitoring the groups who met to write various chapters and so on, so there was a great deal to do and if it had been – and it had to be run by people who were, you know, who were very efficient and knew what the important things were and had to, you know, run with the important things and be prepared to leave a lot of threads hanging in the air because they just didn’t have time to deal with them, otherwise you’d have needed a secretariat of twenty or thirty people. And fortunately I had people were extremely dedicated, extremely hard working, run by a man called Geoff Jenkins who was – who did the job extremely well, and I could not have done it without him and his team.
Hmm … you asked about the Hadley Centre but that comes a bit further downstream still in a way.

Would you like to that until the point where you think you ought to –

Oh great, I’ll leave this –

Yeah.

I’ll – shall I keep on with the IPCC?

Can I just ask you a couple of questions on what you’ve said so far and then carry on.

Yes, how much have I repeated of what – did we do this last time?

You’ve added considerably to what you said last time.

Oh good, fine, okay.

I wondered whether you knew which members of Margaret Thatcher’s cabinet was keen on climate change at the time she made the Royal Society talk, you mentioned that you thought there was someone in cabinet who was –

No, not in the Cabinet Office, no one of her staff actually.

Oh okay, but you don’t – do you know –

And I’ve forgotten his name, I’ve met him and he told me that he was the man, you know [laughs], who helped her on her way, and I’m sorry I can’t remember his name.

Okay –
But it was somebody in his – in her office at that time who … there were people in her office later also were keen on – she had a number of people who were quite keen on this issue.

_Had they themselves had a scientific background these –_

I think they had a scientific background as well as – yes, I wish I could remember their names and who they were, but I can’t remember at this minute.

_Okay._

[16:47]

*And when you joined the Met Office in 1983, were the climate models still being talked of in terms of their relevance for a) military concerns about the climate as a weapon and b) modelling of fall out, was this still being discussed as the reason for having them or ...?*

We will – people still were – when I went they were saying, you know, well we set these up of course because we were, you know, the MoD were concerned about being a military weapon and so on. Hmm, and so that was still in the background but there was no – there was virtually no work going on then on the military side of it, so it became a – a military question being asked and never – it never taken away [laughs]. But the object was to try to under – try to measure – understand the climate and you’ve got to realise that, you know, there was no immediate application to any military problem, although that was still I suppose, in MoD’s thinking, possibly downstream, so this was a piece of work being carried out against any future requirement. And of course this feature requirement turned up in the human induced climate change, but that wasn’t exactly a military problem.

_Thank you. And did you gain any sense of who had – who at the Met Office had started work on the modelling, the very early modelling, at the time in the ‘70s when_
there were concerns about the climate as a weapon, who – who was responsible then for starting this modelling work?

Oh the – well there was John Sawyer who was the head of research in the Met Office in the 1970s, he was a very good – excellent scientist, FRS and so on, and he was a very shy man actually but a very able man. And – and he had some good modellers, he set up the modelling for that – of course for weather forecasting and he’d had a big part in the – in – in the detail of actually the mathematical details too of the models for that, he was a mathematician, an able mathematician and, erm … and then there was a man called Fred Busby who was a – a computer man, a modeller and he had a great deal to do with it too. So there was a good team of people with – who’d been working on the modelling programme ever since the – ever since the 1960s I suppose.

Thank you.

To model weather and then of course they took the climate thing in and – and it was – no it was an exciting programme and I was – and I was – I tried to push it along because I was very keen on it [laughs].

[19:29]

Thank you, so yes if you’d like to continue the IPCC story, you’d just told me about this secretariat and its work?

Yes. Well they were a very good secretariat and without this it couldn’t have happened really. Hmm, and we had our first meeting in – in Newnham Courtenay near Oxford in early 1999, about seventy people turned up to that from around the world, and, erm … we had to decide how we were going to do this … how we were going to do this assessment and just what it would involve and how we could do a good job. And … we had been given a – it was hoped that this – I think it – the meeting, IPCC meeting it had been decided that the report should come out within two years, by 1990. Er, that’s – yes, that’s right I think because there was some – why was that deadline, they were keen because of the – there was a second World Climate Conference, that’s right, was going to – going to take place in 1990, that had
been decided, after the first World Climate Conference in 1979 was it, 1979 I think. It had been determined that conference would take place and it would be very good to have this assessment out before that conference. Hmm, but I think later there was a bit of pressure too because there was talk of course of the – you know the earth summit to take place in 1992 and I don’t know when that was first mooted, but plans I think were for that meeting were at least beginning to be formed internationally and, er, certainly at the end of the period – the – it was thought very important that the report on climate change was fed into that meeting, with the hopes that some sort of conventional climate change could be – could be set up, which of course it was. I guess the Canadians had quite a lot to do with that but I’m not – I don’t – I wasn’t very familiar with the political wrangling that was going on in order to set it up.

Hmm … so the, we started to talk about the chapters we were going to have – have in the volume, this – and what sort of report it should be and what its structure should be and we divided it up into about ten chapters, different areas of the climate issue and, erm … but early on I remember there was a … this – there was a significant body of people there who were – significant number there who were really very worried about the whole project, who thought, you know, we know so little about the climate, we’re sitting there and we don’t know very much at all and not very much can we say. And they were very – they thought, well as scientists, you know, we don’t know enough to say anything, and there was a significant number who actually felt that way and voiced it quite strongly. And I can’t remember all the details of that debate but I do remember talking to them about the – about weather as opposed to climate and saying that people were very used to uncertainty in the weather but they still wanted a weather forecast and, you know, you couldn’t expect your man in the – on the BBC to get up in the evening and say, ‘I’m sorry, I can’t give you a forecast for tomorrow because I just don’t know enough to give you a forecast,’ he just can’t do that because he knows more than that, at least he’s got some idea of what the weather will be like tomorrow, even if he’s not at all certain about it. And he can explain that uncertainty, so he has to tell his best story, tell them what he knows and explain what he doesn’t know, and our job in the climate change issue will be to say what we know, what we’re fairly sure about and also what we don’t know, so that we distinguished between those rather clearly but put over to people exactly what we – you know where we’re pretty sure and the reasons for our uncertainty where we were uncertain and they’ve – and they’ve bought that in the end I think and after that people spoke
strongly too about doing something, because we’d been given this job to do and I, 

erm, think that possibly the other argument that weighed strongly was, well I’ve – you 

know, some of us said, if we don’t – if we don’t do this job, if we chicken out of this, 

then there are lots of people out there who will – who don’t know much at all and who 

will speak and say anything about climate change and get away with it, because we 

won’t speak, you know, what is really known and what is really unknown, so that was 

– that was a – but I think began to gel the group together a bit with the feeling that we 

just have to do something. And – and so the … and so meetings –

[25:12]

So the chapter groups were set up, they had to be of course, erm … multinational, you 

know, we wanted to have people from different countries as far as we could in – 

involved in the different chapters and – and also different disciplines insofar as we 

had different disciplines around at that time, we didn’t have – people were largely 

physicists or meteorologists or, hmm … or people with – you know, the whole 

problem of – of just what happens to gases and the chemistry and all that sort of thing 

was not really addressed very much in the first report and the biological what happens 

on the earth’s surface, what happens, so that sort of thing wasn’t addressed either. 
The effect on the ecosystems didn’t have much of a look in, we were largely coming 

from a meteorological background in determining climate and so we talked about 

weather and – and to begin with the ocean didn’t have a big play in it either because 

the models, most of the models at that time were … were atmospheric models and 

they had a – a fixed ocean below, the temperature of course of the ocean was allowed 

to vary, you could vary the temperature of the fixed bottoms of the model but that was 

not – not one of the variables to be generated by the model. So the ocean surface was 
a fixed component. Hmm, and so I’ll come back to that in a minute, but that was 

mostly what the models did so – we was fairly restricted in a way what – the amount 
of science we were putting into it. But that was, you know, there was a lot of science 

about, a lot of models had been run and people compared the various models and 

there was good agreement between the best models in the world by and large and so 

the chapters got written. And, erm … the …

[27:20]
The – and the – the group as a whole met a couple of times I think between the beginning – I would guess it was a couple of times between the beginning and towards the end, the final meeting when we had the text of the chapters, all pretty well finalised, was in March 1990. So that was only just over a year away from when we began, so it was a fairly rapid process, given its complexity. And that meeting took place in Edinburgh and that was a very exciting meeting indeed because, I may have said this last time, I don’t remember, but Syukuro Manabe turned up from the geophysics lab in Princeton where they were running the best climate models in the world and they had just had their first success in coupling the atmospheric motions to the ocean – motions of the ocean as a coupled dynamical system. So now for the first time the oceans were changing in accordance with the driving force of atmospheric winds and so on, on the – as far as the atmosphere is influenced on the ocean is concerned. And then of course the oceans influence on the atmosphere and you were varying the amount of water vapour exchange and so on, between atmosphere and ocean and that was – ocean and atmosphere and that was an important – a very important breakthrough. And they came along with some of the first runs of this model, and he did – he hadn’t been involved in our work before, previous to that but everybody – we just all goggled at this because it was really very interesting to see the influence of the ocean on the atmosphere in a way which – which, you know, was now coming out of the models and which was bringing, you know, a new dimension to the whole thing. And, erm … so apart from the man who’d been the chief author of the appropriate chapter, who was very unhappy by all this disturbance to – to the chapter he’d finalised, he thought [laughs], but we all said, ‘You know, we have to put this in and this all has to be included and we have to say something.’ With the IPCC as it is of course we wouldn’t have been able to do that because it hadn’t been in the – it wasn’t in the peer review literature or anything, it was just results from a given modelling group. But there were – we didn’t have strong rules of that kind at that time, we could use in those good scientific material, even if it was very new, providing of course because it was getting its peer review anyway, through all the people in the room [laughs]. And much stronger peer review than they’d ever get from the referees who were – who were coming to our paper. So … key to the – key to that – and so people were around – around and there were two people particularly who – who brought – got the volume here actually, this is our first volume [laughs]
and it was chapter six, the authorship of chapter six was – yes, I mean two people were absolutely key in – in putting it together, that was John Woods, he was an oceanographer from London and Francis Bretherton who was a meteorologist come oceanographer come climate man from the United States, although British by background. And, er … and they together with a man called Kirk Bryan from the States, I think he was from the States, also he put this – now put a new chapter together. A man called Michael Schlesinger who’d been the original – the lead author, left the meeting and said he wasn’t going to have any part in that [laughs] … and just didn’t come to the first two – the next two days, in fact for most of the meeting, but he then came back in wanting to be part of it again [laughs]. And stayed as part of it for a short time but then he – he gave up too. He’s actually listed as one of the contributors I see in the – in this volume here. He did a good job but he – the discussion was way beyond him, he hadn’t been involved with the ocean and atmosphere interface at all so he didn’t know much about that and … so we got a much more interesting chapter than we would have had otherwise. And I remember a dear – and of course the rest of us who didn’t – who weren’t modellers, including myself, in any detailed sense, we – we just enjoyed very much listening to the debate and all the information that was being passed around the group. And I shall always remember a man called Hans Oeschger from – from Switzerland who was a palaeo-climate man, dealing with climates of the past and he came and at the end he shook both hands, he said, ‘John,’ he said, ‘I’ve never been to a more exciting scientific meeting;’ ‘Oh,’ I said, ‘it wasn’t meant to be a scientific meeting, it was meant to be a meeting finishing a document off,’ [laughs] which it was of course but it was a – it just shows the – you know, the excitement you get when you’re really as a group together trying to do the very best job you can and telling the world what’s going on.

[33:13]

And that was only two months before the document came in front of the final meeting of the intergovernmental meeting which took place in Windsor, at a hotel in Windsor, conference centre in Windsor, erm … and took place over three days I think, but at that time we had written a summary of the report, or a summary had been written by some of the authors of the chapters and – and that similarly was a … was a very … the – there was a – a … [looking through papers] … where it was … that’s right, there
was a … hang on [looking through papers] … we had a policy – an executive summary, that’s right, and we had a policymakers’ summary, policymakers’ summary was about … was – was substantial – it was about … twenty-five pages I think, where as the executive summary was – was one page of A4. And I remember Geoffrey Jenkins had a big part in writing the – or drafting the text of the summary and – which has three sections, the first is two paragraphs that say, ‘We are certain of the following,’ the second section is, ‘We calculate with confidence that,’ and three things of that kind, and the third one is based on current model results, ‘We predict,’ and there are, one two three four, five bullets under that. So it was very succinct and very clear and did exactly what we wanted it to do in dividing between what we knew and what we didn’t know. And the – for instance we said we are certain that the natural greenhouse effect exists, been known for 200 years [laughs] and it’s a piece of physics that nobody can deny. And then the second point under, ‘We’re certain that emissions of carbon dioxide in particular are rising because of human activities, we know that for certain,’ hmm, not only because the gases are increasing and have increased since the industrial revolution, but also as an isotope signature on the carbon which tells you where the carbon came from, so all the fossil fuel carbon is labelled, so we are certain that the rise in carbon dioxide and other gases is due to human activities.’ And then the calculating with confidence was that, ‘If you’re going to have more carbon dioxide and so on, the other gases are then – they – we would expect – and carbon dioxide lives for a long time in the atmosphere so this is a long – long process, the – the atmosphere is very likely to, erm … or the atmospheric considerations of these gases are going to grow,’ what it says on the second paragraph, the second section. Hmm, ‘And if you’re going to, you know, get rid of the change of gases it will take immediately reductions in emissions to stabilise it by sixty per cent, to stabilise their concentrations at today’s levels, otherwise they carry on growing,’ well emissions carry on growing, that’s what second – second. And then the third one it said, ‘Well the … based on what we do, our modelling results, the average temperature of the earth will grow over the next decade or more at about .3 degrees centigrade per decade,’ was a number we quoted then, hmm, ‘a bigger change than we’ve seen for the last 10,000 years and we’re going to get probably something in the order of three degrees, between two and five degrees by the end of the century unless we really do something about it.’ And so on. Hmm, and that actually was a pretty good – pretty good forecast, erm … but we also – we also explained there in the longest – we …
[looking through papers] sorry there’s another – there are two more there, haven’t turned the page, there are some more sections so the three – there were six sections actually, so that’s the first three sections about what the models predict, and then the uncertainties is the next section which says there are a lot of uncertainties and, erm, the – so the section after that says, ‘Our judgement is that,’ and then it is – and that section explains that, ‘The amount of warming seen so far is – is of course not very large compared with natural variability, therefore we – the observed increases so far could be largely due to natural variability and we cannot actually say, erm, we’ve unequivocally detected the greenhouse effect – effect from observations, nor are we likely to do so for another decade or more.’ And so we explained that uncertainty very clearly that we hadn’t actually any unequivocal detection of warmth due to human induced action at that time, although we believed that it was likely to occur.

[40:29]

And that – that whole summary actually was widely praised by the delegates who came to the meetings, as something which had actually set it out in a way in which was clear and honest and scientific and sensible. And there was not a lot of difficulty in – I mean many people made contributions of course, trying to make it clearer by altering words and that was fine, and it was a scientific meeting of course for the delegates, they couldn’t bring political considerations in at all, any argument had to be a scientific argument, and this whole process of agreeing your summary sentence by sentence with a body which was about, erm … well there were – I think there were – I’ll tell you how many countries were there, I can’t remember. Hmm, but it was a very important meeting … hmm … [reading papers] … hmm, I think there were around fifty countries involved in the intergovernmental meeting but I’m not absolutely certain about that number. In later IPCC meetings about 100 countries eventually, but that was of course a – now a new experience for people, a new experience for me too trying to proceed through a – a document sentence by sentence and get everybody’s agreement. Very tough and, you know, very tight hoop to get everything through. And so that was the – the first IPCC scientific report which, er … which was in May 1990.

[42:08]
And it so happened in that same week, erm … on the Monday of that week I went to Downing Street at Margaret Thatcher’s invitation to present the report to her cabinet. Which was the … I was given twenty minutes to do so and it was the first time the … overhead projector had been used in that room [laughs] and I was told that she’d interrupt me after two minutes and I mustn’t worry, but she didn’t, she listened solidly for twenty minutes, after which they said, ‘Oh you’ve kept her quiet for twenty minutes.’ [both laugh] And – and she muttered immediately afterwards I remember and she – as I stopped, she said, ‘But the real problem is population isn’t it?’ [laughs]. And then there were various questions and so on and it was not a – it was not a big debate of any kind but people – and not all the cabinet members were there by any means, but I walked out of it I remember with Nicholas Ridley who was the Secretary of State for the Environment then, whose question to me, he says, ‘Well it was always going to happen, when are we really going to know about this?’ and I said, ‘Hmm, I’ll give them ten or fifteen years we will really – really begin to see and be probably be very sure about it,’ ‘Oh it will see me out then,’ he said [laughs]. Hmm, which I thought was not a very satisfactory response from Secretary of State [laughs], he was supposed to be looking after this sort of business. Hmm, and then also later that week on the Friday of that week Margaret Thatcher was due to come to the Met Office to open the Hadley Centre … and she decided after the Monday event that she was going to make it a – make her speech a proper speech, she clear – apparently had speeches that she – other people wrote for her and that was fine and – which she didn’t work very hard at, but other speeches we considered – she considered as policy speeches that she wanted to really, erm, make sure they were right and so for – on the Tuesday and the Wednesday evening I remember going into the – she asked me to go over to her – to Downing Street in the evenings to sit down and help her write this speech. Hmm, so I was chairing these IPCC meeting during the day [laughs] and then running off to Downing Street in the evenings and it was very interesting watching – there was … David Fisk going to – from the Department of the Environment and there was also Charles – what was his name, her speech writer, Charles ooh, I’m sorry, I’ve forgotten his name … no it’s on the tip of my tongue, you probably know it do you?

*I don’t but we can – we can –*
No, hopefully you can find out who was her speech writer.

We’ll remember it later and then insert it, yes.

Yes, and then she – you know, had her pencil out and a piece of paper and eraser to scrub things out and tell me I was – ‘I’m a scientist, I’ve got to get it absolutely right,’ and, ‘No, I must make sure I’m,’ and so on, she really took part in a lively way in – in the sort of things she could say. And, erm … no so several hours of prime ministerial time was spent on constructing that speech. Which I thought was very interesting to see her – see her in action in that way.

[46:19]

So I better go back to the founding of the Hadley Centre, since that’s what happened on the Friday morning she came to the Met Office and opened the – opened the Hadley Centre. Now, erm … now going back to the first meeting of the IPCC, in Newnham Courtenay, Nicholas Ridley came to that meeting, the Secretary for State for the Environment, and he spoke … and he announced that Mrs Thatcher’s government were committed to extended its influence into – internationally in this area, providing information about climate change and supporting appropriate research. And so that was a signal to us in the Met Office [laughs] to say, ‘Well we must play our part in this,’ and – and there were various – various work was going on in the Met Office anyway at that time of course which was connected with the climate, and largely from a – there was the modelling work and there was other work compare – and observations and so on, I mean weather eventually becomes climate in the way you’re observing things and so on and – and there was a certain amount of interest in past climates too or past weather you see, because that’s a sort of thing which the Met Office should be doing some research on. And … and I thought a good idea would be to try to bring together in the office all those aspects which – which were related to climate and in particular to extend the modelling programme as, you know, make that – you know, increase its strength so that it could be on a par with the GFDL work in Princeton for instance, in due course when it had done it’s work. And, erm, so the idea was born and by my discussions with my senior staff when I came back from the IPCC meeting and also from the – from the … from the meeting in Geneva and also
the meeting in – the meeting in Newnham Courtenay to say, ‘Well how can we – how can we set up a new – a centre which would – which will do this job and take this work on?’ And so we began to plan this in the – in the Met Office. Hmm, though I suppose I should also report that when I arrived back from Geneva, and told my senior staff that, you know, we were going to do this work writing the assessment and having a technical support unit involved in writing the assessment, erm, there were one or two people in particular who were opposed to the idea, ‘Why do we need another assessment on climate change, we’ve already got Scope 29, we don’t need to put our efforts into that sort of thing,’ and they were pretty opposed to work – work in the climate area in this way. Including my director of research at that time. Anyway we – they got over it [both laugh]. We moved on and – and we planned the – to have the weather – who suggested the name, I [inaud], I can’t actually remember but I … but that seemed a very good name to – you know Hadley was an important British meteorologist, climate scientist, his name is attached to the Hadley Circulation which is the circulation that separates the Tropics from the – you know, the overturning circulation which occurs in the tropical part of the – part of the atmosphere, distinguished British scientist, and so we called it the name – picked up the name Hadley Centre. We ran with it and Department of Environment agreed to supply a very substantial funding include – it’s on this piece of paper actually. Hmm, we rented a new building to put all the climate work together and we got between five and six million from the Department of the Environment for new staff and new computers for the first two or three years. Hmm … Mrs Thatcher’s speech on the Friday, there was a – a sentence which has been widely quoted, erm … where she said, ‘We have a full repairing lease on the earth, with the work of the IPCC we can now say we have the surveyor’s report and it shows where there are faults and that the repair work needs to start without delay. The problems do not lie in the future, they’re here and now and it is our children and our grandchildren who are already growing up who will be affected.’ That was a good start to put the Hadley Centre of a – so that was a very good start and we got those resources and we got some excellent people working on it and – and today the Hadley Centre is recognised as possibly – well probably – well arguably I should say, perhaps arguably the – the best climate centre – climate research centre of its kind in the world. And so to have, you know, a – a Met Office which is also recognised as arguably the best Met Office in the world [laughs] and to have a climate research centre associated with it of the same kind is
something which I think the UK can be very proud of and it’s still going very strong. Hmm … now I don’t know whether there’s anything else I should say, I think the Hadley Centre went on of course to grow and to do very good work and it’s got some excellent people there now too.

[53:13]

*What – what decisions did you make in – in spending the five or six – was it million or billion that you –*

Sorry not billion, five or six million, that’s right, not at the billion rate.

*What decision did you make in deciding what this new centre ought to have that you didn’t have already at the Met Office and were bringing to –*

Well the main – the – the hardware we bought in was a new computer, big new computer for climate work and it’s dedicated to climate, erm … or very largely dedicated to climate, I’m not – I don’t suppose it’s quite so simple at the Met Office these days because the – their computer’s very big and you can share them with all sorts of things and it’s a – and gradually the – the climate work and the meteorological work for dovetailed together. In fact a very important thing that began in the – in the late ‘80s was the – well before that, the software, a lot of the software for the – a lot of the programmes, the software for the programmes for the – from the – for the forecasting work, weather forecasting, were not the same as the programmes running in the climate model, although some of the physical processes were of course exactly the same involved in both. And during the late ‘80s the office and its staff put in enor – a very big effort, and surprising amount of effort actually, in creating what’s called the Unified Model, to make the two the same. To make the algorithms, you know, the software and the algorithm, as far as possible, those that – that were doing the same task of the same kind so that – so that people working on improving the software for the algorithms for weather would automatically then improve what was going on in the climate area at the same time. And that was a … a massive undertaking, it’s, you know, these very big software tasks sometimes can grow like a topsy. But it was absolutely tremendously worthwhile because of course it really paid
off in the end because you had people – a lot of people working on improving the
details of – some of the fine details of dynamical processes, physical processes and
the – in the weather model would then be able to contribute immediately to the – what
was going on in the climate model.

[55:56]

_Why do you think that you got this government support at this time for the – the
setting up of a – a British way of contributing to assessments of climate?_

Well I think it was largely Margaret Thatcher’s influence actually, not that she had
any money to spend herself [laughs], she was very, you know, very tight on money in
a way [laughs], comes from her grocery background I think, her shop keeping
background. But she let it be known that she wanted the UK to … to be in the
forefront of the – of the science, the understanding of climate change, because she
believed that the political payoff from that would be large, and she was right. The UK
has been in the front of, you know, political work and the political – and policy, it’s
been an important part of UK policy to take this problem seriously and to lead the –
you know, to play a leadership role in this activity in the world. And that’s been
bolstered by the scientific work that was carried on here.

_Would you then see that as the nature of her interest in – in climate change, in
securing this political payoff by being involved in it, which is a very particular way of
being interested in climate change?_

Yes, I mean she was interested – her first interest was as a scientist, she realised it was
something she could understand, from a scientific point of view, she could see where
the science came from, she could see it was solid sort of science because it was quite
simple science really, although the way it works out is not simple. And she liked
being able to talk about it because she liked to talk about science, she was very proud
of being a scientist and looking for opportunities of – of impressing people with her
scientific background and knowledge and this was a way she could do it. And I think
she also had a – well, you know, a real care for people who would be disadvantaged
by it.
By the effects of climate change?

By the effects of climate change, having seen what they were like ‘cause this was a serious issue for the world and for her children and her grandchildren, as she said so in that speech, which I – I imagine, I’m pretty sure they were her words, or very close to them. ‘Cause I remember from having write – helped her write the speech so – so I think she had a heart for that, erm … I think – and she made a speech also at the second World Climate Conference which … which was also very pro, very proactive or, you know, very positive about the – our responsibility to do something about it. And I’m not sure if her statements since then have been entirely so unequivocal actually.

Oh.

She’s been influenced, I think her quotations from her book, erm … are not so unequivocal but I can’t – I haven’t got those in front of me, but people have pointed out to me this – some sceptics people – sceptical people, you know, this – this we’ll talk about again, this – talk about later.

[59:20]

Now not – not many people have been to Downing Street, let alone gone a number of times in the evening to help with the writing of a speech, so would you be able to … I suppose give some details about how she appeared to operate from those visits? In other words details of the – of a person and of the – the process of writing the speech as you saw it from the inside of that?

Yes, erm, well she’s a dominating personality of course, but there were only what about six of us round the table I guess, I’ve mentioned – Charles Powell, the name of her speech writer.

Ah.
And so about that sort of order, David Fisk, myself and a couple of other people, yes. [Break in recording]. Marvellous service we get from the Post Office isn’t it, coming up here.

_Hmm, very good._

Hmm.

_You were mentioning the people around the table at –_

Well six people or thereabouts, that sort of thing and it was, er … I suppose it was as far as the – I’m trying to remember, it was very informal. Hmm, Charles Powell would be, you know, doing his best to try to get something down I think or, you know, to – to leave with some ideas. Hmm, and Margaret Thatcher was very dominant of course in what she said and just sort of ideas she came up with, some of which were very sensible and some I think were a bit way out but [both laugh] – and she actually had a, you know, pencil and paper I remember, you know, actually writing down and – and an eraser to rub out things she wanted to change. What she did with those pieces of paper after I don’t know, I imagine she handed them to Charles Powell I would think. But they were interesting, very interesting exchanges on … you know making a speech about climate change in – in the Met Office, what was she going to say, she the – so we were all asked for ideas as to sort – sort of content that might be valuable and, er … but she was very aware of not just of the content but of the impact of the content on her audience, so she very keen to make an impression and say things in a way that would be catching, as you’d expect of course.

This might be asking too much but do you remember any of the things that you said they were a little way out, or things that you think that you might have advised her not to say for that?

Well, I think there were things like that, but I can’t honestly recall them now.

_Did you have any sense of what you wanted – you were there to – to help the prime minister write a speech, but did you have any sense of what you wanted to, not ensure,
but try to ensure was in the – the final speech, were there particular messages that you hoped might be included or particular lines of argument that you thought might be appropriate for a speech of that kind?

Well I was very keen of course she was saying positive things about this – you know, bringing all these bits of science together in the Hadley Centre in the UK, the integration which it would present to – to Met Office and indeed to the public, and the potential that would give us for – for moving the science on, because science moves on in remarkable ways when you put things together. You know when you make the science bigger or increase the [inaud] of the science in this sort of area then you’re bound to, you know, be able to move on well and so you really need to have a – a viable, you know, a viable unit and also one which is, er … you know, which has certain clear objectives and so on. I can’t remember exactly the sort of thing but you can see – that I remember trying to put that sort of thing over. But the more detail of that I can’t remember and I can – but I know there were times when I tried to suggest things or not suggest them [both laugh] and it wasn’t met with great enthusiasm, but that’s inevitable in that sort of meeting, and it was a – I remember them as very fascinating interesting meetings and what a – you know, I felt very privileged to be close to the Iron Lady, yes, with her tremendous enthusiasm, and catching – catching enthusiasm actually, deter – well catching determination I suppose, very determined. Very catching in these sorts of ways.

Were there any aspects of her character that you thought that you saw on those occasions that you think people looking at her from the outside or reading official autobiographies might not – might not have seen? Was there anything that surprised you about her, I mean it probably wasn’t a surprise to you that she was enthusiastic or that she was dominating, but …?

I was surprised I suppose at her commitment, here is she – you know, with an enormous task as prime minister, but prepared to sit down for two hours in the evening, two hours for at least two evenings running, and other times too presumably, to deal with something, or to deal – put her own input into something which you’d have thought that she would have just got somebody to write for her. She’d have given a few – well ten or fifteen minutes with a speech writer and then forgotten about
it, then taken no more notice till the day almost. But to spend you know three – three, four, five hours of prime ministerial time that week on something which was not a big thing politically for the nation, was I thought – showed a degree of commitment, perhaps mostly surprising the attention to detail, on the part of somebody who was – well of course extremely capable. Hmm … I mean I suspect that, you know, that she had a – she got over – you know, she tried to get her way of course in – in the things that went forward but I can’t remember whether she didn’t – whether – the ways in which she didn’t get her way. It wasn’t that – it wasn’t quite that sort of meeting, you know, we were not deciding things on the – those things would have come later, but no it was impressive, she’s a very impressive person.

[1:06:38]

And going back to the beginnings or the first scientific assessment meetings for the first IPCC report, how did you go about choosing lead authors for the various chapters once you’d decided what the chapters ought to be, how did you or you and others decide who ought to be lead authors?

Well – well the – you know, the technical support unit with the people who were going to act as the operating team. The – we were – we had – there was a guiding – and now my memory suffers because I – the whole thing got more organised as we went along. To begin with we were – and I need to try and look up some of the material which I’m sure it’s there, it’s just I – I haven’t got all the IPCC papers, but you know, if I was really going to write up this story I’d have to discover exactly what sort of – who was in control. And I was aware that I was in control in a sense but I also had a … a vice chairman … I think, can’t remember who that was now, I know later downstream but it was not well spelt out at that stage. And the – the papers I’ve looked at recently and I have here would just tell – say who’s a chairman, it doesn’t – doesn’t name a vice chairman.

Because I not –

And also what was called a bureau, in later – later IPCC reports not only had a – you know, chairman of the – of that … of that unit but also a – a vice chairman and also
four others I think, came from different countries who made up the bureau and when it came to choosing lead authors in subsequent reports there was a, you know, a formal arrangement whereby they had to be chosen by that group. Now in practice of course it was the – it was the scientists who were working for me in the technical support unit who – who would talk around and find out who the names were, who the best people were in these – in these various areas, and recognise they had to – you know, create a – a group of people who were [looking through papers] – a group of people who were – who came from different countries and so on … oh well here we have for instance the four authors on the chapter one which is called Greenhouse Gases and Aerosols, and that’s Bob Watson, he’s now the chief scientist at DEFRA, a man called Rodhe from a European country, Oeschger from Switzerland, and Siegenthaler who I think comes from – I can’t remember where all these people come from now, I don’t remember, can’t remember his name. He was possibly from the US. Hmm …

So how for example might Bob Watson have been chosen to be one of the lead authors for that chapter or I think John Woods for the chapter on modelling, how – how might their – in this very early IPCC, how might their names have been hit upon?

Well these names would have come forward of people who … who were in – well partially people who’d been involved in – in some of the international programmes so far, the World Climate Research Programme for instance, or the IGBP, people who were – who – who’d had an international connection already and Bob Watson certainly would have found that and so would Hans Oeschger and Rodhe I know had – had got that. And similarly with the other people in the other – in the later chapters and these were people who were known to the community and, erm … and who … and who probably turned up at the first meeting, or many of them would have turned up at the first meeting and … and I guess it was informal discussions that the – first of all at the Newnham Courtenay meeting which would have started it all off.

How was that meeting advertised then, could anyone go to that first meeting, any – could any scientist turn up almost or –
I think – I mean and of course it’s – governments would have nominated scientists to go, it was intergovernmental meeting, so there would have been messages gone out to governments, ‘Please nominate people to come to this meeting.’ Hmm, and that was the case for all IPCC meetings, they were open to all governments in that – in an open way or open to – in – if there were restricted numbers governments could put forward names for – to be invited to this meeting or to join this group. And I’m sure the governments even at that stage would have been invited to – to nominate people to join in these various author teams. Hmm … but I’m sure most of the – a lot of them would have gone on the grapevine, you know, discussion between the people who knew each other to some extent anyway and would have made suggestions for other people they knew, erm … because to be an author of a document of this kind you’ve not only got to know your science or know what it’s about and be – know the literature, you also have to be able to speak and write English, because all the meetings were conducted in English and the writing was in English. And you also had to be somebody who was known to be reliable, at least the – a good number of them had to be people who were reliable in terms of writing things down and meeting deadlines and things of that kind. And as far as the lead authors were concerned, the people who then you had to have at least a couple of people in each chapter who could deliver on the dates required. And – and could also help to run the – the group meetings, ‘cause each chapter would have its own group and group meetings. But before I explain any further I really should, you know, go and look back on some of the history of that time because I may be influenced by what happened later on.

Okay, yeah.

But it’s – that was – that was the style and we followed that style from, you know. Not absolutely – I guess in the first – for the first report not absolutely to the letter in the way it would have to be followed, now absolutely to the letter. When – when governments do nominate authors for chapters and, erm … and you know – and good reason has to be found [inaud] not accepted and when it comes to the – the – well they wouldn’t – they wouldn’t nominate lead authors of course, the lead authors would be chosen by the – by the bureau, by the – in which the government representatives of course from, about six government representatives, supporting that chapter. And then the – and the … and – and the lead authors are fairly rare so you – you know, people
can really deliver, and known to be able to deliver, and would – and of course they do it for nothing, it’s all their own – you know, tremendous amount of work for no financial or reward of that kind. The reward you get is being – is learning a lot more science in the process [laughs].

[1:15:08]

*Do you remember –*

A point that is very important about the IPCC actually, one which is not always made but I’ve often made it, is that the process … why do people work for the IPCC and give a month of their life maybe to helping to write a chapter for one of these reports? They do it because they just love coming to the meetings where these things are discussed because they learn so much, you know, it’s a marvellous way of keeping up with the subject and learning about neighbouring subjects and neighbouring disciplines that they haven’t known about, and because it’s all, you know, done with expert people, the meetings are friendly and it’s, you know, and there’s a tradition of cooperation in these – in the meteorological climate fields, going back a long way among scientists, so they enjoy these very much. But – and they also get a great, very big rewards. And as far as the world is concerned one of the by-products of the IPCC process is that there is – there are now hundreds of scientists round the world who’ve been involved in it and who actually know about the whole topic of climate change, not just their little bit, they’ve actually been in meetings where the whole thing has been debated loud and long right across the board, and so they can talk authoritatively about the whole – the whole area. Now if that was not the case then the climate change would not have been able to get generally accepted by governments round the world and everybody else – and most other people, or most other people who know anything about the world, you know, whereas it has. Because, you know, scientists wouldn’t have … would have been, you know, willing to talk about it even if they didn’t know a lot about it, these people are when they’re asked by the media and they would have come up with all sorts of nonsense’s because they hadn’t been, you know, trained in this school of people who’d hammered it out between themselves. And that’s – that’s the – that’s the reason why the world is now taking it so seriously, and it – without that I don’t think it could conceivably have done that.
So it's not so much – well it's not just the existence of the reports that you think have been influential but it – almost the training of a large group of scientists in the whole field of climate change who – who are able to answer questions.

Oh the exchanges which have occurred between them, they were all – I mean that was all – and all say the same thing of course but they nevertheless – but they’ve – they don’t talk nonsense on the whole. There are a few who do talk nonsense and I’ll come onto those later on if you like [laughs] but – and they’re a great – you know, sometimes the puzzle and a great embarrassment sometimes but nevertheless that’s a – way it is, yes.

And –

[1:18:00]

And at the meeting –

Actually, still on that, just a by – a by remark, this is, you know, this is a few years ago now it’s – there was a meeting in Edinburgh of – about GM foods and GM crops, a big international meeting and Bob May, who was the president of the Royal Society before the last, was there was contributing and he said, ‘You know, what we really need is an IPCC for GM foods and crops, we need to get scientists together worldwide to actually sort out the problems, rather than have these wrangles with – between governments without knowing the science,’ and, erm … and I’m told the American delegates there said, ‘Absolutely not, we are not approving an IPCC or anything – any such thing,’ and why, because of the strong vested interests which would have been influenced – which would have been, you know … targeted I suppose by genuine scientific argument across national political boundaries and across scientific boundaries too. The IPCC had done such a good job in bringing the truth out [both laugh], if you weren’t interested in the truth then you didn’t want it to happen.

In the case of GM then what would the – would the truth go against – who would be the vested interest worried about an IPCC for GM foods?
Well a body like some of the major – major firms in the world, like Monsanto for instance, who have pushed GM products, not always in ways that have been appropriate …

And –

To put it mildly [both laugh].

[1:20:06]

And speaking then of political influence you – you said that at the intergovernmental meeting in – at Windsor which was at the end of the process for the first IPCC report where the summaries were discussed.

Yes.

You said that it wasn’t possible for people to make any arguments other than scientific ones, but did you have a sense that any of the scientific arguments were being made with a kind of political agenda behind them, if you like, at this stage? I know this happens later on, but in this first one?

