

MAKING CLIMATE HISTORY: ORAL HISTORIES

Two centuries after the emergence of steam technologies, and 170 years after initial suggestions that the atmosphere keeps Earth warm, scientists proved human disturbance of the Earth's carbon budget changes the world's climate. The work and timescales of making and knowing are decisively interrelated, yet still too little is understood about critical links between how imperial and global energy infrastructures have *re-made* climate and how scientists have *known* climate.

Funded by the Leverhulme Trust from 2019 to 2025, 'Making Climate History' explores the largely unexamined connexions between histories of places, personnel, materials and power during the period that made and recognised both a global physics and a global climate. Supplementing artefacts, maps, published writings and archival sources, the project records, curates and analyses a series of oral histories capturing the voices of a generation of retired climate scientists, science administrators and journalists who were active in the 1970s and 1980s.

Interview Summary Sheet

Collection Title	Making Climate History: Oral Histories
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Interviewee's Name	**Michael James Salinger**
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Biography



Michael James ['Jim'] Salinger was born in 1947 and grew up in Dunedin, New Zealand. He attended the University of Otago, Dunedin, oscillating between studies in geography and medicine. Salinger graduated from Otago around 1971, before working as a scientist at Otago Medical School from c.1972-75 which included a spell at the Salk Institute in San Diego, California. In 1976 he became a junior lecturer in geography at Victoria University of Wellington (1976–1979), gaining his PhD from there in 1980. In 1980 and 1981 he worked as a senior research associate in the Climatic Research Unit at the University of East Anglia in Norwich, UK. Returning to New Zealand in 1982, he worked for the Meteorological Service of New Zealand until 1992, and then with the National Institute of Water and Atmospheric Research (NIWA) until 2009, initially as the senior agricultural meteorologist, and later in the role of principal scientist. From 1986 to 2010, Salinger was New Zealand's principal delegate to the World Meteorological Organization's Commission for Agricultural Meteorology and from 2006 to 2010 served as the Commission's ninth president.

Time-stamped Summary

[Track 1]

Birth in Dunedin, 1947, and about his parents and their families [I: 01:06]

Growing up in Dunedin, school, hobbies—including an early interest in making weather recordings [I: 07:17]

Going to university in Otago [I: 13:57], Jewish upbring, identity [I: 16:41], and deliberations and decisions about what to study at university [I: 20:00]

A breakdown, a year out of study and then a switch from geography to medicine, including a year of research at the Salk Institute in San Diego [I: 23:52]

Switching back from medicine to climate, setting up a climate network, the influence of Reid Bryson's work on his 1975 paper in *Nature* [I: 29:08]

The data ana data analysis behind the 1975 paper, the length and homogeneity of NZ temperature records [I: 32:26]

Follow-on 1976 paper in *Nature* on the relationship between temperature and glacier movements in NZ [I: 44:09]

[Track 2]

Work as a junior lecturer in geography at Victoria University Wellington, including the teaching of climate and statistics courses to undergraduates [II: 02:30]

Choice of PhD topic at Wellington and the work that entailed regarding data acquisition, homogenising and aggregation [II: 08:55]

Awareness of international work going on, involvement with Paul Ehrlich and Steve Schneider [II: 14:41]

Connections to activism and the Otago Ecology action group [II: 18:55]

Attending the University of East Anglia (UEA) 'Climate and History Conference' in 1979 and then joining the Climatic Research Unit [CRU] in 1980; the nature of the work at CRU in 1980 and 1981 [II: 19:31]

The significance of Southern Hemisphere perspective for the work in CRU about worldwide temperature data and trends [II: 25:32]

Reflections on Jim Hansen's work and UK Met Office collaboration, especially with Chris Folland with respect to marine temperature data [II: 31:18]

Attending a US Department of Energy conference around 1980 in the United States [II: 35:35]

Understanding of the work of climate modellers around 1980 and the relationship between climate modelling and climate observations [II: 37:57]

[Track 3]

Personal life: mother's depression, meeting first wife, divorce and then subsequent relationships [III: 00:18]

Involvement in the Otago Ecology Action Group in the 1970s [III: 05:01] and thoughts about the relationship between science and activism, and more recent activist involvements and influences [III: 08:21]

Reflecting on his two years at CRU, the value of Southern Hemisphere perspective, the ex-CRU colleagues who are now in Australia and NZ [III: 12:32]

Returning to NZ in 1982 and getting his job with the NZ Met Service [III: 14:45]

Work on forecasting El Niños, especially the 1982/83 El Niño, using analogue methods [III: 17:45]

What a NZ/Pacific Ocean perspective brings to seasonal climate forecasts; seasonal forecasts as bridging between weather and climate time-scales [III: 28:53]

Working for the WMO Commission on Agricultural Climatology [III: 33:45] and efforts to gather archival and paleoclimate data [III: 36:35]

Ongoing collaborations with CRU and with the UK Met Office, especially Chris Folland, and with the French meteorologists re. Pacific climate data [III: 40:00]

Annual updates of the global temperature record, media interest in this, and involvement with early studies of climate change impacts in NZ [III 50:18]

Writing his retrospective 2010 essay for Steve Schneider's journal *Climatic Change*, generally about choices of where to publish, joining the Editorial Board of *Climatic Change* [III: 59:03]

Creation of the Institute of Water and Atmospheric Research (NIWA) in 1992, and commercialisation of data, and the effects it had on his work [III: 1:06:21]

Working on agricultural climatology in NZ and elsewhere [III 1:14:49]

Work for the WMO, conferences attended, commission reports, and Pacific data collection [III: 1:21:14]

Involvement and role with the IPCC, especially the Third Assessment Report (1997-2001) [III: 1: 33:23]

Reflections on the 'global' nature of global temperature, the credibility of climate models and their relationship with the global temperature record [III: 1:38:19]

Views on climate change risks, dangers [III: 1:48:05]

Interview Transcript

[Track 1]

Sarah Dry 00:01
This is Sarah Dry and I'm here at the campus of University of East Anglia. It is July 18th [2023]. I'm doing a Making Climate History interview with Jim Salinger. Jim if you could just introduce yourself and spell your name for me, please.

Jim Salinger 00:20
My name is Jim Salinger. Not to be confused with John D Salinger who wrote a book and became famous for one book. Spelling the name is J-I-M, S-A-L-I-N-G-E-R.

Sarah Dry 00:43
Thank you. Do you have a fuller name? Is there an M.J.?

Jim Salinger 00:48
My full name is Michael James Salinger. But everybody's known me as Jim and there's a story behind that's, but that's just a detail.

Sarah Dry 01:06
Can you tell me when and where you were born, Jim?

Jim Salinger 01:08
I was born in Dunedin, New Zealand, which is 46 degrees South. It's actually nearer the equator than where we are now in Norwich, but it's buried in the midst of the Southern oceans. Dunedin is the fourth largest city [in New Zealand] and it's the southernmost large city, probably, in the globe. I was born on the 25th of April 1947, which if you're an Australian or New Zealander is ANZAC Day, which commemorates World War One and the loss of life in Gallipoli.

Sarah Dry 01:55
Can you tell me about your parents? What were their names?

Jim Salinger 01:58
My father's name was Frank Salinger. He came from the United Kingdom. His father died in an aircraft crash in 1921, when he was about 16. He came out to New Zealand because a cousin of his, her father-in-law, had a job for him in New Zealand. He came on a boat never to return. My mother was Fay Salinger. She was actually born in New Zealand. Her father came from Lithuania, and it was a good thing he did. He was escaping pogroms in that part of Europe at the time, in the 1890s. So, I'm what you'd call a second-generation New Zealander, but we don't go back very far. Most you can get is four generations, compared with Māoris. We're called Pākehās.

Sarah Dry 03:08
What kind of work did your parents do?

Jim Salinger 03:10
My father was an accountant before he went to World War II and sat in Fiji waiting for the Japanese, who never arrived. My mother—they were part of the great generation, so the women didn't work. She was a housewife, and they tended not to go past what would be the Fourth Form [Year 10] in those days. A lot of women just were what were called homemakers.

Sarah Dry 03:48
Did you have siblings?

Jim Salinger 03:50
Yes, I had two older siblings. One was three years older than me. He's now retired in London, and the other is eight years older than me. And they're now in Israel. So, we're basically a family of wandering Jews. When people ask me where do I live, I just say planet Earth.

Sarah Dry 04:14
Your father was Jewish as well?

Jim Salinger 04:16
Yes, yes, that's right. So, we were well away from any action in Europe. Thank goodness.

Sarah Dry 04:24
Salinger is an interesting name for a Jewish family.

Jim Salinger 04:32
If you look in the Holocaust centres, the Germans kept very good records. There are lots of Salingers slaughtered in the Holocaust. It is a Jewish name. It comes from Poland. I think it's to do with the river Zaling or Salinger, but that's where it comes from. You'll find the Salingers, some are here [in NZ] but a lot of them ended up in America, hence, JD Salinger and Pierre Salinger and other Salingers.

Sarah Dry 05:06
What was your household like growing up?

Jim Salinger 05:08
It was a warm household, in terms of what happened. My father was a gentle soul, which was good because it's passed through all of us. We don't have misogynist males in the household at all. My mother was, you would say, the more dominant one, but she was a Kiwi. She wasn't a Jewish person out of Europe, so quite different. My father was an accountant, then went off to World War Two, then came back. He ended up in charge of his father-in-law's coat manufacturing factory in Dunedin, then went back to accountancy. My mother would have easily gone to university but didn't. She taught herself—she was a very good piano player. She was taught by Johannes Giesen who was a pupil of Walter Gieseking from Holland. She was very good. She also taught herself embroidery and knitting and crocheting. She used to teach it—although she had no qualifications—as occupational therapy in a private mental hospital in Dunedin. She herself had about eight years of

depression, and that's when my father actually ran the household. As well as working, he made sure that the housework was done and the cooking and everything we needed. We were probably very close as a family. A bit of hardship doesn't do you any harm.

Sarah Dry 07:17
And what sort of interests did you have as a child? Did you like going outside? Were you especially engaged in school? What kind of a kid were you?

Jim Salinger 07:28
I guess I was probably the most academic of the three of us. I got very fascinated in seeing these plants growing, and cauliflowers, and so I took over the vegetable garden. Then—as with quite a few of my colleagues, as I discovered when we had an IPCC meeting in Auckland—I was given a maximum/minimum thermometer. So, I built myself a climate station as a 12-year-old and started, you've guessed it, taking climate readings. The thing with Dunedin, it had very changeable weather because we were open to the south, which is cold, so would get these Föhn winds, nor'westers, and the temperatures would [go] up to 25 [Celsius]. And the next minute it had changed to the south, and then it was down to ten or five degrees. You got very rapid changes compared with what you get in the Northern Hemisphere. As a hobby, watching climate in Dunedin was fascinating and that's where the interest in the weather started. I was also in the local Meccano club. We made lots of models out of Meccano and displayed them and that type of thing.

Sarah Dry 09:04
So you were interested in making things with your hands as well as making measurements?

Jim Salinger 09:07
It was more that we had a Maccano set and there was a Meccano club. It taught me a bit more about being a bit practical. I wasn't into sport. Well, I wasn't allowed to because, apparently, I got bronchitis a lot. I was annoyed at my mother for that [laughs].

Sarah Dry 09:16
Very interesting. Can you tell me a little bit about what you studied in school?

Jim Salinger 09:35
In school? In the New Zealand system they streamed you into academic and general, so I was in the academic stream, and you were streamed. I was in the top class of three. I was unusual because in the Third Form, because I was in the top class I could do Latin, but I refused to do that because I wanted to do geography, because that had climate. I didn't learn Latin, [but] I did geography, history, French, English and, obviously, you did the sciences. But I deliberately chose not to do Latin because that excluded geography. And I was interested in climate at that stage.

Sarah Dry 10:32
That interest, was that entirely due to having set up the weather station at home?

Jim Salinger 10:37
Yes. Also, watching the weather as a hobby it's not going to backfire on you. There's always something happening and Dunedin's climate was extremely changeable. You could have, as

they said, four seasons in one day. If you think Britain's changeable, it's got nothing on southern New Zealand, because we're so open to the southern oceans and the change between Föhn-like nor'westers, where air goes over the mountains and warms up, and you can get days up to the highest temperatures 34 [Celsius]—and then you're just so open to the south and if you get a long fetch of winds from the southern oceans, down goes the temperature and it can snow.

Sarah Dry 11:34
What other measurements did you make, in addition to temperature?

Jim Salinger 11:37
I had a rain gauge and temperature, [they] were the main ones. It was very interesting when we had this IPCC meeting—I hosted it in Auckland—and we had people there from all over the world. I started talking to Bert Bolin and Chris Folland and a few of us others, [and] we all started [out] that way, with weather stations, as hobbies. That sort of ignited an interest and as you see… it also took you outdoors.

Sarah Dry 11:42
Did you share that interest with others at the time, were there groups or clubs?

Jim Salinger 12:25
I usually organised people around the city to do climate observations. I did that in Dunedin; I used to ring into the radio station—this is probably as a young adult—and we captured the temperatures around the city. When I went to Wellington, I was working as a junior lecturer there, I got some money and we measured the climates all around Wellington. Then I did that in Auckland, [too]. So, I tended to set people up in observational networks, which was fun. That was a good way to organise climate readings.

Sarah Dry 13:09
So, you're using the word climate, but you've also mentioned weather. Maybe this isn't a distinction that's useful, but at the time were you interested in forecasting? Or were you more interested in these long-term changes of climate?

Jim Salinger 13:22
I was watching what was going on, then I produced tables of averages. At that stage—I realised about climate, but it was really watching the weather, then doing the summarising of the highest and lowest and comparing years.

Sarah Dry 13:57
Can you tell me about where you went to university—?

Jim Salinger 14:01
—and what I did? Well, in New Zealand there aren't many universities. There was four, basically, then. University of Auckland, Victoria University of Wellington, University of Canterbury in Christchurch, and University of Otago in Dunedin. So, unlike in the US, or Britain, where you select the university you went to, if you lived the four main cities, you always tended to go to the university in that city. If you lived outside the main cities, in other words the rural areas, the government would—in those days it was free—give [you] a grant

for living in the city, so people tended to move around a bit. But University of Otago-Dunedin was the university town because nowadays with a population of 120,000, 20,000 students arrive from both within New Zealand and overseas to study there. So, it's a student, city. It's like Oxford and Cambridge in that sense. Whereas the other cities—Christchurch, Wellington and Auckland—there were universities there, but they were not so integral. [The university was] probably the major industry in Dunedin, would be the way to say it. The other thing is growing up in Dunedin—you have to understand New Zealand, it's pretty egalitarian: it didn't matter which school you went to, at *all* [emphatic]. All the state schools were good. In Dunedin, you could always get a good education, and it usually educated you out of [the city]. In other words, your ultimate job wasn't going to be there. Being Scotch in origin, Dunedin is the old name for Edinburgh, and all the street names are the same as the main streets of Edinburgh, so [Dunedinites] don't get lost in Edinburgh.