Yes, there were people there who were – who were not keen on getting this positive message about climate – human induced climate change out there, in particular of course people from the oil states and – but they hadn’t got their act together in such a way that they – that they – they had much influence at that stage.

How would they attempt to use a scientific argument to – to make things go their way if you like, what might they –

Well they could question something – question things that they didn’t like, without saying, you know, it is a science or [inaud] or whatever it is, I don’t know what they did but it’s a … but I can remember there were people there who were – who would
have liked to get rid of some sentences but who didn’t know how to do it actually [laughs].

*And at this –*

And indeed later on yes it’s – this is where science is very powerful actually and it’s, erm … I mean you can try and manoeuvre things a bit, erm … and the standard way in which it was challenged, well we’re coming onto the later reports I suppose, the standard way it was challenged later on were – was from people who were – would then – read the, you know, the draft documents very thoroughly indeed, very thoroughly looking for inconsistencies. And … so they could either say, ‘I believe this sentence is more correct for this part – from this part of the document, we should replace what’s there by this one,’ or [laughs] – or words to that effect. Hmm, or just point out the inconsistency but I mean often later on they would go to the extent of saying, ‘Look, here we’ve – this phrase is – is just we think that’s absolutely right, we want to put that phrase in instead of that phrase,’ and the reason is – was very clear of course because it was a weaker phrase or whatever it was, or a less clear phrase or one which actually said – said the opposite, and so it’s those – those particular interventions which caused a – a big debate, and that’s fair enough, that’s what happened. And then people would – and then people – then they would have to be queried and say, ‘Well you know you’ve – you’ve raised just that little phrase and you like that phrase but put that phrase in its context you see and you get a different answer [laughs] and so it’s not a fair phrase to put in,’ or you know, compare that phrase with something in another part of the chapter or document which – which may not say quite the same thing or maybe even be saying quite different things but you were – then the meeting would have to decide which phrase it was going to use.

*Given that it was possible to see why these people were trying to make these changes, did it produce any sort of irritation or annoyance or worse among other people in the – in the debate, in other words, would anyone stand up and say, ‘The only reason you’re saying that is because,’ and sort of declare, you know – point out the kind of –*

No, I mean this didn’t happen in the first meeting in that sort of way at all –
No, no, no.

But that was a – but it certainly happened in the second one in a big way and, erm, I’ll give you some illustrations of how – what happened later on, but nobody – nobody would say, ‘I know where you’re showing that – you’re selling that because you come from Saudi Arabia or you come from Kuwait, or you,’ whatever it is because that wouldn’t have been proper, and that would have been interjecting in a way which is – was bringing to the debate matters that didn’t belong. You wouldn’t – mustn’t castigate a man because he comes from a given country, or even though his speech may tend to – you know people – there’s a certain, you know, UN speak which is [laughs] … which you – you don’t – you don’t have personal arguments against people. I don’t – I can’t remember any … oh perhaps I – perhaps we did have more than one, I can’t remember any – any very significant events where we had that. We had some impasses and I’ll talk about them later on too, but … people were not rude to each other. Well now –

[End of Track 7]
Could you tell the story then of the – the process involved in the second IPCC report, the one that was published in 1995.

Yes.

Hmm, and if you could include in that any changes in the process from the first, including something that you’ve mentioned and that’s I think the role of what you called the Bureau in the second.

Yes, okay. Hmm … well before that, just to carry on with the first actually and – and reminding you that it was the existence of the first report that enabled the – the Rio meeting in 1992 which was this very – you know, the biggest conference ever – ever to that date which involved all nations of the world, Earth Summit it was called, Maurice Strong was the great originator, a Canadian again, who was behind it all. And, erm … no, it was the existence of the IPCC report with its – you know, with its clear definite statements, although ex – explaining – expressing uncertainty that enabled the climate convention to be formulated and agreed by everybody, including President Bush the first, and it was unanimously, erm ratified by the senate, US senate, a few months later. But that was a – and it’s – you know, it’s a – the text of that climate convention starts off by explaining that, you know, the science isn’t all perfectly known, still uncertain but nevertheless enough is known for us to take the situation seriously and they asked that all developed countries, annex 1 countries, should endeavour to keep their – to bring their emissions in – in 2000 back to 1990 levels. And there was no mandate associated with that but it was a – they expressed the hope that this could be possible, or this would be the aim for developed countries to do that. Very few countries actually did, Russia being the prime example because their economy collapsed [laughs], so they were well below 1990 levels by 2000 [laughs]. With the UK another example because we switched from coal to gas for other reasons of course by and large, we also kept within that remit. I think Germany also because of the inefficiency of East Germany, I think they were largely kept in it it too. But it was interesting that they – you know, this was a – a very strong – a strong expression really, no – no agreement on minutes and no mandates, but a … but a –
strong statement coming out in that climate convention which I thought was – I had nothing to do with it, I didn’t go to Rio [laughs], 25,000 other people did [laughs].

Do you remember why you didn’t?

Why I? I had no desire, I mean it was not – it was a political thing you see, I didn’t – I wouldn’t have had any involvement in Rio. Hmm … no I kept – largely kept away from the political main, – from the political meetings, enough to do without to – spending large amounts of time [laughs] sitting in [both laugh] political meetings. I remember a – a conversation I had with Maurice Strong however before the – before that meeting, and he tackled me saying, you know, he thought the IPCC was quite wrong to … hmm, was not the right body to do this scientific assessment at all ‘cause we were intergovernmental and – and therefore political, and erm, we were bound to be politically influenced, we were bound to be accused of being politically influenced, and what was really required was a body of scientists, independent scientists who could write an independent report which would have the credibility associated with that independence. I argued very strongly backwards to him and said that the strength of the IPCC was its intergovernmental nature, it actually belonged to governments and therefore any report that was written belonged to governments, so there was ownership by governments of what we did, you know, the delegates would come to the final sessions when the – the text was agreed, of a summary anyway, was agreed and when the chapters were accepted formally and they’d go back and say, ‘Minister, we’ve just done this, we’ve just received this report, we’d just like – you know, agreed this report,’ and many of the delegates could have said, ‘Well I did this and I did that and I’ll fight forward for this,’ and so on. And so it’s really owned by governments and that’s a report that came independently from a body of unknown scientists, or even known scientists who, no way, it would go straight in the bin.

Hmm, and the other, you know, tremendous advantage of course has been what I mentioned before which was the – this corpus of the world’s scientists, you know, ninety-five per cent of the world’s climate scientists at least [laughs] who had – well of that sort of order anyway would – would know about the IPCC and read it and many of them involved in it and they would – they would be able to talk about it and so you’d have this tremendous strength of agreement among scientists, as a result of
that whole operation. So ownership by governments and ownership by scientists, and ownership by countries too, I mean it’s, you know.

*What was his response, do you remember, was he convinced?*

Oh I don’t think he was at the time, I suspect he will be convinced though.

*So yes, that then was –*

But I remember a very robust conversation when he thought it was, you know, quite the wrong way to do it, and he’s a senior man and of course knows how to run things and, you know, very able indeed, but – but I thought – he did not appreciate the strength you get from being a – no, he thought this was a higher – a hybrid body of a kind you didn’t want. Anyway so that’s – so, you know, IPCC has – that was great strength which has made it unique I think in the – in the science political arena. And when much more use could be made of that sort of thing it was done in this – in a similar way I think, in other areas of – I’ve often sort of wondered well now who – you know, supposing we tried – tried to set up an IPCC today you couldn’t do it, because there’d be too many vested interests who’d be fighting against doing it. In 1988, you see, climate was not that big a thing, climate change was not that big a thing and though the vested interests hadn’t got going, or hadn’t looked forward to when, you know, the – there might be a problem. And so it was possible. It was also of course relatively easy compared with many subjects because, you know, the world meteorological community was a community which knew each other very well and worked together and had worked together for a long time internationally, so because, you know, weather was international and you exchanged weather information and all these things as had been done for a long time and so we were a scientific community who were – who worked together, you know, and had to work together, you couldn’t make progress in the field without working together. And that’s not true in all sciences by any means.

*So it helped that the – the actual physical problem was global itself?*
Yes, hmm, sure, no and I mean it was – it was – you couldn’t get it at any other way by being – for by being global, and it’s what the, you know, the satellites did for us in the early stages, they started to observe globally and that was wonderful. Hmm …

[09:26]

Hmm.

The – I was just commenting on the – I haven’t commented on the other two reports, the work of the impacts report and the policy report, the, er … the impacts reports was under Yuri Israel’s guidance and made very poor progress. It was rescued in the end by an Australian called … hmm … oh I mentioned his name before, McAlbert something or other, yes, who was the – he was – he became the vice chairman of that thing and essentially did the work to – Yuri – Yuri Israel didn’t do it, he wasn’t – wasn’t the sort of man who did that sort of thing. And, er … we had, erm … and it was – well in the end it wasn’t too bad a report but it wasn’t a – of course it was – it wasn’t as simple an area as this – wasn’t as well known an area as the scientific area, looking for impacts all round and new consumers of impacts and things and it was not an easy thing to write, it wasn’t a – it wasn’t a particularly out – outstanding document at the end and didn’t have a big impact but it was – well it was done by the Australians, despite Yuri Israel. But there was a – a collision between the Russians the West over palaeo-climate projections, have I not mentioned this to you before?

You told a story of a –

Mikhail Budyko. Yes I did; you’ve heard the Budyko story.

Yes, where it was possible for the first time for junior Russian scientists to, erm, question the kind of orthodox Russian view of things?

That’s right, sure, that’s right, sure.

And that –
And that persisted actually and there was even some parts in working group two of which Yuri Israel had some control over [laughs], which contradicted what we said in working group one actually, and the palaeo-climate issue actually contradicted, I don’t know whether it was this direct contradiction or just something which was – which we wouldn’t have agreed with but it was – because of the influence of Budyko. A sad story, I’ve probably told you it, yes I remember telling you, right. Okay, working, erm … the next report. We had an interim report incidentally about early ‘90s, which came out I think in ’94, which was on just part of the whole climate scene, radiation report, but it was not a – it’s not worth spending time over that, came out as a – as an – as an – updating report on some of the radiation and problems of gases as involved with – in particular was addressed in that report.

[12:47]

Then – then we started on the – on the next one and it was agreed that it would no longer be just one chair of each of these working groups but there should be two chairs, co-chairs, one from developing world and one from the developed world. So I had a alongside me a man called LG Meira from Brazil, who was a delightful Brazilian, and a clever man actually, he’s been involved in the space business too and so on. And … hmm … but his role was – I mean I had the technical support unit of course in the Met Office so it was all run from the Met Office, I was the person around [laughs] and he was a long way away and he didn’t mind being a long way away but he – so he was involved in decisions of course, major decisions were involved with – together with the – together with the bureau, and I can’t remember who was on the bureau at that time but they were – oh this issues about authors and, erm … particularly authorships, had to be … had to be agreed by the – by the bureau which is largely done by correspondence of course but we did meet at the IPCC meetings which occurred, about a couple of them of course in-between the big meetings that was and that was when you decided on the – on the chapters and you decided on the programme and so on.

Who made up the bureau, was it the heads of the three working groups or were there other –
No, the bureau, each – each working group had its bureau, and then there was also a bureau for the IPCC as a whole.

Right.

And there were approximately six members of these – of the bureau which was representing six regions of the world, essentially virtually speaking. Not always exactly one to one but that’s – that was the idea.

I assume then you were the only UK member of the bureau for the science assessment?

Sure, hmm. And I – that’s with me all the way, and the next – and the third assessment I had a – a man called Ding from China, Ding Yihui, who was a delightful Chinese and, erm …

[15:31]

So otherwise it went as before, as the first one, but with more – I suppose more control over the way it was done or more looking over – looking behind and making sure you were doing it properly, rather than improvising it as you had to for the first one to some – to some extent, but it was – it was following essentially the same pattern, and we had tighter rules about the sort of literature that you could use, peer reviewed literature was – I think that came in pretty fairly strong with working group two but again I’ve – that ought to be checked if ever you were going to repeat it. And, erm … I think that was – I mean there was a list of rules [inaud] as to how you carried on – as to how you did each thing to make sure it was all done properly and within, you know, in a controlled manner. Hmm, the … then … then the – the meeting was held in November – in Madrid in November ’95 … and I was aware that there was a rising opposition to IPCC, particularly in the United States … hmm … you know, because the sort of correspondence that came in and the things that were said and so there was obviously a – a stream of people who were not keen on it at all and wanted to kill it I suppose, particularly after – particularly after the climate convention in ’92, so that’s when the – when the Exxon business began, the Exxon began to organise
themselves in ways which would, as is Exxon and the American coal companies in particular, but not only. And trying to spread misinformation about – about climate change and – and in particular about the IPCC. And it was during that period that they set up in America bodies of – so they looked respectable, there was the Global Climate Coalition set up, was it’s name, an NGO which was … which was there supposedly to bring honesty and all these things to – and reliability to the climate change debate, it was headed by a lawyer called Donald Pearlman who I may have mentioned him before have I, I don’t know, and Donald Pearlman was his name who was a man with a very low voice, spoke very deep down, very able lawyer and his job was to … you know, weaken what we did in every way possible. And he … and when we had IPCC meetings he would hire a room in the same building, he would arrange to meet – because he was allowed in the meet – IPCC meetings, he was an NGO, all NGOs were allowed, and he would invite delegates in to meet him and to see him from different – from countries he thought might be – might be twisting – you know, sympathetic to his view, particularly the oil companies, oil states and so that was going on in the background and I was – I was aware of that.

[19:34]

But when we got to the meeting in Madrid with three days to go I had ambitions of writing a subs – substantially longer summary … you know, having seen how relatively easy to seemed to be in Windsor [laughs] … and … we tried to divide up the summary into – into different chunks and there were – it – there was a draft summary written which was rather long I suppose by authors and, erm … and we – we began by trying to go through this in different – into various groups and the anti groups were present in sufficient numbers so they could actually spread themselves between the groups that we set up. And these were people who wanted to – you know, were out to do policies on the whole, so things moved much more slowly, terribly slowly. And, erm … which meant that the – getting through the – you know – you know, going sufficiently fast to get through it was – was taking a long time and also many of the groups were not coming to closure on the – on the drafts they had in front of them. And it was all going to come to the plenary. And we struggled on and I struggled on, longer than I possibly should have done or I should have realised earlier that I wasn’t going to make it, but hmm … we had also talked of the – the – an
executive summary as well as a – a longer – this longer document … hmm … which was going to still be the summary and still had to go through complete approval and in the … I suppose on the second day we had to – we – I had to abandon the longer document and we agreed that that could go on, erm … being edited and by – without being sentence by sentence or anything but by people taking – taking charge of the various parts of it and so that it was like another chapter and it wasn’t approved by the whole body, it would be accepted by the body but be a – what was called a technical summary. Which was actually in the end a very good idea, it helped a great deal in getting that document written and – and it made a – a substantially longer summary for people to get to grips with when they were looking at the whole document, and that occurred in the third report and the fourth report, you have the technical summary there which is like another chapter, like a summary chapter, before you get to the policymakers’ summary. So the … what we’d been working on as the executive summary became the policymakers’ summary, expanded from being terribly short, and indeed two or three times the length I think that we had imagined for the executive summary but nothing like as long as I’d hoped we’d have made the whole thing but that’s – so it worked out – it’s worked quite well in the end. We – there were … certain points of – where we had almost impasses, let me – let me just get an aide-memoire if I may?

Yeah.

Oh but [talking away from microphone] … that was a piece about it that came out in Nature [telephone ringing] which was, here you are, you look at – [break in recording]. Hmm … I’ll just – well it tells you here the meeting – the meeting between 177 government delegates from ninety-six countries, twenty-eight scientists representing the authors of eleven chapters and fourteen NGOs. There was the Global Climate Coalition was there, hmm … and they were amongst the most active in challenging the IPCC’s conclusions on climate change, backed by the powerful parts of the US and the International Energy Industry, they were taking a lot of … a lot of notice of what we did, they were writing, they were reviewing papers, we got reviews, all of our documents were written to great length, some of them with very valuable stuff, valuable, I’d say, won’t say very valuable but valuable material pointing out inconstancies and saying we’ve got this wrong or this wrong and so on, it was done
with some – with some – some carefulness as well as – as well as – as well as an attempt at attack. Hmm, the Global Climate Coalition worked closely with Kuwait and Saudi Arabia, in fact reports on some of the drafts were sent in from Saudi Arabia and without even changing the notepaper that came from the US, from the Global Climate Coalition [laughs] sent in by the Saudi Arabian government without even bothering to change the [laughs] – change the document in any way. So I mean they were working very closely together. And, erm … the … well the – the first day we’ve – I mean Gylvan Meira chaired the first part when we – which was a formal procedure of going through chapters and so on, and then on the second day we – I got to grips with the main document as a whole. And … and the biggest problem we had was on – apart from keeping to time actually and I’ve mentioned that, there’s the problem of chapter eight which was a – about a question, has climate change yet been seen in the human – in the climate record and – and a man called Ben Santer who was a very good – very good scientist had been responsible for that, as a chief author of that chapter … but the draft which came around to governments about six weeks before the meeting for governments to comment on, or make final comments on, was not a very good – was not in very good shape editorially. For instance they’d had a summary of the chapter at the beginning and then another summary at the end, and the two summaries didn’t agree. They were different, they’d been written by different people I think so it was not put together – there was no great care given about the consistency of the document and so lots of – in particular the US, the US government made many – hundreds of comments on the paper saying, this had to be changed, that had to be changed, that had to be put right, so chapter eight was not in – not in good shape. But the fact that it wasn’t in good shape of course gave ammunition to the – to those who – who were particularly interested in killing that idea that we’d had – had any chance of seeing it. And so a lot of the meeting was spent on – on that chapter and, erm … the – and the first battle which occurred, I say battle, it was the first great discussion, battle is – is too strong a word I suppose for the [laughs] – but it was a battle of minds, there was a draft for – a draft sentence that, ‘made more convincing evidence of the attribution of a human effect on climate, is emerging from pattern based studies’. And it went on – as it went on and then Saudi Arabia and Kuwait both requested that the first three words be altered to, ‘some preliminary evidence,’ rather than, ‘more convincing evidence,’ because in another part of a chapter eight the words, ‘preliminary evidence,’ had been associated with pattern based subjects of that
kind. And the meeting debated for an hour and a half whether we were prepared to put, ‘preliminary,’ instead of, ‘convincing.’

[29:09]

And all delegates apart from Saudi Arabia and Kuwait thought it should remain as, ‘more convincing evidence’. Saudi Arabia and Kuwait would not agree and so in accordance with the practice of WMO bodies we – it was agreed that a footnote should be added to the final text explaining that Saudi Arabia and Kuwait dissented from the majority view. Hmm, and we had a lot of discussion about that and about who – whether it should say that Saudi Arabia and Kuwait objected or – or wanted that or – or some delegations wanted that, but we couldn’t bring that to closure because that was a matter of rules or procedure and – and that needed a different sort of discussion which we hadn’t time of really, so it was said it would be decided outside the meeting. Outside the meeting, later, Bolin having consulted with, you know, WMO especially as part of the rules and procedure, he wrote to both of them saying that Bolin as chairman of the IPCC wrote and said, well the footnote would have to be Saudi Arabia and Kuwait requested that or, erm … or asked that or whatever it was, you know, or dissented to the majority view and wanted this to be put in – however it was written. And they objected strongly to being named and when it – when they were told it was absolutely the rules that they were going to be named they withdrew the footnote. And that was after the meeting of course. Then there was another sentence on the same issue which was a sentence which read, ‘The balance of evidence suggests human influence on global climate’, and you know, in the first report of course we’d – we’d said there was, you know, the unequivocal detection of climate change would not be likely for a decade or more and Saudi Arabia believed that sentence, the balance of evidence suggests human influence was too strong. So we had a – a long debate, and it was a good debate actually on what words to use and there were – there were a whole variety of words put in instead of – instead of, ‘suggests human influence’ the question of, ‘points to’ ‘indicates’ was it a – an ‘influence on global climate’ but an ‘appreciable incidence’ or a ‘measurable incidence’ or whatever it was. And in the end, you know, the meeting, ‘agreed appreciable influence,’ was agreed, but then later in the meeting it was I think the UK delegate who came up with the word discernable and suggested that might be better
than appreciable and this – this was then out of turn of course ‘cause that sentence had then been agreed by that point. But … so it was Bert Bolin who came in the chair at that point and same, you know, ‘We would like to go back now on something you’ve already agreed and but we’d like to put in the word discernable and – instead of appreciable,’ and people applauded and said that was the word they wanted, it was a very good word actually, you’re just seeing it through the fog, you know. So that was a – a very good example of how the – a meeting of that, you know, big kind with all those delegates, with all those preconceived agendas and all those things, could nevertheless come up with a – you know, a very sensible statement indeed on whether we’d seen it or not. And I think that really does say – say something for the whole procedure that we can actually do that.

[33:25]

The Saudi delegate was a man called Mohammed Al-Sabban, see it written here if you want to write it down, and he was a lawyer by training, by profession and was a good humoured person really, and – and we would have some humour as we exchanged things sometimes. Hmm, I remember saying to him, during that meeting, I can’t remember what it was about but I said to him, you know, if I was a member of his delegation I would advise strongly against the proposal he was making ‘cause I was sure I was against his country’s interests [laughs] and didn’t make a lot of sense to me either but [laughs] and he – he said, ‘Oh that’s fine,’ he said, ‘I’ll accept that and I’ll make you an honorary citizen of Saudi Arabia,’ so you can make other remarks on the – for my delegates – delegation. And so it went on. We … at seven o’clock in the evening the interpreters agreed to stay till nine, ‘cause they should have gone by then, they’d been on the go all day, and so we carried on until nine and we still were nowhere near finished and I really thought we were in trouble, because only one delegation has to get up and object to say, we will not continue in English only and we would all have had to agree. But no delegation did, not even the Saudi’s, I thought they – I thought they were so keen to kill it probably, kill the whole thing at that point, or create a great embarrassment of having to come back again at some time and do the rest, whatever it was, that they would – they would have done that but they didn’t, and that was a great relief to me in the chair [laughs]. And so we carried on in English but people had kept saying, ‘Well we must recognise we’re going on in English and it’s
not fair to everybody of course to do complicated things so – so we mustn’t do complicated things and so on,’ which was all sensible of course at that particular time, people were trying to be helpful. Hmm, I can see in my mind’s eye now something that occurred late in the evening when Donald Pearlman crossed – walked across the – the room below so of course I could see where the – to the Saudi delegation with a piece of paper and went into an intense huddle conversation with him on a certain issue. And – and in the end I saw Al Sabban shaking his head strongly, I thought, wonderful [laughs]. I’ve been saved that particular problem. So – and we eventually finished at about twenty past midnight, when the doors were going to be locked at half past midnight so we finished. And when at the end of it I just – I sat and looked – sat down and read the whole thing through, I thought, oh how amazing, it’s come out really remarkably well, despite all the hassle earlier on and the change of length and all the things we had earlier on, it actually came through as a much better document than we’d ever begun with because the whole process had made it clearer, in some ways stronger because there – when people ask for changes on the – on the grounds of clarity of course quite often it makes it stronger, or when they ask and say, this is not right or this is not consistent of course, they’re trying to kill it, but in fact they made it better because you have to put those inconsistencies right. So it was a – a remarkable thing in the end that we got it through. Hmm …

[37:27]

And – but that wasn’t the end of the story, because by then it was a … there was only two weeks to go before the IPCC preliminary meeting which was – which was the formal body which had to accept the report from the working group and accept all the documents and so on and – and put it all to bed. And there was no time in-between those two meetings to do anything very much, particularly with chapter eight, the instructions – the meeting – a number of times in the meeting had said, and it’s all in the transcript, you know, this chapter has to be improved, all these inconsistencies have to go, the things we’ve suggested as delegations have to be taken – taken into account by the authors, or properly changed by the authors in order to make the chapter acceptable. So the chapter was only accepted providing all those changes were made. And it was – they were to be made by Ben Santer and his colleagues who were the authors, under the – the help and the guidance of the technical – of me and
my technical support unit. Well those changes couldn’t be made in the two weeks before the IPCC meeting, so the IPCC meeting had all the draft chapters in – available for them to take away … but chapter eight had not been changed. And I reported to the meeting of course that this was the case and this chapter although it’s available to you now that is not the final version and it will be changed in soon – you know, in serious ways before the – before it’s all published in March, and – and I reported everything properly. But unfortunately we did not actually label the chapters with a big sticker saying, ‘This is preliminary’ or, ‘This is not – this will be changed’ so people could take away the original copy and if they hadn’t taken any notice of – of what I’d said to the meeting, into the report of the meeting that came out of course most of the – after some time, they would have thought that that was – that that was the document that was going to finish – finish with or completed with. Now Donald Pearlman who’d been at the meeting and he’d heard all the remarks about the chapter having to be changed and the approvals and all those things, he went away and – and he managed to get hold of – he asked for a copy of the final text about early March I think … when the whole – of course the IPCC volume was going to be published at the end of March. And – and he realised then that he’d been – it had been changed as – I – according to the instructions. Which apparently meant that a lot of the work he’d done in preparing for a blast when it all came out, imagining that it was the original text, hmm, it was all nugatory. So as soon as the document was published, very soon after the Wall Street Journal came out with a long – a substantial article from – supposedly from Fred Sykes who was an ex president of the Academy of Sciences of the US and was very involved in the Global Climate Coalition, as something which had been prepared by the Global Climate Coalition I have no doubt at all, saying that – which Fred Sykes said, ‘This is the worst … hmm –’ and this is now – well it was June actually when it came out in the Wall Street Journal, he accused the IPCC of – afterwards of altering chapter eight of the 1994 – ’95 report after it had been formally approved, and ‘I’ve never witnessed a more disturbing corruption of the peer review process than the events that led up to this report’ Sykes claimed. Quoting differences between the draft chapters that had been available to them in the Madrid meeting and the final published version. Well, I and Gylvan and Bert Bolin wrote at length to the Wall Street Journal explaining there was no question of any corruption of any kind because that was never the final version, and it was all completely within IPCC rules. But that was ignored by the Wall Street Journal and
… they did in fact in the end publish two or three sentences from our letter which weren’t the relevant sentences at all. Hmm, and worst than that the Global Climate Coalition begin a relentless campaign against Ben Santer … and they tried to destroy him. They managed to – they harassed him a great deal, saying that he’d been – broken all rules, he was a very nasty fellow, I – I talked to Ben quite a bit, I explained to him it wasn’t his – if they should go for anything – any person, they should go for me, ‘cause I was in charge of the meeting, he wasn’t. And erm … I certainly – I … I’ve got an idea, I actually sent a message to that effect to Don Pearlman, but anyway poor Ben had a terrible time of it and managed to get some of his funding withdrawn by working on the agencies that gave him money and so on and so on. And he was a very sensitive fellow, found it very hard to take this … you know, this – this battle of words which was accusing him of everything. And – and in the end the American Meteorological Society published a – a substantial piece in their journal, it was probably later that year, it was later that year, which had copies of the Wall Street Journal letter and – and uncut copies of our letter to the Wall Street Journal. Copies of the letter that Ben Santer wrote which they’d only published little bits of, which had been signed by about twenty or thirty of his authors and they’d removed all those signatures and so on so it was all – the whole thing was published properly by the American Meteorological Society who supported – supported him absolutely in their bulletin. Well that was a very good thing to have come from the – you know, senior – well the scientific society in the States, but of course a lot of the damage had been done, a lot of people don’t read that and poor Ben’s marriage came to an end I think largely as a result of that. It was a … a terrible piece of performance on their part, and is still quoted, if you go to the internet you’ll find that story still there and find these – those words of Sykes about the worst corruption of the peer review process he’d ever seen and so on. And the Wall Street Journal kept on writing articles of the same kind, Fred Singer who was another of the – of that ilk, continued to write things too and … and that’s – so amongst the ch – you know, the nay saying community, that is still believed that the IPCC broke all the rules and did it all wrong.

*The what community, the …?*

The nay saying community.
Ah, hmm.

Hmm … it’s hmm … but of course we didn’t break – none of the rules were broken and that’s what people want to believe.

[46:12]

Hmm, there’s a book written, I don’t know if you’ve seen it called Merchants of Doubt I’ll go and get it actually – well I’ll get it later, remind me, I’ll find it for you, it’s fairly recently published by two American historians, Naomi something and – I’ve forgotten their names of slightly – difficult to remember.

Is it Oreskes, Naomi Oreskes?

That’s right, yes sure, yes, that’s right, yes sure. And Paul something I think it is, Icaims, is it, no something else. And which is a very well researched document on Fred Sykes, Fred Singer and about four other senior scientists in the US, beginning of the 1950s when they, er … when Sykes and Singer and – and others were involved in the tobacco companies on saying that there was no link between smoking and cancer. And they carried on with that in a big way and it got money, you know, got big money from the tobacco companies and then of course in the ‘70s they couldn’t really do that anymore ‘cause there were legal actions against them so they stopped – they stopped on that and they turned to acid rain, did the same thing, said that was rubbish, then they turned to the ozone and the chlorofluorocarbons, said that was rubbish and then they came to global warming. And it’s the same people, to some extent who’ve been involved all the way through, very well placed people, people with connections in the White House and in the congress a lot, who had a particular political agenda, very strong right wing political agenda that says government must not interfere in anything that citizens want to do and … and it’s – it’s all the fault of, you know, greenies and others who have an agenda which is trying to make us all subservient to stupid environmental rules and other things one way or another. And clever people, well placed and who’ve continued to sing that song, and Fred Singer is still at it. Fred Sykes is no longer with us but the Global Climate Coalition was dissolved when – when Exxon actually would do its – its funding support, ‘cause its job had been done
you see. So that was a … a nasty time in some ways, on the other hand I think it was a – the very fact that Nature has published it as a – in their list of twelve meetings that changed the world [laughs], it was a battle that had to be won and – but as far as the US is concerned of course the aftermath is still there in a very big way, and it is – it’s in our own country to some extent too now because of the hacked emails and all the other stories that so called sceptics have been producing.

[49:25]

How did you feel personally about the actions of these people and the – the Global Climate Coalition?

Well they were a great pain in a way of course, they were – but they were part of the scene and, erm, I can remember debating with people in the IPCC, ‘Shall we – shall we, you know, get rid of these people, shall we forbid them to come to our meetings, shall we?’ which we could have done I think if we’d said they were disruptive and not appropriate. But we all agreed very easily really that that would have been an even worse solution because they’d have, you know, used the fact that they’d been kept away as ammunition of a very strong kind, so there was no way we could do that and they, erm … so they came and – and Pearlman certainly tried to influence a lot of people. And … I can remember going back to the next IPCC meeting after the report came out the following year, when I was keen to – I thought, you know, this has been too awful, we must ex – we must get the whole IPCC to write the record, completely – complete the record of what actually happened in an honest and proper manner, and I’d written documents for the IPCC plenary which I hoped the IPCC plenary would pass. Hmm … but … I was persuaded in the end that it was not a good idea.

Why?

Because there were enough people within the – you know, apart from the Global Climate Coalition who would have – who wouldn’t have wanted it. And Pearlman was quite a smoothie really and he … you know, had a following other than just of – had some sort of following from others who felt he was doing a – who somehow felt he was doing a good job in trying to keep the IPCC honest or whatever it was, and he
was to some extent of course, I mean that’s not completely crazy. You know, the fact that he did fight us over anything that looked – that looked, you know, not quite correct did make us a better – did come up with better reports, and I’ve often said that. You know, whatever you say about the IPC’, the Global Climate Coalition, they actually were good for us in the end, they wasted an awful lot of time of ours, but they made sure that we – that we really were absolutely and utterly honest in everything we said. Hmm …

But how did you feel about the – the sort of darker tactics of harassing an individual scientist and –

Oh I thought it was absolutely terrible. I remember the first – I can remember now a meeting with Pearlman – probably the next time I met him after that meeting was in Geneva and he was at a meeting in Geneva and I was, and there he was with a whole lot of serious looking fellows around him and they were all ready to do their dirty work somewhere else, and there he was with his hand outstretched to me you see. Hmm, I couldn’t avoid passing him – passing him and, you know, going by him so I said, ‘I’m not sure I want to – to shake your hand Don, not at all sure,’ ‘Why not?’ he said … and I said, and I don’t know how I said it but I said, ‘Because you’ve been so unprofessional,’ and he flew into a tremendous rage … completely went off the handle at me and I just walked away. They were the best words I could have ever said to him I think as it happened. ‘Cause he’s – he prided himself like anything in his professionalism, but he’d really played below the belt with Ben Santer, absolutely awful.

[53:51]

And what perspective on these events did your faith give you, or how did it help you to explain what you saw going on with this in terms –

Well I mean these are forces of course of truth and mistruth and non-truth which are around and they’re around in the world and they’re, you know, they’re there, why they’re there I don’t know but, hmm … but as a Christian believer, you know, somebody who believes God is there and God – God has entrusted us with certain
things to do on his behalf in the world, and has promised to help us and I felt very helped. Hmm, there were – there were a few, you know, Christians I knew within the IPCC bodies, there were probably lots of them actually but one of two I knew rather well, and well at odd times during that meeting and other meetings of the same kind we would meet and just pray together briefly about it all. I found that a great strength believing that, you know, I’m not here on my own exactly, not doing it entirely, you know, in my own strength ‘cause I haven’t got it actually. It could so easily have fallen apart at all sorts of stages, and now people would call that coincidence I suppose, many scientists would say, ‘Well that’s just,’ you know, but it’s – it was too good a story for that. So you know, I felt that the Lord was with me in doing it and bringing it to a conclusion that was better than I could have imagined. Which I think is the sign of God doing things, not because I’ve been particularly good, but because he’s working behind the scenes in the way he does, in bringing out purposes that he wants.

Would the – the – the decision of everyone to continue in English be an example of the sort of –

Exactly yes, yes I was very surprised at that decision ‘cause I thought I – you know, had it at that point but – but for whatever reason, and nobody actually wanted to be responsible for killing the meeting. So there may have been some real reasons behind their decisions but nevertheless it – anybody who wanted to kill the meeting could have done so, for instance well the fact that Al Sabban didn’t listen to Don Pearlman you see and it was – and I could see it and that was a great support to me, actually seeing that particular incident, realising that I wasn’t on my own.

And in your – in your book The Search for God, Can Science Help You, you mention at one point that praying together can be more effective or more beneficial than praying alone.

Yes.

And I wondered if you had any memory of the sorts of – again I might be asking rather naively about this, but the sorts of things that you said or prayed about when
you got together with the group of scientists that you knew also at the IPCC meetings, you know, how – how you went about approaching God for help as a group, you know. As someone who hasn’t prayed in a group I don’t know what is involved and I wonder whether you can give me a sense of what is involved.

Yes, I see, oh I mean it’s nothing of – there was not a great formula about these meetings, they were just I was meeting with people who did pray anyway who knew – which is just a simple approach to God and saying, you know, well this is all very difficult, please help me, that’s, you know – and just provide wisdom and honesty and doing some – help us do it right, help us do it absolutely right and keeping it going in the way you would want it to go, because, you know, we’re – we’re here to serve you, and that’s the sort of prayers we pray. Very informal, very simple, nothing fancy, and hmm … then you just feel that you’ve offloaded some of your big concerns to – and feel, well, whatever happens, you know, it may go wrong because going wrong may be the right result in terms of the big – you know, the master chess player above [laughs] who knows how to do it all, who’s got all his, er … but he’s also – who has also given freedom to human beings, a freedom to love and freedom to hate and, er, in ways that we don’t really understand, in the ways that he still wants us to – to follow with him, it’s a – no, it’s a very wonderful world of Jesus in John 15 which when he talks about where he mentioned, you know, ‘Greater love is no man than this than a man who lays down his life for his friends,’ which are words I’m sure you know, and he goes on to say to his disciples who are with him and didn’t understand what he was saying at that time, he said, ‘And – and I’ve not called you servants, but I’ve called you friends,’ and, ‘you’re my friends because I want to explain to you, I want you to understand what’s in my mind and I’ll share them with you, what’s in my mind, and so I’ve called you friends and I want you to, you know, remain in my love in that way,’ or words to that effect, and I think those are very remarkable words really for – for Jesus to have given to disciples just before he died. And, erm … so there are confirming stories, confirming words in scripture which lead us to believe that God is really, does really care actually. Hmm, although that gets challenged in all sorts of ways, particularly when you see some of the things that some people have to put up with, but then he didn’t promise that things would be all rosy, in fact of some of the disciples he promised that it would be terrible, that in this life – and then of course the Christian church is – is riddled with stories of people who’ve had the most terrible
torture and persecution because they’re Christians and yet have rejoiced in it in remarkable ways. So [laughs] –

[End of Track 8]
Track 9

The opposition was getting stronger of course during this period – the period immediately after that and, erm … we’re still on the IPCC are we?

*Yes, I wondered, in the context of growing opposition, if you could tell the story of the move onto the third report, including I suppose as well any changes in the way it was done for the third report.*

Yes okay, no the way it was done was very much the same, the rules were … essentially the same. I still had Ding as my co-chair, erm … and erm … no wait a minute, it was not – it was not Ding for the second one, it was Ding for the third, Gylvan Meira was the second one wasn’t it, that’s right.