Sarah Dry 16:41
What about being Jewish? Did that have any bearing on things? I should have asked about that. Growing up in general?

Jim Salinger 16:48
Well, it was a very good environment because we were an exceptionally small Jewish community. There might be 100 of us. I was the only Jewish person at school, and I was very open about it. Everybody was very interested. If you're open, it's not a problem. It wasn't as though—you've probably heard of the JAPS [Jewish American Princesses] of New York City? Very closed and very spoiled. No, we were just—secondary school was good, because my peers were interested and I didn't feel ashamed or anything. They used to joke about Passover, because I used to talk about how we had four glasses of wine during the course of the night and they'd say, "Oh, Jim's going to the feast of the hangover". It was good jest. Of course, I was sent to a Presbyterian primary school, so I got an education in Christianity too. The joke of it all was that my brother and I took out the Scripture prize [laughs].

Sarah Dry 18:14
You did!

Jim Salinger 18:15
Yes! It was New Testament. Not that we believed it, but—

Sarah Dry 18:21
—You could learn it quite well.

Jim Salinger 18:22
Yes, yes [laughs].

Sarah Dry 18:23
Were you religious at home?

Jim Salinger 18:27
We would—although we were nominally Orthodox, we would be effectively progressive or liberal. That's how my father, who was president of the congregation, explained it. It's a bit

like community here [in Norwich]. No one cared what type of Jewish person you were. You could be way out there or you could be ultra-orthodox, but we were all one, so—

Sarah Dry 18:58
—I suppose in a small community that—

Jim Salinger 19:00
—Yes, and I realise—I always thought it would be nice to have more Jewish people around. But now I look and say, no, it was because I was totally integrated into the community. Because as soon as you start sort of cutting yourself off, people suspect you. It was never an issue. I met another community like that when I was in Chile. I went down to Concepción, which is 40 degrees South, walked into the synagogue and it was exactly like the one in Dunedin—and the one here's [in Norwich] the same. Small. So small communities are good communities and Judaism doesn't have a hierarchy. Each congregation is its own, so it's not part of a diocese or all that. So, I didn't regret it.

Sarah Dry 20:00
Going back to university, we had started talking about that. You became in interested in geography and climate. Can you tell me what you studied there?

Jim Salinger 20:11
I didn't know whether I should do medicine or climate. Otago had the only medical school in the country then. So, what I did was medical intermediate, which was zoology, [pause] chemistry and physics, knowing that, if needed, I could pick up geography where I could do climate. So halfway through the first year, I had this decision to make. Would I apply to go to medical school? I would have got in, my grades were fine. Then I decided, 'no'. So, then, the professor of geography who was very good, worked out how I could do a BSc Honours in three years. You had these very inspirational and helpful academics in the New Zealand universities. They were British in origin. The University—for example, a friend of mine who did psychiatry from Australia said, "Well, even though [it was just] one medical school, it was the best in Australasia". It had some very high-class academics in those days. Probably, I don't know, they wanted to get out of Britain or whatever, but they were extremely good.

Sarah Dry 21:52
Was there anyone in particular who inspired you?

Jim Salinger 21:54
The person that was going to supervise me left. At that stage I had—actually, I had a bit of a meltdown, just depression, due to a relationship [breakdown], so I took a gap year after the second year. I just worked in Auckland for a year and grew up a bit. I had a depressive episode. It tends to run in the family. I don't get them now. So, I had to work through that. I took a year out and just worked—actually in the land transfer office in Auckland—which was amazing in itself, because we had people like David Lange as a law clerk. He became a prime minister of New Zealand. You had all these—there was a room where they search the titles. New Zealand has the same as the Scottish system. So there's no gazzumping. As soon as you've signed up [for a land transfer], that's it. It doesn't have this crazy system [like] in Britain, where you can lose out at the last minute. It was fascinating because there were a lot

of people who were training to be lawyers who'd come into the [land transfer] search room and they ended up in Parliament or something like that. Then I went back, and actually went into Otago Medical School in the physiology Department and got a job there as a scientist.

Sarah Dry 23:52
Can we just go back a minute, because you skimmed over—you said you decided not to study medicine. What was the course that you ended up on? Can you just tell me a little bit about how you made that decision? Then we can return to ending up at the Medical School.

Jim Salinger 24:11
I started geography [pause] I had majored also in zoology and topped the class, so used to tutor zoology to other students. I was doing geography when I had this—I think it was after the third year—relationship breakdown. At that stage I had done more than enough to do—yes, I went up into third year geography—I'd done more than enough to get a BSc and I did the physical geography, not the cultural geography. Then I had this meltdown and decided I needed a year off. When I returned to Dunedin I thought, "well, hmm, what am I going to do?" I needed a job, and this neurophysiologist employed me as a scientist in his lab, so I wasn't doing climate then. I spent four years in Otago Medical School, which was very useful for my career, because he took me to the Salk Institute in San Diego. Now this Institute was the Salk Institute of Biological Studies, and they employed Nobel prize winners. This was high-end, sort of biological medical science. It was an amazing place because I got a training there that I wouldn't have got through climate or meteorology. You put your head down and went for it, you didn't muck around—whereas climate has always had limited resources, as you can imagine. It was fascinating because two things happened. There was—there'd be people that would walk around the labs and say to the lab head, "Ah, give us a page on what you want to do". So, they did that, and they [would go] off and get the [lab] research grants. These people didn't have to worry which is [inaudible] and then they got [it]. The other thing which was fascinating is the head of the lab I was in. His wife's father and mother—he was an American who'd grown up in Japan, and she was a Japanese that had grown up in America. Henry Kissinger was always ringing them up asking, "How do you negotiate with China?", because Nixon at that stage decided that China was okay, so we got these Henry Kissinger stories from the lab and then we get a sweepstake [going] on when Nixon would get impeached, so you can imagine what it was like for a 21-year-old [laughs]. I returned to New Zealand, so the next bit is, how do I get back into climate?

Sarah Dry 28:15
Before we go to that, tell me just a little bit about the kind of scientific research that you were doing for those years.

Jim Salinger 28:23
It was basically nerve muscle research. You had tissue cultures of muscles, cells, and you'd pop in some neuroblastoma which would grow axons, and then they'd stimulate them. So, I tended to be involved in that. I was not so interested in that, because at this stage in Dunedin, as a hobby, I'd set up my local climate network I was telling you about. That's what I was doing.

Sarah Dry 29:08
Tell me a little bit about what was involved with that climate network.

Jim Salinger 29:12
Just having people with little climate stations around the city, measuring temperatures, and then I would collect the data. For my BSc Honours I was going to investigate rainfall round Dunedin. I had 50 people with rain gauges. I would install them, and they would send me in their readings. In those days there was no internet, so it was either post or over the phone. So, I was collecting data as well.

Sarah Dry 29:49
Already as an undergraduate?

Jim Salinger 29:50
As an undergraduate, yes, that was going to be my BSc Honours project. There's a funny story on that later which I'll tell you. But you'd probably want to know, how did I get back into climate?

Sarah Dry 30:05
Sure, yeah.

Jim Salinger 30:06
There was Reid Bryson [in] a feature in the *Otago Daily Times*—that's the local newspaper, which is actually still privately owned, a good newspaper, because being in Dunedin you got good editors and that. And there was Reid Bryson saying, "The next Ice Age cometh!" So, I thought, well, this is funny. [Together] with a student in the Geography Department we got all the climate records locally, from up and down New Zealand. Campbell Island which is well to the south, the Chatham Islands to the east and Raoul Island to the north, and [we] put them together. And guess what we found? We were warming up. Then I looked at the World Weather Records which J. Murray Mitchell had put together. He had chosen a few latitude bands. But it was extremely shonky work. I don't know whether others have told you that.

Sarah Dry 31:37
What's the word you just used, shonky? Can you elaborate?

Jim Salinger 31:41
Shonky's, uh, not very good work.

Sarah Dry 31:46
Why not?

Jim Salinger 31:47
Well, it was not done as we do today, where you have gridded data and you represent all the—[Mitchell] had [just] a few points around the Northern Hemisphere—hardly any in the Southern Hemisphere—sort of places with long records. Because it wasn't representative of the globe. So we submitted it to *Nature*, and it got published![1]

Sarah Dry 32:21

[1] Salinger,M.J. and Gunn,J.M. (1975) Recent climatic warming around New Zealand. *Nature*. 256: 396-398.

So this was working with Gunn? Can you tell me a little bit about that person?

Jim Salinger 32:26
She was a student, just a student and—I shouldn't say 'just a' [student]. That's right, Jill Gunn, we put it together. I don't know what she's done subsequently. So it got accepted into *Nature*. If I did it now, I'd be ashamed of it, but it got in and we were just saying, "Okay, it's warming up in this part of the world". And it got featured as the paper of the week. Tom Wigley told me later it was an important paper because it made people realise various things that had been incorrect with the analysis. It was probably one of the first to come out showing New Zealand was warming up. Well, the New Zealand region, if you take the islands north and south and the Chatham Islands—Campbell Island was just a remote weather station and Raoul Island to the north was just a remote weather station. So, they were warming up, so there was no way you could have urban heat islands or any of those [things]. It made people realise, well, the so-called next Ice Age wasn't coming. Phil Jones and co. did proper analysis. So, everybody at Otago Medical School said, "Ah, Jim, are you sure you're doing the right thing?" This is what Otago was like: the professor of geography was still the same as [before], and he funded me to a climate conference. I was working in a medical school. Then someone said, "Oh, we're looking for a junior lecturer". So, I talked to Harvey Franklin. Harvey had come from the UK at some stage, from the other side of the railway tracks, but he was a very successful academic. He was socially liberal, not like some of the clowns are these days. And, yeah [pause] They signed me up. I could register for a PhD, because I'd done a BSc plus [honours], and there was a loophole regulation. I hadn't done a Master's, [but] I had all A passes, so that was fine. I registered to do a PhD, and the topic was the climate record of New Zealand.

Sarah Dry 32:26
That's fascinating. I just want to return, if I can, to this decision that you made based, as you recounted, on seeing this article by Reid Bryson. I just want to ask about how you, living in New Zealand and having already spent time thinking about local climate and weather, how much had you thought about climate science as it was done in the North at that point?

Jim Salinger 35:44
We'd had lectures on what causes climate change, from Milankovitch right through. My thinking then was that, well, so you've got—and it was a bit cooler than normal in the east of the US. My thinking then was, well, okay, the Southern Hemisphere doesn't have any air pollution, it's eighty percent ocean. The Northern Hemisphere—and you can see it, in those days it was shielded with a lot of air pollution that might block out the sun. This was my reasoning, the sunlight with aerosol particles and whatever. So perhaps it wasn't seeing the true effect of greenhouse gases, which has subsequently been shown to be correct. Because where you [Sarah Dry] are [Philadelphia], that part of the southeast of the US, it didn't warm for a while. So that was my thinking.

Sarah Dry 37:08
So how surprised were you when you found the results for that, I think it was a 1975 paper, comment in *Nature*? How surprised were you that you found this warming in New Zealand? I think you may have referred to the Southern Hemisphere and other records—

Jim Salinger 37:28

—Yes. But it was the New Zealand area, which is about 4 million square kilometres. It's not—the land area is only one fifteenth of the oceanic area. So I argued that it was very much buried in the Southern Ocean, so this was reflecting a larger area, which it was. So, I just thought well, no—my thinking was the [other] records that had been put together [earlier] were so poorly done, you could show anything. That was my argument at the time. As I said, they were shonky.

Sarah Dry 38:10
So, you'd read Mitchell's papers on which Bryson was basing some of his—

Jim Salinger 38:15
Yes.

Sarah Dry 38:16
—claims and you thought the technique—

Jim Salinger 38:17
—Well, the sampling was poor. It was shonky, as I said [laughs].

Sarah Dry 38:22
And what kind of sampling did you do for your paper?

Jim Salinger 38:28
All I did was take the climate stations up and down New Zealand, at the time, and I think there was about four or five. There was Raoul Island to the north, Chatham Islands to the east and Campbell Island to the south. There's no way—these were like—what's the island? South Georgia, you know. They're buried in the Southern Ocean, so they're not going to be influenced by urban heating or anything like that. They showed the same warming. I just said, "Well, this area's warming up". So perhaps—and J. Murray Mitchell and co. hadn't taken any notice of the Southern Hemisphere. So, it was sort of US/Europe 'eyes' quite a lot.

Sarah Dry 39:29
You were very well placed, having developed this expertise and facility and creating weather observing networks.

Jim Salinger 39:38
Yes. Well, the other thing was, we didn't realise at the time, but Chris Folland and I—Sir James Hector was a Scotch scientist, and he was the New Zealand scientist of the time[2].

Sarah Dry 39:52
—What was his name?

Jim Salinger 39:53
Sir James Hector, came from Scotland. He had declared that climate observations round the country had to be done in Stevenson Screens—this is the 1860s—and with rigorous homogeneity, in other words, sheathed thermometers. The standards New Zealand at the time

[2] Sir James Hector, 1834-1907, was a Scottish-New Zealand geologist, naturalist, and surgeon, who had a lengthy career as a government employed scientist in New Zealand.

were better than they were here [in the UK]. So here we had a very uniform and dour Scot who [insisted] on rigorous standards, as I found out later. Chris Folland keeps on saying we've probably got the best climate records back to 1870 of any country because of that.

Sarah Dry 40:42
In terms of the homogeneity of the records?

Jim Salinger 40:45
Yes, exactly. Now, cities had lots of concrete, there was lots of green and that sort of thing. Christchurch would have an urban heat island effect, but Wellington—it was the top of a hill and Wellington blows like hell and things like that. Auckland has the Domain [city park], which was a very green area. So the chances of bad observations were low, but also we've had to subsequently—because sites moved a bit—we had to modernise the records. But, generally, when you have [readings] taken on Chatham Islands, or Campbell Island or Raoul Island, which are sort of little islands in the middle of the southern oceans, or the North Tasman Sea, they're not going to be affected by urban warming.

Sarah Dry 41:50
What about Australia and observations there at the time, were there any?

Jim Salinger 41:54
They were, but the issue with Australia [was that] each State was different and had its own system. So, Victoria would be different from New South Wales, which would be different from South Australia. The Bureau of Meteorology sorts it out these days, but they usually say we can get back [only] to 1910. But no, they didn't have a dour Scotsman saying, "Ah, it has to be done in Stevenson Screens with sheathed thermometers". In England, I don't know. Chris Folland and Phil Jones will know the history of those sorts of things. They weren't very—they [Australia] didn't have 'rigorous homogeneity!' I have a big thank you to Sir James Hector [laughs]. Well, no, you know, you can imagine, you come to a country and you're it, you're the chief scientist. You can do a lot.