*Yes yes.*

Ding was the third and, er … and he was supportive but wasn’t – and could chair simple formal things but couldn’t chair anything else, so – and was perfectly happy to leave that to me. Hmm, and … I mean the – you know, we’ve covered the really difficult bit in [laughs] – in – in number two and, er… and we had the, you know, the chapters were a little different, it was – there were many more people involved of course in the science, it was growing, we were beginning to really feel we’d seen something of it being a reality and … and the predictions that we’d been making about putting – like in temperature rise and all these other things became more clear and, erm, were agreed were about right. The final meeting in – for – in 2001 was held in Shanghai in China, hmm … finishing on I think it was the 20th of January, which was the day of President Bush’s inauguration [laughs]. Fortunately it wasn’t after he’d got there because our – the delegation to that meeting was a – was Clinton – still a Clinton delegation and therefore supportive in general.

[03:13]

Hmm … the … I mean there were no controversies on the same scale as there were for the – for the – for the second report, there were still arguments, especially from
Saudi Arabia and Kuwait and so on, of a kind that took some time. I’m trying to remember particular ones but I haven’t got a – they’re not fixed in my memory in quite the same way as the second report.

Am I right in thinking that in the debate over the policymaking – makers’ summary for this one, there was a decision about whether to use a hockey stick graph or Keith Briffa’s graph which was based on only tree rings ...

Yes.

I wondered whether you had any – if a) is that right and b) do you have any memories of that debate?

Well I mean the hockey stick – so called hockey stick debate was as far as the IPCC was concerned, largely, you know, a non-debate, it was not a major issue. Hmm, it was a … the whole hockey stick problem was an invention of the – I say it was blown up by the nay saying community … in ways that were – you know the time we spent on that in IPCC meetings was very small, was small. The – there was that community, which was Michael Mann of course was involved in the first construction which occurred in the ’95 report didn’t it? And … and his – his methods of construction were queried, his statistical methods were queried by people, I’ve forgotten their names now, but you know the – there was a group of people who – I mean clever people, alright people, who were not meteorologists particularly but they – but they were excellent, there were some excellent – at least one excellent statistician who queried the validity of the statistical methods. And then acted rather – you know, confrontationally with Michael Mann and whether he was – he was confrontational too, I’ve no doubt but – and made a big thing of it. As if the IPCC really put any great store by the shape of a hockey stick. Hmm, and it’s, you know, even now we’ve had – you know, I’m reported as having been standing by a picture of this hockey stick showing that this was the main thing in the IPCC report, which is rubbish, it wasn’t the main thing in the IPCC report, the main thing was the rising temperature of the 20th century, which is on that diagram of course is the deep end of the hockey stick. The rest of it, whether the temperature in the year 1000 was – was comparable, higher or higher or lower than the temperature is to – was in the later 20th
century, was the matter of which – of which the opposition has said was terribly important because – because our – and said that the IPCC had tried to argue that it was – you know, that the temperature was never higher in the – in the 20th century than it was in the – in the year 1000. And therefore if it was higher in the year 1000 what is the – you know, why is this unusual today? And the … the problem with having any good discussion about the temperature at the year 1000 is that the methods, the proxy methods used to obtain that temperature are – are not very reliable. And if you look at the diagrams in the – in the standard IPCC volumes, the – the temperatures going back there, even the uncertainty range is enormous because, erm, you know, the proxy’s don’t agree, the – you can only do it for the northern hemisphere anyway, you haven’t got enough data in the southern hemisphere so it’s not a global story you’re telling, it’s only a northern hemisphere story. And, erm, although you can do a global story of course for the 20th century, you can’t do a global story for year 1000, because there’s not enough data. And – and you can’t put very accurate numbers by it because the data is so – you know, the uncertainties are so large by whatever statistics you use them. You – now the – the main discussion about this form of statistics is tying the – tying the proxy records to the modern instrumental records which you – ‘cause they overlap, you try and tie them together and the way you do that then extrapolates back to the beginning, and I don’t understand these statistical methods that are used and never bothered to – to worry about them. But that was where a lot of the debate went on and whatever shape the – the curve has, you know, later in the – in the – or earlier or later in the – in the period, approaching where – as approaching the temperature, the two temperature record, accurate temperature record, then – then, you know, that’s really – really pretty unimportant in the whole story. Hmm, the temperature does rise a little, you know, the – the best value for the temperature rise is you take the middle of the – this big uncertain curve, it rises – it rises towards the year 1000, erm … you can’t rule out the possibility of the year 1000 being warmer than today by ten per cent probability or five per cent, whatever it is, it’s that sort of order, er, the maximum you can make it, and the opposite end of that is, you know, a long way away. So you take the – the maximum possibility of the uncertainty in that direction, you might just about get up to something like the end of the 20th century, but that’s a … and so the IPCC has never made a – a big story in saying – saying anything of any definite kind in our – particularly in our summary statements or anything about that, the temperature at that
time because it’s – we don’t know enough to – to use it as an argument. The other lot do think they know enough to use it as an argument, and think that we’re hiding beyond – or certainly, you know, continually state as Booker does, Booker’s book is mostly about the hockey stick. Well I can virtually never remember any significant debate in the IPCC about a hockey stick at all, it was not – not important to us. If it was – if it did come up it was shoved off to a side group to come up with something – some conclusions, which we would not bother about a great deal because it – you know, there was no story there. So although that’s the – you know, some of the sceptical community and in particular people like Booker, who doesn’t know much at all really, except he’s read a lot one way and another, just selected his material, out it comes, the hockey stick, why the hockey stick? So that’s the hockey stick, yes.

Okay [both laugh].

[11:12]

And what memories do you have at this time in the – in constructing the summary of pressure either from oil states, or from countries who would have preferred for the conclusions to be stronger or more –

Yes.

Eye catching or anything –

Some of the countries in Europe actually, yes, some green countries, strong green people. Hmm … I mean they were – those pressures were there in – in Shanghai certainly, I mean I can remember spending time with the Saudi and Kuwaiti’s on their own, you know, and I’m saying, ‘Now look here,’ you know [laughs], ‘don’t want to waste a lot of time on this please, but please tell me what’s the, you know, what you’re after, [laughs] and insofar as you can do that and – ‘cause that will just be of help – helpful to me in how – you know, knowing – knowing what you really want, what are the things you really want out of this meeting, and that’s, you know, off the record, I’m not – you know, not promising anything of any kind but I would just like
to know what’s in your mind,’ and they were open in some extent, in telling me that sort of thing.

**What did they say?**

I’m trying to remember what the – what the things were now, ‘cause they weren’t very – they weren’t sort of – they knew they – they couldn’t bring in things that were wrong, all they could do was argue about things that were – for which there was some argument in the – in the reports. I wish my memory was better, I wish I could remember some of the things they brought up but they were not, erm … none of them were killing things.

*And which countries tended to present delegates who were – who seemed to be particularly green in what they wanted to produce in terms of a final summary?*

I’m just trying to think, I mean, yes. Which of the European states would – which – there was – they were on the whole people in the – in Europe, west – you know, I think Germany has been fairly green, but – and they have had the – somebody’s – Holland perhaps, I’m just going – this is to some extent a guess. I don’t remember terribly. Probably because it didn’t matter terribly, you know, they were – ‘cause I recognise there were people who wanted to strengthen things that way, but they couldn’t get very far either you see because there was – there wasn’t the material to enable them to do so. But in – and to some extent of course these things just weighed each other out, you know [laughs]. And my memory for particular people and things is not very good, it’s some time ago now too and it all happened very fast of course. Hmm, we went on and it was to be finished about two o’clock, three o’clock in the morning I think in Shanghai. Hmm …

[14:29]

*And leaving aside the commitment to honesty, which is your own and the IPCCs and the concern not to exaggerate or to say things that are beyond things that can be said based on science, what decisions did you make about how to present the summary, and I – by that I mean in the pros and in the – in the – in the graphics of it, for an*
audience of people who weren’t scientists? Did you make particular decisions about how to – how to present science to the – to the unscientific if you like?

I think – most of my job in the IPCC was to present material that was … well the chapters anyway was to present accurate material for scientists to look at. The diagrams we had in the … in the policymakers’ summary of course would be seen by a wider audience but we were still, of course, recognised that the main audience we had there was governments and officials and the scientific world anyway, so I don’t know that we – we were not – we didn’t spend a lot of time on thinking about how – how to make diagrams that would explain to the general public, which you can perhaps say is a weakness with the IPCC, we’ve never – you know, our diagrams on the whole have not been, erm, sufficiently simple always. I had much more of a struggle when trying to write my book on global warming and produce simpler diagrams without misleading people. Hmm … and some of the scientists of course were very – also had very keen – were very keen to get the stuff over in a way that people would understand and that was a – you know, we were all a bit like that in the end because, you know, we were in a meeting that was trying to explain to people who didn’t know a lot anyway from the government delegates’ point of view, what was going on so – yeah, so I don’t know – perhaps it was just more implicit than explicit.

[16:44]

And at any stage have you had any reason to, let’s say, regret any of the – any conduct of any particular authors or lead authors of chapters, given that there are a huge number of scientists across three IPCC reports, whether they’re contributing or lead authors, but, erm … yes, I wondered.

Well I mean a startling example of that which is – which you’d be interested in is Dick Lindzen, Richard Lindzen, professor at MIT who is the … by far the most capable of the nay saying community who I described in that way. He’s a good meteorologist, he’s a clever man, he’s a Jew, he’s a, erm … and he’s been the most outspoken critic of the IPCC of any scientists of distinction, he’s been used by most of these organisations that get set up to oppose the idea of climate change being of any
importance. And I – and I got to know him fairly well in a way, I mean I knew – I knew him before the IPCC work because he was a – you know, a distinguished meteorologist in MIT, and … when it came to the – and he’d already by the – you know, well not by the first report but by the second report he’d pitched in, in supporting these, you know, Global Climate Coalition and things like that, they used him and, erm … I wrote to him before the third report and said, ‘You know, Dick, will you come and join us as a chapter author?’ [laughs]. And surprisingly he said he would [laughs], so he joined the chapter on climate … climate processes which is, you know, very much his thing, he’s written things about the influence of water vapour being negative rather than positive and so on and he’s published papers, a few papers on things like that, along the lines of that kind. And so he joined that group, one or two members, certainly one member of that group was one of his own students actually, the chapter authors who were – who were working with him on these processes and, erm … but really Lindzen doesn’t do much – doesn’t like doing homework and so he was – you know, they dished out to him bits to write, and if you’re writing for a document of that kind you have to go through the literature and you have to be fair to the literature, all of it, not just your own papers [laughs]. All Lindzen did was to write his piece citing his own work. And he was sort of told this wasn’t good enough by the rest of the other authors [laughs] and, erm … I don’t know how much of this story to account to you really, how much is worth reporting and how much is worth forgetting about. I can remember the – the leader of that group, was a very fine fellow and came to me almost tearing his hair out at this time saying, you know, ‘Dick, he tries to lay the law down and he’s very difficult and very impossible and can’t get any – can’t get anything in to write anything,’ and I said, ‘Whatever you do, just treat him nicely [laughs], don’t give him any reason whatever for leaving, because if he leaves, you know, that will look very negative because he’ll exploit that.’ He didn’t leave, his – for the parts he was supposed to write got written by others, and the chapter came out in the end, perfectly sensible, lots of things written in that chapter, lots of statements he would deny outright, if challenged with those statements, they go against his public – what he says in public about the water vapour feedback and other things and, erm, because he – his name appears on the paper, appears on that document. What he has consistently said in public ever since is the IPCC chapters are fine, they’re written by genuine scientists so they’re fine, it’s the policymakers’ summary which are written by people like Houghton and others
who have no regard to the science at all, and they’re rubbish and they – the summary’s bear no resemblance to the chapters whatsoever. When challenged to give examples of what he means I’ve – I’ve – know of no single example that he’s ever given [laughs]. End of story. He’s still at it.

*I – go on.*

Well I mean why – he’s a man who – he’s known as a – you know, a natural contrarian, he argued for many years, well he still does, he was a very heavy smoker, he argued that there’s nothing to do with smoking and cancer, argued loud and long about that and he’s – and he loves opposing what other people say, I don’t know that he’s made lots of money out of it but he’s got lots of publicity out of this of course. Hmm … somebody tried to explain to me once and I don’t know – I don’t know enough about Jewish rabbis to know whether it’s [laughs] – but there’s a certain way in which you argue as a Jewish rabbi which is a bit like the way, you know, rather formal procedure in arguing cases which – which Lindzen tends to – tends to emulate to some degree, I don’t know whether that’s true or not ‘cause I don’t know enough about it but – but his … his influenced of course in the – in the ordinary world has been enormous because he’s – you know, the House of Lords in this country had a session on climate change, energy and technology committee, whatever it was, the first person invited was Lindzen and Nigel Lawson loves Lindzen, thinks he’s a wonderful chap, ‘cause he tells the sort of story he wants to hear [laughs]. I also went to that House of Lords committee and they – they wanted to ignore me, sidelined me and some of them didn’t even – even left the meeting and didn’t come around and so on, they’d heard Lindzen, that’s all they needed to hear …

*When was that House of Lords meeting?*

Hmm … I would have to look it up, I can’t remember when. Ten years ago … or less, eight to ten years ago I would say. I mean you can look it up if you want to do that.

*This –*
You’ll find Lindzen there, in week one, and then they had me and I tried to put him right but I didn’t succeed ‘cause they didn’t want to hear me really. It was I thought the coldest – I’ve been to select committees of different kinds before, but I’ve never been to such a cold select committee as that one.

[25:00]

I suppose this raises a question, a wider question about what has been the effect of the change of – of government in – in Britain over this period, from the start of the IPCC process to I suppose we’ve taken to the present in attitudes to climate science, or perhaps attitudes to the findings of the IPCC in particular, we start off – I suppose we start off with Margaret Thatcher.

Yes.

Has it made any difference and if so what – what has been the difference of a change in – in changes in government over that period?

Well very little actually, I mean John Major was a great supporter, no problem with John Major. Hmm, and Tony Blair was a great supporter, no problem with Tony Blair, and David Cameron’s right on side, though not all his people are in the Conservative party but – but he’s stuck to it very well. And – and in general if you look at governments around the world, because the IPCC is an intergovernmental body, no government, not even the Saudi government has said, ‘We do not believe the IPCC report,’ they can’t do that, they were party to it. The US government has never actually said that, although, you know, some of their statements have tended to oppose it but none of them would ever say the IPCC is rubbish. So you’ll find not even the, you know, the worst, the Kuwait’s or anybody else, would be most outspoken at the meetings but they’ve – because they were there and they agreed it so, you know, governments are no problem really in principle, the problem is, erm, you know, people within governments and people [laughs] outside who get in the way of a government actually doing what they should do. And we certainly suffer very badly in this country from a – like Nigel Lawson who has written a book on it which demonstrates his ignorance, and which is surprising because I’ve, you know, met
people who knew him well when he was in the treasury as the chancellor and when they said, ‘You couldn’t get anything by him that wasn’t absolutely right, he was meticulous for accuracy,’ yet here is a subject where he knows no science, and – and yet will pontificate in a way which is just incredible. The only reason I know for that is that he happens to be a great friend of Fred Singer’s, and why they knew each other I’m not sure, I knew Fred Singer in the ‘60s when he was working for NASA, he was a big man in NASA in the ‘60s and the environmental part of NASA actually and he was a good – he was a good scientist actually and did some good things then. So – but his political agenda was dominated, so dominated his – his statements, it … that the statements he now makes on climate change are just, you know, a complete pack of lies, you know, just inventions, he invents it as he goes along and it’s [laughs] – it’s incredible actually with the man of – with his scientific stature so – well what one believes to be his scientific stature, that has vanished so completely that he … that he refuses to …

[28:36]

What has been the – the role of female scientists and in particular female British scientists in – in the IPCC process from the beginning to the end of your direct involvement? I only ask because we talked about Margaret Thatcher at the very beginning of it and everyone else that we’ve spoken about concerned with the IPCC –

Has been male, yes.

And I wondered whether –

Well you come to working group four, to the fourth IPCC report, that was chaired by Susan Solomon from the United States who was an excellent lady, and did it very well indeed. And you know, the fourth report, the fourth scientific report is a brilliant piece of work and probably the best of all the four reports and I say that [laughs], yes. But of course there was more known and there was – she had more possibilities but she’s a very good lady, did it very well. Hmm, now what other ladies have we had working with the IPCC? Not a lot I suppose, erm … I’m trying to think of one [laughs] in … actually lead authors, we had very few lead authors actually, I could
look through the list of lead authors, list of authors and see. Hmm … can’t actually at this minute think of a single … lead author who’s a woman, from any country, there have been – there have been some I’m sure … hmm, oh there you are, you didn’t give me notice for that question.

Okay, well if not then the scientists, what about the delegates at the governmental part of it, when the policymakers’ summary is agreed, what is the extent and nature of the contribution of women in that part of the process?

I think it’s small but it’s not zero. Hmm, and there have been some women involved in the – as government delegates, yes. Some quite able government people, though you’re going to ask me for names now and that’s … hard for me to remember. Hmm, I mean Susan Solomon is – you know, she was there of course at some stages too. There were – there were British girls from Department of the Environment involved in the UK delegation, quite able people, we had of course some very good people working on the technical support unit too. Some very good ladies.

Yes, you said that it was Geoff Jenkins who was the – the head of that?

Yes, well that was the – working for the first report.

That was for the first one, hmm.

And then it was Bruce Callander did the second. A man called Bruce Callander who was excellent too. And a man called David Griggs who did the third, he’s now in Australia and they were three very able people.

And they had female staff?

Excellent people. And some of the staff were female, yes, all of them had – at least half – half would be female, I think.
The other question that occurred to me when you told the story of Dick Lindzen was that I think you said that you wrote to him asking him to be a lead author –

Yes.

So that sort of made me think again about this question of how the lead authors are chosen.

Yes, okay.

And I wonder if you could say a bit more about that for reports two and three, how –

Yes, well that was a – that was a rogue intervention on my part I suppose … and – except I had discussed it with the other – with the main people involved. Hmm, I suppose I might have had some part in trying to persuade people to become lead authors in other cases too. Hmm, because, you know, we were looking for good people and I was trying to find them but – and I’m sure that Dick Lindzen’s name would of course been presented to the bureau, er … but it was not something I did a lot of [laughs], but on that occasion that seemed to be a – a sensible thing to try to do and I think it was – it was actually in its way. So the end result was [both laugh] played into his hands to some degree.

But it was an attempt to sort of have – have input as part of it rather than standing outside of it?

Oh sure, my – my hope was that he would come and join and join properly, and – and would do some work and – and you know get convinced the result, but of course that was too much to hope for [laughs], actually, which is a shame because, you know, he’s an able scientist.

And do you remember how – how names had to be submitted to the bureau, you know, suggestions for lead authors, I – I suppose I’m thinking of, would perhaps an individual scientist write to the bureau saying, ‘Perhaps I could be a lead author of,’ –
Well that was a possible way of going, with the – I mean they wouldn’t normally write to the bureau, they would write to the technical support unit or they’d write to the people who’d been nominated as the – as the convening – or known to be the convening author which might have probably known before you know all the lead authors. So a variety of ways, or do – write to their government actually and say, ‘Please put me forward,’ ‘cause all governments had a responsibility to put names forward.

But who – who in government was capable of – when you say government put names forward, I wonder what does that mean, who – who in government, what sort of committee in government would be –

Well you go to – I mean in the UK it would be Department of the Environment, so there are people who know – who have some knowledge of scientists in that area.

Okay.

Or the Met Office might be involved – might be invited to nominate people, that sort of thing, various people in government, it’s not – but it’s not political government exactly as – you know, it’s government in the sense of – of running the whole machine. Oh it worked well actually, it was – I don’t know of any great – can’t remember any very great – I’m sure there were one or two occasions when people were – who got it wrong or were just – complained that they weren’t chosen or one thing or another, I can’t – but nothing that stands out in my memory as being terrible. Hmm-hmm.

[35:50]

I stopped being in charge of working at working group 1 – in 2000 – or co-chair – co-chair of working group 1 in 2002 and I’ve – although I kept contact for the IPCC people I knew as – but I didn’t do anything for them in any serious way at all until after the next report, till 2009 when I did actually go to a meeting in Hawaii with the IPCC scientists which was called by IPCC scientists rather against the rules actually,
‘cause they wanted their – you know, all the best scientific people to get together which couldn’t be done through governments, and they met in Hawaii to, erm … they wanted to review what had gone on in the first four reports and try and, you know, what were the big issues now, this is 2009, and what were the main things they were going to have be doing for the next – the next report, and did the way of doing it or the material chosen and all these things need – need changing in a big way. And they attracted me to go to that meeting, they – ‘cause they said, ‘We really would like you to talk about the first three reports, what went on in the early days ‘cause many of us don’t know about that, and reflect on any of these things,’ and it was a super meeting actually, it really was, 150 people there scientists organised in a most interesting way. Hadn’t gone to a meeting quite that like that before. Their main present – and they’d had some … main papers which were on main topics, just a few of those, and asked me to give one of those on the past history topic, but then as far as presenting science was concerned they had, erm … they had three – it was about three days, we had three days of – with two hour sessions, three sessions a day, that was nine sessions I suppose, hmm,, and when the two hour sessions consisted of – well three hour sessions or so, they were three hour sessions and we fitted in three a day, yes, somehow. Oh have I got it right, was it two and a half, trying to remember, but anyway we – the – anybody who had a major, you know, papers had to be put up in advance and chosen but the … the authors were allowed three minutes to present the main – their main conclusions of what they were doing with no more than three slides I think, and then there were posters all around the room. So there were – so that went on for an hour, three twenties so that’s sixty – twenty posters were covered in one hour, then the posters were all there around the room and then you spent the next hour and a half going round these posters and talking to the people who were the authors and went to the ones that interested you, you’d heard about them for three minutes, you’d have this three minute slot beforehand, when you could discuss, you know, face to face or the group of you who went round that poster would discuss face to face, a brilliant way of doing it. Instead of having to sit for you know, people giving longer presentations on everything, you got a very short picture of what was going on and you chose your place. And so you covered, you know, in three days some – some, you know, sixty or seventy topics. And marvellous way of doing it. Very lively meeting and great discussions about, you know, how it would be run and so on, and Hawaii was cold and wet, you wouldn’t believe that [laughs].
Unlucky.

But that didn’t matter ‘cause we were busy.

Hmm.

Anyway, that’s my latest intervention into action in the IPCC in a big way. Okay, right next thing. What –

[40:16]

I wanted to ask you whether you could … tell the story of – of meeting your second wife, given that this is a life story interview and we’ve talked for now quite a long time about work.

Yes.

If just for – if we could simply have sort of dates and things, but you know just you can also tell that story in any way you’d like to.

Okay, of course. I’ve told you the story of my first wife I think haven’t I?

Yes.

Yes, okay. Hmm … well something I got involved with, and you’ll see the reason for this eventually, in the … in the ‘50s and – the late ‘50s and early ‘60s I suppose, well when I went back to Oxford, ’58. I got involved with some – some people, Christian people who were … who recognised a big need in – among students in Oxford for particularly students from the developing world who found great difficulty in finding good accommodation, and, er … either because of some sort of racial prejudice or whatever they found it very difficult. Accommodation wasn’t that easy and it was a … and we wondered if – a good few of us wondered whether, you know, we could actually set up something which would act as a – as a residential centre for students
from overseas, and a place with a sort of Christian foundation but we were not out to … our main – the main reason for doing it was to – was to try and enable people to have a home and nice – of a good kind and under a Christian influence if you like, but that was the whole idea. And … and there was a man I knew very well in the physics department, a man called John Twidell who … who had been a research student in physics at the same time as I was, he’d – he’d left to – as – he’d left to go – after his PhD he went off to Sudan I think, Khartoum, as a physics lecturer in the university, of course he was very interesting in helping the third world and he’d been out there for some years, and very outgoing fellow and he – he came back to Oxford and he – you know, his – his term there was finished but he had six months leave and – and he got – we got to know him and he said – he said, you know, he’ll back me, ‘I’ll – I’ll try and raise money for the sort of place you’re looking for and, erm … and you can pay me ‘cause I’ve got money anyway and because I’ve had this six months pay.’ So he set about trying to raise the money and he was, you know, he was quite successful really and we bought a – there was a … a – a big old house which had been turned into a – turned into a residential centre for – for an Anglican Christian training college for women which had closed, so that was up for sale and John Twidell [ph] managed – you know, arranged to – managed to get arrangements to buy it for – on our behalf and so we – we had the British Council was involved, they were partner with what we were doing and they offered a substantial grant towards it, so we … so we – we bought it and set it up as a – as a residential place which – which had single rooms, and it had married rooms and it had – it had a big kitchen and it had the possibility for people to cook their own meals, as a – as a central facility and – and it took off – I could tell you more about it but I needn’t, it took off about, what, how many number of people were there, sixty, seventy, that sort of number, and it was – worked very well and it was started off very well. We got wardens in and – and I became chairman of the committee and so that was – that was – happened to – we got that about 1969 I suppose. You may say what has this got to do with Sheila, well I’ll tell you how [laughs]. Then as a later part to that story, which is we called it the North Oxford Overseas Centre, it’s still there and we had a … the work – we wanted the work to expand later, a few years after – a few years after it was doing so well in the – and there’s still lots of demand, tremendous demand for it and so we – we got our eyes on – and gave attention to another house that was being sold by St John’s College and – and we, erm … and we bought that and, er, to extend the work. And it was a little
Christian story about that that might – ‘cause you ask me questions about these things [laughs].

Yes, yeah.

Hmm, no, this was being sold by tender, and so we had to put a bid in and we questioned what – how – what sort of bid do we put in and so we – those of us involved got together one evening and we prayed about it, thought about it, thought of a number, put that bid in … but we couldn’t – but we couldn’t buy it unless we had a certainty from the British Council that their grant for it would come through, it was going to be there. And for some reason, this was the Friday before the thing was due in on the Monday, we’d had no word from British Council and we’d been pestering them and eventually they said, ‘We’ve got somebody coming to Oxford on Monday morning and he will bring the piece of paper which will tell you that it’s alright,’ or something to that effect, but no – but we still didn’t have a guarantee or a piece of paper and it seemed a bit odd. So we had to put a proviso in our bid that said, you know, ‘Providing we get money from British Council’. Hmm, Monday came along and no sign of the British Council person at all, I mean he was quite a senior man and dealing with quite senior people, but anyway that and – you know, I suppose I and others were bidding and we – anyway they opened the bids at lunchtime and – and ours was by a small margin the highest bid. So the – it’s – St John’s rang me up and said, ‘Look, what about this figure, what about the British Council?’ I said, ‘Well I’m sorry, but we’ve – you know, we just do not have that – that guarantee,’ it was a big sum of money so we – I couldn’t let it go without – without confirming it and I said, ‘We have no confirmation, their [inaud] hasn’t worked this morning.’ So – so he said, ‘Well, that’s okay, I’ll have to let it go to the next man then,’ so I had to say, ‘Well, I’m sorry, I suppose we – I suppose I have to say that you must go ahead with that, ‘cause I can’t see any way we’re going to – within the next five and a half hours going to get any – any confirmation of that unless you can keep it waiting,’ and he said, ‘No, we keep it waiting because we’ve opened the bids now.’ So, er … so – but I and others continued to chase the British Council in case the whole thing didn’t work or something. And Tuesday morning I remember I got hold of – I managed to get hold of the head man at the British Council, a man called Sir Dermot Milman, who I knew reasonably well, and he said, ‘Look, it’s crazy, you know, we’ve lost it I think,’ and
he said, ‘you know, we – I absolutely 100 guarantee to you that we will – that we will
pay that money, no question,’ I said, ‘Are you absolutely standing by me on that, no
question whatever,’ ‘Absolutely no question whatever.’ So I – you know, middle of
Tuesday morning I get hold of St John’s and say, ‘Look, you know, I’ve now got a
guarantee of that money,’ and so we could actually buy it and – and he said, ‘Well,
you know, as far as I know the – the letter has gone off to the other person and I think
it’s too late,’ but he said, ‘I’ll just check and – check for you and I’ll ring you back.’
And you know, half an hour later there was a phone call from him saying, ‘Well,’ he
said, ‘as it happens the secretary who should have sent the letter off did not come in
yesterday afternoon, so the letter has in fact not gone so you may have it.’ So we
bought it. And being a bunch of Christians of course we prayed about it, we thought,
oh that’s very interesting, you know, that it’s – we thought we’d lost it but we hadn’t
because of course somebody else wanted us to have it and that – that in Christian
experience, I mean normal experience of course helps to – helps to guarantee to you
that you’re on the – doing the right thing, you know, something unusual happens of
that kind and confirms what you’ve done in a way that you would – would not have
expected. And so when you get big problems downstream, you say, ‘Well [laughs],
you know, we were really meant to have it and I’m sure we were,’ and so you carry
on.

So it’s like the story in – in your book of the – well it’s a smaller version of the story
of the man – I think he perhaps was running a children’s home and he – he managed
to keep it going by all sorts of –

Yes.

The funding, all sorts of sort of enormous coincidences, I’ve forgotten the name of the
man in your book, the –

Oh you mean – yes.

He kept it going by –
George Muller, yes, yes, that’s a very good story, I mean that’s – there were – he – he was like that all his life. You know, he was a German by – extraction by origin but he – the Muller homes in Bristol, they’re still there actually, and he raised, oh, fantastic sums of money at that time, without telling anybody, it all came out of the blue. And I believe those stories because, you know, he was not only – he was a very honest man and everybody told you he was. Obviously a very fine fellow, yes. Remarkable stories, anyway. So that was a little story of that – of that ilk, you know, which I – which we thought – so that was the North Oxford Overseas Centre and this was a … and it’s – you know, it’s been a wonderful help to all sorts of people from all over the world, haven’t been there for a bit but it’s – it’s still going strong.

[52:02]

Now … in the – I got married to Margaret in ’62 of course and we went to a Baptist church in the middle of Oxford at that time, and then we went to America in 1969 for three months, to Boulder, Colorado, working with the National Bureau of Standards there on some atmospheric radiation problems and had a nice time there as, you know. Came back to Oxford, we had a – we had a house built just outside Oxford which we hoped would be ready when we got home but it wasn’t, but anyway I won’t tell you that story. And, erm – but we – we decided we would – this was outside Oxford, near Begbroke, decided we’d move our church to a smaller church in Kidlington which was outs – on the outskirts of Oxford and – and there we settled for – as our church home. It was a small Baptist church and it – a chap we met in Oxford came to become the minister, it’s the first minister, it had been, you know, operating without a minister for a long time, and he was an excellent fellow and we got to know him very well and that was good. And, er … and each – and each Christmas, erm, because I quite liked singing and choirs and things, and we laid on a concert at the Overseas Centre in Oxford, and there was quite a number of singers in that chapel and the singers would meet in our house and we’d practice and we had great fun doing it there, producing Christmas concerts for them each year. And you know, it was a very nice occasion, we did that for a long time. And – and early in the ‘70s Sheila came to Oxford working for the Inland Revenue … and she came to our church in Kidlington, and was greatly helped by that church actually and enjoyed being with us a lot and she – oh not terribly often but from time to time Margaret was invited to lunch on
Sundays and she [inaud], so we got to know her and that was nice. But further, she also had a superb soprano voice, because she could join our Christmas concert which – and was, you know, one of the best voices we had, she still sings here incidentally with – with – she still has a very good top soprano voice and – and that went on through the ‘70s, and then the ‘80s Sheila went to leave Oxford and went to Coventry, she became collector of taxes for a large – new Revenue office in Oxford, tough job for someone quite – young lady, at the time of the recession actually and had a difficult time actually, we kept in a bit of touch but not a lot because she had a very bad period in her – with her health. Hmm … but then she still – we still tried to get her back for singing for, you know, she came back sometimes, not always. But then … then Margaret died of course and Sheila came to the funeral and, er … and as this is in July and as she left she said, ‘You know,’ she said, ‘We might see you at Christmas with us again?’ and so it happened. And then we got together and that’s how I met Sheila. And we knew her anyway and she knew the children a bit so that was nice, and …

[56.28]

Would you be able to – I notice in the acknowledgements for the complete briefing you talk about Sheila’s encouragement in writing it and also the book on science religion, but I wondered if you could comment more generally on encouragement or involvement of Sheila in your – in your work.

Hmm-hmm.

I mean as your wife and the sort of levels of encouragement of or support of or practical assistance to you in doing what you did?

Yes. She’s not a scientist of course, she’s never been to university but she’s an intelligent, very intelligent, bright girl. And … hmm … and I use her a great deal for – I mean she read right through the – my Christian book, Search for God, made comments on it, hmm, very helpfully actually, trying to make sure it was understandable. And I often pass things in front of her and she has very good advice to give on how you do things, or how you don’t do things, so … no I tell her what’s
going on, just as she tells me what’s going on in her life, how she’s running a fair-trade shop and … so we … we do work together quite closely in some – you know, or at least we pass things in front of each other, that’s you know, part of being married.

What year did you marry?

I married Sheila in ’88. Margaret died in ’86, yes, that’s right, ’88. And she’s younger than I, she’s – she’s, what, sixty-three now, hmm.

I wondered to what extent you discussed then IPCC work with her, erm, you know including the diff – the challenges and difficulties of it in the – you were married to –

Yes, sure.

Through all of the –

No, she – she didn’t come to many IPCC meetings because she – she hates coming to scientific meetings when she’s just a sort of, you know, bookend or something [laughs]. But she has travelled me quite a bit actually to – when I was at the Met Office, we travelled quite a bit, she came to China with me and she went to Russia with me, she’s been to Australia with me, been to America with me and we’ve been – have travelled quite a bit, on supposedly scientific business [laughs] but which has involved much more social connections and much more interesting things. Hmm, but if the trips are not like that then I go on my own. So I don’t think she’s ever been to an IPCC meeting probably, I don’t know, ‘cause they’re always working meetings and you were – but she knows about it and she’s helpful and very sympathetic and, er, speaks quite firmly about things [laughs]. She’s a strong minded person which is good, you know, no, she’s my best critic by far and certainly is not frightened of saying, ‘No, this just won’t do,’ you know. I remember [laughs] the first lecture she ever came to which I was giving, trying to remember what – Royal Society of Arts or somewhere, and … and I was not the only person speaking, other people were speaking too at that meeting, and came away afterwards and she said – she said she thought, you know, the standard of presentations was appalling, she thought, you know, these were meetings where we were going to get really good presentations
from really good scientists and why were they so bad, and mine wasn’t very good either [both laugh]. So she’s a very good critic.

*Did she mean visually, you know, the sort of slide –*

Well just this standard of actually putting it over … the – you know, the make up of sentences and indeed the make up of the – of the material and, you know, they were not telling good stories and some of their slides were not very readable and all the rest of it, I mean this is – you know, indeed when you look a lot of scientific meetings, the standard of presentation is – if you’re really being critical is quite appalling, you know, slides with far too much material on, people rush through them and without assuming that if it’s been up for a second you’ve still seen it, and all this sort of nonsense and it – it still is a major problem in scientific meetings. So she’s been – you know, she’s helped me criticise my own – my own presentations and I’m sure they’ve been better as a result [laughs].

*What assistance in that sort of way did she give to you in writing The Complete Briefing, or I suppose presenting The Complete Briefing, its appearance? You spoke earlier about making decisions about how to for instance present graphs, which were on the one hand readable but on the other hand not misleading because the information was removed, and I wondered whether you had asked her to comment on drafts of that book?*

I don’t think she’s done too much of that actually, I mean she certainly has done some reading of parts of it. Hmm, I don’t think – know how much of that she actually read a great deal of, ‘cause I got a great deal of help from the CUP in that, and they – they had very strong editorial people, they wanted a very, you know, professional looking – the last one, the last volume they were very keen on getting it very professional. And … and so they had some very good people working with it and that was excellent actually. You know, with very good facilities and so on, so it’s come out very well, looking very well. And they have editorial people too who – who would vary actually, one of them was pretty hopeless I remember but, you know, [laughs], failed to pick things up but otherwise she was no, yes[laughs] yeah. I mean I remember one story of, keep going off on to stories now, in a scientific meeting when there was as
chap who we were told we had five minutes and a maximum of four slides if we were making a presentation, and there was one chap who had sixteen slides, and he was very upset and he went away and he turned his sixteen slides into four slides by putting four slides on each slide [both laugh], four pictures on each slide. Then he got up and he showed these four – sixteen slides, with four on each occasion and you could not read a word of it, you couldn’t see much of what was there at all, but he was entirely happy because he’d presented his paper [both laugh]. You know, it’s a very strange mindset to be in when you feel that having you’re your material up and shown it for even a short length of time, unreadable, it doesn’t matter [laughs], but you’ve shown it, you’ve presented your paper. Yes, and that’s, you know, scientists should be much more aware of the – their audience.

[1:04:30]

*And aside from singing I assume, what sorts of shared pastimes and interests do you have with Sheila, in other words what sort of things do you tend to do together when neither of you are working?*

Well we enjoy the garden very much, she’s a great gardener and she likes doing that very much so we enjoy the countryside. We – we like walking … and just enjoying nature and the countryside a great deal, and that’s I suppose the biggest thing we do together probably. She’s – she broke her knee actually a long time ago now, she broke it on the piece of – big piece of slate out here and smashed it, so it had to be put together again, but it’s – it’s not been as bad as we feared, she – she can walk on the level without being – ever since she got better she’s been able to walk on the level reasonably well, she can walk uphill not too badly but downhill is terrible and so we have to go places that has no downhill and that means on the whole it’s places with no uphill either so [laughs] – but anyway we can go walking and that – that’s very nice, so we enjoy that, yeah sure. Hmm.