Sarah Dry 43:10
So, you publish this paper—just going back to this *Nature* paper—and your supervisor at the Medical School was kind enough to say, maybe you should be going into—

Jim Salinger 43:23
—they didn't mind it at all. My so-called supervisor these days—he retired and set up a vineyard in Central Otago not far from where I live. We talk about climate these days. So, it doesn't matter! No, no, no, he didn't mind at all. Dunedin is a liberal city, so people are tolerant of people from all sorts of type of life.

Sarah Dry 44:09
You published another paper in *Nature* in 1976.[3]

Jim Salinger 44:12
That's right.

[3] Salinger,M.J. (1976) New Zealand temperatures since 1300 AD. *Nature*. 260: 310-311.

Sarah Dry 44:13
Anything you want to say about that one?

Jim Salinger 44:15
That was really based on the fact that we'd seen huge glacial retreat. And, of course, we've subsequently shown that the glaciers are very linked to temperature, because [pause] essentially what happens is, you have a—I think the Franz Josef [glacier] is a classic example, it's like a tube of toothpaste. If you pour a lot of snow at the top, whoomph, out it goes. [If] the snow line goes up and you get less snow, a lot of retreat. So, they're very responsive to the climate. I think their delay is about three to five years. So, basically there'd been massive retreat of the glaciers that started occurring after 1950. And they went [sucking upwards sound]. That was fairly universal. You'd go to the glaciers and you'd drive up the valley and this is where it was in 1930 [gestures]. This is where it was in 1940 [gestures] and so on. They were much more expanded in the 1600s, with moraines dated down there. So they're very responsive glaciers, because they're temperate and the snow line—we landed up on a project where we would measure the end of summer snow line, which is like doing an annual bank balance each year. So, the glacier has snow, that—yes, it has an accumulation site, and what's termed an ablation zone, that's a melting zone. Depending on how warm or cold, that zone moves up and down, and you can work out whether the glacier's gained ice mass or lost ice mass. We had that project since the mid-70s and it was very clear what was happening. We've got—now, we've got half the ice volume we had in 1949. Probably about 25 percent of that from around the 1890s. So, the glaciers' are very responsive.

Sarah Dry 44:15
Tell me how you were thinking about the relationship between instrumental readings and these paleo readings like glacier moraines? Were you thinking about this at the time of how to create a longer climate record?

Jim Salinger 45:04
Yes, I did when I was working on them. But we had to link the glacier response to the climate response. Initially I took the techniques from dendroclimatology where you have response functions and you look at calculating whether temperature or precipitation is driving—in that case tree rings, but in my case the glacier's annual variations. And it came out very strongly. Certainly, the West Coast glaciers were driven by temperature because there were temperate places. They go quite low down and the temperature is the main [variable] driving it, not precipitation. Although precipitation can influence it, as it did in the period when we had more El Niños—New Zealand has stronger westerlies then—but, in the end, they're temperature driven.

Sarah Dry 48:40
So, then you can use them as a proxy for temperature?

Jim Salinger 48:43
Yes, so the argument there [pause] Well, they were much more expanded in the 1600s therefore, and that was, in a sense, a representation of the so called 'Little Ice Age' [makes scare quotes] in that part of the world.

[Track 2]

Sarah Dry 00:00
We're back with Jim Salinger on 18 July, 2023. I was just asking you about the Little Ice Age because you had made a gesture, in quotes, in brackets, about the Little Ice Age. I just wondered if you could talk a little bit about how you saw that.

Jim Salinger 00:21
At that stage I didn't know a lot about the climate record, because I hadn't been working over here [at the Climatic Research Unit: CRU] with people. But I was aware that there was this Northern Hemisphere Little Ice Age with lots of cold winters, in Europe and North America, and also 1814 [in fact it was 1816], the Year Without a Summer. And I was interested in seeing if there was any way of getting back in New Zealand, before Pākehā, that's the Europeans' arrival, because there's no way of knowing with any scientific measurements, and Māori didn't have a written history. Glaciers seemed to be the only way of pushing the climate record back. Of course, the issue there is you'd know when it was colder in the past from dating the terminal moraines, but then once it starts retreating you don't know the variations since. So, there were these terminal moraines for quite a lot of the Southern Alps glaciers, which we're dating back a few 100 years. You could postulate that it was perhaps colder then.

Sarah Dry 01:55
You mentioned readings in dendrochronology, and I wondered about that. How much were you reading that literature?

Jim Salinger 02:06
That was more when I came over here [as a post doc at CRU], and people were doing tree rings and all that. [It was] later on that I linked the glacial variability using dendroclimatic statistical analysis and response functions and that.

Sarah Dry 02:30
Okay, well, before we get to that, which I'd love to hear you talk about, can you tell me a little bit about your time as a lecturer in geography, I think it was at Wellington?

Jim Salinger 02:39
Victoria University of Wellington. I had this job, [for] which they wanted someone to teach statistics. But I could also register to do my PhD, which I did, and I chose, 'New Zealand, the instrumental record'. My supervisors were actually geomorphologists, but I had the advantage that the New Zealand Meteorological Service was about 10 minutes' walk up the road. And in those days, the New Zealand Meteorological Service had, as well as forecasting, it had people who had done PhDs in meteorology and climate. So, it wasn't from my supervisor, but I could always go up there and get advice. It didn't matter that I didn't have a person who had expertise in climate, I could get it. And as a PhD in New Zealand—it's the British system, so you did it by thesis then. You didn't have courses. They allowed me to enrol because I had a very good academic record. It was a lovely job because you were not much older than the students and you had no administration. You were expected to do

your PhD. Then, at the end of three or four years, you had to leave. There was no tenure. But while you were there you were employed as a lecturer teaching undergraduate years, a junior lecturer, yes.

Sarah Dry 04:32
Was that common?

Jim Salinger 04:34
Yes, I was. And I had a lot of fun with it. Ad I took over the climate courses, of course, as well as teaching them statistics. The main thing was convincing female students that they could do statistics, because there was this big block in those days, which were put in [by] the schools, that women couldn't do maths. Once I got them over that, they were fine. But I would teach. I said, "Well, I'll [teach] the climate courses as well". It was logical.

Sarah Dry 05:13
What was climate science like in New Zealand at the time?

Jim Salinger 05:19
Victoria University was bad because they'd never had a climate person. But they had a lecturer in meteorology and geophysics. And of course, the Met Service, New Zealand Meteorological Service, like the UK Met Office, was just up the road. You had Chris De Freitas in Auckland, who was a climate sceptic.

Sarah Dry 05:48
What was his name?

Jim Salinger 05:49
Chris De Freitas. He was bad news because he—there was another person there who wasn't [a sceptic]. In Canterbury you had Andy Sturman and in Otago you had Blair Fitzharris. Apart from those, and people in the meteorological service, and me, there was usually [just] one climate person in each university. That's basically it. It was quite sparse. We knew each other, as you do. John Maunder at that stage was in the New Zealand Meteorological Service, but he had worked in geography departments before. John was very good. He alerted me to these files in the basement of the Meteorological Office, which had climate histories of all the climate stations. Because of that I then realised you had to homogenise all the records. It was interesting in the 1930s—then, the head of the Meteorological Services was part of DSIR [Department of Scientific and Industrial Research], which is like CSIRO [The Commonwealth Scientific and Industrial Research Organisation] in Australia. So they [all] had PhDs and they were very good scientists. John made me aware of all these station files and that documented everything that had gone on in the stations. In the early days they used to do overlaps if a station got moved. There was also a tradition of documenting the changes. From that I realised you had to homogenise the data. And that's why what I said my paper [in *Nature* in 1975] wasn't that good. But it was good enough, it got into *Nature*. The first task of the PhD was to document all these climate station histories. I'm glad I did because [of] what happened in the 1990s or late 1980s. They decided to corporatize—well, the neoliberal winds blew in and there was a huge chucking out of these station files. But I'd got it all down on paper. Then I'd do comparisons with nearby stations and all that. So, I developed a technique of homogenization of data, which other people then did later.

Sarah Dry 08:55
I want to pick up on a few of those things. First, how did you decide to do your PhD on the instrumental record of New Zealand? I mean, at this point, you're 30 years old?

Jim Salinger 09:08
No, I would have been, so yes, 1976. Hang on [pauses] '77? Yes. It was because I was fascinated. I'd seen warming in the record. I wanted to really nail it down and do it properly.

Sarah Dry 09:32
Were you thinking of that warming in relation to the kind of global history of climate?

Jim Salinger 09:39
I was then.

Sarah Dry 09:43
Were you thinking also [about] the speculation at that period about what the effects of greenhouse gases would be on the atmosphere?

Jim Salinger 09:51
Yes, I was. I wanted to do a rigorous analysis at that point. I decided, well, the initial analysis which went into *Nature*, so I took the instrumental record up to 1975 from whenever it happened, and I wanted to do it properly.

Sarah Dry 10:22
Can you tell me a little bit about what it meant to do a properly rigorous analysis? How did you think about homogenization?

Jim Salinger 10:30
Okay, well, I thought about—you've got the climate site. I didn't have to worry about Stevenson Screens, or sheathed thermometers. It was more about the actual site, where it was. Like in Dunedin, there were several sites and some of them were up hills, and you had to adjust them as though they were [representing] one master site. So, you had a number of things to do. You had to adjust for whether there was vegetation growing around them, or whether there were buildings around them, or the elevation, and actually where they were in the city because you can get microclimates. You had to allow for that. The good thing is these climate data—shall we say metadata, basically, station histories—were very good, because they gave you all that. And many times, there was overlaps between one site and the next, so you could work out the difference. I spent a lot of time doing the climate histories of the climate stations.

Sarah Dry 12:04
And when you say climate histories, just to be clear, are you talking about the histories of the stations?

Jim Salinger 12:09
Yes. The histories of the actual climate station, because, well, for example, Queenstown is very unusual. It's been in the same place since 1931. That makes life easy when you have

sites like that. Kelburn in Wellington has been there since 1928, at the top of a windy hill. So, you have these sites, which are very good, which don't require—sometimes the actual Stevenson Screen was not in good shape and that. But the New Zealand Meteorological Service in the 1940s, and '50s, had these technical people who would go around and inspect these stations. They were very rigorous. When I look at it [laughs]—I don't know what happens in other countries, but it was this rigorous tradition. That enabled me to get—so I now have a 22-station series from the original seven station series. I wanted to produce something like the Central England Temperature record. So, I produced a New Zealand temperature series, [focused on] the land, and there were seven stations I used. I don't know how the Central England Temperature series [worked]—but I wanted the equivalent for New Zealand going back.

Sarah Dry 13:48
You're talking about Gordon Manley's Central England Temperature record?[4]

Jim Salinger 13:50
Yes, that's right. Yes.

Sarah Dry 13:52
So how were you dealing with the problem of spatial averaging of data at this point?

Jim Salinger 13:58
I wasn't. I was saying, "Okay, New Zealand had three in the North Island, four on the South Island, then the islands". But now I use a 22-station series, which is much better. There are people that [have] now digitised it to grid squares, since the mid-1970s. But they all seem to compute pretty well.

Sarah Dry 14:36
At that point you weren't worrying about spatial averaging?

Jim Salinger 14:38
Not too much, no.

Sarah Dry 14:41
And were you aware at all of work being done by Soviet scientists on temperature at this time?

Jim Salinger 14:50
No, no. My link was obviously with work done here [at CRU].

Sarah Dry 14:59
By here you mean?

Jim Salinger 15:00
—England. And also, later on there was US NOAA and all that.

[4] Manley,G. (1974) Central England Temperatures: monthly means 1659 to 1973. *Quart. J. Roy. Meteor. Soc*. 100: 389-405.

Sarah Dry 15:11
Very interesting. And—

Jim Salinger 15:14
—So that was 1976 through to '79, I was working on my PhD work, which was the New Zealand climate record.

Sarah Dry 15:27
How did it feel being the only climate person in an academic institution?

Jim Salinger 15:35
Well, you had a lot of freedom. You just did—and I'd go and get advice. Because my supervisors weren't climate people, they were more sort of—was I sort of stepping through a PhD rather than mucking around? Well, I'd learned from medical research, you put your head down and went for it. And at this stage I'd linked up with Steve Schneider. Have you heard of Steve?

Sarah Dry 16:15
Yes. Tell me about how you met Steve, or first came to know of him?

Jim Salinger 16:20
Well, I wrote to him and then he was on a honeymoon with his second or third wife, I've forgotten. He came and stayed with me. That was fun.

Sarah Dry 16:35
What prompted you to write to him?

Jim Salinger 16:40
Just trying to think [pause] Oh, I know what happened. When I was in Dunedin, Paul Ehrlich—'The Population Bomb' person— was on a [tour], and he visited the city and talked [laughs]. It was a funny visit. But he talked to school audiences and to the city on population issues. We had a lot of funding, because I was [part of] Ecology Action Otago. We advertised his talk on lampposts. Suddenly all these posters disappeared, so [unclear: we made more posters]—and then *they* [emphasis] disappeared. So, we went to the *Otago Daily Times* and got the front page story on how all the posters advertising Paul's talk were disappearing. That gave [us] great audiences [laughs]. They were [being] pulled down by the Society for the Protection of the Unborn Child.

Sarah Dry 17:46
You were you said you were a part of Ecology Action Otago?

Jim Salinger 17:50
This is when I was at medical school. We had dinner with Paul and Paul said, "Oh, you should write to Steve Scheider". So, I did.

Sarah Dry 18:02
Why did he suggest that you should write to Steve Schneider?

Jim Salinger 18:05
[bad audio on this segment] Because he knew I was interested in climate. So that's how the link happened, and Steve paid a visit and he said, "Well, you should write to Tom Wigley here" [at CRU of the University of East Anglia] and I went to the 'Climate and History' conference here in 1979 and Tom offered me a job here.[5] So that's how that happened. Victoria University was very good, because I was free to follow my interest, but you knew you had to leave, so completing a PhD was important.

Sarah Dry 18:55
Just briefly you mentioned the ecology group. Were you an activist while you were in medical school? Would you describe yourself that way?

Jim Salinger 19:06
Yes. Because there was Alan Mark, who worked in the South Island high country. And Alan basically prevented Lake Manapōuri from being razed, which would have drowned some of the native bush. So, we turned—well, in Dunedin, generally it was a liberal city and you got active on issues. So, yes.

Sarah Dry 19:31
What was it like coming to the 'Climate and History' conference here [at UEA]? What was your experience of that?

Jim Salinger 19:37
I could meet people of a like mind. I remember the big photograph taken of all of us, and Tom [Wigley] offered me the job and so that was an opportunity to do a postdoc here. No, that was good. And that's when I me—well, it was Sarah Raper and Keith Briffa, they were very hospitable. So, I just met a few people and Phil [Jones] was here. We had like interests. And Tom was an Australian anyway, so he [pause] Tom was funny because he had to sit in [on] my PhD Viva because we did it by telephone [laughs]. He had to sign that it had been done in a proper manner [laughs] So, going back—no, it was good coming [to UEA]. And the other thing is, New Zealand's a small place, you have to get out of the goldfish bowl. Because there's limited—you don't meet a lot of people, whereas here there's always people passing through or Tom took me to the US Department of Energy meeting in Washington DC. You could connect with people. The other thing is you could then measure yourself [against others] as well. You either sink or swim. Well, I swam. Because you don't know what your standards are like.

Sarah Dry 21:30
What was CRU like at the time?

Jim Salinger 21:32
It was very interesting. In 1980 and '81 Tom [Wigley] was director. There was Jean Palutikof, Phil [Jones], there was Keith Briffa, Sarah Raper, Janice Lough, Tom Holt. Just trying to think—I think Tim Osborn, was he around? I'm not sure. No, he might not have been then.

[5] 'First International Conference on Climate and History', 8-14 July, 1979, at the University of East Anglia, UK.

Sarah Dry 22:09
Phil Jones?

Jim Salinger 22:10
Oh, Phil, definitely. Yes, yes. We used to play bridge at lunchtime. Never been so good at bridge, in fact, just playing it briefly, but regularly, every day. It was nice because you could go out running in Earlham Park and things like that. There was a really nice environment. I enjoyed it, and it connected me up with important people in the world. So, you have to get out [of NZ]. In those days the fastest thing in communication was an airmail letter. If you want to mix with your peers—but the meteorological system was good, because it had a global communications system. You could pass messages that way by Telex. That was set up after World War II. All meteorological services, which I went into, were globally connected. I had approached the director of the meteorological service in Wellington, at the time for a job. He said, "No, you go here [to CRU] and do your postdoc". And that was the right thing.

Sarah Dry 23:40
Had you heard about the work that was being done at CRU on global temperature before arriving?

Jim Salinger 23:46
Ah, yes. I was aware that people were starting to do it. I think it was about then that we really got going, and so Phil [Jones] and co. realised about homogenisation and all that. We were all on the same page, although we'd come to it from different angles. We knew that [pause] to get a sensible climate record you had to homogenise [the data]. There were various ways, and there are all sorts of ways these days, but yes.

Sarah Dry 24:10
What work did you do while you were here [CRU] during that year?

Jim Salinger 24:18
A couple of years [1980 and 1981]. I worked a bit on paleoclimate and looking at paleoclimate indicators. I also wrote up the New Zealand temperature record [from my PhD research] because I didn't publish that. Then I wrote a couple of papers based on climate patterns of temperature and rainfall in New Zealand. So, it was a bit of everything. I think it was being exposed to people from overseas that was the much more important thing. That's when I met Chris Folland [from the UK Met Office], who was working on, at that stage, temperature records from the oceans. So, that's when we collaborated on areas in the South Pacific and that.

Sarah Dry 25:32
How do you think your perspective from the Southern Hemisphere affected the work that was going on at CRU?

Jim Salinger 25:40
It had the effect—well, people like Phil [Jones] started getting climate records out of South America. It was the other big continent, where, you know, you had Argentina and Chile. And also—now, I'm just trying to think. The Bureau of Meteorology got busy on Australia, and I was the New Zealand bit, and I've always provided them [CRU] with data. So, they

really got into the more remote areas of the globe. I think that's what it did, made people think, "Oh, you can't [just] think of North America and Europe, you've got to think of the whole globe". Of course, Chris [Folland] was—the UK Met Office was getting all the ships observations, which were—because Britain was quite a force in the nineteenth century, it had ships everywhere—started getting all the ships' observations together, the marine series, which date back to 1850. That's from—initially from the [pause] they would measure the sea surface temperature [SST] every day. That's right, canvas buckets initially, [moving] over to engine intake [measurements]. They realised all that. It was interesting that they got onto the huge naval archives and were able to digitise those. So it was, I think, awareness, that you just couldn't look at a small area in the globe or, as J. Murray Mitchell did, [use] very sparsely sampled [data]. You had to look at the whole globe. I think it was—that would be the main development. And I remember Phil [Jones] and company, they were digitising things, but they then went and got climate records. I think Phil flew into Punto Arenas, way down there—we had to fly like oops [gestures wildly like a plane landing abruptly]. He has interesting stories of that. They data collected in a lot of places which hadn't produced records.

Sarah Dry 28:30
How much statistics did you learn while you were here? For example, did you pick up techniques for homogenisation and gridding while you were here?

Jim Salinger 28:40
Okay, for homogenisation I sort of self-taught in New Zealand. Later on, we did a paper with other techniques. I didn't get into gridding as such. Other people did, but subsequently in the New Zealand Meteorological Service and now NIWA [New Zealand National Institute of Water and Atmospheric Research], there were people that since about 1972 gridded the data into five-kilometre squares. Whether you choose that or the 22 stations—the issue is [that] before certain years—probably since about 1950, or certainly since 1972 they've been able to grid. But before, [in] the early years, you don't have a lot of stations. That's the issue. Certainly, you can grid the sea surface temperatures, but they can get quite sparse in some areas, particularly during the war years.

Sarah Dry 30:00
You publish this piece in 1975 saying we see warming in New Zealand and in other parts of the Southern Hemisphere for the more recent period. I'm wondering if it's possible for you to remember by 1980, '81, how you were thinking about the evidence for a more general warming or cooling trend? Can you remember?

Jim Salinger 30:29
Oh yes, I can remember here [in CRU], we definitely saw warming by 1980. We used to discuss how, by 2000, it would be very obvious, given what was happening, to everybody. We realised in 1980.

Sarah Dry 30:54
And when you say warming, you mean global?

Jim Salinger 30:57
Yes.

Sarah Dry 30:57
And global at that point included ocean as well as land?

Jim Salinger 31:03
Yes, because the UK Met Office was producing the SST series and CRU, with Met Office, combined the analysis, and it was definitely there[6].

Sarah Dry 31:18
Do you remember when Jim Hansen and colleagues wrote their paper in 1981 in *Science*?

Jim Salinger 31:26
Yes, because I went to a meeting, a [US] Department of Energy [DoE] meeting, and [Hansen] was—in presentations—he was always very bolshie, would be the way to put it. And people would get a bit annoyed at him for being too over the top then, because he would come in with a smirk.

Sarah Dry 31:58
Did you feel he was too over the top?

Jim Salinger 32:01
A bit, at the time. Because he was doing it as though he was seeking publicity, so—

Sarah Dry 32:13
—And what about the difference between the methods that were developed by you and people at CRU and UK Met Office [and Hansen's group]. Can talk a little bit about how you perceived the different methods for generating temperature series at the time?

Jim Salinger 32:36
Okay, well, I wasn't too up on Jim Hansen's, but I knew the methods here [at CRU] were extremely rigorous. They were using gridded data, and they were homogenising records, and the amount of work going on at UK Met Office that Chris Folland and David Parker did was excellent.

Sarah Dry 33:03
Can tell me a little bit about the UK Met Office work? Did you have any contact with them?

Jim Salinger 33:09
I met Chris. I think we met up somewhere, I've forgotten when the first time I met Chris was. All I knew is that David Parker and Chris [Folland] were working on the sea temperature series. The issue they had was that you went from canvas [buckets] to engine intake, then measuring night marine air temperature. Then the night marine air temperature went from ships to container ships, which means it was up [gestures up high] there, so they had to homogenise for all that. Of course, with the canvas buckets, as the seawater drains out there was evaporation which would cool it a bit, so they had to do adjustments for all that. I was aware of that work. Later, Chris and I collaborated on the South Pacific, comparing

[6] This formal combination of CRU land and Met Office marine didn't happen until the mid-1980s, after Jim Salinger was in CRU.

basically island temperatures with the surrounding marine SSTs [sea surface temperatures] and night marine air temperatures. The New Zealand Meteorological Service, when I was working there, used to archive all the climate observations from the South Pacific. They used to run the Meteorological Services of the South Pacific, and so we had a lot of archived island data from Kiribas, Tuvalu, Cook Islands, Tonga, Samoa, so there was a lot of interest there. Those islands are actually surrounded by oceans, so it was a good test.

Sarah Dry 35:35
I just wondered if you had anything else to say about that DoE conference. You mentioned that a couple of times, and it seemed like an interesting moment.

Jim Salinger 35:43
It was, because then I met all the Americans and there were [pause] oceanographers. There was Ray Bradley, and there was Tom [Thompson] Webb III, he was into dendroclimatology, so I met some of the, shall we say, American climate community. Of course, they were very active then. And again, the thing with America, the climate community—[they] were sparse compared with medicos, but we all tended to work on our part of the globe, because there wasn't competition as such. So, there was the space and that sort of thing. There was, now, [Syukuro] Manabe and [Richard] Wetherald of course, who did the first climate modelling at that time. And, of course, I knew Steve Schneider. He was at NCAR [National Center for Atmospheric Research] then, before going to Stanford.

Sarah Dry 37:10
Do you remember the title of the conference or the year that it took place?

Jim Salinger 37:14
I think it was 1980. We were funded by the US Department of Energy, anyway.

Sarah Dry 37:22
When you say we—?

Jim Salinger 37:24
Here , at CRU. Yes. I was on US DOE grant, looking at paleotemperatures and other indicators ,as well as instrumental record.

Sarah Dry 37:38
Your postdoc was funded by the US DOE?

Jim Salinger 37:41
Yes, yes. Yes.

Sarah Dry 37:43
That would have been via Ray Bradley, at the University of Massachusetts?

Jim Salinger 37:48
No, I think we had a direct contract[7].

[7] Most likely this was the grant held by CRU, under Tom Wigley, from the US DOE for "Geographical patterns of climatic change (particularly since 800 AD)".

Sarah Dry 37:57
Oh, I was just going to ask you a little bit about the climate modellers. You mentioned Manabe and Wetherald and I wondered what your perspective on modelling was at the time?

Jim Salinger 38:04
My perspective—well, if you wanted to look forward—Manabe and Wetherald were regarded as the best of the time. But they were still—computing power and memory wasn't up to the speed that it is these days. So we agreed with them, but we knew that there was still a lot of development to happen. It's the same as numerical weather prediction. It was—at that stage, [it] would be computer limited. But the general idea that you put more greenhouse gases into the atmosphere, was fine. Though there were all the naysayers around then saying, "Oh, they're no good", or "you haven't taken too much notice of clouds", and—but you have to—and there were people developing models. You have to have the work done to make them better, and that's what happened. So, my view, although I was in the instrumental area, was that the modelling was fine. John Mitchell, at the UK Met Office, was a very clued-up modeller.

Sarah Dry 39:37
I think one of the things that's interesting about models is that they work with things like climate sensitivity, where they give you an average number.

Jim Salinger 39:50
That's right. Yes. Were they getting climate sensitivity right?

Sarah Dry 39:57
Yeah. I wonder how you saw your work on the instrumental records as in relation to these climate sensitivity issues?

Jim Salinger 40:06
Well, the instrumental record was very important because the climate models had to simulate what had happened up to that time, as a check on how well they're performing so that they could look forward. So, we saw the instrumental work as essential, so that models could [be] checked for how [well] they verified, [identifying] errors and that type of thing.

Sarah Dry 40:42
I just wondered, as someone who is so sensitive to local and regional climate variation, how you felt about models that were—

Jim Salinger 40:53
—global?

Sarah Dry 40:54
Yes.

Jim Salinger 40:56
Well, okay. At the time, we knew they were just giving the big picture, but not a lot of detail. If you wanted to know about New Zealand—I remember the climate scenarios from about

1990 and they weren't model-based—then you had to make various assumptions on how the circulation might change. Whereas once you got to 2000 [and beyond], the models weren't limited by computer power, weren't limited by memory.

Sarah Dry 41:42
You're talking about regional models?

Jim Salinger 41:43
Regional models. Yes. You couldn't really do anything with regional models, but we agreed with the general [circulation models], what was happening globally. It was trying to tease out what was happening in the regions—you just couldn't do [that] until models were much better. The general idea—and of course, Arrhenius had shown way back in the nineteenth century—was that you put more carbon dioxide in the atmosphere and it warms up. Things like that.

Sarah Dry 42:23
And what about Antarctica? Can you tell me a little bit about the research on Antarctica and what role it played in the general research on climate science?

Jim Salinger 42:38
Really, it didn't get going until the IGY [International Geophysical Year] in 1957. New Zealand, of course, was involved in that. So apart from some climate stations on the Antarctic Peninsula—McMurdo Sound, and Scott Base started about then as well—here there weren't any records. So [Antarctica's] role was ice cores. You could bore down and get a climate history through oxygen 18/16 isotopes. And you could also, very importantly, measure little bubbles of air which contain carbon dioxide and methane. So, basically, the early role was you could get a paleoclimate record out from the ice sheet, but it wasn't until later, before the ice cores drilling and extracting the bubbles of air, that people could get a much better record of temperature and greenhouse gases. It was very important in showing interglacial/glacial cycles. And therefore—with greenhouse gas variability—it was very important in developing—because it's a bit like continental drift [that] nobody believed in it for a while—[an understanding of] Milankovitch as cycles to tip [between] interglacial and glacial periods.

Sarah Dry 44:38
And what about the work that you did on Antarctica air temperatures? I'm thinking of a 1984 *Monthly Weather Review* paper[8], does that ring a bell?

Jim Salinger 44:51
No, it doesn't. I'm not aware of that one. I did a paper where I supported [pause] Someone wrote a paper on—I've just forgotten the name. I wrote a backup paper on how, with the settlement down into agriculture—and how when people settle down—two things happened. They had livestock and arable crops in Europe and perhaps parts of North America. This was before the Anthropocene, they started clearing forests. What you got was, if you look carefully, a reversal. What should have happened with Milankovitch is that we should have been heading, about 5,000 years ago, into the next Ice Age. But because we started burning

[8] Raper,S.C.B., Wigley,T.M.L., Mayes,P.R., Jones,P.D. and Salinger,M.J. (1984) Variations in surface air temperatures. Part 3: The Antarctic, 1957–82. *Monthly Weather Review*. 112(7): 1341-1353.

forests, putting a little bit of carbon dioxide into the atmosphere—and the other thing was livestock and rice paddies producing methane—we got a slow growth in both of these, but the climate system had enough time to adjust. And if you look at—ah, Ruddiman, Bill Ruddiman wrote the paper[9]. And if you look at it, it's good proof that the very slow changes then were probably triggered by agrarian agriculture and livestock and clearing of forests. But it was so slow [that] the climate system could adjust. Unlike today, where you've had poof, up into the atmosphere, so—

Sarah Dry 47:19
Thank you. Maybe we'll stop now, unless there's anything you'd like to add now about the topics we've been discussing this morning?

Jim Salinger 47:29
Okay, so we've really been doing the CRU years. After that, I moved back to New Zealand and I was employed by the New Zealand Meteorological Service. We can talk about that. It was a very interesting period, well the whole period has been interesting. That's fine.