[1:05:49]
Could – could you tell me now about your service which you’ve mentioned as a member of the UK government’s panel on sustainable development, the dates of which are 1994 to 2000.

Yes.

So it’s after the end of the IPCC.

Yes.

Yes.

Well I mean I don’t think there’s a lot of time – worth spending too much time on that in a way. I was a member, I was not a chair, Crispin Tickell was the chair and he was a good chair and he was very good, chaired it very much in the government style of course ‘cause he’d been a diplomat and all that. It turned into, erm … so our remit was to, you know, comment on anything to do with sustainability and sustainable development and which we did. I could look up some of the topics if you wanted me to but, you know, we covered the normal topics, we made comments on all sorts of things and those comments went in and government would write a response back saying they were doing this or that or whatever it is. Hmm, but – but looking back on it it’s, erm … I’m sure it was a useful thing to have, but how much it really cut ice I don’t know. I’d much prefer to talk about the Royal Commission really.

Okay.

If that’s a sensible thing to do now is it? Would you like a cup of tea?

[End of Track 9]
Track 10

Okay, so it’s the story now of your – your role as – well your role in the Royal Commission on Environmental Pollution, including your chairmanship of it from 1992 to ’98.

Yes, correct. Well when I left the Met Office, erm … well Derek Osborn, of the Environment Ministry, asked me if I’d be interested in the Royal Commission job as something to do afterwards and I thought about it and thought that would be quite an interesting thing to do. The Royal Commission was founded in 1970, set up by Harold Wilson – Harold Wilson in 1970. That was a big move at that time actually to – for government to take any notice of the environment and what had to be done about it. And … hmm, and it had, you know, a very good history of doing useful things, lead in petrol was one of the most – one of the things for instance that was most noticeable by the public at large, but in other ways too they had done things on – so it made it an interesting body to join.. It also was interesting the way it was formed, it was a commission which was under the control of the Queen in some sense and reported of course – the reports went to parliament and parliament had to respond to them. And they didn’t have to do anything about them but they had to respond to them. And of course it on the whole tended to be people who were very able, very capable in their own field, in a mixture of fields, hmm, scientific fields and scientists with a couple of economists seemed to be almost always there, very important to have more than one economist so that they can suitably disagree [laughs]. And for instance I’ve learnt that and, erm … and also people from the social sciences, and during my period we – we also had a theologian, Michael Banner which was interesting, an academic theologian. Hmm, we met once a month for two days … and the object was to delve into the important topics and write in-depth reports on them. And to call as witnesses to anybody we cared to call on, to help us on our way. So it was a – they had a good history of careful and sensible work and, erm … and also had some good secretary – a good secretariat which was good. When I joined in ’92 the first – doing one report at a time essentially, mostly anyway …
When I joined in ’92 the report we were doing was on the incineration of waste … important topic, how to get rid of waste. The Royal Commission had well – it wasn’t I didn’t think invented by the Commission but their – their rules for waste were either, number one, don’t make it [both laugh]. Hmm … number two, recycle it … and only number three, or number three, recycle it as energy, in other words burn it and make use of the energy, number four, put it in landfill if you can’t think of anything else you can do. That’s a very last resort. An awful lot of waste goes in landfill, it still does actually and the UK was way behind in – in the way it was treating its waste and generating its waste and so on, so incineration of waste was an important topic. I came in halfway through that and, erm … and we, you know, learnt – I didn’t know a lot about it of course and on the whole didn’t know a lot about things you were told at the start, when you started these things, learnt a great deal rather fast. And the problem with incineration of waste was that there were – there had been some very bad incinerators, some very polluting incinerators, people had got very badly diseased or – or problems with breathing and all sorts of things with - because of, erm … air effluent from incinerators, being downstream of – of an incinerator, terrible thing to be in some parts of the country and these incinerators were just not good enough. But nevertheless the word incinerator was just a dirty word to a lot of people and nobody wanted to live anywhere near an incinerator and it’s the idea of – of incineration could be actually clean and not producing any – any bad results, bad [inaud], people just didn’t believe. But we tried to – well we looked into it and we – we all visited actually a modern incinerator on the Wirral, a big one where they were incinerating – incinerating toxic waste, so it had to have very high standards indeed and if you looked at it you could not see anything coming out of the chimney. Hmm, because you can, you know, wash the gases coming out, you can make sure that absolutely nothing comes out of the top and make sure you burn it at high temperature, very high temperatures as you can, which means you burn the waste much more effectively than most ordinary incinerators. And so – so we wrote a report saying, ‘You know, incineration of waste was a good thing to do, you can get energy out of it and you could do it – if you do properly you have to have very strong rules.’ This place in the Wirral they had a – they had a committee which was a committee of locals who met frequently and who – they were given all the results of what was coming out of the chimney and all the pollution and all the rest of it was there and they … erm, so you know that was a really good – but nevertheless – and still we wrote it all up and it’s
had some slow process, progress has been made since but it hasn’t turned many of the bodies that were so opposed into – into supporters at all, to any great extent, but it still is a – because people remember the past so badly. So it was a useful report, it was a good report and it’s had some effect.

[07:45]

The second long topic we chose was – was transport, and we all realised it’s – you know, transport was not satisfactory, what was the relation of public transport and private transport, how, erm … how could we encourage public transport at the expense of private transport. Hmm, on the whole really Margaret Thatcher idea about transport was to give everybody a motor car and tell them to use it as much as they liked, and the government would build roads appropriately and no … provide and – you know, predict and provide was the motto of the Department of Transport in those days, you predict how many motor cars and you try to provide for them. And as for public transport well that didn’t really matter. So I don’t – I’m not paraphras’ – I’m not … misinterpreting what went on then, when we’ve began the transport report, we – very early on we had a whole morning with the civil servants in the Department of Transport … and I imagined, you know, I mean knowing government a bit, that there would be a … a cell in the middle of Department of Transport which would be studying the future, or what of the future demands of transport or what are we going to do in the future. And, erm … anyway these people came and we quizzed them and it was a wooden a morning as you could have expected, ever [laughs] imagined. We got virtually nothing out of them, we discovered nothing that was new, they were not looking to the future, they were just trying to predict and provide and – and public transport wasn’t of any great importance to them. And at the end of that morning we – we didn’t know a lot about transport, none of us were experts in it, but we were galvanised into saying, we have to do something about transport [laughs]. It just is ridiculous, that we have no policy, no policy, no government policy on transport at all, no looking to the future, no – no imagination of any kind, so we set about it and, er … and we published quite a strong report, particularly on public transport saying we have to plan for public transport, we have to – the whole thing needs proper planning anyway and we can’t just build roads willy-nilly and we have to have transport plans, we have to put planning and transport together so that people don’t have to … hmm
… so that people, you know, don’t have to travel to – you know, long distances because the facilities are put in the wrong place, there was no – not enough links between transport and planning in those days, no links at all, people put down anything where they wanted and imagined you could get there by motor car [laughs]. And so on. So we published a fairly strong report advocating public transport, sure I have the [looking through papers] – well just saying it was unsustainable, erm … and we have to, you know, have real plans for – for where our shopping centres are, for workplaces, for hospitals, proper plans for how you get to places as well and for putting transport together, public transport needs to be integral, you know, integrated in a sensible way and all the things that weren’t happening then. And to some extent are not happening now, but it’s a lot better now I think one way or another. Hmm, no … John Gummer was the Secretary of State for Transport at that time – Secretary of State for the Environment at that time and he thought – he found our report a bit difficult because of course not being a very senior cabinet member he hadn’t a lot of clout, although he was in principle very supportive, he – he found it hard to push things in the way he’d have wanted them to in a great extent. But it made a noise and people took some notice and put – began to put public transport on the map, so it had some real influence in government and in what was going on.

[13:00]

Our third report was on soil … [laughs], here’s this bunch of experts you see, who turn from transport to soil. And … that was very interesting, we looked, you know, how are we losing soil, what about organic farming, is that absolutely – should we all go organic, what can we do? Problems of … you know, slurry and nitrates and fertilisers and all sorts of things came into – came into it, and what sort of agricultures did you do and how should you set about it, and it was very interesting thing to study and I think we produced something which was quite worthwhile. We didn’t – we didn’t go all in favour of organic but we did say in appropriate circumstances organic was the right thing to do. But in some places organic was causing more nitrate pollution than non-organic, so we didn’t – you have to do it scientifically and push it – big push for – for farmers, you know, using … material science – you know, doing things scientifically and, erm …
Did you have links with Rothamsted?

Well Rothmans, we had, hmm-hmm, yes they were involved.

Presumably witnesses and –

Yes, we had witnesses from all over the place, yes, but a lot from the farming community actually, we had a – we had a genuine farmer in the Commission actually so that was very useful.

[14:31]

I think that was a useful report and has been taken notice of and so on. And then the next report was – was transport too, we felt that the first transport report hadn’t, er … been taken enough notice of [laughs] so we tried again. And tried to push the same messages essentially that we did the first time around and, er, particularly integration of transport and looking at the economics properly and looking at everything all around and doing in a proper manner and – and gradually, with the transport too, as well things begin to – things began to switch from – public transport became much more government policy, which it hadn’t before. I can remember after our first report, the railway line here was obviously due for closure, civil servants said, ‘Oh that won’t last more than five years,’ for instance. You see they were not interested at all in – in a public railway system, they thought that railways were largely a waste of time. And they’re not and that people have realised that now and that’s a – was a big turn around and, er … the idea that you could, you know, just build roads wherever you wanted and so on and how you’d no – planners begun to take notice of transport requirements and so on, it’s been a slow process. Hmm, one of – well when the second report came out and I think it was John Prescott who was Secretary of State for Transport … and I never thought he was a man I was going to get on with particularly [laughs], didn’t seem to be my sort of chap, you know, but I have of all the secretaries of state I got to know when I was in the Commission I thought he – he was a man who – who was a leader, took an active – active interest in what was going on and, you know, some secretary of state goes in for a few years into a department and hardly gets to know the – the set up and the, you know, can’t really work the system, he’s the man at the
top and he goes around and speaks – speaks on this and that and all the rest of it, what – looks at his brief before he goes places and all – and so on, but the connection between him or her and the department is sometimes a very – almost non existent.

Not with John Prescott, he got his chap – whenever I went to see him he had his chaps all around and he would bang out – bash out instructions as to what to do and get on with it and they were looking as ooh, looking as [laughs] worried as could be, what’s he going to come up with next, but it was a – no, he was a man who had a – you know, two jag Prescott but he was – he was a man who really drove – drove his department.

So –

In a way I thought was interesting.

So if you – as somebody who doesn’t know anything at all about how government works, you went to see John Prescott, what would – what might you – what might you be saying as a member of the – as the chair of the Royal Commission, what might you be saying to him and then what would be saying to these people you said he had around him? I'm interested in what [laughs] – you know, how it works.

Well I mean these meetings were of course informal meetings on the whole. We’d say what we were going to put in our report or what we had put in the report and things that we thought were important, pushing things like, erm … like public transport, as opposed to, you know, road building and where was the balance between the whole thing, who was looking at the balance for the whole thing, who is – how – how are they connecting with the planning system, we thought this wasn’t satisfactory and all those sorts of things. And John Prescott would have a – now again I can’t remember the detail now but he would – he would pick up from the sort of things I was telling him about what the Commission had done, he’d pick up three or four things and he’d go with them and say, ‘Look here, you know, to these fellows, you must study – you must do this this this and this.’ It wasn’t, ‘Thank you very much for coming, that’s all been very interesting, I’ll,’ you know, ‘we’ll talk about it amongst ourselves,’ and all that, no he did it there and then, he would come out with the things that he wanted to pursue, with no – no very detailed instructions of course at that point.
but he’d be saying, ‘Look here, we’ve got to do,’ you know, demanding of the people in front of him that they did things. Now of course how much the follow up – happened afterwards I’ve – I – I didn’t – I wasn’t privy to but I got the impression that he was – that he would follow those things up as time went on.

[19:25]

_Had – and through the period in which you were the chairman of this commission, did the – the kind of status of the secretary of state for the environment go up over that period as, I don’t know –_

This was transport, oh –

_Oh of course, yeah._

Prescott was transport, yes.

_Oh and John Gummer was environment, yeah._

That’s right, yes.

_So did it help then that Prescott was sort of closer to the sort of centre of government in terms of getting things done?_

Oh it’s his personality actually, I think it was just the way he did it, you know, he was not – he was – he was trying to drive from the top, whereas I – John Gummer was a driver from the top too, he tried to but he – he obviously didn’t have the clout in cabinet to do things which he – particularly regarding something like transport, which was somebody else’s department too so. Hmm … and … trying to think of the others I met during my period of – other secretaries of state, but those were the two that I remember particularly, as being good ones and there were others. I’d have to look them up now but I, hmm, so –

[20:34]
And then there was the – you know, of course the – they were very bright people in the Commission … but we all had our expertise in our disciplines and our language … and when you get people of very different disciplines talking about the same thing, you can talk like this, even if you think you’re understanding, you know.

_Hmm._

And … we – I can remember where we were doing the standards reports and I’ve got this somewhere in here, this is how to set environmental standards, which was a [looking through papers], the last report I was involved in and that’s – which was absolutely fascinating, how to … there’s the sort of, you know, that’s the sort of – the process of defining a standard. You know, you have to recognise the problem and then you’ve got to go to the – take away and ask questions and formulate your policy aims and then you’ve got to through a scientific assessment the technological options and risk assessments, economic appraisal, how you’re going to do the implementation and then you’ve – come to some synthesis of where you’ve got at that point and then you’ll go back to start again and make sure it – and follow it all through again. And then you decide what sort of standard you’re going to set up and specify the content of the standards and – and monitor the effectiveness and then go back again to the problem, work all the way through again. So this whole process of – of environmental assessment and environmental action and how you actually do it requires a very big breadth of interest trying to bring all the things to bear on it because you can’t be concentrating on very little – you know, simple problems which seem to be the main problem because they’re all influenced by other things too. So it’s a very integrated approach we try to put forward and – and I believe, you know, we wrote a volume which was – which was I think probably pretty widely used and I hope it still is, how we could – how these – you know, would have very sensible appraisals and movements towards a sensible sustainability. Hmm, now … but this problem of [laughs] – of talking … I remember one particular – I can’t remember the topic now particularly but I do remember the – the – it felt like it was a – you know, we – we’d gone through some quite difficult thing one day, a lot of economics associated with it and thought we’d understood each other, the following meeting we were going through exactly the same thing again, I said, ‘We did this last week, why
are we talking about it all again?’ and began to realise we were not talking to each other. And, er … and then some of the draft – the economists produced draft material which I couldn’t make head or tail of really and I thought, you know, this is supposed to be understandable by the public at large. So stupid me I went away and I tried to write some of it up myself in sort of, you know, using my language you see [laughs], tried this out on the economists and they said, ‘Oh, no economist would be seen dead writing that sort of stuff, absolutely not,’ [laughs].

Why, what did he see in the way you’d written it?

Well it was just not written in the right way. And it just wasn’t, you know, the words I used were not the right words, the structure of it was the wrong structure and it just wasn’t right. And … so they had to go away and write it again and then, you know, economists didn’t agree, and one economist threatened to resign, said he wouldn’t sign the report at the end and so we had all sorts of problems. All nice people in their way but … it shows you – it just illustrates the problem of clever people getting together over issues that – where the – the language everybody uses is rather slightly different or a bit different and you’re not in the – using the jargon of your own discipline, and I’m sure we all suffer from that sometimes.

Did science then have a slightly lower status in this sort of thing than in the IPCC where everything – every argument – the strength of every argument depended on the science almost, whereas – and it was – it was a group of scientists agreeing on a statement, whereas here you’ve got people from different disciplines, only one of which has signed, so –

Well the other – all social sciences actually, it’s all science it its way but social science is very different from – from natural science, you’re dealing with people and behaviour and things that are not so clearly defined by their nature, as you’re dealing with when you’re dealing with the hardware or physical things. And it’s – it was a very interesting illustration of – we got over it in the end one way or another, we actually did get them to sign the report and so on, but it was a – it was quite a tough time actually to actually bring the thing to closure. But I think it’s a good report, I think people have always said it was a good report, that was how to set a standard. So
that was my time at the commission essentially, I think I’ve given a reasonable summary of the – of – of the whole thing.

[End of Track 10]
I wanted to start today by asking you about your sort of private political views and possibly your voting through the ‘70s, ‘80s and ‘90s, we talked about it early on, you talked about your interest in politics as a young man and a general sense of dissatisfaction with the sort of generally two party system and people opposing each other. But given that – given that in some ways you’ve become quite close to political power later in life I just thought it might be interesting and important to have a sense of your private political views and the way in which you voted through the ‘70s, ‘80s and ‘90s.

Yes, uh-huh. Well not a lot to say really, I mean I’ve – I’ve never been a strong party man, I’ve never felt allegiance to any of the political parties.Hmm, I suppose I’ve had more sympathy with some than others but on the, erm … I suppose during the ‘70s, ‘80s and ‘90s I would have more often than not voted Liberal Democrat, or Liberal. Not because I particularly espoused, you know, particular policies they had, although they did tend to be green, on the green side of wanting to care for the environment and things like that. But they were also in the middle and – and it was – you know just felt there was a very strong need for all the – for more integration between parties as far as government was concerned, that this two party system was not a good way to proceed [laughs] and, erm … you know partially because it just made people create, you know, go out of their way to create controversy out of – about almost everything. And also I didn’t think it was the best arrangement for the civil service because the civil service would be – in a way had more power because – because of the way the party system operated and you went from one party to another, then the civil service had to carry on as bef – you know [laughs] and make it as seamless as possible and they – and they would therefore, because of the – you know, the way the parliamentary top of it was engaging in this, you know, controversial debate all the time and they were left to get on with all sorts of things which would have been much better had they been – had much more supervision of a – of a … of a, you know, genuinely you know probably cross party, political kind. But those of – those are very general statements, I didn’t get involved in it to any extent in – in any sort of political … lobbying of – lobbying. Hmm, so that’s really the – the story of my political interest.
Hmm … the … and when I – when I left Oxford and went to Met Office and became a civil servant of course, and a very senior civil servant, I was a deputy secretary in charge of the Met Office and therefore a senior member of the MoD and I got to know some of the senior civil servants very well, in particular the permanent secretary to the MoD of course to whom I reported. And very clever people, very nice people, you know, very able people, but suffered from the awful problem they’d never run anything. And – but they were now in charge of a – of a very large department which spent in those days twenty million a year with – it’s much more these – it’s twice that now of course but – and – and somehow they – so they were technically in charge of it all and had – but they … the way the MoD was run was broken up shall I say, it didn’t help in the way that we – towards efficiency or towards scrutiny, or towards accountability and all those things, you had the political side and the – the civil – the main senior civil servants of course came out of the political route of the civil service, and they reported to ministers and that was their – a very important part of their life of course. But then you had the – you had the army, navy, and air force and separate – separate outfits to a large extent joined together in – in some way at the top. Which didn’t actually work all that well. In fact … when I went to the Met Office, Hesseltine – you know Michael Hesseltine was the Secretary of State and – and he did one thing which only somebody as, erm … of his character could have done [laughs] which was to – he abolished the – the deputy secretary – the civil – the civilian sides of each of the services, there were three deputy secretaries, deputy secretary, army, navy and air force, those posts were abolished and he created three new posts which were, you know, deputy secretary operations I think and two other names, so joined – so really joining the force – the three services together at the top level as far as the civilian – or the civilian support was concerned. And he did that in the – in complete opposition to the – to his chiefs of staff who appealed to Margaret Thatcher over her – over his head and said it was awful, they couldn’t be in a department of that kind, and she ignored that of course and Michael Hesseltine drove it through. And – and it was a very good thing to do because at least they began to be real cooperation, at the top level, and further down, between the three services who were otherwise vying for –
for all the rest of it, for funds one way or another. Hmm, I could carry on with some
[laughs] – some of these reflections on my –

_Hmm, yes please._

On the political side of the MoD, because, erm … or the way it was run … the, erm …

[07:19]

Well one … I mean a big problem with the way the – the – the MoD is set up is – is
there are people who go into the services of course and – and the best people from the – from the point of view from the three services retire later, final years are spent
within the department, and they are there – and they’re put in, you know, charge of
projects within the MoD. And these on the whole are very able people, they’ve – you
know, they know how to run things, they’ve run things within their own places of
course, but when they come to the MoD they’re put in charge of a given project and
they’re put in charge for three years, or is it two years, three years, is it two years or
three years, one or the other. Anyway, it’s a very short period and then they’re moved
onto another one. So, you know, you – you – these are major projects, I mean for
instance there was a Concorde project through the MoD and I remember that one
because, you know, they’d had some weather connections there. They were lots of
other projects which were of a military kind of or a semi civil kind of course in some
cases and – but complex things, it takes them a year to really really get in and to
discover what it’s all about. They then have a year to try and do things and – and
make decisions of one kind or another, and get to decide what to do about major
problems and then they – the next year they know they’re going so they can’t do a lot.
So another one comes in and has a – you know, then just he’s learning the first year,
and decides the decisions taken by the last man were hopeless, so he has to change
them and so it goes on and that really is a – is a very destructive way of – of – this is a
very general statement of course, I mean some of it works and some of it doesn’t, but
very destructive way of running an operation to – to have such a – such a strongly –
and I think – I think it’s still the same today but I’m not absolutely sure of that. So –
so some of – some of the things that get uncovered within the MoD about, you know,
projects going on or going very much over budget and so on, it was a – it was just a – you know, an endemic problem, and continuing so and of course helped by the Official Secrets Act which prevents a lot of it getting out. Hmm, when I went to the Met Office I – I was interested to discover what MoD was doing in certain areas because I was part of it, so part of the MoD and also these had weather connections, and of course while – the services were our biggest customer at the Met Office, so it was important for me to discover what went on in the MoD as far as weather and anything related to that was concerned and I – so I went on – went to the odd committee which seemed sensible to go to and – but soon discovered of course that I couldn’t operate within that committee because I hadn’t got the right clearances, and that there were lots of code words being used and of course I – and I daren’t ask, ‘What does that mean?’ because it’d be, ‘Oh aren’t you on the list?’ [laughs]. So I soon abandoned that sort of – I had lots of other things to do anyway but – but it seemed that it was too closed a system to – partially because of the secrets act and partly because people wanted it that way. And, erm … when I – when we did the Met Office bit did I talk about the – becoming an agency and that sort of thing?

Yes, about becoming the executive agency and that –

Yes, and about the way the – about the way the finances were operated in the Met Office which was by that time in the [laughs] –

Yes.

Extreme and I – so, you know, I learnt about the way in which the finances operated really and – and it seemed to me it might well help of course a very big major military systems and so on, and I shouldn’t comment on their efficiency or their inefficiency, except to – you know, the things that emerged from the top of the iceberg [laughs] continually about problems in MoD, it seemed to me there was a – an awful lot below the – below the surface which never – never saw the light of day. Which was – and which – because of this lack of transparency and openness and the dissection of management within the whole system, and the power games that were going on within [inaud] loss of – lots of money actually, an awful waste of money in many ways. Of course projects went on beyond their – well were improved, considerably improved
because something new came along and so they ran over time by – by years in some cases, and over budget and all the rest of it, whereas there needed to be very much stronger – stronger control. Hmm, I mean Michael Heseltine recognised this when he went in and he brought in a man called Levene, a businessman to try and sort it out, you know. Hmm, but he – I mean again this is – as it seemed to me from the outside, he was – he came in and he – he was supposed to try and, you know, get MoD running much more efficiently but of course the civil servants were much too clever for that, because they’ve – because of course Levene had a whole lot of his own vest – his own interests, and – and he could not get involved in anything in which he had even a smell of a – a concern himself, or involvement himself, so – so lots of things he couldn’t get involved in because – because of his own business interests. And – and that was a marvellous way of keeping him out, you know, they tried to keep him out in all these ways as civil servants do. And the … the civil service is far too … tight an organisation, far too closed an organisation. A further example of that, erm … I was one of the most senior scientists in the – in the civil service so I got put on a committee called the science committee of the – for the – manpower point of view and … there was long discussions about how we can get more scientists involved in the senior civil service for instance, because very few scientists climb up the civil service ladders and the general – the proposals that were being made were that – you know, scientists should be pulled out of their science and put in a – in a more general – more general jobs, you know, much more open jobs where they had more control over the things, other than science and interest in things other than science and interesting things other than science and that was the way to bring them in and, you know, make sure they were – their jobs were changed in such a way that they became more like normal civil servants. And I opposed that very strongly so I said, ‘That’s crazy, you have scientists from the civil service – in the civil service because you want some scientists there with scientific expertise, scientific knowledge and scientific attitudes. Trying to turn them into something else before you can use them at senior levels is not the thing to do at all. What you should do is decide you’re going to have certain people who are scientists in the top jobs, in top jobs in the civil service, or reasonably top jobs, and say, ‘This job, we’re going to put a scientist in this job,’ you know, a senior position and get the best scientists you can find.’ I mean he has to have of course writing skills and other skills too and general skills and you’ll have to allow for that but don’t turn him into something which he is not in order that
he can join a party of people who are of a certain kind, [laughs] you know, were trying to make them like – make them like themselves. And the reason – and so they said, ‘Well scientists can always apply for some of these senior jobs but then of course they never get them because they’re not the right kind of person,’ and that becomes obvious at interview, because the civil servants want to clone their own images, their own people. So – and that seems to me a very – and then I also argued that some of these jobs, you know, in the civil service, in the senior jobs should also be advertised outside so that scientists from outside the civil service could come in at senior levels instead of – instead of just pulling everybody in to letting the civil service grow from inside. And, erm … I mean Lord Trend in the 1970s had written a report on the civil service proposing all these things actually, saying the civil service should be much more open, much more – many more jobs should be advertised outside and people should be brought in with expertise from industry and elsewhere and so on and – and that in the ‘70s was hard to implement because – because of the pension arrangements. You know, if you couldn’t bring the pension in because it was a – you know, pension scheme civil service was of a certain kind which didn’t – where people lost their pension rights to some degree and so on, I don’t believe – that became less and less true of course as time went on. I went from a university position to a civil service position and I had – the pension thing was – was interchangeable and that was fine. But nevertheless the – there’s still recruitment into the civil service largely occurs from, er … or very little of it occurs from people who are – some of the jobs come in from outside, maybe more now I don’t know, but certainly when I was there there were not many people came in from outside and, erm …

[18:20]

A further piece of research I did when I was there, I – you know, I’m not sure these – I may have not remembered the numbers right, so put it down with a query by it, but this was while we were becoming an agency and when the treasury was so – seemed to be so – you know, so much on top actually, so much in charge of doing anything, you couldn’t do anything without the treasury and some of the things the treasury talked about and so on, behaved about were really – seemed to be quite stupid. Did I talk about that last time at all?
No.

No, I mean for instance … we have the European Centre for Medium Range Weather Forecasting is one of the very few European institutions in the UK, we have very few European institutions, belonging to the – belonging to Europe, and one that came up during my time was the – the European Meteorological Satellite System was being set up, and this was for the countries of Europe through their Met services to put up satellites to observe the atmosphere and the weather and so on. Weather satellites so where there was going to be a – started something called EUMETSAT, which was the European Meteorological Satellite Agency, and – and rather too late in the day I – I caught on with the idea why – why don’t we have this in the UK you see, because we’re good at satellites and so on, and the Germans had been for some time making a bid for it and to me it seemed quite a good place for them to go in a way but – but I said, ‘Well I’m stupid, I should have done this earlier,’ you see. So I began to move on trying to get EUMETSAT in the – in the UK and produced a paper which argued that it was a very good thing to have, it’s – it just needs computers and people, the people get high salaries, the tax they pay is high, is very – you know, considerable and when you think of the cost of bringing it to the UK that cost is dwarfed really by the income that would come into the revenue by these highly paid people working in the UK. And I made this, I said the the financial case seems absolutely obvious, we have to provide a building for them and so on but, you know, that would all be covered in due course by – by this marvellous tax coming in you see. And we had a meeting with an undersecretary from the – from the treasury came along, talking about it, and the big problem was where does the money come for the building, and I said, ‘It’s obvious, you know, from the point of view of the UK, it will be a great asset financially, as well as a great asset, you know, in other ways too,’ and this man from the treasury, I can’t remember his name but he – he said, ‘Well that’s,’ I said, ‘You’ll get,’ but he said, ‘The Inland Revenue is nothing to do with us, we’re not really the Inland Revenue [laughs], the fact that they get the money makes no difference to the fact that we can’t – we can’t afford the building, or the building – we had to find money for the building from somewhere else,’ so I said, ‘Well that’s crazy,’ [laughs], you know, ‘the money you get from the treasury comes from – comes from the Inland Revenue, comes from revenue that’s raised so you should have a – you should look for – at UK limited, not at [laughs] – not at some parochial view of some department
or other,’ and he – he was completely brazen about it and said, ‘Absolutely not.’ So – so I then did some homework on the treasury, senior people in the treasury and, er, trying to discover how many of them, the people under secretary and above, had ever been – had any experience of business or industry. And, erm … and the answer was very few indeed, I think the number was out of what 120 people at that level, that sort of number, over 100 people at that level, only less than ten I think had had – ever spent more than six months in industry or in business, or outside, or you know, outside the civil service. And that seems to me absolutely crazy that, you know, here are people creating all this legislation and very dominantly so by the – because the treasury is absolutely the dominant department, they were crazed, they were making … they were making sure they were in charge of it of course and did all the running, but they had no experience at all of how to run the business. And that – that’s quite wrong and it is still is I suspect very largely the case.

Did you make this research that you’d – this private research that you’d done known to anyone or –

I’ve talked – I’ve talked about it but I didn’t do it very careful and I wasn’t – I never wrote it up and it was not a – it was very casual – I mean I did it in a casual manner, I can’t remember how I got the data but I’ve – I’m afraid I didn’t pursue it and I had other things to do, but I’ve talked about it to quite a number of people since, including people in the treasury. They’re clever people in the treasury, very clever, but they just come out of PPE courses and economics courses and universities and they really don’t know what the real world is about in terms of business or – in terms of business or industry and that’s quite wrong, we need people, you know, running the country who’ve – who really know what they’re doing. I mean just a – my own example, you could say I just came from academia of course into the civil service and – but I had learnt to run a business in a sense ‘cause I had to fly some satellites [laughs], you know, and so I was running teams – a team of people who had to do a very – very difficult job, absolutely to time and absolutely within budget, and talking of, you know, well, fractions of a million, of course for that sort of – up to a million – up to million pounds a time, and so I had some – I learnt that – I learnt that the hard way by having to do it and knowing that if I didn’t do it, you know, the thing would collapse because there was no – there was nobody I could go begging to if I did it wrong. No,
but that sort of injection of reality into – into – into the lives of many civil servants would make a great deal of difference, and I suspect we’re one of the – possibly the most inbred country in the world, I don’t know whether that’s true either, but much more so than – and the Americans get over it by bringing people in from outside so readily. Hmm, I guess the French have a more – a more open system to some degree at least in terms of the sort of people that go in for their civil service, but I don’t really know about that so I shouldn’t pontificate [both laugh].

[26:02]

*You mentioned – you mentioned work for the MoD conducted by the Met Office and I wondered what were the key – the key pieces of work that you did for the MoD, secret and otherwise, so – and perhaps there was work that – for which you had to sign the Official Secrets Act, I don’t know but –*

Oh yeah, sure, yes yes.

*And I wondered what were the – I suppose the key military projects you were involved with as –*

Well the main – the main business was the – the main direct business for the Met Office was with the Royal Air Force and we had … we had forecasting stations on every forecasting, you know, erm … teams on all – at all RAF establishments, of any size. And these were – they were for – directly forecasting the weather in the appropriate manner for what the – what the RAF required. We also had a strong link with the navy but the navy had their own meteorological forecasting service, their own personnel on ships and things, we didn’t put people on ships, and other ground stations, but they – I mean so there was a fair amount of to-ing and fro-ing with the – with the naval met service too. And similarly with the army, we had – it wasn’t quite so – ‘cause they were – they didn’t have the same day to day requirement of the – in the UK that the army did but when the army went overseas of course, things like the Iraq War or things like the Falklands War, the Falklands War really was quite a stretching thing for us because they need to know the – the what – the weather of the Falklands, and people knew little about that between the air force or any of the
services. So that was the main business, in fact that was in terms of personnel … we had people of course on – public weather – public weather stations – weather – weather centres too around the country and working on the public weather service, the people – there are more people, more Met Office people on the RAF for establishments than there were directly concerned with the – with the public service. Hmm … so, erm … but that was interesting and I – I had the pretend rank of an air marshal so [both laugh] – well the equivalent rank of an air marshal, so many times when I went to a – if I went to an RAF station I would be the most senior person on – in some sense on site. So – and then these people are very sort of rank conscious so I had to walk in first and so all the rest of it [laughs], with somebody behind me saying, ‘Turn right, turn left,’ and so on [laughs]. In fact I remember almost my first day in the Met Office, the – the people who were running – responsible for the – for the military side of things for service, service weather and weather forecasting came to see me and said, ‘Now you’re, you know,’ they said, ‘you’re the head of the Met Office, you’re an air marshal, and when you go to have any dealings with people in the RAF or any of the other services, you are to act like an air marshal, you know, none of this informal stuff. You’ve got to – you mustn’t let the side down because we have to behave like we are appropriate ranks,’ and some of them were fairly senior, ‘so and you’ve got to do the same,’ and [laughs]. They were a little worried that this rather scruffy academic from Oxford you see who’d come along [laughs] would actually let the side down seriously. So that was an interesting fun part of the job in some sense.

[30:22]

Thank you. And another specific question I wanted to ask was I was wondering whether the IPCC meetings, the ones in which you have delegations and discuss the summaries in particular, I wonder whether they had a kind of social or lighter side, or even a kind of social programme attached to them, the meetings themselves. And linked to that I wondered about the role of host nations in I don’t know, organising a kind of social side to these meetings, a non work element.

Yes.
Which we haven’t talked about at all, which may be because they didn’t have one, but if they did I wonder whether you could give me a picture of it?

Yes – yes, I mean these were very – if you’re talking of the main meetings of the IPCC, of course these were – these were rather intense meetings, ‘cause they were very tight timetables of programmes and things but – but we would have – certainly the host nation would provide a – an evening party, would be of the standard sort of an evening buffet, social event, you know, with wine and with food and – and so on, I don’t think anything else other than that, but people could mix and talk and wander around and we didn’t have – I can remember very few with any entertainment as such, that occurred within the IPCC, if any actually. Hmm … no I guess there would be some – some receptions which would have – you know, carried on quite late, there might even have been some – some music and dancing and – and some of these – probably was actually. Trying to – to remember really the IPCC one, certainly with – as far as the general meteorology, you have a meteorological meeting. I mean for instance if you have the – the WMO Congress in Geneva which lasts – used to last for a month every four years, er, it wouldn’t – no it goes every year, the congress meets every year, they have a – oh I’m sorry, the executive committee meets every year but the congress meets every four years. At the congress you would have a party every night because different nations were producing parties, or receptions, evening receptions were the – were continuous [laughs] at the congress where you had – where it became three weeks and then two weeks I think the end, or left – no three weeks I think it lasted. And so there would be – you know, they were vying for, you know, the best nights and so on between the big nations and so on. And some of those would be very colourful, well quite colourful events, or less colourful depending on the sort of nation, the sort of party, but. So one got used to these sort of [laughs] reception type parties, and certainly IPCC when we had people we would be hosting – people would – the host nation would want to put on some sort of reception for us.

And was anything work like achieved at the receptions in the same way that people talk about the – I don’t know, the – the informal sessions at academic conferences being places where –

Yes.
Actually quite a lot of work is done, not – I wondered what – whether anything was achieved work wise at these receptions?

Well you got to know people and you chatted of course to people who were on the delegations and you – no, great places actually where you – because you’d been doing all this work all day and different problems have come up one way or another, you constantly referring to things going on in meetings, sure, yes, but people talk about other things too. And, er … no, they’re very valuable ways of helping to oil the works of the – of the conference. And that goes for the IPCC too I think, people would, you know, go off and eat in different groups and, erm, at lunchtime as well as in the evenings, and, or, during the meetings and – and that would be – and occasionally I remember in Madrid where we were so pressed for time, we had some food brought in, people [laughs] – and a sort of break for half an hour to consume your food while people would wander around and do – you know, talk to others during that period, there was a – a very good spirit within these meetings really. Even though some – some of it was – you know, not … some of the arguments and the debate was not [laughs] … was not what you wanted necessarily but there was no – you know, people were not being terribly aggressive towards each other or, you know, or even – or even keeping away from them, or ignoring them, people were very willing to talk to everybody.

[35:32]

Including Yuri Israel for instance who was such a pain but [laughs] still talked to him.

And you’ve mentioned that he – that he didn’t set to work on his particular bit of a report, but in what other ways was he a pain, I think you said you might talk about this at one point?

Well – well he was a tremendously dominant man … he had the biggest ego I have ever met, almost I – too – there was a bigger one, I met one. When – when Yuri Israel was licking somebody’s boots and that really was amazing [laughs], but he was a very big man and – and he always wanted to dominate meetings. In fact almost every –
very regularly, when you had a – a big meeting of a committee which might be, you
know, fifty or sixty people or something were in the room, you know, almost before
the chairman had started the meeting Yuri Israel would have his hand up or would be
trying to set the agenda, or change the agenda, making a speech about how the
meeting should be run. Now people who knew him of course would – would say,
‘No, we can’t do that now, it’s – no no no, that’s not our business at the moment,
we’ll move on,’ but people who were new to the chair, or people like the Chinese who
didn’t actually, you know, didn’t know how to be firm [laughs] at meetings because
they weren’t used to meetings where, you know, where – where there was debate of
this kind, and we had a – a president of WMO who was Zou Jingmeng who was a
delightful and very able Chinese but he had no idea, he could not run a meeting, he
could not shut people up and so, erm … so, you know, the first half hour or so would
be sometimes taken with the – with Yuri Israel’s first remarks. And so it went on, and
he was – you know, he would talk and talk and talk and he’d have his hand up all the
time, some – lot of – quite a lot of the time it wouldn’t be relevant and sometimes it
would just be awkward for him to go on. Hmm, my standard story of him is the – is
on the executive council, when – when there was an item which was to nominate – or
choose a lecturer for an international – a lecture – international lecture, a named
lecturer which was to be given and we had to choose the person and there’d been a
committee who were – who – or a group who’d – who’d done their homework and
chosen a certain person, and I can’t remember his name or where he came from now,
but he was – it was proposed that he give the lecture. And Yuri Israel had obviously
promised this lecture to somebody in Russia, at least I presume that’s why he
suddenly put his hands up and says, no, he thinks that a much better person would be
somebody from Russia to give this lecture. And, er, certain name but I can’t
remember his name now, and … could – and he – he would like to propose this
because he’s a very suitable person, he should be the lecturer. Hmm, well at this point
I and others said, ‘Well please, Mr Chairman, you know [laughs], we have chosen, we
had a committee choosing, can we please agree the committee’s person?’ and – but
Yuri, ‘Oh no no, my man is much – much more suitable and,’ – and … and then – and
so it went on, you know, to-ing and fro-ing to some degree, the chairman Zou of
course, Zou the Chinese, couldn’t – couldn’t bring it to closure. Then Yuri Israel
recognised that he wasn’t going to get his man very easily so he said, ‘Well, why
don’t we have an arrangement where both be the lecturer you see?’ [laughs] so there
was another twenty minutes on can they both be the lecturer of course and which part would one give and how – how would they arrange it and, you know, one give it and the other be named as the co – whatever, all sorts of possibilities you see [laughs], so people were raising this. Hmm, but then some of us also said, ‘Well it’s silly, you can’t have two people giving a lecture, and you’ve got to have one person giving the lecture,’ and well – so Yuri Israel went on and said, ‘Well perhaps – perhaps this, you know, Russian can – can join in the lecture but not actually give it, the other man give it, he be the co author and he be the author and so on,’ and they – they agreed a text and I – well, you know, I and others said again, ‘You know, that’s just not the way we are – you can only have one man, unless it’s a very clear joint thing, giving a lecture, that’s not a way to do it.’ So – so it went on and I – what was his – then he had other suggestions too and – and then some of us said, ‘Well we’ve talked about this for quite long enough Mr Chairman, can we please have a vote?’ and eventually we got a vote, and we hardly ever vote in the executive council, and the vote was thirty-three to one [both laugh]. Now any normal person, or even an abnormal, would have given up at that stage but not Yuri Israel, up his hand goes again. ‘I’m sorry Mr Chairman, my colleagues have not understood my compromises and my,’ and all the rest [inaud] and he carried on saying can we – going through the same sort of agenda again, ‘Can they both be the lecturer,’ one thing and another. And – and I was … and despite our best efforts at that point, you know, we – you know some of us were saying, ‘Well we’ve decided this, can we please move on, can we move on Mr Chairman,’ but still Yuri Israel kept his hand up and the chairman [taps desk] would not finally shut him up.

And – and after about another half hour or whatever it was, twenty minutes the – you know I – I began to feel [laughs] and the – well about half a dozen of us were really trying to you know stop it, begin to feel, well it’s our fault the meeting’s going on you see, because we were saying, ‘Oh we’ve got to carry on, we’ve got to have our meeting,’ you know, ‘can we come to some compromise or something?’ you see people were beginning to say that and – and I was beginning to feel that it was me and others who were trying to – who were keeping it going. But eventually we did actually – the chairman did say, ‘Right, we’ve had enough, we’re going to move on, our decision is,’ but that took ages, that we were, what, an hour and a half on that particular piece of business. A man who, you know, will not give up under – I’ve never – never known anybody so tenacious and so – so objectionable really. And that’s not the only – the only occasion. When we had – we had difficulties with Yuri
‘cause he – he – I mean sometimes he – I tried to clock how much time he was actually spending in a meeting, and he was approaching half time actually, and you know the way time wasted in meetings and fortunately he was a lot in working group one meetings, ‘cause he was in working group two meetings and so they were very difficult, very difficult indeed. And occasionally he did – he was once or twice in working group one and we, er … once I remember there was the – he – I got somebody to actually take him off on a tour, on a trip [laughs], you know, ‘The best thing you could do to help me is to take Yuri Israel off somewhere,’ [laughs]. Man with a very very strong ego, and – and when he was – sometimes he chaired meetings and they were just hopeless ‘cause he started off by telling you his view of the whole thing, he would then of course go around asking people to speak, allow them to speak, he would then sum up at the end saying exactly what he said at the start [laughs].

Was he –

Absolutely determined to, you know, be the key figure. And he became – of course he had certain – because the Russians had ways of getting support from some of the developing nations, offering all sorts of things in return for the votes for Yuri Israel and so he did get, you know, became a – one of the vice chairs – vice presidents of WMO. Hmm … he … and he – I think I was – yes, he became – he became – he was – he managed to keep on as a vice president for much longer than he should, ‘cause there were rules saying you can only have one term you see, four years … and then he had one term as the third vice president and then he stood for being the first vice president you see, and although that was probably strictly incorrect he argued, ‘I’ve not had this job before.’ In fact the rules had – but he got a term of another, the counting was arbitrary in some sense but he was a … hmm, and so on. I could go on [laughs].

Can we then go to your –

But it’s – you know, these people can be so disruptive within – you know, and he was the nominal – he was the chosen chairman of course of working group two of IPCC and that – so that group really was – they had to – you know, try and do it despite
him, the – the other people who had any charge of it, which must have been terribly difficult for them.

_Hmm, was he involved in the final discussions over the – the wording of the policymakers’ summary at that point, did he become involved at that point, become difficult at that point?

He – if you were – in working group one he was never there fortunately because it was – he was working group two so – and that’s where the real problem arose. Hmm, I say no he might have been the odd – the odd occasion he tried to be in all sorts of things. Hmm … but I mean he had a – he had a … a 100,000 people in his – in his service in Russia, meteorological service [laughs]. And he was obviously a man who fought his – you know, fought his way through the Russian system using all the – all his powers of [laughs] … and they used him you see of course, he was a useful man to use …

_In what way?

Well because he was so – so resistant and tenacious and so difficult, if you – if you’ve actually got him onside, in fact, I don’t know how long you want to talk about this sort of thing, do you find it interesting?

_Yes.

[Both laugh] There was a – a meeting in Moscow in 2000 and something, it was … it was to do with the Kyoto Protocol, there was – there was the … how could Russia be persuaded to join the Kyoto Protocol, so this must have been around 2003, 2000, that sort of year. And David King who was government chief scientist at the time was involved in that, those discussions as were other people of course in the UK government, very keen to get Russia onboard and – and a meeting was setup between the – between the UK and Russia, the Academy of Sciences in the Soviet Union and the – and the Royal Society in the UK, but with the UK government playing a big part in that, to try to help scientists in Russia, you know, become better informed about the problems of climate change and what needed to be done to join the Kyoto Protocol.
And – and I agreed to go and speak and other people did and, erm … I had nothing to do with the organisation of the meeting but it was – it was set up between the Royal Society and the Academy of Sciences. But unknown to us in the UK, the meeting became hijacked by Yuri Israel who was a – Academy – he was in the Academy of Sciences, and a man called Andrei Illarionov and I’d have to look up his spelling, who was a … an economist who was one of Putin’s special advisors, a Rottweiler really [laughs], and Yuri Israel never really believed in climate change, despite his membership of the IPCC … and – and he and Illarionov, and Illarionov used him of course ‘cause he was the academician, to hijack the meeting, to invite a whole lot of sceptics and nay sayers from around the world to this meeting, unknown to the British, although it was a joint British Russian thing, and advertised as a joint British Russian thing. And, erm … they … and they chose – so they had a new programme, which we didn’t know about and David King didn’t know about until very close to the last minute, two days before or something like that when we were all going. I – David King was involved – I was only involved in the periphery ‘cause I was just one of the speakers but – or rather the first speaker on the list and I had nothing – I hadn’t joined the organisation. And David King was supposed to be co chairing the meeting and so on and, erm … and this new programme appeared which was completely – you know, had all these sceptical people scattered in among the programme. The original speakers were somehow still there but not all at the beginning or anything, and the chairmanship was Yuri Israel and, erm … was Illarionov in the chair too, I think he was supposed to be in the chair too, can’t remember, but anyway the meeting was just – so that – so David King and I got hold of the president of the American – of the Russian academy, or tried to, which was virtually impossible, but he did get hold of the man who was organising it over there who was known to us, and who’d been hijacked too, whether he – you know, he’d been sidelined actually. The man who was organising it and so on, he’d been put on one side while other people did it in the way they do things in Russia, when the top man comes in and says, ‘You do it this way,’ and so he hadn’t told us what was going on, he perhaps didn’t altogether know what was going on. And the – got to the evening before the meeting and David King was in Germany and he said, ‘I’m not going unless I have assurance from the president that the meeting is as originally organised.’ And … so we flew to Russia that morning I suppose, that – that evening actually, that’s right, following morning and discovered that the meeting – that all these assurances that David King had got were
not worth anything at all, and the meeting was – had started essentially and all the – the people were there shepherding people in, the programme was advertised as a joint UK Russian thing and the – but was not our programme at all and the … and these other speakers had all been put in one way or another and, erm … so what did we do? David King got hold of the embassy and all the other people and just said, ‘Look here, we,’ and the president of the academy and – and said, ‘Well look here, we’ve – I only came on the assurance of the president that this would – that we would have the original – the programme we agreed and not this crazy programme you’ve now put up,’ and – but you see the president was there but he didn’t speak, it was Illarionov who was driving it all and he said, ‘Well it’s, you know, science is an open thing, all the world – [inaud] should be here,’ and so on and so forth, ‘what are you trying to argue about? You see we’re having a scientific meeting for everybody’s views and so on.’ [makes muttering sound]. So – so David King was in a very difficult position actually. Then the embassy made a suggestion which was not a helpful one, as it turned out, and that was Jack Straw was also in – Secretary of State for Foreign Affairs, was also in Moscow at the time so – so why don’t we alert Jack Straw to this you see. Well what could he do [laughs], talking to the foreign ministry which was completely – that was a different ball game entirely so why should he get involved in this really, we should have realised, we should have said, ‘No, we can’t do that.’ Anyway that was a – that took an hour to – and Jack Straw was supposed to do something about it but he – what could he do, he couldn’t do anything, and he didn’t have – may hardly have known about it really because, you know, he had his business to do too. And so did we pull out of the meeting and go home or did we – did we – did we go in and do the best we could? Well we announced we were going to pull out because David King was not – wasn’t going to be allowed to be chair and then, you know, five minutes later we thought, oh, I said, ‘Oh we can’t do that, it’s far – you know, it’s worse, we should go in and make the best of it.’ And David King had another appointment with the – a later appointment the foreign minister so he said, ‘I can’t come in, I can’t join the meeting because I’ve now got – I’m now seeing the foreign minister,’ so that was his excuse. The rest of us said, ‘Okay, we’ll come in and do our part in the programme, make the best of it,’ and – and I was first on, erm … my slides wouldn’t work [laughs], that wasn’t their – that wasn’t their fault, I don’t know whose fault it was but it wasn’t – it wasn’t put up that way so I had to start off without slides and things so that was a bit awkward. And anyway I did – said my
piece, you know, whatever it was. That was immediately followed by Illarionov, who was co-chairing it essentially with Yuri Israel but he was the dominant chap, pitching in to me with a variety of questions, a long list of questions. So I … I answered some of them and then there was one which – we had of course the delegation of other scientist, so I said, ‘Well this question I will ask so-and-so to reply to please because he’s an expert in that area.’ Which Illarionov said, ‘Ah you must answer it, the question is for you, you must answer it,’ I said, ‘But my colleague will answer it, I’m sorry my coll – he’s a perfectly good scientist, why can’t he answer it?’ and this is at the meeting, ‘You must answer it,’ so I said, ‘No, my colleague’s going to answer it.’ And so – and so it went on if – and then there was another argument which I could not understand at all ‘cause I’m – I was a little deaf then, or going a litt’ – couldn’t make it out with the translation, but it was some nasty thing he was trying to say about – about the whole thing and, you know, he was a very nasty piece of work. And then other people spoke and some of the sceptics spoke and, er … and some of the Russians spoke and we had a lot of chats to some of the Russians and the Russians were just so upset, you know, all the Russian scientists were terribly upset about the whole thing and the way they’d been, you know, pressurised into saying, you know, only certain things and so on, it was a – it was an absolutely put up meeting. I mean there were one or two quite good people who were in the sceptical community in a way, people from the rest of the world but it was a – you know, who had particular points to make, one – one particular chap on Malaria and the IPCC had not done – not dealt with Malaria very well, and I agreed with him actually, when he was there and so on, so it went on that day. And then – and then – there was one slightly bright spark, bright thing at the end of the day when Michael Grubb was there, I don’t remember his name but he’s an economist from the UK, a very good economist and he was going to speak, but he was put on, you know, in the following day, you see he was pushed down the stream. And … and he couldn’t stay for the full – he had to go, so I went to Yuri Israel and I said, ‘Look here Yuri, we’ve got Michael Grubb was here, he can’t be here tomorrow and he’s, you know, he’s our economist and he must speak today,’ so he said, ‘Well go and talk,’ I said, ‘Yuri, I’ve never known you before put, you know, not make a decision on a good thing, you can make a decision, why are you so chicken,’ you see [both laugh]. And said, ‘You must promise that – that Michael Grubb will speak today,’ so he promised that Michael Grubb would speak today. And I had to keep reminding him, you know, because he – anyway
Michael Grubb came up here and did a very good talk about the economics, which Illarionov was actually captivated by, very interested in what he had to say. And he went to him afterwards and – and he said, ‘I want to hear more of this, we’ll have you speaking a bit longer, can you do this, can you do this,’ and it began to – was something he really, you know, a subject that – which is – of which he was fond, this stuff on – on the climate, on the science of climate was rubbish you see because – because it was nonsense and that was being produced by other people I guess. But he was – so that was a – a bright spot in the end in a way. But then the following day there was a press conference organised and announced and … and we – the British were not allowed – not invited to the press conference [both laugh], just – although it was still advertised as a joint British thing and we – you know, we complained as hard as we could via various channels and wrote to the – got papers – got some articles in the Russian press actually, all of whom were not that keen on Illarionov so – so we got some – some good articles, but it was a very nasty business and a very – you know, I’ve never in – as international occasions go it was just so appalling for the British to be treated in that way by this awful man, awful Russian man. And when you talk to Russians about him and you say, ‘Why has Putin got a man like that?’ ‘Oh Putin likes – likes his – likes his dogs, he – he takes on, you know, dogs to fight – you know, to play dirty games for him, play games for him, people like that, he likes people like that,’ it’s just one of – he doesn’t necessarily agree with them anyway, he doesn’t – he uses them to – to – as Rottweiler’s [laughs]. So that’s a little story about Yuri Israel again, but I was – it was very interesting to see Yuri in a subservient position, very subservient position and – but [laughs] – but still of course enjoying some power, although it was delegated power, it wasn’t his power but – but to see, you know, I always thought he was the biggest bully I ever known – I’d ever met but in fact [laughs] there was him being bullied [laughs] by an even bigger bully [both laugh].

[1:02:09]

Yes, thank you. Next could we talk about your role as – as chair of the joint scientific and technical committee for the Global Climate –

Observing System?
Observing System which happened in 1992?

Yes … the – the whole … climate science depends on climate modelling of course but … but also on variable observations in the whole climate system, that’s the atmosphere of the oceans, the ice, the land, the biosphere and so on, and … these observations are needed on a global scale in global coverage, considering it was coverage in space and time in order that we can, you know, understand the interactions between all parts of that system ‘cause they all interact on different – in different ways and – and if we’re going to understand it we have to observe it very carefully and as thoroughly as we can. You cannot observe everything everywhere all the time, but … so choices have to be made as to what you can measure and how you can measure it depending on – on techniques and of course there had been a great growth in the techniques of observation with space vehicles, the first place, and with devices to plant on space vehicles in particular, but also devices also which went down into the oceans. Hmm … ocean buoys, ocean depth sounders, making measurements down in the deep oceans and so on, the whole range of possibilities for which global coverage really was required. The … so there was a tremendous need for coordination and for not just coordination but also, you know, co planning of these observations worldwide, but an awful lot of agencies were involved. For the atmosphere the situation was relatively simple because the World Meteorological Organisation had been in place a long time and it had organised observation systems for in the atmosphere worldwide, through meteorological services and through other agencies as well, to try to get the best possible picture of the atmosphere. But as far as the other – rest of the world was concerned, the rest of the – the climate system was concerned there was – of course there were all the space agencies and the space agencies were – were not controlled by any – any international body of the same kind, although there were sprout – beginning to sprout up other, you know, other consortia, international consortia which would help in – in putting things together. But then the oceans also were – were very different, of course there was the International – the IOC, the International Ocean – Oceanographic Council, IOC, which was the equivalent of WMO for the ocean business but that was a – that was much less strong and had much less of a control over the whole – over observations over the oceans. And then there was the – of course the ice and also then there was the land also, well
the land needed to be observed and – and the whole of the biosphere. So how was all that to be put together? Hmm, and it was in the … I think as from my point of view as I became in charge of working of working group one of IPCC I realised more than ever the – the need for, er … organising observations in a sensible manner, because some observations are much more valuable than others and – and you need observations in key places and you need to choose where the key places are, and so there’s a lot of science has to go into that with observing systems and – and so one of the jobs of IPCC was not only to try to collect the science together in a sensible way, but also to try to come up with programmes for observations and persuade people to do it. There was also of course the World Climate Research Programme which had been going since – since, what, 1980 which was – was organising programmes such as TOGA, you know, the Tropical Ocean Global Atmosphere programme, and the WOCE, the World Ocean Circulation Experiment, which had observing systems attached to them so there was already some – some degree of international coordination between those observing systems but –

[1:07:37]

But still the whole thing was in some ways a mess and also a great deal of waste within it from the point of view – of the scientific point of view, er, because we’d like the money to be spent in the best possible way. But the space agencies for instance, they’ve – they were in business to send things into space and to demonstrate – demonstrate what you could do in space and they weren’t desperately interested, as a whole the space agencies were not desperately interested in actually producing the very best observational programme you could. So the – what could be done and I think I was right at the front in – in proposing that there should be a – an international programme coordinating and looking after and managing observations, a global climate observing system. And … in 1990 of course there was the second World Climate Conference and the second World Climate Conference stated that the … stated that the, er … we expressed a concern that some of – the main recommendation of the conference actually was – was there was the need to establish a global climate observing system. And, erm … I can remember – I can’t remember who – sitting in a Geneva one lunchtime, during the second World Climate Conference actually, when about half a dozen of us concerned with us were sitting around and had my – I wish
I’d kept the piece of paper [laughs], it had the – you know, the bones of what such an observing system should do on it, with the names of the people who were actually around the table, but I haven’t kept that piece of paper unfortunately. And so it was … so a meeting was – was generated, supported by WMO, the IOC and ICSU in Winchester in the UK, January 1991, to come up with a, erm … an initial specification of GCOS. And that was a – and that was a good meeting, I can’t remember – trying to remember how many people were there and that sort of thing, it’s a [looking through papers] … but the – the object and the goals were just to monitor the climate and climate change and … the response of – to climate change by terrestrial systems in particular, terrestrial eco systems in particular … we wanted the data to help through research towards improved understanding, modelling and predictions of the climate system, and eventually sort of comprehensive observing system for climate forecasting as the goals. This all incidentally helping to international economic development. Hmm … there were already of course – there were already some attempts to bring things together, there was an Integrated Global Ocean Services systems called IGOS and a Global Sea Level Observing System, so there were other systems behind – beside those in – in what was called World Weather Watch which was the meteorological services system. And – and the requirements were spelt out for – on all these other areas. And so very soon in – in Geneva there was a – a committee set up called the Global Climate Observing System with a technical support committee, erm … which was called the … erm … [looking through papers], who was the – that’s right, the Joint Scientific and Technical Committee, JSTC of GCOS. And, erm … and set up in Geneva I was … which had about a dozen members, I was chairman of it, the first chairman and – and it had to have an ocean climate observing element, a cloud radiation observing element, a land observing element and a hydrological cycle observing element as a first – a first priority areas to be addressed. There was a man called Tom Spence from the United States who became the director of the programme and he had a small secretariat in Geneva.

[1:13:12]

Hmm … the … of course there had to be a lot of – it was a complicated thing, as you can imagine, because there were so many bodies, all the space agencies and that’s of –
that’s a big enough body to deal with, never mind all the – the meteorological edge – all the – you know, the international bodies who had some part to say in it to – to … some part to play in it. The hydrological people were concerned with water supply and so on, so you were really covering a tremendous range of – of bod – of national and international bodies in trying to define a programme and then you’ve also got to try and come up with your top priorities of things that are really missing and who’s going to do those and where’s the money going to come from, because the money has to come in the end from – from national agencies who have to then club together to do something about it and – and it is a very complex affair. And so it took some time to really get going. Hmm … Thomas Spence started off very well in Geneva, hmm … but then he had a difficult period, and, erm … a personal problem, I mean I – this is probably important to air these things really, but of course that this involves people not behaving well so I don’t know if you can – whether I should tell you or not for public record at this stage before – while people are still alive.

Well you can tell me now and we can close it for a certain amount of time if that's what you’d like to do?

Yes.

So that we could close it until after the time when you think it would affect people who are –

Yes, okay, well let’s put that on – put this on that sort of – sort of list.

[End of Track 11]
Track 12

Yes, well Tom Spence was a good director and got lots of things going and that was fine but – but after a short – fairly short time he became very – he just wasn’t doing things and I could not understand why. He seemed to have changed his whole attitude not – you know, he seemed to be struggling under some problems that I didn’t understand. Now there was the World Climate Research Programme also in the same building in Geneva … for whom the director was Pierre Morel from France … and there was a – and I realised that Tom Spence and Pierre Morel, well that Pierre Morel didn’t think anything of Tom Spence, didn’t think he was any good. I was aware of that and … but I – I said to Tom Spence, ‘You mustn’t worry about Pierre Morel because you’ve got your job to do and it’s a big job, you know, very big job and he needn’t be involved in much of it, or his people may be involved in bits of it of course and you’re got to liaise with him but you can do that, and don’t worry about Pierre Morel.’ And that went on, you know, the situation went on in this sort of not very good state and I was wondering, how – you know, have I got to replace Tom with somebody else or what can we do to get him – him really doing a – doing this adequate job. And it went on for eighteen months, then Pierre Morel left WCRP and handed over to somebody else, and within a short space of time Tom was back to his own self again, the transformation was remarkable and GCOS started to take off properly. And I thought, well that’s – you know, the answer [laughs] – the answer to my question is very clear, Pierre Morel had tried to bully I suspect in – Tom in one way or another, he’s a very able person is Pierre Morel but if you got on the wrong side of him I can imagine he was – and I got on with him very well, but got on the wrong side of him I imagine he was just completely impossible. So – and Tom Spence was no chicken, I mean no – he wasn’t a – a – he was a, you know, a man with a lot of drive, wanted to do things, he was not a man who just sat down waiting for things to happen and of course – and later on it became he was doing well, very well. But it’s an interesting – interesting to realise that, you know, that people can be very positive about – be very positive in their influence, they can also be extremely negative in their influence, even though they know we’re not working – he was not working for Pierre in any sense. And I thought the fact that he wasn’t, you know, under his control in any official sense would mean that he would – get on alright, ‘cause obviously this – this figure who was in the background, this shadowy figure
who had no control over him technically, in principle, was obviously enough of a utter
distraction.

*Knowing Pierre Morel as you do, what do you – what do you imagine might have
happened?*

Well it’s very hard to say actually and very hard to understand. I mean I could
imagine – and there was … Pierre Morel might have tried to get Tom Spence to do a
variety of things which Tom didn’t want to do or something, I don’t know, I’ve – but I
never – I was never parted – Tom – Tom never came clean with me about it, didn’t
want to talk about it. And although I realised, you know, there might have been some
problem I could not have imagined it would have affected his work so completely, so
thoroughly, but … it’s a pity when problems of this kind arise in this way. Anyway I
think you’ve said that should be not … reported, I mean it’s a – Tom Spence is still
around and Pierre Morel must be – he’s older than I am so he must be well in his
eighties but – but I wouldn’t want it to, erm … I don’t know what to say, you can
write these things down, it doesn’t really matter but … you know, see in the political
world you wouldn’t care but in the scientific world is more sensitive to – and Pierre
Morel could – and to say I wouldn’t want to upset him, in a way I wouldn’t mind
actually [laughs] you know, but I don’t want to – but Tom – Tom Spence I’d be more
concerned about if Tom – if people realised Tom had been under – Tom might not
like that at all, hmm, alright?

[End of Track 12]
Track 13

That’s independent of the –

What –

It just slowed the whole thing down a bit.

What then did the Global Climate Observing System achieve in terms of things put up into space that weren’t there before or things put into the ocean that weren’t there before if you like?

Yes, well of – of course I’ve lost touch with it to a large extent since the mid 19 – well ’90s, I stopped being chairman about ’95 I should I think, I don’t remember when.

Another way then might be to ask what did – what did you think were the gaps that –

But it has, hmm … well a big – there were big gaps in the oceans because you can’t observe under the ocean some space so there have been big programmes set up in the oceans and – to observe the – below the surface. There have been some, erm… but even things on the ocean surface of course were coming along on-stream in the ‘90s, the radio altimeter which was measuring the height of the – the level of the ocean surface very accurately, which also gives you a handle on – on ocean circulation because it’s the – hmm … because just as you have pressure maps in the atmosphere, the height of the ocean surface is like a pressure map, providing you can measure it within a few centimetres, and you can. And so that was one way of handling – getting a handle on ocean circulation. There were also of course radar measurements that came in, again this was – this is story of the ERS1 to some extent, don’t think I’ve talked to you about ERS1 have I? The European Satellite System, we must do that later on. So ocean systems began to become online, ERS1 went up in ’91 you see I think, I think it was 1991, and that was the first European climate observing satellite and pioneered a lot of ocean observations. And those began to feed through the system and – and become better and so on. And then there’s the whole question of the ice for instance and the ice can now be measured, also the height of the ice with an
altimeter, can measure the profile of the surface of Greenland to a few centimetres. And tells you how much ice there is there and tells you there’s a – and this is largely happened during the – since the year 2000, or since – or very recently actually, they haven’t got all those things in place yet but when they have we should be – we should get complete measurements of the amount – total amount of ice in the – in the polar regions. And the rate at which it’s melting therefore, by the – the melting versus the replacement balance. Hmm, ten there’s the – you know, the sea ice is another big area which you can measure from space very well, one way or another. Then also there’s the – there’s the vegetation of the land surface and the – and the soil moisture and a whole range of things concerned with the surface which have – which are now monitored on a very – very fine timescale – fine space scale and timescale. And then the clouds, clouds are always a problem actually ‘cause it’s very hard to – but they have LIDARs now observing clouds, so we can get cloud structure from space too.

[03:51]

These all happened of course within – well it’s a twenty year period since GCOS began and GCOS has had a big – big part to play really in determining, or influencing, not determining, influencing what has gone on within space agencies, within meteorological services, within ocean – the IOC and other ocean bodies, navy’s and so on, what people measure. So it’s been a massive coordination, lobbying, erm … discussing, you know, presenting activity on trying to get observations of a kind that are really playing a part in climate research and has – but it took I should say probably five to ten years before it began to become really effective. And really get, you know, documents together which – which were of the kind that would – they’d really influence major bodies like space agencies.

[05:05]

I wonder if you could then talk now about a related topic and which is your involvement in the ERS1 satellite.

Hmm-hmm. Yes [pause whilst eating]. The first part’s a bit … a bit hazy I suppose but … I got – I don’t think I’ve got very much – I haven’t very much here which
shows that particular committee, but it’s been going about 1980 … plus or minus a year [laughs]. Well after I went to the Appleton lab actually, after I went to the lot at Appleton and associated with setting up this space science – space science support unit, the SRC. Hmm … and I was obviously very interested therefore not just in … you know, because of my space work in the ‘70s, and realising that, you know, the American space programme so far as earth observation was concerned had a big lull in it, because Nimbus 7 was the last of the nimbus satellites which would be the main, you know, atmosphere observing satellites of – of NASA, erm … and although another – suddenly called the Upper Atmosphere Research Satellite had been – was beginning – was the next in the series, in NASAs series in which the Oxford group had expressed a – an interest in. And Fred Taylor was in Oxford, he came to be in charge of my department while I was away at the Appleton lab, he was my research student and I’ve probably told you all that before. And, erm … so I was very keen that the new – you know new laboratory at RAL had a – had a really good climate component to it. And we had two divisions of course, there was then the one which was looking at astronomy and the like, and the other was looking at the earth, there was of course the ionosphere and the magnetosphere which was also involved in that, so I was very keen to – to start measurements to – to encourage measurements from space within the whole climate area. And … the Americans were unlikely to do a great deal because they – you know, the space shuttle had come along which was eating all their money up [laughs], in fact the Upper Atmosphere Research Satellite which was first routed about 1978, in fact immediately after Nimbus Seven went up and which was began to be planned in the late ‘70s, did not actually get launched in 1991. So there was that enormous gap in the American scene so far as earth observations was concerned. From a research point of view they had of course their operational satellites, meteorological satellite systems, TIROS series, and that kept going, with improved instruments to some extent and so on but they – the whole research part of it disappeared for virtually a decade. So you – the European Space Agency was another place that – another body that I was very keen to encourage to do this sort of thing, climate work, or observations of the – of the earth and the climate, and … and a new director had been appointed to the ESA, called – a man called Quistgaard who came from Denmark … a man who’d been … who he said was looking for somebody who would be much more dynamic director in terms of – in terms of – in terms of management level concerned about their … you know, how
efficient they were in term – in the – in the sort of – as a scientific technical business. They wanted somebody who was going to be a really good manager and I – I mean I wasn’t involved in the – in the ESA management organisation, in the ESA committees to any extent, but – but I, you know, I was very keen that something should happen and that they – they apparently – ‘cause I knew people who were of course involved in it, and there was a man called Quistgaard who came from – whose great claim to fame was that he’d taken over a shipyard, I think it was a shipyard, to being made – losing money and within a short space of time he really made it … made it very efficient and actually making money, and he was – he was – therefore had a very good management credentials. But he had no experience of the international scene, no experience of international agencies in the way they ran or anything like that, so he really was almost like a fish out of water when he came I think. Anyway I happened to meet him, he came to the UK and we had a long talk about – and he was very keen to see something happen in this area too, and I don’t remember all the details now at all but – of how it – how – but he started a programme in earth observations, er … science – wanting to launch a satellite concerned with earth observation and in particular possibly looking at the oceans. For which there was quite a strong lobby at the time and, erm … and he … asked me if I would chair his committee. The committee was a committee which was setting this up. Now there’s another person involved, exactly when he was involved I can’t remember, anyone who writes this up they should do some homework on the [laughs] – background, and there’s a man called Phil Goldsmith who I’d known from the – from my … PhD days 'cause he was – he was then a – an assistant at the – Royal Aircraft Establishment at Farnborough, at the Meteorological Research Flight of the Met Office and it was he who – who helped in the flying of my – the radiometer I made in those days, looking at the stratosphere and the radiation exchange. And – and he was in the Met, he’d been in the Met Office and, erm … no wait a minute, let me get this right. Hmm … Phil Goldsmith came along later, he was still at the Met Office. He became – he later became director of the Earth Observation Programme and he’s a – but that was not until the mid ‘80s actually, I’ve – I’ve got the order wrong, so he was not involved particularly in the – in the late ‘70s, early ‘80s where I was at the Appleton lab.
So forget about Phil Goldsmith for a moment so it was – it – so Quistgaard asked me
to take part in the – Phil Goldsmith came in later ‘cause he was the man in charge and
he’s a – so I’ve forgotten that he joined later. Hmm, and so we got a committee
together of experts from – scientific experts from around Europe to try to draw up a
payload for satellites which would make climate observations and, erm … and it was
– we decided that it should be largely concerned with the oceans. There was a very
strong lobby from – a strong lobby from industrial people who were very keen to fly a
synthetic aperture radar on a satellite to observe – to observe the earth’s surface, this
is a radar that takes pictures, in – at microwave wave frequencies, of the earth’s
surface. It penetrates through clouds therefore and it’s a big instrument and it’s a – it
has lots of data of course ‘cause it’s taking actual pictures in the microwave – and it
could observe the oceans, it could observe ocean waves, and – and the – and it has a
possibility therefore for measuring wind all over the ocean because you can measure
the waves, the height of the waves and their direction gives you wind speed. And that
was – that was a very dominant instrument on the – on the satellite. Hmm, I should
find the payload I suppose, the whole payload, but we developed an instrument at
RAL called the Along Track Scanning Radiometer, a – Along ATSR, which … hmm
… which was a radiometer measuring in the window region fifty microns in the
infrared. Hmm, but it could scan along the track so that you could look at the ocean
surface from a variety of angles from space and therefore have a – change the path
length of the atmosphere through which the observation was made. And – and that
would enable you to make a good allowance for the absorption in the atmosphere of
the radiation which was coming from the earth towards the satellite, and make
corrections for that hopefully so you could get measurements of the earth’s surface –
the sea surface temperature better than one degree, which was the aim. Because it’s
changes of the temperature of the ocean surface that have a very big influence on the
atmosphere and its circulation and, erm, particularly when you’re considering the
longer term. And in fact a lot of work had gone on in the Met Office, at that time was
going on which was using sea surface temperature measurements to make long term
predictions of drought in Africa for instance, because you can … you can get, hmm,
some forecasts of – not perfect reliability but some indications of drought periods and
so on which are – which tie up with certain sea surface temperature patterns over the
Atlantic, or over the Pacific of course. And of course there was also over the – over
the end … the, erm … what’s the program – the programme in the Pacific, the
problems of the Pacific which are to do with the temperature of South America, sea surface temperature which of course that’s the … oh it’s just gone, hmm … you know the – the name of the biggest single climate anomaly in the – in the Pacific Ocean which occurs around Christmastime.

*It’s not he El Niño?*

The El Niño, that’s the one, it’s just gone from me. And – and there was that programme so sea surface temperature is very important. So we had that instrument on a satellite and there was – there was the – the … the radar – the synthetic aperture radar which would enable us to get – get wind observations, trying to remember – I’d have to look up the other instruments. Hmm … which I could do later on if that’s – I’ll bring them – remind me at the end, I’ll go and find that. But it was a fascinating job actually to try to bring together the aspirations of, you know, people on the committee, some of whom were scientists, not all of whom were scientists, some were very keen to see the big instruments fly for – for industrial or for, you know, very technical reasons, trying out technical things, but nevertheless we had to have a – a really – some really good scientific measurements. And so eventually that satellite was launched in 1991 and was the first real ocean observing satellite dedicated to ocean observations. And that had a big impact on – on climate programmes in the ‘90s and since. Hmm, so that was a good – very interesting programme to be involved with.

[20:16]

*Could you explain a little more about the – the interest of industry in the flying of particular pieces of equipment, you said that they were very interested in having certain items on the payload.*

Well like a radar for instance, yes, to fly a radar in space you would then get a – get an enormous boost to your instrument capability, being able to mount it on a satellite.

*So it was the companies who were making the instruments who were keen to have them flown, the industries that were being –*
Well the industries concerned with that sort of technology I should think, that’s – take it back to the technology and recognising the importance of this as a – as a burgeoning technology and which would become very important. And to do that from space of course is a – was a big thing to do.

Were there any –

The whole industry was keen to do things and the European Space Agency was very much a – a servant of industry in a way and governments wanted it to be, government saw it as a way of industry getting involved in a technology of space observation and – and also building devices which were going to be useful in all sorts of ways, yes.

Were there any British companies involved in the committee or represented as a British industry?

… Hmm, I can’t remember all the other members of the committee now I’m afraid, sorry.

Yes of course [laughs] but, hmm.

I don’t know.