Sarah Dry 47:56
Okay, great. Thank you.

[Track 3]

Sarah Dry 00:18
My name is Sarah Dry. We're picking up after lunch session on the campus of University of East Anglia on 18 July, 2023. I'm interviewing Jim Salinger. Jim, I thought we would start after lunch by talking a little bit about your personal life.

Jim Salinger 00:37
Sure. From [when I was] 8 to 16, my mother had depression. She was unusual in that she got treated with psychotherapy. Then I had my own meltdown when I was [about] 20. So that would be 1968, '69. That was due to a relationship breakup. So I had my own depression. And that's why I had the gap year then—obviously, I went into one or two other things—and then got married in 1973.

Sarah Dry 01:19
Can you tell me a little bit about how you met your wife?

Jim Salinger 01:22
It was actually through the B'Nai B'Rith young adults when I was up in Auckland in about 1968. It was a bit unusual for me to have other Jewish people who were young, my age. We actually went to a ball because my aunt was being inaugurated as the first woman's president of the B'Nai B'Rith local chapter. B'Nai B'Rith's a Jewish service organisation which started in 1843, one of the longest service organisations on the globe. So that's how we met and then—and that's probably the reason for my other relationship breakup because I felt very much like *The Graduate*, I was [pause] dating the wrong person. Anyway, she went

[9] Ruddiman,W.F. (2003) The anthropogenic greenhouse era began thousands of years ago. *Climatic Change*. 61(3): 261–293.

[off] to Australia. And so when she was in Australia, I was in Auckland, and then I went to Southern California and came back, and then we got engaged, and subsequently got married. And what was interesting, both families played bridge. So we had bridge tables at our wedding. Which is—everybody remembers it because it's not the normal thing you do. She was Jewish, but her parents were from the Holocaust generation. It took a Holocaust to get them out of Holland. They met in Switzerland, so they didn't suffer like some people did. Although they were Jewish, they weren't particularly that [way] identified—they weren't observant. We had two boys.

Sarah Dry 03:19
Can I stop you there and just ask what was her name?

Jim Salinger 03:22
Carla. And the family name was Lenwood, but it was changed from Levison. Salinger had gone through from the 1830s, from Russia, and Poland. She came out [to join me at UEA] when I did my postdoc, then we returned to New Zealand. In terms of personal life, we were married for 33 years, and she decided—she never seemed to get on with males. I think that problem there was with her father, who was a very dominant misogynist Dutch man. So in the end, she decided to call it quits and I was on my own for a number of years. Then I did what many people do—jumped into the wrong relationship that lasted eight years, then I ended that one because it was very toxic. The person was a smoker and an alcoholic. So that doesn't go well. Now I'm in with a delightful lady.

Sarah Dry 04:44
And you mentioned that you had children.

Jim Salinger 04:46
Yes, two boys, and one of them is 48 or 47, and the other's 45. Yes, and some grandchildren as well.

Sarah Dry 05:01
Great, thank you. I just thought, briefly, you had mentioned being involved in something called the Ecology Action Group for Otago, is that right?

Jim Salinger 05:15
That's right. That was when we were in Dunedin. Dunedin again being very progressive and environmental. We had an ecology action [group]—we'd clean up streams and what have you. And then, because Paul Ehrlich and his wife Anne came out on a cruise, we organised for him to talk to the schools and also give presentations to the City Hall, effectively, or the Regent Theatre, and that was packed.

Sarah Dry 05:55
I wondered what environmental consciousness was like in New Zealand in the 1970s?

Jim Salinger 06:00
It was very high. Because Alan Mark, who's got knighted, was able to stop the razing of Lake Manapōuri because that would destroy the native bush around the shorelines. It has always been—I guess, because access to the outdoors is very easy and people do a lot of

tramping in the mountains, they're very aware of what's happening in the environment. And of course, lots of clean air and clear skies. We're very sensitive to that. Not that we have the best record, because the Pakehas were busy introducing—we'll call them vertebrate pests, mammals, like possums. The first thing they introduced were rabbits. New Zealand was the original bird land, because it was bio-geographically isolated. The only thing we had of a mammal was native bats, because they could fly there. Everything else was birds, or reptiles, or what came before. So our English forefathers decided they wanted to hunt rabbits. And of course, the rabbits had a heyday and there was a rabbit problem. So then they introduced stoats to kill the rabbits. And so it went on. The worst was possums from Australia, because the bush and birdlife was not adapted to those predators, and also mammals that would graze on the native bush. And so there's been—and the Māori removed a third of the native bush, the Pakehas, or Europeans, moved another third, so we've only got a third left. Shall we say the arrival of humans has not been kind on the environment.

Sarah Dry 08:21
I wondered if I could ask, if at that point, you had any sense of your role as a climate scientist in relation to protest and political engagement on the environment? Or were you just a student interested in raising consciousness?

Jim Salinger 08:38
In the early days [pause] it was just a sort of young person interested in that. But obviously, after 1980, I became an activist, as far as I could be in a government department. Once I left it, I've been a climate activist since. And we have a lovely group now. The idea I hit on—when I saw David Attenborough pairing up with Greta Thunberg. And we have a really talented young lady [Sophie Handford]. She's 20 now. She's a second term councillor on the Kāpiti Coast, and she got 170,000 schoolchildren out on climate strike in 2019, which was magnificent. So, I've paired up with them. We've got an intergenerational group of climate investors. We span from ages 105 to 18 and because they're all active—have you heard of Lucy Lawless, Xena the warrior princess? Yes, she's one of them. That way we get really easy political access. And also, the young ones can do the heavy-lifting. We've done it. Well, we're still doing it, but—

Sarah Dry 10:15
So what happened in 1980? You said after 1980, you became an activist?

Jim Salinger 10:19
I think it was the realisation that global warming was real. Having come over here [to CRU] and seen the evidence properly. We used to have debates at CRU and the debates would go, "Okay, everybody will be able to see [the warming] two decades later" which, of course, happened. That made me very aware of the path that the globe was heading on. Really, we had to start curbing fossil fuel use. So that was an important turning point.

Sarah Dry 11:11
Was there a particular moment in time where you felt that you had an "ah hah" moment? Or was it more of the cumulative experience?

Jim Salinger 11:19

For me, it was probably a more cumulative experience, and for other people was, like, 'ah hah'. I talked with Lucy Lawless once. She was a 12-year-old, ducking her father's—he was mayor of a local area in Auckland—ducking her father's smoke. She heard this man talking on the radio about climate change. And she thought, "Ah hah". I found out this year that was me [laughs] which was nice. I used to talk about it a lot. That was my way of getting the message out. But I guess, coming here [to CRU], we realised what was happening because the evidence—science is evidence-based—there was too much evidence. And of course, the greenhouse—CO_2 and methane—curves were jumping when you looked at the paleoclimate records. There was enough published evidence then. So, in a sense it was evidence-based.

Sarah Dry 12:32
So, we go back—how many years did you spend at CRU?

Jim Salinger 12:38
Two. We went back to New Zealand because my wife didn't want to stay here. It was two years, but they were very important years because they connected me up with everybody in the Northern Hemisphere. Or, the important people I regarded in the Northern Hemisphere.

Sarah Dry 13:02
And they were probably important in connecting the people in the Northern Hemisphere to you—

Jim Salinger 13:08
—Yes, that's right. I became the sort of Southern Hemisphere person, but subsequently, we have a group I loosely called CRUSH [Climatic Research Unit Southern Hemisphere], because half a dozen of the people that were there at CRU in my time are now in the Southern Hemisphere. We have Tom Wigley at University of Adelaide and he's also at something 'Waters' in Queensland. There's Janice Lough. She's now at the Australian Institute of Marine Sciences in Townsville. We've got Dick Warwick, who's at the University of Waikato, Jean Palutikof who's at Griffith University of Queensland. Mick Kelly, who's in Northland and me. Six of us. So we've nicknamed ourselves as CRUSH.

Sarah Dry 14:17
Do you think that was more than coincidence that so many people ended up in the Southern Hemisphere?

Jim Salinger 14:24
Well, Tom was Australian anyway, so, but he's still holds a post at NCAR. I think it's a bit more. Yes, Dick Warwick was American. Mick, he was over here, so he's British. Jean was British. So probably a bit more than coincidence.

Sarah Dry 14:45
Can you tell me about what job you got next in New Zealand?

Jim Salinger 14:52
The New Zealand Meteorological Service didn't promise me a job coming back, but as soon as I landed in the country, they flew me down and offered me a job. It was the public service in those days. the agricultural meteorologist of the day had had a heart attack and died. So,

they offered me that job. What was funny is one of the directors, [said] "Where do you want to live?" I sort of didn't mind, and he said, "Well, you're going to live in Wellington for the rest of your career", which didn't happen. But I got—and there was a public service job, so that was permanent. In those days, public services, probably like the UK Met Office—it was manna came down from heaven—being in the research division it was great, you decided what you should look at, within the organisation, which was great, because you didn't have to think about where the money was coming from. It was public service money. So, I embarked on agricultural meteorology, which was very good because it put me in touch with lots of people and departments of scientific industrial research, who were in agricultural research, be it horticulture, arable or livestock. I was the liaison with all these people, which was lovely, and I could visit them, and I was able to expand out. Then a significant event happened, which was, in 1982-83, an El Niño. Now, New Zealand is particularly sensitive to El Niño Southern Oscillation because when we have an El Niño year you get far more southwesterlies, and it's cold and wet in the western-south of the South Island, and dry in the east of the North Island. In 1878 [knocking sound; pause]—it's captured in the early reports—they had this huge El Niño, and Napier in the east had half its annual rainfall and Queenstown had double. That's what it does. So [in 1982-83] we made the first ever seasonal climate prediction based on the El Niño for summer. And it was totally correct!

Sarah Dry 17:43
How did you do it?

Jim Salinger 17:45
Well, someone in the research division worked out the sorts of climate patterns we got when we have El Niños, so we forecast that. And it happened.

Sarah Dry 17:59
When did you make the forecast?

Jim Salinger 18:00
Oh, we did it before the summer. Summers go across the year boundary, so it was the summer of '82-'83. We were totally correct.

Sarah Dry 18:12
And what enabled you to make a forecast which hadn't been able to be done before?

Jim Salinger 18:16
Well, Neil Gordon had put together what climate patterns you get from El Niños, and in New Zealand it's very stable. Because we're in the Pacific, the circulations cross the Pacific basin. It's like Australia goes into drought, but in New Zealand the south and west is wet and the north and east is dry because we have mountain ranges. If you beef-up the westerlies, it's going to dump more rain, and the rains just go up to 3,000 metres in the west and south, and the north and east are sheltered so they're in the rain shadow. With La Niña, the opposite happens: it's wet in the north and east, and dry in the south and west. We didn't do another seasonal forecast for about a decade. But that one really was correct.

Sarah Dry 19:26
When you say it was a seasonal forecast—

Jim Salinger 19:28
—Three months. This is what summer is, the average over December, January, February. So, 90 days. You're painting a picture of a theme, you're not painting what happens every day. That woke up the climate field about seasonal climate patterns, which before people [had] just thought about—okay, when we did weather forecasting, I did a few weeks of weather forecasting. I had to be public service potty-trained after all [laughs]. And then—ah, it was good fun, but just basically [pause] In 1982, you did the forecast for today and you did the outlook for tomorrow. That was it. As the 1980s progressed, at the European Centre for Medium Range Forecasting and the [UK] Met Office the computer power got better and better. By 1992, you could forecast the week [ahead]. Numerical weather prediction [now] wasn't limited by computer power or computer storage. So that was the big development, a huge improvement in numerical weather prediction. We were really on the cusp of that. There was a triumvirate of us—myself, Brett Mullan, and James Renwick. We would research climate patterns that decade and what they did to New Zealand weather, whether it was La Niña or El Niño, and we started teasing out as to what the seasonal patterns were. Then we progressed to decadal patterns. In other words, we were really getting into the beefy stuff of understanding the climate system. Of course, the huge 1982-83 El Niño made everybody realise about [these] things that would affect climate.

El Niño, La Niña is very important on global temperature. After global warming, El Niño Southern Oscillation is the next big [influence] causing the variability in global temperatures. This year's [2023] forecast of [global temperature] will be very warm because we're going into an El Niño. You tend to get above the trend, above average. In La Niñas, [global temperature] tends to be a bit lower. In the climate community, we were really teasing out what happened from seasons to decades. In other words, starting to fill in the timescale, because before that there was day-to-day weather forecasting and then climate change, which was way in the future. But there's [seasonal and decadal] detail in between. The seasonal aspect is incredibly important if you're in farming, or what have you, and Australia's dramatically affected by El Niño and La Niña. In Australia, the El Niño years are droughts and they have terrible forest fires. La Niñas you get wet in Queensland and New South Wales, and it can even get into the interior. So, in Australia they talk about sometimes it's a sunburn country, other times it's deluged with water. That was an aspect, not so apparent in Europe, that we picked up in the Southern Hemisphere particularly.

Sarah Dry 24:10
That's really interesting. I just want to make sure I understand the techniques that you were using. Can you talk a little bit about that? You mentioned computer models catching up later on, but am I right that you weren't using models to do this?

Jim Salinger 24:24
No. We were examining climate patterns. We would look at the El Niño years and La Niño years and [also] in-between years. The other thing that the global climate community's improved on dramatically is [that] meteorologists, unlike medicos, have been always good at archiving data. That goes back to World War II. Then after World War II, they developed something prior to the Internet called the global telecommunications system [GTS]. You know what the biggest part of meteorological organisation was? The communications room. They had all these ladies banging out telexes because they had to get the balloon observations

into the GTS, which went around the world. Because if you're going to forecast the—it's basically applied science and the action you get this in. There's no point in trying to have weather forecasting models without pulling information from the entire globe. Why I enjoyed the World Meteorological Organisation experience (and I can talk about that a bit later) is that it was built under global cooperation. This is unlike corporates. The idea is that everybody puts in, and everybody can take out. A good thing is the Americans championed it because [the rest of us] get far more out than you put in. I mean, we could get all the satellite photographs, everything. We didn't have that capability, but it was, gee, an incredible model of global cooperation. That's what I learned through meteorology, which I wouldn't have picked up through other sciences. And we had to archive data, we had to archive this in a way which was globally consistent. That's where you got development of the meteorological codes and the climate codes. Whereas during the pandemic, medical records were a mess, because they never had any way of—

Sarah Dry 27:15
—No consistency.

Jim Salinger 27:16
No, no, we'd had 70 years of consistency. Well, if you going to send it around the globe, you have to speak the same language.

Sarah Dry 27:28
You said you were comparing climate patterns? Was that through mapping?