Okay, well we can –

But we certainly had people who were – who were strongly connected with the different industries of – but we were a scientific committee so it was a – we didn’t have, you know, top industry people in the sense, we would have the people who – in – work in industry in – in scientific or technical roles, but it was meant to be a scientific satellite with scientific aims and … but in those scientific aims actually had a – you know, industrial connection or a connection with building instruments which would be useful in other ways, that was obviously very important, yes, hmm-hmm. Okay, that’s the ERS1 I think really.
Could we then – could you then –

But it was a lot of fun actually, you know, working with a – designing a satellite and moving it along. And Phil Goldsmith of course later became – you can put him down now, he became the director of that programme within ESA so – so he became the person the committee, erm … you know the agency member on the committee and – and he was the man responsible for getting – making – making it happen, which is a very nice connection to have so he was the other one that came on later on. I don’t know whether he was involved at the start as a Met Office man, I’m not sure but – I should look up the files so it’s all in the Met Office I guess, I haven’t got those files here.

Could you tell me about your – or the story of your role of acting as trustee in the Shell Foundation?

Yes.

Perhaps including an initial description of what the Shell Foundation is or does. And then the story of your – how you became involved?

Yes, erm … that goes back to [looking through papers] – oh that’s something else [pause – looking through papers] – what – well I’ll start to talk and see how I – I have to look up further material, I’m not sure, I haven’t done all my homework properly [laughs]. Well the year would be year 2000 I suppose, or perhaps late 1990 … when … some people from Shell either wrote to or rang me up, whatever it was, and talked about the foundation that Shell were planning to set up which was to be a charity, paid for by Shell, of course the money coming from Shell with a … with management by Shell but separate from the – no management by – including Shell people but – but of course as a charity had been absolutely separate in terms of – in terms of its decisions and action from the Shell company. They wanted to set something which was
promoting sustainable development in the world, I suppose this is an image thing as far as the company is concerned but they were keen to – to support projects with a social impact and social benefit, especially sustainable energy for poor people. There were two billion people in the world remain without modern energy services and there’s lots of extreme poverty. And so they were looking for directors, they were not looking for – they were looking for two external directors, erm … and there would be other directors, the board I think is six, they were looking for two independent directors to join the others who would be largely Shell people, I don’t – perhaps at least half the directors, that’s right, half the directors would come from Shell, including the chairman. The chairman of Shell at that time, Shell UK was Mark Moody-Stuart who was – Mark Moody-Stuart is a – was a man with a – with a tremendous, erm … you know, with green credentials, a man who drove one of the first Prius cars [laughs], that shows you the sort of man he is, and a man with a great social … and a very able – very able director. The … I was called up by these people and two of them came to see me and they came here actually to interview me and to see whether I was a suitable person, my name had been suggested as somebody who was concerned about these things and knew about climate change and was a top scientist and so on so we had a good discussion and then I said, ‘Obviously, it sounded very interested indeed and I’d be very interested to be involved,’ and they – so I was appointed as one of the first external directors and we had our first meeting in June – June of the year 2000. The company was talking of a – fifteen million a year being available to the charity, hmm, to be – to be raised in the end by a capital endowment, which the – if half a – half a million, half a million that the company was intending to put in to the charity within ten years and then it would be self sufficient and the – working from the – on the income from that, from that big endowment. Hmm, and … there was a man called Kurt Hoffman who was their first director of the – of the company who had worked in … he was an economist by – by background and had worked on the economy of the – the economics problems of climate change and things of that kind, so he was well aware of – a man with a great social conscience and desire to help and so on and a very good – very good man to start the whole thing off. And, erm … so they began to look for – what did we do at Shell, we tried very hard to find projects which were – which fitted these criteria, they did not want to spend all the money on academic research or anything like that, they wanted to spend money out in the field, really helping people on real projects, they were very keen
right from the start that any money Shell put in should not be the only money going into projects, they wanted to see the big multiplication factor of – of Shell’s money as it went in. And – and the sort of programmes that were set up were to do with, erm … they were very keen to empower poor communities, erm … they were very keen to set up small and medium enterprises in third world countries, arguing that there’s a lot of money available for big projects in third world countries, there had been – there was beginning to be money available for – on a very small scale through the Grameen banks and things of – which had been started in Bangladesh by Grameen where – where women can borrow very small sums of money to buy a sewing machine or something of that kind and could start a tiny business which would help to get them out of poverty and – and they can do that by the million and they – their – so there were people working in that sort of area and then banks prepared to loan to small – to women and people who could sew, very small businesses. But in the – in the middle area small and medium enterprises there was virtually no available – no capital available for people to borrow in third world countries to set up businesses. So Shell right from the start began to put in – put a lot of effort into trying to fill that gap, and with the Shell name of course that’s a powerful way of going in and, erm … the object was to go to banks in the third world and invite them to join in – in loan arrangements, which would be not tiny but not – not enormous. You’re talking of … you know, a few thousand or a few tens of thousands of pounds, that sort of ord – that sort of number, for people to set up a business. And with that money being, er … you know, the loans of that kind being given to people. But then of course people have to learn how to spend money and how to run businesses and so there’s training to be done so the foundation put a lot of money into training, into – and into being the – the backstop for things of this kind and into setting up further banking arrangements, banking arrangements which would be – which would be solely responsible for supporting small and medium enterprises. And they’ve been tremendously successful in doing that, they have some of the very big banks in Africa now which are – which are run into billions in the amount of money they’re - they’ve – they’re all getting up to a billion in the sort of money available, hundreds of millions anyway, when Shell puts in – you know, ten per cent, maximum, the other money comes from elsewhere, from other banks, other lenders, and people get trained to run these bodies and to run these new banking and financial bodies and also get – train local people who are keen
to set up businesses. It works very well and very few of the loans go bad. And so
that’s been one of the big things they’ve done over – over the years since then.

[33:58]

Perhaps the simplest way I could describe the – describe the – I went to India visiting
their – some of – some of their work in – I went to India some time [looking through
papers] February 2006, and there’s some notes I made here, to see some of the things
they were doing. First went to Gujarat which is on the west side of India, it’s the bit
that sticks out just north of Bombay, it’s a – an area which is – which when I went had
been dry for some years, dry for – they’d had a drought for three years, very dry area,
farming, lots of farms, tens of thousands of farms on the whole area. A lot of it was to
do with growing cotton and – and a lot of it was becoming unsustainable because of
the – the problem of actually selling the cotton and growing it – and growing it in
ways that were sufficiently efficient so that they could actually make money out of it
instead of losing money on it, so a lot of farmers were going out of business. There
was a lot NGO there called, hmm, Agrocel which was run by some – they were run by
Indians who were – who were clever and good people actually and they had – but they
were not that large and Shell … had – got them to help in setting up how the whole
thing could be – get on a much better footing so far, from a – a viability point of view.
And, erm … so I went there and I went to [telephone ringing] – went to a – excuse me
[break in recording?]. Which is this, it’s called Appropriate Rural Technology
Institute run by – it’s quite an old institute and it’s, you know, doing some good work,
hmm, helping poor people a great deal but also trying to do things technically and
scientifically which were sensible. I, erm … the main thing I did there, I – I visited a
big farm, I guess it was one of the very best around otherwise obviously they’d try to
take – a good example but – but the farmer there was thrilled to bits with what – with
the way he’d been – become viable, as a result of the work of Shell and – and ARTI.
In particular he – and he was a farmer and it was his extended family who were there
who were working on the farm, there were about thirty people I think I met, so all part
of this farming – this farming – this big farm. The first thing that – well various
things, at first he was using organic pesticides, traditional pesticides, which was using
the leaves of trees – certain leaves from certain trees were a source of pesticides and
so on, traditional pesticides. These were not as good as using industrial ones, they
didn’t have this – anything like quite the same results, but you didn’t have to pay for them, and pesticides were significant – very big – significant drain on his budget if he was using, erm … non – non organic ones, things he had to buy in. He – there’s the whole problem of water, the water came from a borehole coming from down below and was scarce, and so he was using the minimum of water by using – drip feeding water to the – to the cotton plants and – and he’d been taught how to use the minimum water which was of course a great deal less by orders of magnitude of what you would use if you bought it in conventional ways. And then he was using – instead of using fertilisers he was using compost and organic waste from the farm, so he didn’t need to buy chemical fertilisers anymore and so he was organic, entirely organic. And, erm … and then he had – he had a fair-trade arrangement with Marks & Spencer’s who negotiated – which would have been negotiated through Shell, through a joint – joint Shell, Marks & Spencer’s enterprise, which enabled him to – to have a guaranteed price for his – for his cotton. And, erm … and that was – and that was an enormous help to him and he was a very happy farmer. He was now paying his way and – and they had a reasonable – reasonably satisfactory life, compared with farmers who were still doing it, or still attempting to do it using – having to buy in the pesticides and all the rest of it and not using organic techniques and not using organic fertilisers and so having great problems with water, and – and thousands of others, many thousands of other farmers joined that whole scheme. And, erm … and was a – so that was a wonderful – that was a very successful project that – and it extended to other parts of India where there was cotton farming too in due course. I then went to Pune, erm… well – and I mixed up – I’ve just talked to you about another – the Agro – Agrocel was the NGO concern in Gujarat, there was another NGO in Pune called ARTI, Appropriate Rural Technology Institute, so that – the name I put in before was wrong. Hmm, and they were concerned with stoves in … in huts in villages, in small homes. The – and Shell – the Shell Foundation put a lot of effort and still does put a lot of effort into – into trying to get better arrangements for cooking in villages in the third world, it is the fourth biggest killer in the world, indoor air pollution from stoves that pour out smoke in kitchens, or in huts and it – and children are particularly effected, and many children don’t live to adulthood because of the smoke and those who do are badly disadvantaged in some way or other. So the object is to try and get better stoves into these places. And there was a programme that Shell had organised with something with ARTI to try to design a – a stove with a chimney, try to arrange for its
manufacture locally, try and do it all on a local basis and … which was a – which seemed to work quite well in its way, it was a relatively small scale at that time, when I went, it was … and stoves had been installed in – in villages, I visited a village or two, was taken to see these stoves. Hmm, and also saw some of the original stoves, some of the stoves which brought out smoke. And I saw village people actually pouring the con – pouring concrete into the moulds that – from which the stoves were made as a little village enterprise. I met some of the women in the villages who were being – who were working for – for ARTI in – in arranging loans for people so that they could buy these stoves, I mean a small price of course, very simple stoves, they just helped – had a chimney which got – a significant proportion of the smoke out into the outside and it’s, erm … and these women were just obviously delighted to be – to be helping with the enterprise and negotiating loans and this sort of thing. These were just ordinary – very ordinary village people who were obviously paid for doing this too and so this was helping the local economy. The – I met a – met somebody whose job it was to go round villages testing these stoves, determining how much smoke was being produced and whether they were working alright and … and she showed me some of her results, I mean testing all the stoves didn’t work very well because – for all sorts of reasons, some – were some … women were not using them because they weren’t big enough or they – they went back to the traditional way of doing it ‘cause they couldn’t cope with it, or because the chimney was not looked after, it was not swept and things of this kind, so they were not all – perhaps only sixty per cent of them were any – working as they should in any way and even then they weren’t perfect, but nevertheless – and she was being very honest in the way she was determining this and writing it all down and they were – she was therefore the inspector of stoves in these various villages. And one got a feeling for the scale of the problem which of changing the way people do things, at that – in these very poor local communities. I learnt that the – the state in which – in which this area was, erm … had – had had a scheme too and they had given away a quarter of a million stoves in – which – which would have helped with this problem and … but the story was that these stoves, nobody had actually used them because there was no help in using them, they didn’t own them, they’d just been given them, they didn’t know what to do with them and so that really was a waste of time to have been given a stove which – which they didn’t know how to deal with. And so – and Shell was well – the Shell Foundation was well – people were well aware of this problem of actually helping
people to use the – any new technology of any kind, making sure it was all done in a way which was user friendly and which people – had to explain to people what it was all about and how – how they could do – could do the – do a good job with it and you just give people things and it didn’t work at all and that – and the state didn’t – didn’t take notice of that, they felt they’d done a good job giving them away and apparently very few of them if any were used in that area. So that was a waste of time. So that was – I mean Shell has been – as I know from Shell from meetings with Shell since, are still battling with that problem of how you can scale up. They had a plan at that time of – of actually getting – selling two million stoves in that whole area was the plan, that was not realised, I doubt if it’s been realised yet actually, because of the … the difficulties of doing that, of being sure that you’ve got a good enough product to scale up on that scale and also good enough arrangements with the local people to use these stoves in a way which would make it worthwhile to scale it up in a big way, and also setting up arrangements that are viable and well founded and not a waste of time. And the problem with – with an NGO like ARTI although it’s quite a big organisation, they were not used to the scaling up ideas on that sort of scale, that Shell was wanting. And there still is work going on on different designs of stoves, some of them being designed in the United States now, I mean there’s very simple designs of course but it’s designing one that really does what you want it to do without upsetting people and without creating other problems with very difficult. Anyway that was a – that area with stoves is still going on in the world, you can read about it on the internet and all sorts of people tried – trying to create better stoves that people will use. And some – some stoves now which don’t need chimneys which get the temperature up sufficiently high that much less smoke is produced and which try to – and that sort of thing. And there’s a lot of work still going for the design of a perfect stove for – for a village home which doesn’t produce smoke and yet provides cooking and all the rest of it in a way that they want, not an easy problem to solve. I then went to Bangalore after Pune and there’s some work there on, erm … there was – there was a small factory I saw which was – which was working on spinning the cotton and finding ways of making the thread properly, and – and then there was also a very small amount of work going on with photovoltaic cells. Hmm, and I – I met a person who was a – who had – who had a little business where he was charging – where he was charging batteries during the day, from a battery of a whole range of solar cells on his roof at his home, and then he would take these batteries round in the evening to – to –
to stalls in the market where they were – where they needed lights because it was dark and they had lights which were run from batteries within these stalls, and he was the man who changed the batteries in the evening, took them home and he – the battery was charged up and that was his business. And that was fine and you could – and there were quite a few of these people around doing that sort of thing, it was a very small enterprise of course in terms of the need that you require, I also saw some photovoltaic arrays on certain homes there which are used for – for lighting in the homes, or providing small amount of electricity, but it was the scale of it was – was miniscule compared with the need and – and these were very small companies which were involved in that and Shell was trying to help some of them but it’s – that was a further thing they were doing and hoping they might be able to scale it up one day. I don’t think too much of that has actually happened yet.

[50:27]

There was another programming with the foundation and that was called a – they called the programme EMBARQ which was to try to improve local transport in major cities in the third world, starting off with Mexico City. And they had an arrangement with a – an American NGO for designing mass transport, bus route in Mexico City and for which – and this was largely done by the – by the American group and they negotiated with the city on setting up a major bus route from one side of the city to the other, just one in the first instance, and eventually, after a great deal of problems, you can imagine with getting permissions and defining routes and making sure that the – there was a priority for the bus rather than other things and so on, so it was a major job for the city to take onboard but they did take it onboard and that was really very successful. And Mexico City was a place with gridlock in its traffic for much of the time [laughs]. So this was begin – beginning to – it wasn’t long before you were talking millions of passengers using this bus route. And they’ve now carried on in Mexico City with other routes of the same kind, to try to make sure you’ve got mass transport, public – public systems and other cities in the world that have picked up the – that sort of idea and there’ve been negotiations between the foundation – the foundation with some cities in South America, Shanghai I think have got involved with them, although they didn’t want a lot of help but they’re picking up the ideas, so that idea of one way of dealing with these enormous problems in – with growing car
park relations in third world cities and gridlock of – has been something the foundation has done a rather good job with actually, through the American – largely through the American group who’ve been working with them. So it’s been a good story and … and they’re – you know, they’re keen to develop things and move on, the object is to do things on a – on a big scale, not because they have enormous money, but because they can use the Shell name and the – and their expertise in setting up small and medium enterprises which will do the sort of things they want to do. Regarding the enterprises in Africa I’ve, you know, constantly pressed for – for these enterprises to be concentrating on sustainable energy, getting sustainable energy, commercial energy into villages so that they can set up small businesses which – because they have electricity and – small amounts of energy and – but they’re still very – it’s still only a small proportion of the money – of the loans which are made are going to businesses of that kind, maybe twenty per cent now, that’s all, twenty or thirty per cent but it’s no more than that. Many of the companies have been set up have been in transport, and so that they can transport crops and food to market, and – and set up transport arrangements for goods which don’t exist in many parts of Africa at all, and so that’s a very good thing to have anyway. The – or in retail work selling of course – selling things like – selling things, or setting up retail outlets for a whole lot of – a whole lot of things, including gasoline and things [laughs] and so on. But helping to build the infrastructure within – within rural areas of – of Africa and India, largely in Africa and India these things have been. But the – I mean of course even when you’re talking of millions going into a – these small enterprises, that still only is a very small amount of money compared with what’s really required if you’re going to – going to build up rural areas in these places which have anything like the connections with … you know, with economic growth of the kind that’s really needed. But it’s been a – I’ve just come – just left the Shell Foundation this last year after ten years, I was the longest standing – the longest serving director [laughs] they’d had until that period, and so I was just delighted to be part of that remarkable enterprise.

[55:28]  

*Did you have any concerns in joining about I suppose what might be called Shell’s wider image, the company rather than the foundation?*
Hmm, not really, I had – I had contact with the Shell company over – over climate change, I’d in fact given a – given a presentation to senior people in Shell on – on these things, and they were very … aware of the problem of climate change, and Mark Moody-Stuart in particular of course as their director at that time, their CEO, was absolutely onboard and was very keen that Shell got involved in – in renewable energy, and they had a big – a big company of course in photovoltaic cells and they – and they were keen to develop in – in ways other than just using oil. I think since Mark has retired from Shell it’s not been quite so obvious that they’ve – and they’ve had, you know, big problems of course in the oil business of one kind or another and they’ve been very much concentrating on oil, but – but nevertheless they – they’re not opposed, they’ve not been – they’re not opposed, erm, increases in efficiency, they’ve not opposed money going into sustainable development at all, they’re very keen to have an image of their own which is supporting that sort of thing, even though their main work is still getting oil out of the ground. And I’ve tried to help them to understand the big problems with these big things and we’ve had some interesting debates on the – well I’ve made presentations to the board of course several times on where the – well every year they’ve asked me to – to update them on what’s happening in the climate change area from the – from the point of view of all the things I’m interesting in, so they’ve been very – they’re willing to listen and been really supportive really of the thing I’ve done. Short of actually changing their business.

_Hmm. And when you say that you gave presentations to Shell on climate change, before you became a director of Shell Foundation?_

Yes, that was earlier, that was some time in the ‘90s, I can’t remember when, yes.

[57:55]

_And this is a more general question and it’s_ –

Well before you do that let me just talk about BP because … one of the most remarkable meetings I’ve been to ever I think was I was asked by BP in 1997, John
Browne who is the chief executive and – to – to go to a board meeting, a meeting of
the board of BP in London to present the latest on the science of climate change.
They’d also invited a man called Jake Jakobi who’s an economist from MIT to also
talk about the economics of climate change. And – and we had several pre meetings
with members of – with their staff actually trying to – making sure that it was – ‘cause
this was a meeting of their board, they were keen that it was all done properly and
well and what sort of thing was said, so I think a couple of times I’d turn up and do a
pre run of the sort of thing I would talk about. Anyway I made a presentation to the
board, the normal sort of presentation I make of the dangers of climate change and the
problems of – and how we have to change the – get our energy and how we need to
get sustainable energy in the future and so on, and I gave all that story. And Jake
Jakobi said his piece, it wasn’t entirely inline with mine and it – that didn’t matter
actually. And then John Browne came in and said, ‘Well,’ he said, ‘tell me, is this a
real problem, will it be still here in twenty years time?’ we both said, ‘Absolutely
yes.’ ‘Will it – is the real problem, no two questions, is it a real problem?’ ‘Yes, it’s a
real problem, there’s a real science behind it,’ ‘Two will it be still here in twenty years
time?’ ‘Absolutely yes.’ ‘Okay,’ he says, ‘right, we’re an energy company, we must –
we have a long term view, we must pick up the issue and really do something about it,
take action, you know, appropriate action for this.’ And they began to have some – a
bit of a – you know, debate, people asked questions, I remember one … remarks, and
there was one from the man who had been chairman of BP, who became a
government minister actually, whose name I forget just now, but he – he said, ‘You
know, you’ve been talking about the cost of the damage and the cost of doing
something about it in terms of perhaps a few percent of world GDP you see, that’s an
awful lot of money,’ he said, ‘a very big lot of money,’ and with a long face, but then
somebody else on the board, I don’t know who it was, I can’t remember, didn’t know
them anyway, so he said, ‘One per cent of world GDP and we’re an energy company,’
he said [laughs], ‘What an opportunity,’ and the meeting just switched in a way in
their attitude and you could see them switch that, boy, we’re in, this is our business,
we’re going to really take it onboard. And I thought that was a very interesting – a
very interesting and positive reaction, starting at the top with John Browne. And John
Browne since that day has given lectures on climate change, a lot like I do, he
changed the name of the company to Beyond Petroleum instead of British Petroleum,
that didn’t last very long because – because they took onboard a – the American
company Amoco soon after that and then – and I imagine the problem was that Amoco didn’t like the new name of Beyond Petroleum so they all went back to British Petroleum. But nevertheless John Browne has consistently talked about – talked about – recently in fact – very soon after – two other things about that. He, erm … soon after that he – he set up within the company a trading in – in emissions of carbon dioxide, so different parts of the company you allocated allowable emissions and if they wanted to exceed those they had to go and buy them from somewhere else in the company and within one – I think the – within one year, or perhaps it was more than one year but it was of that order, they had saved half a million dollars, because they had reduced their flaring, and other things, and they had saved as a company half a million dollars, which isn’t a lot for BP but it’s a – a lot of money. Hmm, a few years later, now I could find the year but I can’t remember which year it was, I got a request to go to Bath where BP was having a meeting of its property managers from around the world, BP spend half a billion dollars a year on property, big company. And they’d asked me – just asked me to go and talk to them about climate change which I did, I wondered why but I soon learnt why when I got there because the instructions from John Browne to the property managers were very clear, he wanted within a relatively small space of time, any new building built by BP to be zero carbon, and he’d arranged for people like [inaud], big building cont – building firms to go and instruct these property managers, how they could build zero carbon buildings. And to the best of my belief that’s what they’ve done ever since, I’ve no – I’ve no – had no contact with that business since but that was their intention, that meeting was entirely devoted and there were, what, twenty or thirty people there from around the world, devoted to telling them how they build zero carbon buildings. So that was a – and BPs been very supportive really, at least in what’s been said, whether they’ve been entirely supported in what they’ve done I’m not sure but, erm …

_In these pre meetings before you – do you remember any – any things that they wished to alert in what you planned to say?_

No, I had no problem, no problem at all, I don’t remember – unless it was altering it for making it better, making it more understandable or what – I’m sure they had – I’m sure I had feedback on, you know, don’t say it like that, say it like this, but they were
not trying to – trying to make me tell a different story, no. No, it was very open and honest and I knew – I knew some of them quite well actually so, hmm …

[1:05:08]

And I wonder what you would say to people who – some people who would argue that climate change is caused by capitalism or perhaps especially by global capitalism, and this is partly inspired by a section in your book, The Complete Briefing where you talk about the back to nature approach, or response to climate change, I wondered what your general views were on I suppose relations between climate change development and capitalism?

Well I mean a lot of the – you know, the reason for climate change on the scale we have it is – is what – what’s happened, the development of industry since the industrial revolution, which has been a development of capitalism through very cheap energy and … and that’s the way a lot of it has happened. But we know now that the – you know, cheap energy has – has created this problem, but that doesn’t mean we have to carry on getting energy the same way, and in fact it tells us that we have to get – start getting energy in very different ways. But we can still get energy from coal providing we pump the CO2 back into the ground, and that’s a possible thing to do and that should be looked at very hard and that’s – that’s another piece of capital expenditure if course in your power stations to do that. Hmm, but we have to look at renewables and this is – and there are – and the – I also mention in my book of course the IEA, the International Energy Agency which is the body that is the top energy body in the world, it’s not full of greeny people or anything, who are asked to create a blueprint for how you got your energy, how the world should get its energy from now onwards in order to cut the emissions, you know, to zero well before the end of the century and – and they’ve come up with that blueprint, they were asked to do it by the G8 who met in Edinburgh in, what, 2005, I think it was 2005 who they offloaded the problem onto, said how do we do this you see. How we really do what the scientists are telling us we have to do. And … and their – you know, their blueprint is – is fine, the problem is we just have to get on with it, and the cost of doing it will be – they point out will be about zero, because we will save so much from the fuel we save that that will actually pay for all the change in – in the energy of the structure between
now and 2050. We have to get money – some of this has to be done upfront and cost money upfront, but in the end we will save more than we will lose by the – by what we’ve done, and we will have much – you know, much more robust installations and much more secure energy as a result, or we should have, and much less polluting energy and all those things so it will lot of co benefits too, which they point out in their – in their stuff. So – so there’s no reason at all why we should change for climate change reasons, change the way we do things in terms of the use of capital, we just have to make sure we don’t produce polluting gases as a result. And we must not carry on doing the things we’re doing because we’ve always done them, or because – or because the power of those industries is so strong because of the – you know, the benefits they’re still getting in financial returns are enormous, still enormous, that nobody who’s working for those companies wants to change what they’re doing and it’s a very strong – very strong lobby is the oil lobby. And in fact it’s largely of course Exxon who’s been behind the – behind all the negative stuff that’s come out in the – and the coal companies of America too have been behind it as well. But they’ve brought up the American congress with lobbying in order to stop this change occurring and there’s no reason whatever from a – from the future of capitalism point of view to stop doing it at all. And to, you know, stop the things that we need to do in order to get on with it.

Leaving aside whether it’s practical or not have you ever had pause to sort of question the whole idea of capitalism as a way of organising society. What you’re – what you seem to be saying is that capital – capitalism ought to continue but in a different way, but you have you ever felt that the whole – this particular way of organising economic and social life is wrong in itself or –

Yes, I mean I’m not expert economist, I don’t understand economics really. I realise that – that money is – is only a value so far as it has real things behind it, whereas the way money is dealt with by some forms of capitalism imagines that it’s a real thing and that’s the only thing that matters, where it isn’t, it’s a very small thing, it’s just a useful way of – of paying for things and arranging the [inaud] things and all those sorts of things. And Jonathon Porritt has a good book, *Capitalism. As if The World Matters* I think he’s called it which I agree very – agree with very strongly and he’s not – he’s not talking of throwing the whole – the whole thing over but he’s asking for
capitalism to be done in a much more responsible way and ... and one of the results of modern capitalism is the – is the way in which it’s linked with free trade and, erm ... and the way in which money flows in the world is – is of great concern because, you know, wealth is actually moving in the world from the poor to the rich, and you say, well we give lots of aid away and so on and governments give aid away, individuals give aid away and that’s very good, but if you add aid and trade together the overwhelming flow of wealth is from the poor to the rich. And that really is very obscene, for us in the rich world, to behave in that way that we’re receiving gobs and gobs of money, or value or wealth, not – it’s wealth we’re talking about rather than money, at the expense of very poor people. And that’s got to change, the world cannot carry on like that, we have to have a much fairer way and this is – you know, the fair-trade movement is a very important movement I think. My wife’s thoroughly immersed in it with the little outlet she has here, and – and people pick that up, but people have not – you know, picked it up on the scale that’s required, or to the level that’s required, to buy a few things fair-trade in order to solve their conscience or something without realising that they can buy a lot of things that way; they may cost slightly more in some cases because of the fair-trade and the need of paying the people how are making it but we should be ordering very much more in the way of supporting fair-trade and movements that do involve – and we’ve got to involve the poor people in the world, not as slaves of the rich, but as running businesses in their own right, and maintaining their lives, maintaining good lives in rural villages because they have the means of – of – of having you know real economy on a village scale. And this village economy is a very important thing to have actually and a fair amount of my time is spent on thinking about ways of – of setting that up.

[1:13:38]

Do you continue to think about that and work on that having left the Shell Foundation?

Yes, well I still have – one of the things I did when I - in later years in Shell I – I got the Japan Prize which gave me a fair amount of money and – quite a lot of money and I used some of that to found a fellowship in Jesus College Oxford, which is my own college, in sustainable energy for the third world. It still needs more money adding to
it to make it really viable in the long term but – but Shell – I also asked Shell to
support that and they agreed to support the first fellow along with the – with the
college. And in fact they’ve paid almost his – most of his salary for the first few years
and this is a man called Zheng Jiang, a Chinese, a very clever Chinese chemist who’s
working in Oxford on – on turning biomass into – into energy, in a really efficient
way. There’s a lot of people trying to put waste into energy, erm … and it involves
all sorts of chemistry and technology which is very fascinating, I’m not an expert in
these things at all but Jiang is a very good expert, one of the best in the world as it
turns out, didn’t know he was going to be that but he is good. And he has a … device
now, a vessel which you can put your waste in, you know, heat it up to, what, 600 or
700 centigrade and you – and gas comes off, it’s a gasifier and – and you want that
gas to be the right sort of gas and he has developed catalysts which enable that
transfer, so the right sort of gas to occur you want to – it to come out actually Syngas,
what’s called Syngas which is a mixture of carbon monoxide and hydrogen, with bits
of methane and other gases thrown in but the main – the main – and Syngas can be –
can be burnt on your stove for cooking, it can be put into a – a high temperature fuel
cell to make electricity, or indeed you can burn it to make – into power stations for
electricity or you can, erm … you there are ways of converting it into ethanol and
liquid fuels, quite simply these are all very well known to the chemical industry. And,
erm … so he – he’s got a – this box of tricks, you put the – the stuff in, you – the
waste in and – and then you allow – you have to have a second chamber in which the
gases go, you have catalysts, very small particles of these catalysts which are cobalt
salts or zinc or nickel salts and so on. He – these catalysts are all magnetic so that you
can actually surround the – this big vessel with a cause wire which creates an
oscillating magnetic field, stir the pot up and so they get the reaction going efficiently,
as a result of that stirring, so that you get almost complete conversion into these
gaseous components, and off it comes. The – there’ve been a lot of gas fires produced
of this kind, they suffer from the problem that they don’t – that the yield of the right
sort of gases is low because you’re not using catalysts, or the wrong catalysts, if you
use the right catalyst you get it all done as you want, and you can actually determine
the – determine the composition by the sort of catalyst you put in. It’s a sort of
chemistry I didn’t know much about, I still don’t know much about it but I’m aware
it’s there. And – and the – the catalytic particles being, their magnetic and the stirring
going on makes sure its – it’s all converted and, erm … and a big problem with – with
these standard other things that are in use in the – around the world at the moment is that they coke up very fast and then you have to tear them to bits and get the – and get all this nasty stuff out and tar is produced too and it’s all – so you have to clean these things up very – very frequently and that also adds to the inefficiency. So he’s got this device and he’s done this in – largely in Oxford and he’s coming to – he’s coming to Aberystwyth next month actually to talk to the people in – in their big IBERS, which is – IBERS is now Institute of Biological Environment and Farming Science, or whatever it is, Rural Sciences, which they’ve just set up Aberystwyth as a conjunction – as a coordination or conglomeration in different departments in this whole area and they’ve got some new people in and it’s one of the – it’s probably the best department in the country of its kind. In fact Zheng, I haven’t hardly told Zheng about Aberystwyth, but he’s heard it’s the best in the country, I said, ‘You must come and talk to these people about it,’ so – so that’s moving along a bit. Quite exciting really. ‘Cause we really could set up something like that, if it’s simple enough and robust enough to put in every village in China, where you have enormous quantities of waste, you know, rice straw and other waste material, which you can use. And then you’ve got a – a source of energy which can be used for whatever you want, you know, ways of doing it which are quite robust and easy – and could be organised too, and China is clever enough to do all those things, and India too. Africa might take a bit longer because it’s not quite so clever but it would be – and that’s a way of keeping people in rural communities – rather than denuding the countryside of everybody who would go into cities, imagining there’s money in cities when there isn’t in the country. So you keep money and expertise and you could set up small businesses doing all sorts of things with the energy you provide, whereas you’re never going to get commercial energy on a grid form in most of the village in – in these big continents. So we do it fast enough we might stem that flow of people into fifty million people cities, you know, which they talk about in China by 2030, and there – the Chinese government is very worried about it, enormous cities with slums which are unimaginable. So …

[1:20:58]

Thank you.
[Laughs].

*Your work from about 2000 to the present in America on climate change, it's something that you mentioned yesterday that we ought to cover?*

Yes, okay. Hmm, and anything else on that sort of thing I’ve just talked about, I don’t think so. There was something occurred to me just a minute ago that was related to this – to the Shell stuff and to the … this sort of energy problem. What was it? Something else I wanted – wanted to tell you, but I can’t remember it now, it’s gone, it’s flown.

*If it comes back at any point can you tell –*

If it comes back I’ll let you know. Okay. That’s – so I’m still, you know, busy doing all sorts of things as you can see [looking through papers]. Oh the Japan Prize, yes, which was a – I won’t say much about that except that it was great fun and very interesting, it’s a – it’s a big prize … it’s – it’s worth nearly a quarter of a million dollars.

*Is this the prize that allowed you to set up the – the Oxford –*

Yes, that’s right, yes, I set that up with money from that prize, yes.

*And you won – you won the prize?*

Yes.

*How did – for what?*

In 2006.

*For what did you win the prize?*
I won the prize for my work in – it was a prize to do with – what did they set it up in, I’ve just got the prize here actually [looking through papers], it was reported in *Nature* and these things … it’s really – it’s for – they like to think of it as Nobel Prize actually, but it isn’t just for excellence in science or for doing something great from a scientific point of view, but it’s also for doing something which is useful to society, so they’re looking for things that are useful for society and, erm … the … the – was through the … the prize in 2006 was for … environmental change or something along – what was the official … which was for environmental change I think was what it was called, or two different words but one – something change. Anyway I was put up for that and they gave it to me which was – which was marvellous and, erm … and there was another prize that they gave two prizes, as they do each year, the other prize was for – was for medicine, medical work in medical science and the man who got that was a man called Akira Endo who … who discovered statins … and was an expert in reducing cholesterol. I’m grateful to his work ‘cause I take statins too [something banging] – let me just – it’s got a bit cooler, I’ll just –

*Shall I shut that?*

Yes, why don’t you do that for me, yeah. And they gave us a – and we had to – we both had to give a big lecture and there were sort of visits and programmes and things over the whole week and the – which the most – the most marvellous part of it was a banquet, given by the emperor and the empress and, erm … which was a – Sheila sat next to the emperor and I sat next to the empress [laughs]. And they were wonderful people, they were – they spoke English very well and they very interested in everything, and there’s the emperor of course is the great expert on fish, he’s quite a scientist in his way and he, er … and the empress was interested in science too and she’s been brought up in a Catholic school actually so she knew all about – so we talked – talked about science and faith for quite a bit actually, very interested in that area – and it was a marvellous occasion. Hmm, and … well related to a question you asked yesterday, one of the … first thing that seemed very un-Japanese at the – at the end of that meal was there was a lady who was there, the – the speaker in the upper house as they had there, whatever they called her, and she made a speech thanking us for this and that, and she’d been sitting the other side of Sheila during the dinner and – and she’d left her brief and she said, ‘You know, I was talking to Lady Houghton
about, erm … about asking her if her husband ever discussed – talked to her about his work,’ you see and she said she did, yes, we often talked about what we did and so on and, erm … and she’d made the – Sheila had made the – because she said, ‘That’s a bit unusual, lots of Japanese don’t do that and, you know, talk to their spouses at all,’ and Sheila had just hinted, because the way she asked the question that she’d talked to Dr Endo you see, or Mrs Endo, Mrs Endo had told Sheila that she didn’t know what her husband did you see, Sheila happened to mention that to her. And then so she gets up and makes her speech and said, ‘I understand [laughs] that Mrs Endo never talks to her husband about – about his work,’ and she thought it would be very important that people shared, you know, talked about their work and it wasn’t very Japanese and she hoped people would do that. And this was all in Japanese, I hadn’t a clue what was being said of course but people were, you know [laughs], gesticulating and – and gave her a great cheer and all that otherwise at the end [laughs]. And then poor old Dr Endo we’d – he and I had – had then to make our own little speeches and so he had to eat humble pie a bit and say [laughs] – so that he’d been – but that would – and then we talked about it afterwards when talking to the emperor and empress about and they were laughing – laughing at this very un-Japanese thing to do, you know, to actually have a – you know, produce a criticism of that kind at a very public meeting, it was not a – not the Japanese style at all, but this lady from the – from the upper house was a very – well she was an actress actually by [laughs] – in real life and – and that caused a lot of mirth [laughs] around – around the room. And I have a picture actually of the emperor and empress with us and her laughing greatly about it. Hmm, so that was a very interesting occasion, it’s – the emperor and empress lead very controlled lives, you know, they have a system where they’re – which dates back of course a long way when the emperor was a god and hardly anybody ever saw him, but he was worshipped as a god but never – hardly ever came into public, and that’s continued and very … hinted in various ways that they wished they’d – well she in particular, his wife, hinted that she would like much more contact with people and be able to get out more and so on, but it wasn’t possible she said and it’s a – which was a shame. And so this was one event of the year actually where they actually got out, it was – they had very few public events of that scale. But before he became emperor he’d been – as the prince now is responsible for this prize, for – you know for the entertainment at the prize and he did that before he became emperor and he insisted on keeping it on afterwards. And so they really, you know, and the people – the
Japanese people were dying to meet them and see them and so on, ‘cause they hardly ever see them. And it’s interesting, the – you know, this earthquake that occurred and the – and the nuclear problem, the – the comment was made that – the emperor made a speech to the nation and it would – he made – it was the first speech he – the prince had made for years and years and years, talking to his people, and he gave a very nice – he’s a very humble lovely fellow, lovely man, they’re lovely people, they really were. And, er … and his – the empress had … had been to Wales actually and visited Wales at one time and … we were talking with her afterwards and – and she knew that Sheila sings in choirs – in a choir and she said, ‘Oh,’ there’s a Welsh song she remembered, you know, all through the night and she started to sing and so Sheila joined in so the pair of them were there [laughs] duly singing all through the night and so – and she remembers Wales with great affection and so on. So it was a very – very happy evening, hmm. Then at the end of it they took us to Kyoto to show us around Kyoto and all its historic sights and so on and gave us a super banquet there too, with a party of geisha girls who – who were there to look after you and help you eat your food and all lots of things [laughs]. I had been to China before, to Japan before, of course and met – nothing on that scale before but – but they know how to entertain, but in very formal style of course. No, it’s an interesting country, hmm-hmm. So you were – you were saying.