Jim Salinger 27:37
Yes, yes. Definitely in those days. And correlation, spatial correlations. You had statistical techniques such as cluster analysis and principal component analysis, where you could get patterns out and that would tell you what percentage of the variation was explained by certain patterns. So, we'd get patterns out and, invariably, you could link them to the dynamics. That, I guess in the 1980s, was a very important part of development of well, we'll call it, meteorology, climatology, whatever. Weather's daily and climate is when you start—

Sarah Dry 28:38
Yeah. It's very interesting you were talking about filling in the seasonal timescale, so three-monthly scale up to decadal scale. That's important for linking weather and climate.

Jim Salinger 28:53
Yes.

Sarah Dry 28:53
Were you doing that in a self-conscious way, that you we aware that New Zealand could play a role?

Jim Salinger 28:58
Yes, yes.

Sarah Dry 28:59
Can you talk a little bit about that?

Jim Salinger 29:01
Yes. I had some very clever colleagues in what was the former New Zealand Meteorological Service. We had to work through this during the corporatization process. We went from a system where manna came down from heaven, [to] where the funding was removed, and we had to bid for it, which was horrible. It was neoliberal stuff. The forecasting wing of the Met Service got split-off from the climate side. That shouldn't have happened, but it did, I won't go into why. So, during that period, I would convene meetings between the meteorologists, the forecasters and us climate scientists, because we wanted to put together, on the same page, if we're talking about seasonal climate—and this was in the 1990s. I would convene a monthly [forecast] meeting, because the Met Service was going to talk about the next two weeks to the month, and we were going to pick up from the month onwards. We wanted to be consistent. I was very careful to keep this going and it was by actually doing it we improved our techniques for seasonal climate forecasting.

Sarah Dry 30:40
How was that?

Jim Salinger 30:41
Well, before the climate models really got going on seasonal, we'd do things like taking the last month, or two or three [months]. We'd look at what phase of El Niño/La Niña we were in. There was something else, equivalent of the North Atlantic Oscillation here [in Europe], but we had the Southern Annular Mode which was more of a monthly sort of thing. Then Brett Mullen developed what we called 'analogue forecasting', and we'd compare the last few months and match with seasons in the past and have analogues and look at that. So, we were doing interesting techniques, but later the global—because World Meteorological Organisation was pushing us to that, the modelling centres started producing these seasonal forecasts, which they do today. We were really developing at the forefront of that. In that you had to understand El Niño Southern Oscillation, we had something larger in the Pacific called the Inter Decadal Pacific Oscillation. We would nickname it IPO, but it wasn't 'initial public offering' in the share market. But PDO is what it is. It happens on a decadal basis, and it was picked up by sudden changes in fisheries along the west coast of North America. What had happened is when the circulation changed, so you got different fisheries. It was like a decadal version of El Niño Southern Oscillation. In our part of the world, we had the Southern Annular Mode. That has been getting more and more positive, partially because of ozone depletion, but also the globe warming up. That pushes the summer circulation further south, so you get more anticyclones across southern New Zealand. Our understanding of the Southern Hemisphere circulation improved dramatically. I was allowed to go back to climate change a bit later in the decades [after] 1980 because people were realising global warming was happening.

Sarah Dry 33:44
When you say you're allowed to go back to it later, what do you mean?

Jim Salinger 33:45
Well, I was taken on as an agricultural meteorologist, but then I'd keep on being invited to conferences. One was in southern Africa on paleoclimate or climate variability and change, and as these got [pause] more often, I was usually invited [to] them with money. I didn't

have to get money out of the system. In other words, travel [funds]. Then I was sent as the New Zealand delegate for the Commission for Agricultural Meteorology of the World Meteorological Organisation.

Sarah Dry 34:33
When was that?

Jim Salinger 34:34
1986. That was to Madrid in Spain. I met up with all these representatives from the globe and, oh, it was fun because, you know, the WMO Technical Commission. At the next one, I got voted in as the vice-president.

Sarah Dry 34:59
You seem to have had a facility for being in mixed groups of people.

Jim Salinger 35:04
Yes—

Sarah Dry 35:05
—dating back to organising observers when you were in school.

Jim Salinger 35:09
Yes, that's right.

Sarah Dry 35:10
Why do you think?

Jim Salinger 35:14
I haven't thought about that too deeply. But I like working with people. So that was very good, because you got experience of what I would call consensus. Because that changes—you're not authoritarian, you let the group decide, but you have to let it come out. Because this is a group of people representing nations of the world, and then I was president—well that was in the 2000s. It was a very good experience of seeing how global collaboration should work. I think other sciences tend to be more competitive, but because of the World Meteorological Organisation you had to have data collection, which was consistent, and you shared everything. It was a very good lesson. You get much more out of collaboration than [by] competing.

Sarah Dry 36:35
I wanted to return, if I could, to something you were mentioning with the Southern Ocean circulation and improving understanding of how it worked. I wondered how much new data played a role in that? So [were you] getting access to new data? Or was it that you were asking new questions of existing records? What enabled you to make those advances?

Jim Salinger 37:00
Well, far more superior—[was] NOAA [who] archived a lot of the data. They've now been able to see [through] pressure records which have been around for a long time. What they did

is they would produce analysis going back [through time]. And with the growth of oceanic observations, getting the ship's observation—and that included pressure as well—into the global databases has enabled everybody to build up a far better understanding. You have various analysis that go back in time. I think, for example, we have produced basically synoptic analysis from about 1950, right through. This is built up for the Southern Hemisphere, we'll call that southern oceans, because once you're on Antarctica, there's not much there, it's all ice anyway. Once you build that up, you can get the patterns, and it enables much better analysis to be done and get out any sort of seasonal to other time.

Sarah Dry 38:39
And can you tell me a little bit about the paleoclimatology conference in South Africa? What was that like?

Jim Salinger 38:48
Oh, that was looking at—so, that was 1983. And two of us—I know we visited Wits, Witwatersrand, it was a multiracial university, but of course you had Soweto and that. The paleoclimate conference was always done in Swaziland [the Kingdom of Eswatini] because that was part of the British Commonwealth, so South Africa could legitimately do it there because there was no apartheid involved. No, that was very interesting. And they were looking at really long-term change. It was paleoclimates of the Cenozoic.

Sarah Dry 39:33
Were you doing paleoclimate work at that time?

Jim Salinger 39:36
Not exactly. But I'd done the glaciers. Anyway, they let me go. So that was fine.

Sarah Dry 39:45
It sounds like your work was becoming increasingly international in this period. Is that fair to say?

Jim Salinger 39:52
Yes, yes. And I published in the *Journal of Climate*.

Sarah Dry 40:00
Did you continue to collaborate with people at CRU?

Jim Salinger 40:03
Yes.

Sarah Dry 40:04
Can you tell me a little bit about the nature of that ongoing collaboration?

Jim Salinger 40:08
Yes. And also with Chris Folland at the UK Met Office. Well, Phil would always want our records updated. So, I'd send them.

Sarah Dry 40:19

How would you send them to him?

Jim Salinger 40:20
Oh, just the data files. He was working on monthly—

Sarah Dry 40:27
But was it by post or by—?

Jim Salinger 40:30
Ah, that's a point. The Internet developed—I remember sending, probably it was by post initially. I remember sending my first emails about 1989 and it would just be strings of text. That's what you could send [unclear]. I put a report together for WMO and [it was] just the text. So, you could start sending—once we were into the 1990s it was a lot easier, but—

Sarah Dry 41:08
But when you were sending records to Phil?

Jim Salinger 41:11
It would be by post.

Sarah Dry 41:13
Sorry, you said he wanted to keep his records updated.

Jim Salinger 41:16
Yes. But that was easy. There weren't a lot of records to send.

Sarah Dry 41:22
And then I had asked you just about the nature of the ongoing collaboration. In addition to sending records…

Jim Salinger 41:27
We did the odd paper from time to time. In the late 1990s and [first] decade of the 2000s I did a lot with Chris Folland. I actually visited him for a period, and we put a paper together.[10] Now, what happened was I got busy pulling together the South Pacific records, because we'd archive them in the New Zealand Meteorological Service. In the early '90s, we got a bit of extra money. I hosted the first climate change conference for the Meteorological Society of New Zealand. Geoffrey Palmer was Minister for the Environment, and I invited him to open it. Between my invitation and him opening, he became the Prime Minister. So, he opened it. He knew all about climate change.

Do you remember the Rainbow Warrior incident? Well, a Greenpeace boat was blown up in Auckland harbour by French terrorists. And of course, we caught them. The French were incredibly embarrassed, because they thought we were a tinpot nation. They thought we're a bit like the British, I should say. But of course, when people are suspicious out in the country, everybody notices, so they got caught. So in the early '90s, of course they were in a New Zealand jail, and of course, the French wanted to get them back. There was a bit of

[10] For example, Folland,C.K. and Salinger,M.J. (1995) Surface temperature trends and variations in New Zealand and the surrounding ocean, 1871–1993. *International Journal of Climatology*. 15(11): 1195-1218.

French money coming into New Zealand. What happened was, the French Embassy funded me—it was about 1990—on a trip because I wanted to get together the French Pacific records, which were French Polynesia, in New Caledonia, and the French Polynesian islands. Why Tahiti was important was that the Southern Oscillation Index was made up from pressure records at Tahiti and Darwin. So, Tahiti is the other leg. The smart travel agent worked out I'd been funded an economy airfare on UTA French airlines, and she worked out that, okay, that normal economy fare would take me business class round the world [laughs]. My mother booked with me because she wanted to get over to see her son. She would have to sit in the economy class and UTA said, "No, your mother can't sit in economy class". So, she travelled with me. We went around the world in business class. We went to New Caledonia and up to Jakarta, to Paris. That's where I met Isabelle Leleu, who was going to become the deputy-director in French Polynesia [Meteorological Services], then Paris to French Polynesia. And back to New Zealand. We worked on climate records from the islands of the Pacific, including the French territories. We were able to extract a lot of the island temperatures and compare them with sea surface and night marine air temperatures. And that was in the 1990s.

Sarah Dry 45:37
When you say you worked with those records, had they not been accessed before?

Jim Salinger 45:41
No, they hadn't. We had a project where we looked at the ones we had in New Zealand Meteorological Service archives, because after World War II the New Zealand Meteorological Service ran the South Pacific—you could say they ran that as well. They'd send people out in little boats to Tuvalu and places with their wives and let off weather balloons.

Sarah Dry 46:17
That was the New Zealand Meteorological Office that did that?

Jim Salinger 46:20
Yes. This was in the 1950s. But I remember some of the people talking about it. They had this wonderful life living on a subtropical Island. Anyway, the role was to do the weather observations and climate. So we had them all, including Pitcairn Island.

Sarah Dry 46:46
And where did those records end up? How were they integrated into something that could then be used to continue to build a global record?

Jim Salinger 46:55
Ok. Well, at the moment I mean, they're still archived in New Zealand, but then if people needed them, we sent them. They were important, because these are some records, like the Samoan observatory, [which] went back to 1900. And things like this—some of them were very long. Usually, in the French system, it was the medical people that did the observations. The British system it was more the military, but they went right back. And Fiji and places like that. So, eventually, these island nations became independent, but we would end up always training them. Later in the 1990s, we developed a monthly teleconference, which included NOAA in Washington, various islands across the Pacific, us in New Zealand, and

Melbourne and Australia, to put together what was happening in the Pacific basin, and that's how we would then develop our seasonal forecasts.

Sarah Dry 48:32
So you said seasonal forecasts—were you [still] working at the New Zealand Weather Service?

Jim Salinger 48:40
Well, in 1992 is there was a split. This is where corporatization happened. Where the science and the Meteorological Service, which I was in, was put into the National Institute of Water and Atmospheric Research [NIWA] and the weather forecasting stayed in the Meteorological Service. We were doing atmospheric and climate research, and then the Meteorological Service was doing weather forecasting. That's how it's been. It shouldn't have happened, but I won't go into the politics. This is when science and New Zealand got corporatised, this is the neoliberal phase. This is where we all had to start—we had 10 percent base funding, but then we had to put up research bids to get the rest. We survived all that. The latest review is—would you believe—they're now going to decide [that] they're going to fund research. They're going to fund people and infrastructure. So that's back to the old system. Neoliberalism doesn't work because science is a collaborative thing. You don't want to compete with your peers. It's crazy stuff. So, Milton Friedman, bye bye.

Sarah Dry 50:18
Is there a sense at this time of wanting to keep global temperature up to date? Can you tell me a little bit about that?

Jim Salinger 50:30
Oh yes. When I was with the Meteorological Service, I deliberately produced monthly, seasonal and annual climate summaries. I used to keep the seven-station series up to date. I left NIWA in 2009. For the annual, I was always on the media because there's always something going on in New Zealand because of the nature of the country. But we deliberately would call an annual press conference early in the New Year, when we'd bring out the figures for the year. We always kept up to date what the New Zealand temperature departure was for the year. And of course, we'd bring it out early in the New Year when everybody's on holiday. There's not much news around, so we'd get huge coverage.

Sarah Dry 51:48
What was it like?

Jim Salinger 51:52
We'd get on TV, and we'd get pieces in the newspaper. It was very good coverage. I made sure that we stuck to the facts, didn't try and exaggerate. In New Zealand, the wettest place gets 10 metres of rainfall. The driest place gets 300 millimetres. So, there's always something to talk about. Then you talk about which was the sunniest centre and which was the cloudiest, which was the wettest, which was the driest, and the hottest.

Sarah Dry 52:34
When did you decide to do those press conferences? What inspired you?

Jim Salinger 52:38
Well, I just like talking about the climate. This was a good way to get the message across.

Sarah Dry 52:46
What did you see as the message?

Jim Salinger 52:48
Well, it was consistently getting warmer, but there's nothing like talking facts. I got very well known for that. You could bring it out regularly being a small country, it's easy.

Sarah Dry 53:07
So just so I understand, you were talking both about New Zealand climate, but also in the context of a global temperature?

Jim Salinger 53:16
I'd relate—well, when Phil [Jones] and co. brought out the global temperatures, we'd bring those out as well and say, well, New Zealand was whatever.

Sarah Dry 53:30
How did New Zealand generally track in relation to the global average?

Jim Salinger 53:34
In New Zealand, El Niño years are cooler years unlike the globe where El Niño years are warmer years. But we've had a whole series of La Niñas which means we've had warmer years. In fact, 2022 was the warmest year on record [in NZ]. If you pull out the New Zealand record, it tracks like the global, it's warmed up. The Pinatubo volcanic eruption [in the Philippines] was [a] very interesting year—that was 1991-92—because I looked at other years that had had significant atmospheric dust veils which had got into the stratosphere. And sure enough, all those years were preceded by about three, four or five seasons that were cooler than average. Sure, the Pinatubo years went, yonk! and then back. You could see the stratospheric hydrolysed sulphates, sulfuric acid droplets. Because of our clear skies, you had magnificent sunsets. And it was a lot cooler, and there were some massive snowstorms that winter. It [gave] the signal you would expect.