Yeah, so next it was your – the work that you’ve done in America concerning climate change.

Yes, remind me to come back now we’ve been talking about Japan and contacts with Japan. Hmm … I also gave a big lecture actually at the embassy in Tokyo on my way to Australia one year which was a – which was a big occasion actually, they – the embassy laid on a big lecture arrangement and there were a lot of Japanese there as well others on the climate change issue, we – which they were really not well informed about to a large extent. But also I should talk to you about China too because of my contacts in China. A bit of a story …

Yes, I’ll remind you to come back to those then.

Okay, right.
Right. My work with America, yes well this was really under the – which is part of the JRI story actually, the John Ray Initiative story. But it’s a separate part of the story in some ways so I’ll do that – tell you about that. Hmm … about the year 2000 I think, I was at a conference in St George’s House Windsor, you know the big conference centre in Windsor Castle, on an environmental conference which was partially run by the John Ray Initiative I think … and – and president of that conference there was a man called Cal Dewitt from the United States, who was an ecology professor in Wisconsin University and a distinguished ecologist. But he also ran – was the director in those days of the Au Sable Institute in the States, A-u S-a-b-l-e, two words, and – which was a Christian organisation that particularly – particularly supporting work in – or trying to interest Christians and particular Christian students in getting involved in care for the earth, care for creation, care for biodiversity and all those things. And – and had been quite successful in – in their way in they had conferences right through the summer for students – student and he was a very practical man and had big programmes working in various parts of the world in ecological things. And – and the – at the end of the Windsor meeting he and I were walking in the park, Windsor Great Park, and it was a lovely sunny day and we were walking and I said to him, ‘You know, one of the biggest problems in this whole climate change area, and indeed environmental area, is the lack of interest in the United States, and the fact by and large people in the US don’t believe it’s happening and don’t understand it and so on, what can we do about it?’ And it was Cal Dewitt who said – he said, ‘Why don’t we organise a meeting in Oxford, as Americans like coming to Oxford, trying to explain the science and the theology and so on of this whole matter,’ and he said, ‘I will try and use my contacts in America to get a good American attendance and we can get some good speakers and see how – how that works.’ So that’s what we did and, erm … it was organised through the person who was looking after, you know, we had a part time director for the John Ray Initiative at that stage who took the job on of organising the meeting. Hmm, I talked quite a bit to John Ashton at the FCO, Foreign and Commonwealth Office about this and he arranged for, erm … a substantial subsidy to help to pay for it from the FCO, which was very helpful, so that the Americans would have to pay their fares but they
wouldn’t have to pay for their living in Oxford. We arranged with St Anne’s College Oxford and we got a meeting of – it wasn’t as – and then nothing like as many people came over as we’d hoped, because it was only – only six – well nine months after 9/11 so Americans weren’t flying. Nevertheless we did get a – oh significant number of people, total number, I can’t remember the total number of people at the conference but it must have been forty, forty to fifty Americans, one or two people from other countries other than America and – and people from the UK. Hmm, I – I asked people in the IPCC I knew to – to make presentations on the science, including some Americans, and Bob Watson who was the president – was the chairman of IPCC at that time, whom of course I knew very well and he – he agreed to come and – and speak and help us. And, erm … a man called Jae Edmonds from – from California somewhere who was one of the – you know, economists associated with – Americans economists associated with the IPCC, he came and talked about, you know, the economics of it. The Bishop of Liverpool, that’s another story I must write down Bishop of Liverpool for another story, came and talked about the theology of it and how important it was for Christians to get involved and, erm … and I and others spoke about the science and – and we had a good – a good – and John Ashton came from the FCO and spoke to us and so we had a – a good number of – you know, top people to talk to these Americans and – and we had a good meeting. And we all agreed we’d had a declaration at the end which was not agreed formally by everybody but people were asked if they would – when it says at the end this has not been formally agreed by everybody, this was the sense of the meeting sort of thing and I don’t think anybody said they wouldn’t sign this or have their name at the bottom, perhaps one did, I don’t know, maybe one did, we had some argument with one or two people who weren’t entirely happy, but otherwise it was signed by everybody there. And – and it was a – you know, a good statement about – about the science and involved of course the Christian responsibility for caring for the earth and for treating this issue as a serious issue and for doing it and so on. And it was drafted by a … by various people, you know, this statement was drafted by various people in the conference, at different parts of it, different people. And Bob Watson, although he’s not a Christian, said he’d take the theology – chair the theology group [laughs] ‘cause he’s very good at, you know, getting people to write statements that make sense and so on, he’s a very good chairman, excellent chairman doing that sort of thing, and he
was keen to try and help in that regard, so that was very interesting to see Bob Watson in that role [laughs], taking on some serious theology.

[1:40:33]

Hmm … and so everybody went away but the – the – there was a particular person there who was absolutely key to the future, that was a man called Richard Cizik, C-i-z-i-k, he was the vice president for public policy of the National Association of Evangelicals in the United States … and which meant that he had a lot to do – anything to do with issues, political or otherwise, he was the top man in that organisation to take those things to congress and to the president. Now the NAE, the National Association of Evangelicals is a – has 50,000 churches associated with it and … about twenty-five per cent of the American population … are – if you take the – penumbra as well – you know, the umbra – if you take the people who are associated in any way with those churches, not just the memberships but people who are – who support or are influenced by that body directly, you’ve got twenty-five per cent of the American population. So that was a big organisation. And the right wing almost 100 per cent republican and therefore almost 100 per cent anti environment and anti climate change, or not interested or opposed to it. He made a little speech at the end, he’s a – he’s a very able person, but he got up and made a speech and said that he’d enjoyed it enormously, he never realised scientists could be so humble and he really, you know, was going to take away the messages in the – in the document and do something about it. And he described – he’s described it since in public as a Damascus road experience for him, to come to that meeting and to meet with people. I think part of that was a – we had an outing to Blenheim Park in – in … in Oxford as our outing which is a lovely park of course to walk around, and I remember spending probably an hour or so walking with him and his wife around that park and he was asking all sorts of questions. So he was really very – you know, he – he became a convert to doing something about it.

What was he asking you, do you remember what he was asking you on that walk around?
Not – I mean he was asking scientific questions, asking theological questions but I can’t honestly remember exactly what they were, but I remember we had – I felt we had engaged in conversation, it really was a good conversation. But then I don’t think that was the only thing that switched him in any way, I mean he was – it was the – the general attitude I think of he hadn’t seen scientists so, you know, talk about uncertainty and talk in a – in a modest humble way in which I hope IPCC people do [laughs].

[1:43:46]

*Is there a reason why you think he wouldn’t have experienced that kind of modesty in America? If he was surprised by the – the modest way in which scientists were presenting their case at this conference in Oxford, that implies that his experience up to that point of scientists had been different from that?*

Well I don’t think he’d come across many scientists actually because he wasn’t a scientist by training, and he’s – his – although he was a man who was well versed in the world, you know, because he was bound to – his – with that sort of job knowing about public science, public policy but he – he – I don’t think he’d have come across many really working scientists, or scientists who were working for some lobbying organisation you know ‘cause of course there’s an awful lot of lobbying in Washington and anybody that sort of is trying to put things to persuade congress or the White House to do things are – the lobbying that goes on is just frightening. Hmm, I mean the lobbyists, there’s hundreds, thousands of lobbyists in Washington doing nothing else but trying to put – trying to persuade members of congress and the White House to – to do things according to their recipe and – and it’s a – it’s something we don’t understand here and it’s something which – which we’ve suffered from of course in the whole climate change business because – because people like Don Pearlman and the Global Climate Coalition and the Marshall Institute, and other bodies set up particularly to be in Washington to lobby people in – or to – try to educate people in congress along the lines they want them to be educated. Not with truth but with their – with their particular material. So I think he – I’m sure Richard Cizik had come across people like that, so he was surprised to come across people
who spoke more modestly about it, weren’t particularly trying to lobby him but try and tell him the truth, so recognised that.

[1:45:55]

Okay, now … and he became a very important man in the follow up, ‘cause he went away intending to try and do something in his organisation, he found that very hard, very tough, ‘cause nobody wanted to hear him on this – on the subject, however, in 2000-and – it was 2001 was that meeting.

[1:46:22]

In 2000-and – just a minute, I think I might have a piece of paper that includes some of his stuff, just a minute, I’ll pick it up [pause – looking through papers]. Oh hang on, this is it somewhere … yeah, somebody else actually came to – who spoke at our meeting was John Gummer which [knocks something over], oh – and Jim Bruce, I’ve – you know, this man from Canada who – who helped to set up the IPCC, he was there, also there, we had seventy plus, about half from the US … the – and now in 2004 through – through Richard Cizik’s influence and his people he knew, he set up a meeting at Sandy Cove, a Christian conference centre on Chesapeake Bay in July 2004 and to which I was invited and there were thirty people there, about thirty, who were from different churches and a few of them knew about, you know, the problems of climate change and were – you know, were informed about it, but a good number of them, you know, were – had no knowledge at all really and who believed it to be something they shouldn’t be doing, but Richard Cizik had persuaded these people that they should go and learn about it. So these were just the people he’d managed to persuade. It was an interesting meeting, the – it lasted from Monday to Wednesday and Monday evening a man called Howard Schneider, who was from a theological seminary in Philadelphia, spoke about what the Bible had to say about caring for creation, which he did very ably, and very persuadably to these people of course who believed in the bible above all else and believed in what – and spoke very strongly saying, ‘Look, here the Bible tells us we have to care for creation and look after it.’ Hmm, Tuesday morning I had a slot and was – talked about the science, and there were other people speaking too about different things associated with the subject.
Hmm … at lunchtime that day we … we met some … well we had lunch and I’ll tell you – come back to that in a minute, and then we went on a trip round – in Chesapeake Bay in the afternoon which was the, erm … which told us about the big environmental problems in Chesapeake Bay, it’s almost a landlocked – and of course very big area of water, they have enormous pollution problems, and awful waste problems and so on, but they have – we went in a – what these old style oyster fishing boats, skipjacks or whatever they’re called, so people – it was a nice afternoon, we had that afternoon.

[1:50:17]

But before we went on that we – at lunchtime that day there were a couple of people from Tangier Island on Chesapeake Bay, which is an island in the middle of the bay, they were fishermen from Tangier Island and Tangier Island had been a – it’s quite a sizeable island in the bay, where they had very big pollution problems, where the – the government, I think it belongs to Maryland had tried to lay rules down for what they did with waste and how much fishing they could have, quotas, fishing quotas, getting rid of waste, not throwing it into the water and so on, environmental behaviour and really trying to – trying to live environmentally clean lives [laughs] without very much success. And, erm … and with a result that, you know, it was – the pollution there was getting a lot worse and the oysters had very largely disappeared, and other – the crabs and so on were also diminishing because of these problems. And … for a couple of years – a few years before Cal Dewitt had had a student, a lady student called Susan Drake Emmerich who was going to do a doctorate and he said, ‘You go to Tangier Island, study the ecology of Tangier Island and see what you can make of it for your thesis.’ And she was a keen Christian girl so she went there and got to know the fishermen, got to know people there and was quite appalled at what was going on, tried to tell them they should be keeping to the rules, instead of behaving the way they did. It’s an island where most people go to church, so most of them were – most of the people on the island were at least nominally Christian, or more than nominally, they were Christian but they weren’t doing what they were supposed to do, she kept telling them they should. And she’d been there a year or two after – there’s a video we made of that story, but – the first story there but she – there was an evening when she was supposed to be I think going round talking to different churches that evening
about the problem, but it – there was a big storm and – and so she couldn’t go round the churches ‘cause it was impossible to get round actually but – so those who could gathered in one church in the middle and she spoke to them passionately about the problem. And, er … and at the end of that a number of the fishermen went forward to the front and said, ‘Look here, we will covenant now to keep to the rules and – and sign some sort of covenant agreement,’ and I think it was – and then – and so they started to do that and about forty per cent of the fishermen I think who had agreed to keep to the rules and stop putting waste in the water and keep to their quotas and so on. And gradually the – you know, the fish started to come back and things, the pollution was much better, the water was less polluted, instead of chucking all the waste into the sea it was all, you know, all dealt with properly and – and life was – began to be very much better. And these fishermen, these two fishermen told – briefly told their story to the – at lunchtime that day, they were not very articulate but they were very passionate and – and a bit of the video was shown. Then, this is the dynamics of this conference I’m describing [laughs], in the evening we got together and, erm … and there had been a draft document drafted for everybody to sign, hopefully, explaining about the need to care for creation from a Christian point of view and then going on to say, you know, that action was going to be taken on these various environmental issues. And – and the first bit, the Christian bit was thanks to Howard Schneider the night before wasn’t too difficult, they were prepared to say we – it’s a problem and we’ve got to do something about it, that was alright. But then as soon as they had to start to say that certain environmental action which was necessary, that was beyond what many of them were prepared to – they couldn’t conceivably go back to their, you know, church – senior church people, some of them were very senior church people you see, how could they conceivably go back and present them with this sort of ultimatum or, you know, this strong document, no way could they do that. And we – you know, we really understood that but we still want – there was still a great desire on the part certainly of the green people present to get something out of it. And then somebody – and I’m not sure who it was got up and said, ‘Well let’s forget about the statement, why don’t we sign a covenant like those fishermen did on Tangier Island,’ and that went down rather well, they thought yes we could sign the covenant, agree to do certain things, so the document – the theological bit was alright and then we started to write words like – if I could find a copy of it printed, I needn’t read it, I can remember some of it, the, er … like we recognise that, you know, that all
is not good about the way we treat the planet and that they’ve – we’ve not behaved properly in the way we care for it and we covenant to over the next few years, over the next year or two maybe, to study the issue, study the best information we can on the problems of the environment, including climate change, to engage our congregations … with the – in these studies, and to, erm … find, you know, discover what action needs to be taken in various aspects and – and in particular, within one year we will write a statement on climate change. So that was a remarkable statement for them to make, you know, agreement, covenant for them to make rather, so they would actually engage with the best scientists they could find in this whole issue to decide what should be done. And so then there was a question of the follow up, how this is going to happen, and that happened the following morning before the – before the whole thing broke up and … the … the problem was to – so there was a man called Ron Sider, S-i-d-e-r who’s written a book called, The Rich Christians in an Age of Hunger, I don’t know if you’ve come across that book, you probably won’t have done, but it sold probably a million copies by now, over the years, several editions. It’s a plea to Christians to take care of the poor and not to act so, erm … so improperly in forgetting about the poor and so on so it’s all about that and he was the – he’s a dynamic fellow, he was there and he got people organised into little groups to – various parts of this agenda that was determined by the covenant. So the follow up was organised and off we went away. Now as far as the – and some people said, ‘Well what a wonderful meeting, really the work of a holy spirit,’ they said, ‘especially the covenant idea.’ And it really was actually, it was – really transformed the meeting and it made it was a very useful meeting instead of something which would have gone nowhere.

[1:59:02]

So, hmm, very little was done actually until it was the year of Bush’s election and nothing must get in the way of Bush being elected, ‘cause they were all Bush people, absolutely, I was warned I must never say anything that was critical of Bush [laughs]. And – and I didn’t, but – and so nothing could happen before – because they didn’t want anybody to get wind of the idea that this – ‘cause it might stop them from voting for Bush. Hmm, so we didn’t get a statement within one year, it took over eighteen – well eighteen months actually, but in eighteen months time there was a – ‘cause they
worked at it, there was a half page in the *Washington Post*, and a half page in the *New York Times* which published a statement from … these people as individuals, not as the – any national association of the evangelicals or anything but – but it was leading an, you know, er … evangelical Christians’ point, signing – ninety leading Christians signed a statement, a strong statement, about the need to take action on climate change. And that really created some waves in the States, including in the White House because Bush wasn’t used to that sort of [laughs] idea at all because he’d been trained to believe that there nothing in it at all. And that was a major – a major achievement and the most – possibly the most senior person who signed that was … the man in California which was a, hmm, names again, hmm … a man with a very big church in California who prayed on the – the – at Obama’s inauguration. Hmm, it’ll come to me in a minute … has a 20,000 person church in California, remarkable man. Hmm … sorry I’ve just – it’s lost – it’ll come back. Hmm … so I too, I’ll say something about him again in a few minutes if I may. So that’s what happened and then – but then a few months later after that there was a further statement published with ninety signatures from Evangelical Christians which was an anti statement, a contradictory statement to that one. A bunch of people who were – who’d written a document, entitled, *A Call To Truth, Prudence and Care for the Poor*, which sounds wonderful, but it was essentially a statement saying that the whole climate change thing was – was … was not … was completely uncertain and nothing – and Christians should take no notice of it and – and if Christians really wanted to help the poor, the most important way to help them was to support the American economy, ’cause if helping the poor, doing something about climate change would cost so much that the poor would really be – poor worldwide would be very disadvantaged and that would be a crying shame, and so if you want to help the poor you help the American economy and therefore you do nothing about climate change, you must stop. You must stop thinking about that or the environment because that will only divert money which should go to the poor. And that battle is still going on. But I think it’s gradually being won. But the … and in fact the – the man who is now the – the leader of the National Association of Evangelicals is strongly on the side of doing something about climate change and so on, so there are lots of very key people over there now and people – big key churches and so on. The man in California is called Rick Warren [laughs]. I went to see him incidentally on my way back from Los Angeles IPCC meeting, had a Sunday lunch with him in – in his church in California and he’s
a – and he’s got a tremendous heart for the World’s poor and has something called a
peace plan, he’s training thousands of members of his church to go and work in third
world countries, helping with their – with poverty and so on. And his main question
to me was, you know, ‘We have this … poverty in the world, which is so – so – and
other major problems like that which are affecting the poor in the world very much,’
in fact he had five – a list of five things that affected more than – more than a billion
people, namely, erm … the list is five things, he’s very keen on a list of things like
this and publicise – publishing them and so on, and he – the first one is … spiritual
emptiness, the second is corruption, especially in high places, the third is poverty,
endemic, you know, utter poverty, you know, real poverty, the fourth is major disease,
like AIDs, but which is treatable, treatable disease. And the fifth is … illiteracy. All
of those he says affect more than a billion people in the world, we should tackle – be
tackling – as Christians we should be helping to tackle those problems. And his
question to me was, ‘Well we have poverty and we have these other things, why
should we bother about climate change until we’ve done something about poverty,’
and my reply of course is, ‘Unless we do something about climate change poverty will
be enormously worse because, you know, the poor will – mainly the poor won’t even
have what they have at the moment, so we really have to put that as number one
alongside poverty and we have do both at once,’ and he said, ‘Well maybe we shall
call that number six then.’ I don’t think he’s actually done that. He has a – he has a
church which is almost entirely republican politics, because it’s in a fairly affluent
part of California actually. He set it up in that – he went – came out of college, he
said, ‘I want to set up a church in the most un-church part of America,’ and so he got
books out of looking for the place – places further away from any church that he
could find with a good, big population, so he went into the middle of California, just
south of Los Angeles and he didn’t want to compete with any other church, he wanted
to go to people – and 20,000 people are now members of that church. It’s a
remarkable enterprise and he’s a remarkable fellow. He knows Obama very well.
And he said, ‘Come back,’ I was with somebody else and he said, ‘come and run a
workshop for me on this issue, or for us,’ I’ve tried to written – remind them since of
that desire on their part but I’ve not had anything back. And he’s a very busy man of
course and he has a lot to do in his church one way or another but I suspect that
there’s not a will amongst his – amongst church members at large to bother about it
and there probably won’t be until some real change in the American scene. So that’s
the story of the … of where we are with them and it’s still going on actually, these –
we still have … hmm … oh there’s the Sandy Cove covenant if you’re interested to
looking at that [looking through papers]. And that’s the Watermen’s covenant from
Tangier Island.

*Oh yes.*

There’s a file I’ve put on this pile too to look at in case I needed it, right. [Laughs].

[2:08:24]

Bishops, which I think was a significant event in the UK … I’ll just find the year of
that, do that just now and then we’ll – and then I’ll make the lunch. [Break in
recording]. Annual conference.

*Sor*ry this is the – *the Bishops*?

Well it’s the Annual Conference of Bishops. They meet every year in Liverpool and
George Carey was the archbishop about 1999 I would guess, that sort of – ‘88 or ’89,
I’m guessing now, I can’t find the – the years. And so they asked me to go and they
were going to have a session on the environment, would I go and talk to them about
the environment and climate change in particular. And so which I did and, erm …
well there were bishops I knew were pretty well onboard, people like the Bishop of
London of course was keen on it, people like the Bishop of Hereford actually at the
time was, oh his name, I’ve forgotten, he was keen on it, so on. But – but it was in
Liverpool and – and James Jones Bishop of Liverpool was there and he was – he … I
think has described it as a Damascus road experience for him, he really picked it up
and – and he’s done a great deal about it since, and in particular he’s had a heart for
trying to win the Americans over. And he’s organised a number of essentially private
sessions for Americans in the UK, particularly at St George’s House Windsor which –
some of which I’ve been involved in a bit too and he’s a – and other people of course.
And he’s really tried to spread … you know, to scientific information as well as
theological information about these things in the community I’ve just been talking
about in America, with some success. It’s hard, not easy. But there’s been some
success in that and he’s had a good part in that, in – in recent years, we’re about to have another one next month [laughs], but we don’t talk about it [laughs].

What do you mean?

Hmm?

What do you mean you don’t talk about it?

Well we – it’s much better if people don’t know Americans are going to come to Windsor, to a conference on climate change, American Christians.

It’s better for the American Christians themselves?

Of course, yes that they don’t, that they’re not labelled as people who are coming to – they’re keen – keen to get people who are not convinced or – or might even be anti, and, er …

And are you saying that the Americans would be less likely to come if this was sort of advertised and known about, the meeting?

I think they’d be more frightened of coming, might not come, yes sure. That’s off the record this little bit, yes.

We are recording but I can close that.

Yeah, hmm, well I would say I think it’s very important that we don’t advertise these things, it won’t matter if you do so probably but –

Well it’s quite interesting that I suppose in a way that being interested in climate change is seen as something that they’re very concerned to – some of them would be very concerned to hide, is that …?
Sure, I mean it’s an – it’s an issue over there, and you know, Christians who are not people who believe in climate change, climate change is seen as something which is something which only green people bother with, and green people are not Christians so it’s, you know, it’s not a Christian thing. And it’s a – it’s a very serious – it’s a very simple divide in a way, and a very serious one.

Do they – do they take anything from the Bible as evidence that it’s something that they shouldn’t be concerned about, in the way that you would read the Bible and argue that for instance, you know, the story of the garden, that it indicates is an argument for.

Yes.

Do they take anything from scripture as indicating …?

Well I mean they – they – they hone in very much on the – on Genesis One which says, you know, we were put in the Garden of Eden, or put in – or humans were made to have dominion over the earth and to subdue it, which is what it says in Genesis One when humans were created. It’s – that’s of course modified, very much – modified very much by the what’s said in the next chapter, Genesis Two, when humans were put in the Garden of Eden to care for it and to serve it, but you know, to have dominion and to – and to rule over it, which is what you get in Genesis One when you interpret it as they want to interpret it, means you can exploit it how you please. And, erm … there’s not much else in the Bible that gives them that excuse but it’s a – but it’s well – they’re – you know, they’re a community who are, you know, they’re a pioneering community in America, they’re part of the great American dream and they took over America and they’ve been farming it and – and exploiting it all over the earth and they don’t want to have any – have any of that stopped in any way, because they can do what they want and because God’s put them there and he’s given them stuff to use as they please. And we have this – the earth to use as we please, and one day Jesus is coming away, coming back again and the earth will be destroyed, so they think, and so why does it matter? And we all go to heaven, wherever that is and whatever it’s about [laughs]. Whereas I would argue that what the Bible says about, you know, coming again and all that is Jesus is coming back to earth, it’s the earth
where we’re – where there’s – God isn’t giving up the future of the earth in any way, he’s put us on the earth to look after it and care for it and – and although it’s very unclear of course what’s meant in other parts about new heavens and new earth and how – what – or what – that means in real terms, a lot of them just are theological language, nevertheless that’s the – the main message of I think – of scriptures regarding the future, and which is care for the earth. I mean for here and now of course that it really matters here and now to lots of people and we’re not doing it properly, and so that’s the main reason for doing it, but also in the end it’s not – not as if this is all going to disappear, God’s creation is going to remain in some form, be it a transformed way where there will be no sin and no – you know, no death. Hmm, however you can work out that whether it’s – whether creatures die in any way or not I don’t know, it’s far harder to know, we don’t – not given that information. But – but we are given information that it matters what we do. [Laughs].

[End of Track 13]
Track 14

You asked me to remind you to speak about – to speak further about links with Japan and China concerning –

Or China actually.

China.

I have a sheet with some notes on that my … I call her my secretary but she’s not really [both laugh] [pause – looking through papers]. China, yes, er, I first went to China in 1980 as a – four of us went to a – to go on a lecture tour I suppose, organised probably by the British Council I would guess. Hmm, Sir John Mason who was then the – the director general of the Met Office, a man called John Monteith who was a professor at Nottingham, a distinguished person there, distinguished for his work atmosphere – atmospheric work, well concerned with agriculture really for the Royal Society, and a man called David Jones who was a – a Met Office meteorologist, who spoke Chinese, and myself. We called ourselves the Gang of Four [laughs] which they thought was amusing. Hmm, have you got that bit?

Yeah.

It’s all there. Hmm, and I – well we had an interesting six-day visit to Beijing and then to Nanjing and Shanghai, finally Hong Kong, we were giving lectures on the topics we knew about, and John Mason was a great cloud physicist and also of course at the Met Office, a very good lecturer, John Monteith, we were all I think quite good at lecturing. And, erm … just one or two things which I remember that might be of interest to people. I think it was not that long after the Cultural Revolution of course and China was try – trying to pull itself out of that, so a lot of the universities and so on were really very primitive and so that service was very prim – primitive by our standards even in those days and they, er … and they appeared rather embarrassed by these poor standards really so they tried to avoid taking us to places, although we’d have loved to see them very often. You know, we’d just arrive at the time when it was, ‘Oh sorry, it’s got shut now actually, [laughs] you can’t go in,’ hmm, ‘what a
pity we haven’t time to show you,’ and all that sort of thing kept coming on – coming by and we understood the message. But – but they were dying to learn things and so on and they – and it was all done with sim – with sequential translation, the lectures. I’d say a sentence, they’d say a sentence, showing slides in the middle and so on, so it took hours for these lectures but it was a great experience. Beijing then was very different from what it is now, full of bicycles, millions of bicycles, very few cars. We had, you know, official cars that took us round, erm … which – there were two cars actually who took us round. One car had curtains and looked very smart and the other car wasn’t quite so grand, and John Mason felt himself to be a grand person and always succeeded in getting into the car with curtains, [laughs] and so on. And the others of us tried to – always vowed that one day we were going to prevent this happening by getting there before him. We never succeeded [laughs]. But it was, you know, we got on very well together and, erm … Beijing also was, you know, full of – very different from today, no roads of course, no very big roads, it’s now enormously different. They’ve had an enormous building programme of course since then, it’s a completely transformed city. And – and then there were large, you know, large areas with, you know, long huts where people lived, you know, long buildings, long low buildings like people lived. They had – and there were also of course massive, erm … massive – massive, you know, shops for tourists with all sort of knickknacks and bits of things, and relics and emblems and bits of jewellery and all things of this kind for – for – and so I tended to come home loaded with all sorts of stuff we didn’t really need but we – [laughs] but we bought ‘cause it was interesting and different and all those things. Very hard to find a shop like that in Beijing now, the money is all with the people in China so they’re not bothered about tourists so much and – and they’re all, you know, glitzy department stores for local people. And massive jams on the motorways, go around Beijing and it’s absolutely changed beyond – and terrible pollution there on way or another, so it was very different in 1980. Hmm, we – the most senior person we met was a man called Fang Yi who was one of the deputy – deputy prime ministers and president of the Chinese Academy of Scientists, engineer by training. And – and I can remember – and we had tea with him, you know, in Chinese style, which was nice, and I can remember this speech he made to us, I can remember its content more than any other speech I’ve ever heard, I think, ‘cause mostly when – well in occasions like that they may say nice words and, you know, proper things and it’s friendly and all that, but he was extremely matter-of-fact, he
said, ‘There are four problems in China today, I’d like to tell you about them. The first problem is population. We are growing too fast and we have a rule of of course one child per family, it’s working in the cities and it’s not working in the village – in the rural areas, but we hope it’s going to control the population in due course. Second problem is food. We – we are trying to increase our – our food production ‘cause of the increasing population and we are getting three – three harvests a year from some parts in the south now and we are, you know, we are trying to do what we can and – and we’ve just started to privatise – privatise food,’ he said, ‘We’ve let the – we are allowing people to grow in their own patches or gardens, food which they can sell and that’s – that’s put up food production by ten percent,’ he said, ‘we’re very proud of that, privatisation. Third problem is science and technology. We – we’ve lost so much in the Cultural Revolution, you know, in this scientists sent to the fields and we’ve lost a, you know, generation or so and we desperately need to grow in science and technology and perhaps you can help us with that.’ And so we had a discussion afterwards about what we could conceivably do to help in exchange of Chinese, all the rest of it, to try and help them on their way with their Cultural Revolution – with the problems of the Cultural Revolution. ‘Well,’ he said, ‘the final problem is bureaucracy. If you have any – any idea how to cope with bureaucracy please let me – let us know [laughs] because we desperately need to get rid of it.’ End of speech.

I’ve shortened it but it was of course – but it was a remarkable speech I thought for a politician to make to a group of visiting lecturers, opening – just opening their problems and saying, ‘We’re very pragmatic people and we’re getting on with it. Help us please,’ and it stuck in my memory ever since. Hmm, anything else that happened during that trip, I don’t – anyway that was a – that was a good trip, very interesting to see China in that – in that way. The, erm … as I say we also – they took us to the central Meteorological Bureau and so on, which was woefully short of computers and expertise and so on and was not in a good state compared with anything in the West then, and had virtually no good fac – weather-forecasting facilities of the kind that we know and [inaud]. Hmm, but we were – we then met Zou Jingmeng who was the acting director-general in China, and he later became head of the Meteorological Bureau, about the same time as I became head of the Met Office, and so I got to know Zou very well. He became president of the WMO in due course. He was a man who was – who knew … who had been to school with the man who was Chinese premier. What was his name? Ling? Not Ling. Like that – like
that, Chinese premier at that time, in the mid ‘80s, so he had a straight line to the top and he was able to buy computers of a, er, you know, buy computers in the West, and not just Chinese computers and so on, he was able to – he was able to get equipment and was a – what he wanted to do was for his bureau to be a really modern weather-forecasting bureau. And so it turned out to be, you know, during the ‘80s when I visited China, well, a couple of times more when Zou was there and I was head of the Met Office, and we, erm. - I need to look at the Met Office archives to see what exactly these programmes – these visits were about, but he – we had a very good liaison between the Chinese – that Chinese department and – and the Met Office and we tried to help them all we could. And eventually they set up a – they set up a climate research centre … about the time we set up the Hadley Centre actually and their centre largely was somewhat modelled on the Hadley Centre. Very good exchange and we had some – some joint meetings with them, very – a particular joint meetings actually trying to do – trying to do work together very – well that was later on in my period at Met Office. Hmm, so it was remarkable to see that growth which had occurred, and of course their growth in science and technology very rapidly, remarkably rapidly, and industrial connections, all those things were – were good and of course I had a Chinese – Ding Yihui who was the – my coach here with the IPCC and so we had lots of conversations together. And, erm … so … so that was a very good connection and I think a very … effective connection there with us helping them onto – to get set up and also the WMO connection with Zou was very strong and he … he retired in the ‘90s I think and – and very sadly was murdered. They thought that he’d been killed in a mo – in an accident or something but he was actually – he used to love driving himself around, you know, he had a, what, by Chinese standards of course a fancy foreign car you see, or I don’t know if it was a foreign car but a fancy car. And he’d go and shop, take himself to the shops and all sorts of things you see, and he went – he went through the centre of Beijing one day and he got out of his car and was threatened by somebody who wanted money or wanted something from him, and Zou being the sort of man he was fought him and – and was stabbed to death on the spot. I’m sure the chap who did it suffered, you know, had the appropriate sentence but nevertheless it was very sad that he died that way. It seemed – we wondered at the time whether this was a plot of some kind, you know, because he was a – a free-minded man in some ways, he had no – as far as the regime was concerned he wondered whether they were keen to get rid of him but that was – there was
nothing like that about it. So that was the growth of China which I was pleased to have had a little to do with. Hmm … alright?

_Could I – could I then ask you now about the book The Search for God, Can Scientists Help_?

Yeah.

_And one of the – one of the key arguments in the book is that because God made the universe, to then study it is – to study the universe is to, sort of, to study his creation._

Hmm-hmm.

_And therefore if you can understand his creation you might be able to infer something about God, in other words you might be able to infer something about the person who made it._

Sure. [clears throat].

_And so I wanted to ask you, specifically in your own scientific work in – in observing one part of the universe, especially the upper atmosphere of earth, but also your work in climate change, what have you been able to deduce about the nature of God?_

… Well that’s a – a good question, erm, I mean if you – we know so much about now the earth as a whole and how great creation is, it’s very big and very great, beyond our imagination, and that’s, er … and that’s wonderful, you know, it’s a very, you know, there are, you know, the stars in the universe has now gone up by a factor of ten recently, almost, ten – from ten to twenty-two to ten to twenty-three [laughs] ‘cause people think there are more of them. But it’s – so that’s enormously large numbers of objects and we happen to live on this small place, but nevertheless … for us to be here in the whole universe because that’s the way the atoms have been formed, in stars. You know, the – the way in which complex atoms occur, er, are made up, nuclei are made up, they’re made up in – in reacting stars and, erm without all these stars and the sort of length of time required for these – for all these things to be created within the
universe, we – we wouldn’t be part of it. So, erm … so that’s just these are interesting facts which make us, you know, on the one hand very – feel very small, I’d say we were completely and utterly insignificant compared with the God who made all this lot, on the other hand when you realise that we don’t know of any other beings like ourselves in the universe, there may be lots of them of course, very interesting, we might be able to solve some of that in the years to come, looking at some of these new planets that people are seeing. But it’s a – it just the – the variety of facts which declare the greatness of God, his … his orderliness, you know, the whole mathematical structure of the way in which physics works, with its enormous precision in some of the numbers which he used, I mean, they’re all in the books I think, are just amazing. That the universe is so precise in the way it’s formed, the way it goes about its business and all the rest of it. So there’s that about it too, and the mathematical basis means it’s extremely orderly and precise in its form, physical formation. Nevertheless there’s a – also a – a looseness about it in the way it – no detailed things go on. We talk of chaos theory which – where things are extremely sensitive to the original conditions and, you know, if you want to predict on a computer the … the placing of balls on a billiard table, perfect billiard table with perfect cushions and all that, after one minute you have to know the – the push with the – the thrust with the Q-ball to an accuracy that allows for the attraction that, you know, the gravitational attraction of the electron at the edge of the universe – at the edge of the galaxy. You know, it’s – predicting the future is very difficult in terms of physical terms and we have these uncertainties, and it’s to give the – give a flexibility to the way things are of a kind which – which all forms the background to the lives we lead and have to lead, to our freedom and our lack of freedom and to our, erm, to all those things. So it’s – well there are things to reflect on, rather than to prove, about the nature of God and his relation to us, but he’s given us some freedom, he hasn’t made it all, as people have, no freedom. Er, where the origin of evil comes from and evil, er, so on, we – we don’t know. And why, you know, evil should be there, people, philosophers and theologians pontificate about it and talk about, well you can’t have love without hate and – [clears throat] and if God really, really [inaud] on love, which he certainly does, and then you can’t have that without having some things negative too, and I don’t understand that of course and don’t know if anybody to a large extent does. But we have a very interesting God and very great God and a God who, you know, with the revelation we have of him in Jesus, which is the other
half – big half the revelation, putting the two things together is a very exciting thing to try to do, which is what I try to do in the book to some degree. Hmm, I’m not a professional theologian and I’m not a – [laughs].

*I felt – I felt more comfortable with the idea of a Holy Spirit, in other words a god that acts outside of time and space.*

Hmm-hmm.