Sarah Dry 55:20
Was that interesting partly as a way of understanding the overall climate dynamics to distinguish better a signal of anthropogenic warming?

Jim Salinger 55:30
Oh, yes. Yes.

Sarah Dry 55:31
Can you talk a little bit about how, at the time people were thinking about these different effects on climate?

Jim Salinger 55:38

We had a Labour administration in 1989. They gave us some extra money to look at what was happening with climate. This was before we were fully commercialised. We did the first reports in New Zealand on climate change. We produced reports in 1997—
there was science, the impacts and the mitigation.

Sarah Dry 56:19
Sounds very much like IPCC.

Jim Salinger 56:21
IPCC. Yes, yes. But that was way ahead of its time. And two things happened. I collaborated with people in agricultural science and produced this report. And we said how, you know, another 30 years or whatever [we'd start to see global warming]. I remember the TV at the time—it was the lead item saying how we'd be growing bananas and pineapples in Northland. Guess what we now grow on Northland? Bananas and pineapples! [laughs] It's been amazing in the sense that—it was much more qualitative work then, but we'd worked it out. A journalist reminded me that at the time I was asked, "when would we see the impacts of climate warming?" And I said, "the 2020s." This was 30 years prior.

Sarah Dry 57:36
But at the time, this volcanic eruption—I'm just wondering about that?

Jim Salinger 57:41
It was very clear that [the effects] would last one to two years, and that was it. And that's exactly [it]. That's when John Mitchell did his models, and it showed exactly the same thing. You can see it in the climate record. So, it was a nice test of how the global climate modelling was going. That was important in the development of the field, because here was a real signal. The models could detect—you push stuff into the stratosphere, which blocks out a bit of sunlight, which is what it did, that the [models] were working okay. So, that was a useful test of what was happening.

Sarah Dry 58:43
How are you doing?

Jim Salinger 58:44
I'm fine, good.

Sarah Dry 58:45
Okay, great.

Jim Salinger 58:46
Because as you see, it was the whole time—Chris Folland was right, we were there during an important period in the development of the science.

Sarah Dry 59:00
Tell me a little more about that. How you feel about that?

Jim Salinger 59:03

Well, I've written a piece in *Climatic Change*, where for the hundredth volume Steve [Schneider] wanted us all to write editorials. So we did.[11] Basically, I traced—there's a bit in, is it Psalms or somewhere?, that said "from dust to dust". And you know, "turn, turn, turn". Things develop and go forward and go back and forward. So, tracing the development of science is like a journey, and you find out things, then you go back, and you progress. I've felt it's been very much like that, a journey. It's still going on. So, I keep busy now. I have a group of about 14, we write up, we've been having all these heatwaves in the New Zealand area, which is 4.2 million square kilometres. All sorts of things have been going on. We keep having to write them up because they keep happening.

Sarah Dry 1:00:22
So, before we leave the 1980s, I want to make sure that we've covered the main components of your life during that time. Is there anything we haven't discussed?

Jim Salinger 1:00:35
Well, we were in the old New Zealand Meteorological Service. We had agricultural meteorology, we had seasonal forecasting, then working out important climate patterns that define seasons and keeping the climate record up to date, as well, because basically, we had an interest—that's when I develop producing monthly and seasonal and annual climate summaries just as a way of tracking the climate.

Sarah Dry 1:01:15
And who were those for? Who responded to those?

Jim Salinger 1:01:21
Oh, well, there was James Renwick, who was professor of Earth and Environmental Sciences at Victoria University. Brett [Mullan] unfortunately passed away. Brett was Dux of Auckland Grammar, so he was a very bright cookie. Then me, then Dave the director, who's retired. The four of us, it was quite nice. You know, that was a group of us. I like working with people.

Sarah Dry 1:01:52
So, four was a big group at that point for you, having been alone?

Jim Salinger 1:01:56
Yes, yes, it was nice. But now, people, in climate science anyway, we collaborate with larger groups. But I guess through WMO, it's always encouraged this collegiality rather than being just on your own.

Sarah Dry 1:02:20
And what about international meetings? During the 1980s, were there any key meetings that you attended?

Jim Salinger 1:02:27
I got to one in Cairo in 1989. I'm just trying to think. I tended to go to ones in Australia because, obviously, the Australian Bureau of Meteorology was—and Neville Nicholls and

[11] Salinger,M.J. (2010) The climate journey over three decades: from childhood to maturity, innocence to knowing, from anthropocentrism to ecocentrism. *Climatic Change*. 100: 49-57.

people there. We tended to collaborate with the Australian community, obviously, because we're in the same part of the world, but they work on Australia, we work on New Zealand. We tended to—just trying to think [pause] trying to think [pause]—I went to one in Cairo. No. I tended to—I took the lesson to publish a lot. In other words, get the message out. I also liked promoting it within the New Zealand community because I thought having good information was important.

Sarah Dry 1:03:51
How did you choose where to publish your articles at that point?

Jim Salinger 1:03:57
That's an interesting one. There was *Weather and Climate*, a local journal, and *International Journal of Climatology*. I didn't actually pay too much attention to where I—there was *JGR* [Journal of Geophysical Research], there was a number which just—a group of us would decide where to put something. I was on the editorial board from 1979 of *Climatic Change*. Michael Oppenheimer [is Editor-in-Chief] now.

Sarah Dry 1:04:34
Tell me a little bit about that experience being on the board of *Climatic Change*. I know Steve Schneider had played an important role in introducing you to Tom Wigley who hired you to bring you to CRU.

Jim Salinger 1:04:46
Yes. I guess Steve wanted people in various parts of the world. And although we were on the editorial board, Steve would just use us to review articles at that stage. He must have done an incredible amount of work, because when he died, Michael Oppenheimer and then Gary Yohe said, "Well, he'll be huge to replace". So, they have assembled teams now that did all of what Steve did. But it was a good experience because you'd get papers to review, and we got free copies of the journals then, and you could keep up to date with what was published there. That was the first journal that dealt with climatic change as the main topic. It was good because it was supposed to be multidisciplinary, rather than just very technical. So [cough] there's been quite a lot published there, you've probably noticed.

Sarah Dry 1:06:11
Yeah, it's very interesting. Okay, so I think I heard you say that in 1992 the New Zealand Weather Service got—

Jim Salinger 1:06:21
Oh, yes—

Sarah Dry 1:06:22
—split into two? And that freed you, is it right, that that freed you up from doing agricultural meteorology to being—

Jim Salinger 1:06:32
No, that happened a bit earlier, because we got this extra money. Suddenly, Geoffrey Palmer and the government was keen that we find out more about climate, and we got a million dollars to look at climate. So that went into publishing the climate change histories and re-

homogenising the climate data. I now have a 22-station series rather than seven station land series. And of course, we've got the various archives, which are gridded for the oceans around New Zealand.

Sarah Dry 1:07:13
So that was that the first time that you did gridding?

Jim Salinger 1:07:16
Yes, in that sense. The landmass of New Zealand is only one fifteenth—we have a huge continental shelf, so that gives us the 4.2 million square kilometres. We're unusual in the world for having—we're about the fifth largest EEZ [Exclusive Economic Zone] in the world. Well, every time you have an island, Chatham Islands, or Tokelau up there, that's expanded, right.

Sarah Dry 1:07:55
If you could just tell me a little bit about what work you were doing now, let's say in the in the early to mid-1990s.

Jim Salinger 1:08:04
Okay, so we move from [pause]… So, I was doing a bit of agricultural meteorology and which in the 1980s I'd do papers with people and other—well, it was DSIR [Department of Scientific and Industrial Research] and MAFTY, then.

Sarah Dry 1:08:28
What was the second one?

Jim Salinger 1:08:30
MAFTY. Ministry of Agriculture and Forestry Technology. The science reforms happened because two DSIR people disagreed in the 1950s and set up their own. You had a duplication. The science reforms were to bring like-with-like together. The Met Service was split off. We were joined together with oceanographic research, with hydrology, and then we brought the fisheries in and the upper atmosphere. The idea was you had all the correct people in the correct places, but then they had competitive bidding, which was not very good. But yes, we survived that. That was sort of a *Brave New World*, the corporate structure. The best thing that happened to us was we had this horrible CEO [chuckles]. The first thing they wanted to do is, we had to make a profit, but then we could use the profits back and didn't have to pay it to the government. We could use it for ourselves. Anyway, this guy decided we were short of funds and that he'd have to get rid of staff, and after a couple of years the research director said, "Oh, you don't have to do it this way. This is how you do it". So, the board—it's the only time I've ever seen this—they got rid of the top managers. They sacked the top managers instead [of us]. And then we had eight golden years with a CEO. He said, "Well, actually our assets are our staff, and we want to pay the scientists more". So, we had eight wonderful years, and it was good.

Sarah Dry 1:10:46
When was that?

Jim Salinger 1:10:50

1994 through to about 2002. The person that followed him was okay, but then we had someone that shouldn't have taken over later. I call those the golden years of NIWA, we went from strength to strength and in the end, we learned the name of the game, which was you designed your proposals, then they had to get reviewed, then they would call in people from overseas. We'd recommend our colleagues and Australia and, of course, you can guess what happened.

Sarah Dry 1:11:26
They gave you the good reviews that you wanted.

Jim Salinger 1:11:36
[laughs] Yes! So, we could work out a plan that we thought—because scientists know what, you know—things would happen like. Okay, the sick leave—this is a good example. The HR person was very good then. We said, "Do you want to check out how many days sick leave scientists take a year?" So they did and they found it was only two or three days. So, they said, "Ah, well, when you're sick, your take leave", there's nothing, yeah. We were treated as responsible people. Those were good years. But that's when we really got into the climate modelling, just tracking what the climate was doing. I tended, because I'd had agricultural experience where you looked at the climate impacts, and things like where you could grow crops and what would happen to kiwifruit and viticulture and all that—as well as understanding climate patterns more, and the models by the end of decade 1990 were starting to produce regional climate patterns, rather than us waving our hands saying, "There's going to be more of this or more of that, and it'll be warmer", the models were starting to—and Brett Mullen would work downscaling models to the New Zealand grid.

Sarah Dry 1:13:24
Did that mean that there was more relevance then for some of the instrumental readings to validate the downscaled models?

Jim Salinger 1:13:31
Yes, as well. And of course, the instrumental. We had a denser pattern of instrumental records to verify the downscaling with. They'd work out regression relationships in the downscaling as well.

Sarah Dry 1:13:51
What does that mean?

Jim Salinger 1:13:52
Well, if you get more westerly flow, for example, it's going to be wet on the west coast of the South Island, but drier in the east. So, there's dynamic downscaling as well. They would have more the sort of northing and easterling and that type of things [going] into the downscaling. I would tend to still liaise with people in the, they were called CRIs then, Crown Research Institutes. I remember working on sweet corn and climate and some kiwifruit and climate which was an interesting one, and then working in the agricultural space as well, the impacts—

Sarah Dry 1:14:49

I wanted to ask you about the work in agricultural meteorology, actually, because it sounds like initially you ended up there despite your broader interest in climate?

Jim Salinger 1:15:01
Yes.

Sarah Dry 1:15:02
And indeed, moved back into climate science. But how did the experience of doing agricultural meteorology affect the way you thought about climate science?

Jim Salinger 1:15:13
Okay, so it was [pause] Of course the WMO experience comes into that as well. It would ground you into the impacts. What was fascinating is that, and it's happening now, too—I also looked a bit at climate and health as well—we would see in kiwifruit that the fruit requires a bit of winter chilling. You need to have cold periods, which then synchronises the flowering in spring. If you don't have those cold periods, the flowering is all over the place and they [have to] bring in beehives to pollinate the flowers. What's happened in Northland, they can't grow kiwifruit anymore because the winters are too warm. You don't get the vernalization. The early surveys we did in the 1980s with people—we used to research orchards up and down the country, they had climate stations, and they also would observe what was happening. This was good because you could get data. We worked out that the range was from Bay of Plenty through to Marlborough: round Christchurch was too cold, and up in Northland was too warm. So, you could work out a range, but obviously that moved south as the climate warmed. Things like viticulture in New Zealand has it made, because all you do is migrate the warmer styles into the north and migrate the cooler wine style south. You're not hampered as they are in France, where you have areas that are defined.

Sarah Dry 1:17:43
The agricultural work made it natural to think about impacts for you. And for other scientists, you think they weren't as interested in impacts?

Jim Salinger 1:17:55
Oh yes, because New Zealand is quite an agricultural country. And the impacts on arable crops is—obviously it affects the timing of when you put things in, [cough] and when you can grow. The other thing is with grasses in the north, you have subtropical grasses. Basically, if you have frost that kills them off. But that means that with warming, they spread south. That's what's been happening. Of course, the glaciers were retreating as well.

Sarah Dry 1:18:38
We've been talking a lot about temperature. But you've also talked a lot about rainfall, precipitation and pressure a bit. I just wondered if you have any thoughts on the way that temperature became central to the practice of climate science?

Jim Salinger 1:18:58
Well, obviously, you're talking [that] with an increase in greenhouse gases that increases the temperature. So, it's very much the central player. But the other reason why it's important is, [as] you warm the atmosphere, with each degree of warming you hold seven percent more moisture. We've had this year, on Auckland anniversary day weekend, 400 millimetres came

down in one day. Those sorts of things. So you're getting sort of what used to be, I guess, 500 [year] return period floods happening much more frequently. New Zealand has problems in that there's been a lot of forests that were cleared that would stabilise the slopes and the floodplains; things were also designed on earlier types of climate information. So now you're getting the big danger in New Zealand, [which] is floods. Floods was always called the New Zealand death, because people from here [the UK] would go over there and they'd get taken out by rapidly rising rivers, because our rivers are very steep. And so, whoosh. I remember a flood once happening out here, and there was fine weather. But you know the rivers are sort of low gradient and have to build up, that sort of thing. The other thing is a lot of the New Zealand cities are built around the coastline. So, sea level rise is important. And bits of the country are going up and bits of the country going down because of earthquakes, as well. It's complicated.

Sarah Dry 1:21:07
Thank you. Can we have a little more time?

Jim Salinger 1:21:13
Yep.

Sarah Dry 1:21:14
I wanted to hear a little bit more about your experience working with WMO, because you mentioned that a few times. Then, if we have time to talk about how you got involved in IPCC, that would be great. Then anything else that we haven't covered that you think we should, given the time that we have.