*Because the argument is, why – why should the person who – or why should the being who created the universe be limited by it, if you like. But I – I didn’t understand quite why … that the designer of human beings, or the designer of the universe, must himself have human qualities. Why – I didn’t quite follow the deduction, why do we assume that God must be like us, given that he’s so different and so much bigger and can act outside time and space, why do we – why do you suppose, I should be saying, why do you suppose that God must have human qualities or be like – be like humans?*

Well, hmm … I mean I’m starting of course from a position where having read what the Bible says about him, we are made in the image of God and that – that therefore there is some – some background to the idea that these qualities that we have of freedom, of consciousness, self-awareness and all those things, are not just unique to, er, to us. We don’t know of course to what extent the animal creation has any of these anyway but – very hard to find out but – but to imagine we have those, erm … and the creator who’s made us, for some reason presumably, or he’s caused us to be made or whatever it is, is completely impersonal and doesn’t have those qualities, which seem to be, erm … it’s a perfectly possibly position to take of course but – but it’s reasonable to suppose that it’s likely that he has qualities of this kind so that he can relate to us. Because the highest thing we know in terms of qualities is probably love, love and relationships are tremendously important to humans ‘cause that’s the way we – where we create our – find our greatest enjoyment and our greatest happiness comes in – in loving relationships. And – and if we are … and if there’s a creator who’s made us, why shouldn’t he have these qualities too? And that’s where the Christian story of course begins in a way, to say that God has these qualities, but it’s very reasonable to suppose he has. To say he’s just a – just a god who made this machine
and then stopped, left it to its own devices and has no interest in it, is a possible position to take of course, but it’s not an interesting position to take, it’s not a position you can approve and it doesn’t seem to me likely that the person who made it all is not going to enjoy it in some sense having made it. Hmm, and of course in terms of size he must be in all – all respects he must be enormously greater than we are, having made it, and with potential of a kind that’s enormously greater than we are, erm … but it’s to explore that possibility seems to me a very – very exciting thing to do and if you make any progress with that, exploring that, which is what the Christian faith does actually, is very exciting. Is that a …?

Yes, thank you. In – in the answer to my previous question about what does studying the universe tell you about God, I mean partly ‘cause I included the word universe in the question you talked about, you know, what the – the scale and behaviour of the universe tells you about God, can we just talk then about the earth’s atmosphere. And I wondered whether you could say what you have under – what you have come to understand about how the atmosphere works, which is considerably more than many other people have understood about how the atmosphere works, through satellite work for example, what does –

Sorry, through?

Through satellite work for example, what does that particular part of the universe tell you about God if you – if you think about it in that sort of way? In other words, what does the way in which the atmosphere operates tell you about how it’s – its creator might operate?

Well I – I suppose I’ve never thought of it as, you know, taking the atmosphere on its own because it’s not on its own, it’s part of a whole system. Hmm, it’s – it’s a gaseous envelope of the earth that moves around in ways that are determined by – through dynamics, the laws of motion and so on. It has certain properties of certain gases within it which are essential to its – to its use, of the atmosphere has a useful place ‘cause it helps the rest of – the whole of – the rest of creation on this solid earth and on the liquid earth and so on, to – to operate. Hmm, it – with the atmosphere we have at the moment of course it enables us to breathe, it enables us to live, and there’s
a cycle of nature which is cycling all sorts of materials and all sorts of mechanisms that go on in the whole of nature, which involve the atmosphere in all sorts of ways and it’s a remarkably connected thing. In fact of course Jim Lovelock talks about the whole thing as being one organism, the atmosphere, earth, ocean, and so – and the whole solid earth all being one organism which is – the various parts of that organism are helping each other one way or another, or feeding on each other or connected with each other in a way that makes it – makes it all work, and that’s a very interesting idea. In fact some people of course have taken that and called that God, ‘Our God is Gaia,’ which is their god of the earth because it’s such a remarkable, seemingly, you know, cyclical complete setup. Things depending on each other in – in remarkable ways that we don’t actually understand, and many of them – some of them we don’t even hardly understand in detail, the – how things have arrived at being so – so useful. Hmm, and for instance, one often quoted by Jim Lovelock in his book, if one is it, if you take the atmosphere, there’s a, you know, oxygen is one fifth, or thereabouts, of the atmosphere, 20 percent, which if it was 24 percent or 25 percent then forest fires would be much more common and would be very hard to put out. And so lots of forests would disappear as we know them and become black in places and so on, and all that goes on there would – would be, er, wouldn’t be viable. If you had only 15 per cent or so you would never get forest fires and they wouldn’t last any time, they’d go out and – but fires are the means by which forests are … are restored and they need that cyclical process to grow all sorts of creatures and plants, and things within forests require that in that cycle to enable them to keep going. So it happen, and how did it come to be just about right? And it’s hard to – you don’t see the co – there are big feedback connections within nature, some of which we understand and some of which we don’t understand but it’s, yeah, it’s interesting that you – you can invent a – or create a – a concept of something like Gaia which means that things are very dependent on each other in ways that you don’t – you can’t follow physic – the physical mechanisms entirely but nevertheless it’s on evidence that it’s like that. And – and that again is wonderful and I think that’s, you know, hmm-hmm, without answering questions, it’s –

Yeah.

One’s asking questions all the time.
Hmm, hmm, and would you be able to give me a picture of the – the varied response of scientists including your own colleagues to your sort of openness about your own faith, but also about the interconnectiveness of science and faith.

Hmm …

The response of other scientific colleagues, both positive and negative, if you like, I suppose.

Hmm. Well except to reflect perhaps that it’s – it’s not something many scientists do, is to put the two together. It’s not the sort of thing that many people do actually, put – they have compartmentalised lives, and thinking, and, erm … it’s certainly true of many religious people, whatever religion I think, they have their religious beliefs and they don’t interfere with – or don’t connect actually, with their scientific training or scientific knowledge of any kind. And there are lots of, you know, quite – quite keen Christians and good scientists who don’t put the two together, don’t seem to want to put the two together particularly. For some reason, a strange reason, I don’t know, I’ve always wanted to put the two together, right from a early age, and want to feel that there’s a big picture up there that is to be understood. And so, you know, when I talk like this in – to scientists they – they tend to dismiss it on the grounds that, you know, science is, ‘Well I’m not very interested in religion anyway so why should I bother?’ And the other way round, when you’re talking to Christians, ‘Oh well, well I’m not interested in science so why should I bother?’ And, so there’s a great deal of indifference and people – well we all actually, I myself included, tend to put ideas in compartments without allowing them to wander out and come back with messages that might be interesting or important. So, I don’t – I don’t know if I can expand it very much –

But would –

Beyond that sort of feeling, so.
Would particular scientists have commented on your book, you know having read your book?

Hmm-hmm.

You know, told you what they thought about it or –

Yes.

Agreed or disagreed, or made specific comments.

Well I was – well when I wrote the first edition of – of Global Warming, I did it at the request of Lion, Lion publishers who were a Christian publisher. They said, ‘We won’t like to publish a book on global warming,’ from a Christian point – well from a scientific point of view but, well, they said, ‘Write a science book,’ but I thought, well it’s Christian publisher, so – so let’s have a Christian chapter, or something along those lines, so I put in a Christian chapter. And the book got quite wide publicity and sold quite well and – and I expected some flack actually from my scientific colleagues, for having put in a Christian chapter in a book which was essentially a science textbook. Hmm, I got very little flack, I got quite a – a lot of people ignored it of course, but some people went out of their way to say what a good idea it was to put the two together. And the most prominent of those was a man who wrote a long, er, long review in the bulletin of the American Meteorological Society, I think five or six pages, it was a very long review of the book, hmm, what’s his name now? I’ve – I’ve forgotten it for a minute, doesn’t matter, oh it doesn’t matter at the moment, but he was a man with a senior position, a senior policy position in the – in the administration, and I’d known for some years, but he – and he wasn’t a Christian. He said, ‘I’m – no I mean I’ve lost it but I do recognise and I do salute,’ or words to that effect, ‘John Houghton for putting – putting these – these spiritual things in, you know, these connection with the rest of life or the other – other ideas, because it’s very good to know where a scientist is coming from. It was very good to put all these things together and I really think that more scientists should do that. What is their background in terms of ideas of other things too, let’s put the whole thing together,’ and he was – it was, er, it was a very nice st – a very well written, a very nice
statement, I was really – really was very, er, pleased with that indeed and – and other people have said similar things, not quite so eloquently, not quite so long. Hmm, there was one that when the – when after the first edition, which sold quite well here, it hardly got into America ’cause Lion wasn’t no good at that. And when I changed to – to Camb – to CUP for the second edition they took in onboard. They – they wrote off to different people to – for comments on the book. And there’s one in particular that came back to me, it may have been between the second and third edition, or the first and second, I’m not sure, one or the other, hmm, and this is a chap who – who made very caustic comments on the – on the Christian chapter and said, ‘Well if Houghton believes all this mumbo jumbo how can we – how can we conceivable trust him on scientific matters at all?’ I – I could guess where it came from but I wasn’t sure of that. That was the only very negative comment I got from anybody on that book, on that –

Where would you guess that it came from?

Well there was a scientist in California, I’ve – again, I’ve forgotten his name, now, I’m realise hopeless at remembering names, but I – I would guess this – the person it came from, I thought it was the sort of man they’d send the book to anyway, so I have no knowledge of where it came from.

And why did you – why did you slightly reduce the – those personal reflections on faith as motivation for science in later editions? I think I may have number two or number three in which you say that you’ve de – in the preface that you’ve decided to –

Well that was a change between one and two actually.

One and two.

It hardly changed between two, three and four.

Oh, I’m thinking then –
No, it’s essentially the same, but I was now writing for CUP as a – as a university textbook and in the first edition I had written, you know, the Christian chapter in a way which was a bit more personal, as a personal testimony for me in a way rather than as something that was inviting students to pick this up and study it and argue about it and discuss it. I thought that – I – I’d better write it a bit differently and – and put it in a way which asked questions, er, and there are lots of questions I put in the book. Yeah, I didn’t have any questions in the first – the first one. A lot of the material I tend – tended to put into questions about, you know, what is – does it matter whether you’re religious or not or what is the impact of your religious faith or your non-faith or whatever it is on your attitude to the environment, and things like this, and I tried to make it less of a personal thing but more of a didactic argumentative type of – type of discussion rather than a – ‘cause I thought that was more appropriate to a book which I – was going out as a – as a major textbook in the university community rather than just putting a bit of – a bit of religious chat. I was not trying to water it down in a way, I was just trying to make it more accessible to students who might come from any background of any kind, and I suppose my objective in the first edition was to try to persuade Christians to get involved in – in this sort of thing. The – hmm.

Could you then tell me about your role as founding chair, I think, of the John Ray Initiative.

Yes. Well this is I suppose in … 1997, I think it was ’97. Hmm, well I was then, you know, we’d come to live here and, erm … and it so happened that we have the outward bounds school down there, below us here. At that time the outward bounds school had another property, er, this one was the original founding place in 1941. On the other side of Aberdovey there was a big house called Rhowniar, doesn’t matter what it was called but it was a – which had been a – which had been on the girls’ component of the outward bound, [laughs] they had the boys over here and the girls over there, a long time, but it had turned out they were not using it very much and it was up for sale. And – and it was a big – a big centre with, you know, lecture – big old house, had a lot of dormitories in – in a block and also, you know, lecture halls and this sort of thing. And I began to dream and imagine, well, you know, supposing we tried to set something up as a – as a, say, environmental centre trying to do
environmental things and get Christians involved in environmental things, maybe it’d be good to have a centre, and wouldn’t this make a marvellous centre and it’s probably not going to go for a lot of money and could we do anything about it. So I had a friend, er, have a friend called John Sale who then lived just outside Oswestry and had a deer farm out there, who’d been, erm … spent most of his life abroad, he had been at the University of Nairobi, he was a – he was a, well, a leading zoologist. And I’d known him a long time and we have – I’d visited him in Kenya and we’d had – he’s a big outdoor man and – and was a keen Christian also and we – well he came over one day and we chatted about, you know, could – what could we do to really further this sort of burden that I was beginning to have, you know, that I’d left the Met Office and I was retired, supposedly, you know, and Christians by and large used to not take an interest in the environment at all to any extent and it’s such an important subject, and it’s getting more and more important and climate change is happening. So what can I do about it. So I talked to – so we talked together, shared the ideas with some other people we knew and wondered about whether we can conceivably raise money to – to buy the building and set up a conference centre which was a, you know, a crazy idea really but anyway that’s – so that’s what was driving us at that time, and here was a beautiful location where you could imagine it happening. Hmm, anyway we – we started to talk around to different people about it and an organisation called Orosa which was a Christian organisation concerned with ecology and the environment but very much homing on certain particular things, very – started by people who were very keen on studying bird migration and things of this kind, it’s – it’s a become a great organisation actually. Talked to them about it, they were a bit worried about us perhaps getting in their way and, er, which in a way I understood, so I – we would perhaps do it together, I was sort of saying, and they had other ideas and – and so on. Hmm, I also talked to other people who knew about raising money, a friend I knew who had raised a lot of money for, erm … you know, been a director at Kew Gardens actually, Kew, and raised all the money for Kew and so on and he – he said, ‘Oh, you shouldn’t have any problem raising – raising money for that, you know, I’ve raised money for such things,’ and so on. And so we pursued that for a couple of years, failed to raise the money and I needn’t go into all the detail. But nevertheless the I – the idea had been – the seed had been sowed to say, ‘Well we should be doing something,’ so we found a – this is John Sale and I talked, er, with others, there was a man called Sam Berry who’s professor of genetics at University
College London, and we tried from there, who was a key – a key person in plants who was director of Kew, who I was talking about, and he was retired from that too, was about to retire from that. And, you know, top people, top scientists in their way, and we – and some others, and we, erm … oh and a man called Colin Russell, Open University, again a keen scientist and also were very – always very keen on caring for creation and caring for the earth, and caring for the poor actually too. And so – so we founded – we started the John Ray Initiative with the object of, er [looking through papers] … there’s one, John Ray set, I have a set of things there which remind me of the history. Hmm, and one of the very, erm … we set up the – we started – we were going to do thinking, we were going to try and write – writing on the subject, trying to spread the word through conferences of a – of a specific kind, training, educational, spreading the word type conferences, and – and also through trying to get a – together a body of associates, people who were interested in the same sort of problem, would in a very loose way, loose connections, we tried to further this amongst churches and things like that. Hmm, one of the first things we did [walks away from microphone to get papers] – first things we did, we were – set up a conference, Christian Approach to Environment, the data, that was, erm … 1999 I think, the Brunei Centre in London, Christian Approach to Environment. And we had some top speakers, Sam Berry spoke, Hugh Montefiore, who had been bishop of Birmingham, I don’t even – probably know his name, and Alister McGrath who’s a great theologian, exponent of things of that kind. Hmm, Gordon Wenham, what other – I mean top theologians and scientists concerned with the environment and that was a – you can have a copy of that if you’re interested.

Yes please.

Would you like a spare copy?

Yeah.

That was the first thing we published and the first thing – one of – one of the major first things we did. Hmm … which was trying to say, ‘Christians, you should get together, do something about this caring for the earth.’ The next thing we did I suppose was really the – the forum in 2002, the American conference in – in Oxford,
was the thing that really followed that in terms of conferences. We had other – there were other conferences downstream, a couple of other books that essentially began with conferences, later in the – early this – over the last ten years or so, running often enough. [looking through papers] That was a Christian framework for environmental sustainability, this was a joint conference of John Ray Initiative and the Victoria Institute, the first lot in October in 2005, and that has top people writing for it and so this was a way of spreading the word [inaud] which is more recent, and this was set up jointly with the Faraday Institute at Cambridge in the book is dated 2009, so it was probably about 2007 we –

So the book is Creation in Crisis.

Creation in Crisis, that’s right. And that was that particular conference, again to do with sustainability but climate change of course came into a – part of this. So we’ve published books and we’ve – and went – gone around and given lectures, given a lot of lectures. We have a active website, which if you look, jri.org.uk, and, erm … which has quite a lot of material in it and we should keep it more up to date than we do but we – it’s not too bad. Hmm, we have collected also tens of associates around the country, who are people who, you know, as scientists of some calibre, working in different areas and who are trying to do things locally and trying spreading the word, the importance of this, er, otherwise. So that’s been our main activity. Oh there is – we’ve also been – got in – is, er – we’ve run a – a distance learning course called CRES, Christian Rural and Environmental Studies, which was a joint enterprise between the JRI and a body that called itself … oh dear, this was on the farming side, that sort of farming, agricultural side. What – what can you do about problems of the environment in farming and – and should – how should Christians get involved in that sort of farming game. Hmm, and the agricultural end is – is fairly important in the whole, you know, the global warming problem, you know, the earth can be – the land can be a – a source or a sink depending how you use it, what you put on it. And the, you know, there are lots of place where it’s occurring in the soil – the interface between the soil and the air, which either can mop up CO2 as is – as can be done if you appropriate things in the soil. Or you can go to move CO2 into the atmosphere. If you take the water out of a peat bog for instance, the peat essentially burns but slowly, and out goes the – comes the carbon dioxide in very large amounts, so it’s –
there’s a big interface there to be taken care of, and we’re not doing it very well, and farmers are not doing it very well, so there’s a lot can be done there. And we’ve – at the moment have a – one of the people we partially support is doing work in this area and he’s helping with this course and he’s also trying to write about it and hold conferences about it and so on. So it’s conferences, that sort of thing, not in a very big way, we’re not a big organisation, we – we’re small but we – we believe we’ve done some good things.

[End of Track 14]
Track 15

_Could you say something about the way in which you have been misquoted by various people concerned with, hmm – [phone rings]_

[End Track 15]
Track 16

Yes, so –

In – in dealing with these, there is always false information on the internet and always false information goes around about the IPCC, about me and – and all that sort of thing. I’ve taken the line on the whole that if you’re being – if you’ve talked up – object and create a fuss then you’re only giving greater publicity to the issue and that on the whole is counterproductive. A few years ago now a quote started to appear on – in various places which was, ‘Unless we announce disasters no one will listen,’ which people have attributed to me and you can now find it on millions of websites as my quote. Hmm, and again, I ignored that, I didn’t know where it came from, I had never said it, it’s – I never would say it, I never published it. It was – people often reference this as coming from my book, it is nowhere in my book, any edition of it, and – but still I thought, well this – it will go away one day. But eventually it got to the pitch where it was being used by people to not only say I was exaggerating but to say the IPCC was exaggerating, and erm … and the IPCC could not be trusted because here was a chap who was the main editor of these reports an – and he was clearly alarmist and exaggerating and not to be trusted. And that got so bad and, hmm, and – [phone rings] oh no.

Don’t worry.

Right? Hmm, and in particular a man called Booker, who has a book on global warming, this appeared as the number one quote on page one, but reference to my global warming book. And again I – I ignored that and then, er, but I … but I talked to various people about it and in the – and The Independent newspaper picked it up and did some homework on it and wrote a page on it in – well this is now, what, two years ago or 18 months ago. There’s a whole page of The Independent which exposed this, and the people who misquoted, who’d used the quote seemed to, according to The Independent person who looked around where it came from, seemed to have originated in Australia. There’s a particular person who again my name has forgotten his [laughs], and – so they – they had a, well, a big page debunking it which was – which was good. Hmm … but then when I – but then I wrote to various friends about
it and said, ‘Well, you know, what do I do about this? How can I – can I pursue it legally in any way because it’s really doing damage, real damage to the IPCC,’ and, well, one of the people I know – knew very well from the Royal Commission, Richard McCrory, who’s a – who’s a lawyer who deals in environmental law and I asked his advice and he – and he got in touch with Freshfields, who he knew very well, you know, the big law firm in London, and suggested I talk to them. So I did talk to them and they – they agreed to pick it up and pursue it on my behalf at no cost because they were, you know, keen to help the environment and so on, and so in the end they – they got agreement from the publishers of Booker’s book that a corrigendum slip should be issued, should be enclosed to every edition, every copy sold, and of course in any – for subsequent printing it should be, er, either removed or explained. And so that was a major – that was a significant achievement, except Booker, he writes in *The Sunday Telegraph* very frequently of course, he’s one of their people who writes there, he wrote a nasty article, referring to – referring to my quote and how – oh I can’t remember just now all the words he used but it was – it was not in any way – he said he had – he’s going to draw on this quote because he’d found another quote, that’s right, he’d found another quote from me, ah-ha, of course, which – which was also about disasters, which came from an article in 1993 I think in this – in *The Telegraph*, *The Sunday Telegraph*, which was an article labelled Me and My God, which was an interview I gave to somebody in *The Sunday Telegraph* talking about disasters and I had said so – something about, well, disasters helped to make people take notice. But that – which I was not in any way proposing exaggeration in order to do that, and it was all part of a sentence that made, you know, perfectly good sense as – as a normal sentence, not a alarmist or exaggerating sentence of any kind. It was nothing to do with climate change anyway. And he said, ‘Well this is – it’s much the same sentence so Houghton really believed that I think really, even though he’s said he’s never said it,’ sort of thing. Freshfields sorted that out with the Press Complaints Commission and eventually after months of argument [laughs] *The Telegraph* published a piece and a further article from Booker [laughs], which was not friendly. *The – The Telegraph* did insert in reasonable sized print a letter from me which was – which was saying I was not alarmist and this was all – a satisfactory letter, not over the top in any way, but it was trying to put that thing to bed in a way which – which tried to destroy any evidence for any exaggeration on my part. Hmm, Freshfields have also taken up with – there’s another book by a man called Carter where there’s a
lot of rubbish from the same – who said, you know, ‘Houghton has said he never said this but of course it’s the sort of thing he would say, wouldn’t he?’ type of argu – type of sentence, and they’ve – they’ve managed to get that changed in all subsequent editions of that book but they didn’t get anything inserted in it. Hmm, so that’s the – but this is the sort of rubbish that goes around, people who write what they want to write, whether it’s true or not, and make arguments from untrue things, to also untrue things, it’s a very easy way of proceeding. You know, you write something which is wrong and then you quote what you’ve said that’s wrong, or other people have said is wrong, and so it goes on. Oh well. So, that was a – a little excursion of mine into the legal business which is a, oh terribly – terribly time-consuming thing to get involved in. You asked about UEA and the – and the emails, well, I’ve not studied those emails, I know, erm … what’s his name, chap – Philip Jones, who was terribly traumatised by it, almost committed suicide at one point. Almost, you know, thought of committing suicide, it was – the flack that into him as a result of that. Hmm, they were investigated, officially investigated, and of course it was – it was hard to – for people like me actually, to write in anywhere as soon as the thing became, you know, officially under wraps ‘cause they were investigating it. Although I had little doubt that most of it was rubbish, most of it was completely incorrectly ascribed– criticism of them. And – but there have been, what, three major, you know, there was the Oxburgh Report which was, you know, a man who had been chairman of Shell of course and, erm …. there was a report, the Pew – the Pew Centre in the United States did a very detailed report on it, and there was a – the – the university did one of course and there was another one too by – by some official body. But all of those completely exonerated the scientists at UEA from any fraud and from any scientific misconduct. what was the word, what’s the word I want? Any scientific –

*Misconduct?*

Misconduct or misbehaviour or whatever it is or – or inappropriate, er, or – and completely exonerated them absolutely from that. The – the remaining issue was why did they try to prevent the data being passed onto other people, why did they refuse to pass the data on to other people who demanded it, and so the answer to that is very simple. They’re under the Official Secrets Act – under the Freedom of Information Act of course they were supposed to do that, but they tried to avoid doing that at all
cost, why, well the – well the – the data is not very easy to pass on. It’s – they’re not an operational organisation that has the data in very simple forms or very organised forms, they were a research body of three people who were using very large amounts of data which were not in a very tidy state, and people have commented that Phil Jones was not the most tidy of people so to actually hand the data on in a – in a form that other people could use was not at all easy. Some of the data anyway came from sources which forbade the passing it onto other parties and that would have to be separated out, and hmm, and – and also the people asking for the data were not, as far as Phil Jones and his colleagues were concerned, were not bona fide people who wanted to know for genuine – genuine scientific reasons. They were out – most of them were out to try and get the data in order to try to destroy this as a piece of evidence used for the IPCC. And that may not have been completely true, some of the people asking for it may have wanted it really to, er, even though they may not have believed in climate change they wanted to investigate, but nevertheless, they were – they were faced with a barrage of requests. One week I was told they got 50 requests for this data, from separate organisations who were demanding it under the Free – under the Freedom of Information Act. Well, how could – they couldn’t cope with it, they had to stop work completely in order to try to carry on. So – so that was the reason for their, you know, the sort of remarks they made on those emails, which were private emails to each other after all, about this terrible thing that was happening to them. Hmm, I mean there were – the best example I know of how stupid the – the whole thing was, was the – almost the first reports that came out in the paper was the use of the word trick. Hmm, you know, the – the emails, that it was scanned through for the word trick, and trick occurs quite often because they talked about mathematical tricks to get around corners to solve – help to solve problems. Well trick in that sense is – is being clever, it’s not being fraudulent, but it was portrayed in the press in a big way as if it was – these people were looking for tricks to mislead us and to change the data. They were not doing that at all. They were finding clever ways of using mathematical means to help to solve the problems they were trying to solve. I mean the whole thing was – was this complete … you know, what’s a – what’s the right word, a farce, but I mean it’s a nasty farce, it’s a damaging farce, it’s damaged them enormously, it’s damaged the science enormously. And the media, when the exoneration came from various sources, did you find its headlines? UEA exonerated? No. In fact they drew the – when the university one came out they
honored in other things, you know, about the – which was slight criticisms of the – of UEA about the data or other things. They did not put any – or hardly made any mention of the fact that on the major issues they’d been exonerated. The media were utterly irresponsible. All of them actually, *Times* included, all of them were utterly irresponsible, they did not want to tell the story. This was a hoax or this was a – and this was a nasty piece of work and all those sorts of things. They were taken the side of the hackers, rather than the side of the scientists. I don’t know of any newspaper that did not do that. Which just shows the state of, you know, society and – and the state of the people’s understanding of this climate change problem, and what the media want to do with creating controversy rather than settling issues which have gone wrong.

*How would you portray the BBC in terms of climate change, in terms of their coverage of it?*

Well it’s mixed of course, it’s mixed, and they’ve had some very good programmes, David Attenborough’s done some good programmes for them. They’ve had some – I can’t remember them all now but they’ve also done – they’ve had good programmes on climate change by and large. The – there was a Channel 4 programme of course, which was an absolute dis – disgrace, *The Great Global Warming Swindle* I think, which really was appalling actually, the way they misquoted people and misused people and – they had an awful lot of complaints about that programme. People who made – a man called Carl Wunsch in America who appeared on it, and he appeared – who – he was, er, presented of course the things he said which were critical of – or which seemed to be critical of the sort of things IPCC were saying. They were not meant to be that way, he was just exposing some of the problems in the oceans, he’s a great oceanographer. He actually, you know, filed reports to complain bitterly but I don’t know – I don’t know whether he got away with it or wher’ – whether he was supported or not in the end. But, erm … but they misused people very badly. Then there’ve been other programmes a bit like that too, but there’ve been positive programmes too, very positive programmes. Hmm, I can’t complain completely about it because some of it’s come over quite well.

[End Track 16]
Track 17

We’re just going to add some material on the – on the writing of books, include – [interviewee laughs] starting with The Physics of Atmosphere which was mentioned in an earlier track.

Okay, well we start – well we’re talking of books, we could start with Infrared Physics which was a book I wrote in the ‘60s with Desmond Smith. We were both new to this in – infrared field, which was quite a new field in physics really, doing things in the infrared, and – and we were both working on, well, the space experiment or – and it’s – and its predeceasing work and we thought, why don’t we write a textbook on infrared physics. So we started doing it and the problem was we – we never kept pace together in doing the bits that were required [laughs] and it was our two wives who in the end said – because we used to meet – gather for dinner sometimes, Des was in – in Reading, I was in Oxford, and from time to time we would meet for dinner. And the wives said, ‘We will organise a dinner party, a dinner arrangement once a month, you know, either at your place or my place, providing that there’s progress been made, very good progress been made, in the book before each meeting. If there hasn’t the meeting will – the supper will be off.’ [laughs] And that did help actually to galvanize it in a way and keep it going. And that was a textbook, er, that was the – well it wasn’t much to do with the atmosphere, but it was – it sold very well, it was well – well reviewed and we were pleased with it actually. And OUP seemed to be pleased with it, but OUP had a view in those days that they said, ‘Well good books – we don’t advertise books,’ they had no advertising plan, they said, ‘Good books sold themselves and poor books aren’t worth selling. So – so we’re not going to worry about advertising.’ So, the shame was that they had very little outlet in America, the United States. You know, I went to Los Angeles in, what, 1969, UCLA for three months, looked for the book in their library and it was nowhere to – it was nowhere – no book seen or to be referenced in their library, which – which I thought was, you know, of all the places you should’ve found a book, one of the major uni – one of the biggest universities in the States did not have a copy, despite its good review. No it did – hardly sold in the States at all. Hmm, so then when I started in the ‘70s with the Physics of Atmospheres, and started trying to write the physics book I wanted to write as a result of the lectures I was giving. The – the only way I
could do that, I discovered really was to – I took my daughter to school, was in the office at about 8:30 each morning and I would sit there till 10:30 and try to keep the door closed, and tried to keep in isolation from anybody else, to do two hours on the book. And the great thing about that was there was continuity because I could remember what I did the day before and you could just move straight on, so I actually made quite good progress that way. The only way I succeeded in making progress on a book. And then towards the end of the ‘70s I was keen to try to write something about science and faith, I had some ideas I wanted to write, and my – it was my wife again who said to me, she said, ‘Well –,’ I said, ‘How on earth am I going to get this written?’ and – and she said, ‘Well –,’ this was after – this was probably early ‘80s actually when the children had left home, and when we – she said, ‘Why don’t you stop going to church on Sunday mornings, [laughs] why don’t you dedicate Sunday mornings to writing the book, [laughs] then we’ll go on Sunday evenings instead.’ That’s what I did, that was a – that was a very good system because, you know, a solid Sunday morning was a good way of making progress. Hmm, then I was invited by the – I don’t know if the name John Stott means anything to you, John Stott was a very prominent Christian, Anglican minister, he was All Souls, Langham Place, by the BBC in London for many years. Hmm, and he founded something called The London Institute for Contemporary Christianity, erm … but in the – but worldwide in Evangelical Christian circles he’s known extremely well, he’s written lots of books, commentaries, extremely able person, very passionate man, but also extremely, you know, truthful and academic and has led the – led the Evangelical wing of the church ex – became a very strong leader in that area worldwide, and various – very well respected and a lovely man. He said – and The London Institute ha – he had summer schools, he said, ‘Come and speak to the summer school on science and faith,’ the early ‘80s, so I went and d’, and that helped my book along a lot too. So I gave these lectures to this motley collection of people, quite a few Americans actually. Hmm, got a lovely letter from John Stott at the end thanking me very much for doing it, but passing in the way that he would of course, and should, said he’d had some comments from the group, they – they liked – they were very interested, they were very grateful for the lectures, they thought the science was wonderful, they were very interesting and so on, but they thought my theology needed some attention. Maybe I should look into that [laughs]. I suspect what they meant was I was not a creationist and – [laughs] if you know what creationists are.
Yes.

People who either believe in a six-day creation of 24 hours or whatever it was and – but anyway, that’s – but that was a nice letter, a nice way to – but that helped me on my way in writing that book, and it was Lion who published the first edition of that. And, erm … then it got translated into a variety of languages, Chinese or Russian, Spanish and so on, as indeed my Physics of Atmospheres has been and Global Warming has too. That’ll do for books I think, alright? That’s – anything else of –

[End Track 17]
Track 18

There was a ... just an interesting event, which was 1995 when, erm ... when Sheila and I was invited to ... join a boat in the – in the Mediterranean which was going to cruise around and celebrate the 1900th anniversary of the writing of the Book of Revelation. This was a cruise so-called set up by the – by Bartholomew, the patriarch of Constantinople and his senior people, and his archbishops, and they called the title of the sort of seminar in the boat Revelation in the Environment. Which was very interesting because, you know, the Greek church, or the Eastern church, exist in countries which are terribly polluted, Eastern Europe, the Black Sea and all the areas around there, and Russia of course has been tremendously polluted. Hmm, pollution on a scale that we don’t – we’ve never experienced really. And so here was a, you know, head of that church and really trying to take the environment seriously. And, erm ... and using this – this particular date of someone writing the Book of Revelation on the island of Patmos, to get a very eclectic body of people together, about a hund – well over a hundred of us I think on the boat, including, erm ... including David Bellamy I remember was there. Hmm, the programme was organised by John then – the Metropolitan of Pergamon, the archbishop of Pergamon, who was a scientist as well as a Greek theologian and, erm ... there were other people. There was a man called – oh dear, Senator Tim Wirth who’s a US senator, very concerned about the environment. There were quite a lot of media people, Geoffrey Ream from The Observer was there, I remember. And a whole lot of people who were involved either with the media or with the – with ecological organise – green organisations. There were a whole variety of religious people, not just all Christians or Christianity, from various churches or beliefs and we all – and I didn’t really imagine people would want to know a lot of science or anything but it was – but there were – there was a very interesting mixture, extremely interesting mixture, we had some wonderful times as – as we, you know, people talked about various aspects of creation, the problems with the environ’, problems with pollution, problems with environment, problems of how different religions looked at these things and, you know, what we could do about it either politically or economically or whatever it was. And – and it was extremely stimulated and it was – the original ship they had planned for, it was a cruise ship but the cruise ship wouldn’t work anymore so they – they had to take – it was actually a roll on, roll off ferry what – what we went on [laughs]. The accommodation was not
marvellous, but the food was terrific. And, erm … I think – it was just very lively and I’m sure the impact of that on – in all sorts of ways must’ve been quite large because of the variety of people who went. We had – the Patmos Principles were published afterwards, in fact it was reported as a book actually afterwards but the – a group was asked to set up the Patmos Principles for us all to agree and David Bellamy was chairing that group. I was not a member of it but he – John, the archbishop of Pergamon was – they told us several times every day that not caring for the earth was a sin, s-i-n, you know, so the first Patmos Principle was not caring for the earth is a sin [laughs], and we should really ask forgiveness for it and do something about it, which stuck in everybody’s mind. It stuck in my – my mind ever since, I’ve often quoted it coming from source. Hmm, there had been other – the Bartholomews – Bartholomew himself was a delightful person, quite a young guy, I was surprised to find him so young and active and – and so, er, and communicative actually. Hmm, and they’ve organised other cruises, other events since of a similar kind, I’ve not – we’ve not been on any of them but – but dealing with issues of a – not a dissimilar kind elsewhere in the world.

Why was it a cruise and not just a meeting?

Well that’s a good question you ask the organisers, but maybe they – well we – we started in – it started in Athens actually, we joined them in – we joined them in Constantinople, Istanbul, and – ‘cause I couldn’t go on the first day, then we cruised from Istanbul down to Ephesus, calling on Ephesus, and then went on the Patmos. So it was not a – it was only five days or something, five days, something like that. Hmm … Sheila and I had a interesting experience in Istanbul trying to get on the boat [laughs], are you interested in Turkish-British relationship? [laughs]

Yes, go on.

Well we’d arrived, you know, we’d arrived by air, getting on this boat with – with Bartholomew, who was already onboard, people of course had already come from Athens so we were joining one day late. There – there were I think three or four couples waiting, who were then put in a corridor sitting on our cases for ages, ages, wouldn’t let us anywhere near the – and they said, ‘Oh no, we can’t get you on the
boat yet, they won’t have you yet,’ or something. I couldn’t really believe that, it seemed – the boat was there, you could see it. And, erm … we actually got nowhere in tackling the officials and saying, ‘Look here, what – what are we doing here? Why don’t we get on the boat?’ They said, [grumbles]. So – so eventually I managed to persuade one of them to take me to the – take me to the entrance to the boat but he’s saying the people wouldn’t let us on, but they didn’t seem to have any problem when we got there. So I said to him on the way back, I said, ‘Why won’t you let us on the boat? You know, there’s no problem, and it’s in your power to let us on, well clearly in your power to let us on the boat, why don’t you let us on the boat?’ And he put his arm around my shoulder, he said, ‘You are an Englishman and I am a Turk [laughs], and we haven’t always –,’ or words to the effect we don’t get on with each other. I said, ‘Why don’t –,’ he was going back to the 19th century, you see, [laughs] problems between the British and the Turks. I said, ‘Well, why have we got to go back so far, you know, we – that shouldn’t really need to bother us now. Please, you have it in your power to get us on the boat, will you please do that?’ And in the end – I don’t know whether he was expecting some backhander or something but I wasn’t going to give him one of those, I didn’t feel inclined to offer them money, and so he – and after a short time we got on the boat. But it was a – an interest – and a further problem with the boat of course was that they didn’t really approve of Bartholomew.

_Hmm._

You know, he’s a – he’s a Christian Orthodox, Christian – a Christian – Orthodox Christian and they don’t like Christians anyway, so, being a Islamic nation, and he doesn’t fit in, whether they don’t like him, they don’t like having him there, very clearly. And he – although he has this great place in, you know, this great cathedral of course in Istanbul. So we found – we found the Turks really – well they were not at all keen on talking to us. I suspect the number one problem was they didn’t really like having the boat there at all because of Bartholomew.

_Hmm._

Thank you.

[laughs]

[End Track 18]