Jim Salinger 1:21:34
Yes. Okay. Well, WMO. Because I was the agricultural meteorologist in 1986, I got sent to this—every four years, the Technical Commissions would meet, and this was in Madrid. So, I was sitting next to the Dutch person who was standing for Vice-President at the time [inaudible]. And what's funny, I remember the British delegate was Bruce Callander, who later came on the Technical Support Unit for IPCC. He was there, put up his flag, then said, "Ah, the normal working hours are sort of nine to 12. And then you had three to five". And he decided to check his microphone and said, "Yes, I propose that". It went through. So, we had these three-hour lunches [laughs]. I found it difficult because the time to eat in Madrid is 10 o'clock or after 9[pm], or [maybe] not that late, anyway. I was fascinated by—there was the American would stand up and the Russian would stand up. The next meeting was in Florence, and we were—it was four years later. Kees Stigter next to me was standing for President [of the WMO Commission for Agricultural Meteorology][12]. So, what happens is, I decided to stand for Vice-President of the Commission. And people in New Zealand said, "Okay"—and then it was the week, or the two weeks, in Florence and all the galleries were open, free. We had the meeting. And there was still the Russian and the American like this [posturing to each other]. So I got voted in as Vice-President. So, I would get trips to Geneva fairly frequently, because I was chairing a working group. I chaired a working group after the 1986 meeting, and we put a report [together] on how climate would affect agriculture globally. It was a WMO Technical Report. It was the first report I did via internet—we would send strings of text or fax diagrams.

[12] Professor Cornelis Johan "Kees" Stigter, 1940-2016.

Sarah Dry 1:24:44
Do you remember the message of that report?

Jim Salinger 1:24:47
It's still around. Oh, [it was] that agriculture would be dramatically affected. There was an older guy. He was from Sweden. We did a lot of work on what the effects were likely to be. Again, qualitative, not quantitative.

Sarah Dry 1:25:07
When you say qualitative, what do you mean?

Jim Salinger 1:25:10
It means we reasoned it out rather than [it being] based on modelling research, that's probably what it would be. 1996 was interesting because we met in Cuba. Of course, there were no Americans. So that changed the dynamics a lot, because he didn't say this [gestures to indicate posturing]. Now, of course, the guy who was the American delegate in those first two sessions was a climate sceptic.

Sarah Dry 1:25:56
How much did American politics have an impact on international climate science in that period?

Jim Salinger 1:26:07
It wasn't too much then. It came in [later] in decade 2000. No, I can very clearly remember that coming into the—because Martin Manning who was with our institute—ah, 1994, we had a combined CSIRO/NIWA Climate Change Conference. WMO was good because you could connect people up. I did quite a lot of work with Météo France in that period, through the climate records.

Sarah Dry 1:26:50
Can you tell me a little bit about that work?

Jim Salinger 1:26:52
I spent time in French Polynesia, and we were wanting to get out the Pape'ete [part of Tahiti] records because that was an important part of one leg of the Southern Oscillation, the Southern Oscillation index. At the time, Isabelle [Laleu] was the Deputy Director. So, she got that set up with two automatic pressure recordings rather than the barometer there because of the importance of it. We also got people extracting the climate records.

Sarah Dry 1:27:33
From where?

Jim Salinger 1:27:34
From their archives, because basically they were either in French Polynesia, New Caledonia, or in France, and after her stint there, Isabelle Leleu was allowed time off and she—well, time to work somewhere—and she chose to work with me in New Zealand. That was good, because she would work on French records and pull-out rainfall patterns and temperatures

and things like that before going back to France. That was good. It enabled good collaboration across the Pacific, none of Britain versus France or anything. In the Pacific we tended to work as one. At WMO we would have working groups on various aspects, and I would always be in a working group on the effect of climate on agriculture, be it trends or whatever. And Kees would be working on traditional—he was very good with the developing countries and traditional forms of agriculture and climate, how they coped with climate via traditional methods.

Sarah Dry 1:29:10
Who was that Kees?

Jim Salinger 1:29:12
Kees Stigter. He's no longer with us. S-T-I-G-T-E-R. That would take you to lots of interesting places. Actually, that's what really took me around the place because I remember we had meetings in Accra, Ghana, [pause], Brazil, Argentina. It really made you travel because we had to do things. I decided we had to have a climate and fisheries meeting. Guess where we held it? Rarotonga, the Cook Islands. Well, if you're going to hold a fisheries meeting, you want to be in the middle of the fisheries hemisphere. Everybody loved it [laughs]. So WMO enabled a lot of that activity, which was a different side of things. Quite often I convened the meetings, which was fun. We'd produce a book from it—I got two special editions of *Climatic Change*. I produced one on climate variability and agriculture and the other on climate fisheries[13]. It was an opportunity to synthesise information and get people from various backgrounds together. The WMO work expanded into other areas. I'm nominally still on the Commission, but—

Sarah Dry 1:31:13
—Were you doing any teaching in this time?

Jim Salinger 1:31:15
No, no, my teaching was at Victoria University, and that period in Stanford in 2012. I would do guest lectures from time to time, but no teaching.

Sarah Dry 1:31:31
You were a research scientist.

Jim Salinger 1:31:32
Yeah, yes, effectively. WMO took me to lots of places and when I was President I'd have to go twice a year to Geneva. And it even took me to Russia, which was interesting.

Sarah Dry 1:31:52
Where did you go?

Jim Salinger 1:31:55
Obninsk. But I have a Russian daughter-in-law and so I had to go and visit her folks in Ufa, which is two hours flying east of Moscow in the Ural Mountains. That was an interesting experience.

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[13] Salinger,M.J. (2013) A brief introduction to the issue of climate and marine fisheries. *Climatic Change*. 119: 23–35.

Sarah Dry 1:32:14
Did you have much collaboration or any collaboration with Russian scientists at that time?

Jim Salinger 1:32:20
Not really. There were Russian people on the Commission, [Oleg] Sirotenko. And there was a nice guy, oh, yes, I can picture him. He was lovely, Alexander [Kleschenko]. At the Obninsk meeting, we had vodka drinking competitions. I've just forgotten his name. That would be the collaboration. But he was on the advisory working group. He was good. So, no problems. Well, having got the best of Lithuanian background in me, I guess.

Sarah Dry 1:33:01
You knew how to drink vodka with the Russians.

Jim Salinger 1:33:06
Well, that was easy.

Sarah Dry 1:33:08
Yeah.

Jim Salinger 1:33:09
It's like going on Hogmanay in Scotland. The key is slipping glasses of water when people aren't looking.

Sarah Dry 1:33:23
I wondered if you could talk to me about how you got involved in the IPCC because it was founded in 1988 and was developing through the '90s. When did you first start to get involved?

Jim Salinger 1:33:37
It was the Third Assessment Report. I was invited not by New Zealand but by Tom Karl and Chris Folland who were [convening] lead authors. So, I got invited on to the observations chapter of Working Group One. The first meeting I remember was in Paris, and I said to Bruce Callander, "Okay, do you want to have a meeting in Auckland?", and he liked the idea. So that wasn't too difficult. It was a fun process because on our chapter was Chris [Folland], Tom Karl, who was National Climate Data director, and there was John Christy. They usually put a sceptic on. There was Mike Mann, myself and Chris Folland. And Tom Karl kept on being taken out by NOAA things. I ended up sort of being the honorary convening lead author with Chris, you see. But we had to stop John Christy and Mike Mann fighting, because you have a sceptic and Mike is someone who's very—he was very defensive of his hockey stick graph. Whereas John Christy was with the satellite people at that stage, and they were disputing the climate records.

Sarah Dry 1:35:40
What did you feel at the time [about] the instrumental—?

Jim Salinger 1:35:43

Oh, it was very sound. [By year] 2000 [it was] very clearly showing things. You just had to look at UK Met Office, the CRU record, there was NASA's record. Another one somewhere else? NOAA. They were all showing the same thing. Might be a little bit different. But certainly very clearly, climate was warming then, but we had to write about things like ENSO and other things that made climate vary as well. We captured that. It was a great experience, because you worked with Sir John Houghton, who was the Chair, and there was someone from China who was the Vice-Chair [Yihui Ding]. He was a lovely guy. I remember sitting overlooking the Serengeti with him and debating various things. He was great. And Bob Watson was very good.

Sarah Dry 1:37:03
What did you actually contribute?

Jim Salinger :37:06
I was pulling together various climate records following up people on the global series, bits of climate variability. We did regional summaries as well. It's a bit difficult trying to remember now, but—Tom Karl was absent, so I had to—Chris would send me instructions and I would get on with it. Mike Mann was there for the paleoclimate record. I was there basically for the climate record as well. So, balancing the Southern and Northern Hemisphere.

Sarah Dry 1:38:01
Balancing in what sense?

Jim Salinger 1:38:02
Not balancing, getting the global picture, right. Mike Mann was the paleoclimate person and John Christy was supposed to be the satellites.

Sarah Dry 1:38:19
So can I ask the question, this term 'global temperature'. When did it start to be used? And when did you think it started to be used in a way that was really justified in calling it 'global' temperature? We started out talking about your reading of [J. Murray] Mitchell, and what you said were his shonky methods. So from 1990, looking back, when would you say that it was—

Jim Salinger 1:38:44
—Well, it was produced here [at CRU] in 1980. I think about 1990 would be when the IPCC first started being—that's when you've got the temperature series, you had the NASA series, you had the CRU/Met Office series, and you had the NOAA series. They all started during the 1990s. As I said, our prediction of 2000 came out to be correct, but it was very clear what was happening then, including the blip around Pinatubo.

Sarah Dry 1:39:32
What about the fact that there were three series using slightly different methods. How much did that matter?

Jim Salinger 1:39:41
It didn't matter that much, because they all showed the same thing.

Sarah Dry 1:39:45
Do you think it was useful that they were doing it in a slightly different way or, again, was that irrelevant?

Jim Salinger 1:39:52
Yes, it's a bit like these days in numerical weather prediction. If you look at the model guidance these days—when I did weather forecasting, you would—this is 1982—you would do the analysis and work out the speeds of the various systems, and [you] might move the perspex on, sort of thing.

Sarah Dry 1:40:23
What do you mean move the perspex?

Jim Salinger 1:40:25
[laughs] Well, then we drew up—

Sarah Dry 1:40:27
Tell me how it actually worked. Because that's a physical technique that I don't know about.

Jim Salinger 1:40:31
Well, it was just basically [that] you had the speeds of low-pressure systems and the highs and—so you didn't have any numerical weather prediction guidance. You knew the high was moving at such and such, and the low was doing whatever, and you'd try and move them and then you'd draw up what they call a prog[nostication] map. Kevin Trenberth, have you heard of him? Well, anyway, he was a very bright guy that went to NCAR. He was, shall we say, he has an H index of 100. He has a high opinion of himself as well [laughs]. So, he was a terrible arguer at what was called modelling at the—but I wasn't there in the Met Service then. So, people would discuss it out, then agree. But nowadays, you've got the UK Met Office model, you've got the European Centre for Medium Range Forecasting model, you've got the Australian Bureau of Meteorology model. You've got all this model output. I remember the deputy-director of ECMWF, that's the European Centre—he was on a shopping expedition in 1990, giving us a talk and saying how, "Well, in about five years' time meteorology won't be computer limited, or limited by speed and resolution". And that's what happened. Now people choose which models, or model, are working properly. And this is why, for example, with cyclone Gabrielle over New Zealand [February 2023], at about a week out the numerical models showed what it was going to do, so people could—well there were terrible impacts—people could try and prepare for it. Whereas you go back to 1980 and you wouldn't be looking at a week out and saying, "Oh, the cyclone is going to come in and cause chaos".

Sarah Dry 1:40:44
Well, we were talking about 1990 and looking back at when global temperature emerged and the different methods for generating it. I think there was a contrast between—

Jim Salinger 1:43:32

—Oh, I think the point is that the climate models now are hugely better as well. Again, because you're not processor or storage limited. The models since 2000 have improved dramatically. Of course, then we've gotten into the age of disinformation.

Sarah Dry 1:44:11
Right. But thinking back to 1990, the 1990s and—

Jim Salinger 1:44:21
—So numerical weather prediction came of age, and you had the development of seasonal climate prediction. That led on to climate models, so all that's important. Of course, it's still important to have the temperature, the observations, because they verify the climate models. Still, for example, they haven't got on to El Niño Southern Oscillation properly. They don't seem to [be able to] model a feature in the Southern Hemisphere called the South Pacific Convergence Zone, which is a special feature northeast of New Zealand, across the South Pacific. There's still things to do. In IPCC, that was the 2000 [Third] Assessment, and I was also involved in the next one which came out in 2007 [Fourth Assessment]. I was on the impacts chapter at this stage, and we were working on Australia-New Zealand as a region. The lead authors and CLAs [Contributing Lead Authors] were from Australia and New Zealand, looking at the impacts [of climate change] on Australia and New Zealand. Firstly, what the climate models were saying, but then all the impact studies pulling it together. In the first [Working Group], what was happening, I got involved in the Synthesis Report with Bob Watson. This was Assessment Report 4 [in 2007] and it was influenced by politics, because Martin Manning was able to tell me about that. What happened was a certain person was able to influence the Secretary-General of WMO, who was an African [Godwin Obasi]. The various committees were formed—the people that were the Chair and co-Chair of each working group were voted in by the WMO. This guy from America came and convinced Obasi that there should be a developing country chair on Working Group I, because he wanted to get Bob Watson out because Bob was too pro-climate. I've forgotten their name, but it was a right-wing think-tank guy. And Obasi, being African, swallowed the argument. That's how you got the next guy who was Indian [Rajendra Pachauri] as the head. You got someone else from somewhere, but that actually slightly backfired on the guy because—I've forgotten whatever his name was [Pachauri]—they actually took the science seriously. You had these forces at work. I saw the politics, until Obasi left, that would go on inside WMO. It wasn't nice.

Sarah Dry 1:48:51
Well, I think we're maybe close to the end. I have one more question, if I may. And then if you have things you'd like to add. I was just wondering, reflecting now as someone who contributed to the creation of what we might call a truly global temperature record, how you feel about the emergence of this idea of 1.5 or 2 degrees warming as the kind of universal language to structure climate policy today?

Jim Salinger 1:49:37
How I feel? Well, if you talk to me—clearly, I've been on this journey now for four or five decades, and have not seen a lot of [policy] action. We're almost at 1.5 degrees, and if I talk to my colleagues [they would say we'll] probably, we're certainly, probably going to reach two degrees. Which is unfortunate, because there are going to be lots of impacts. We're seeing it all playing out now. I don't know how survivable—the big impacts are going to be

heatwaves. Certainly in areas that are humid because once—I've been a runner at times, and I remember training in Accra, in Ghana, where you'd have to go out at four a.m. in the morning, because the temperature was already 28 [°C] then and I would have a heart rate monitor on. I'd have to wash myself down every 10 kilometres because it was too humid to sweat properly, so my heart rate would keep building and building to try and get rid of the extra heat. Basically, once the dewpoint temperature gets above 34 [degrees] we can't survive because you can't cool, whereas if it's too cold you can always put on clothes. So the big danger will be these areas. We've heard this week they've recorded 53.9 degrees centigrade already in Death Valley. The highest temperature in the world is 56.7 degrees from Death Valley. I've been there. And when that occurred, apparently—birds use air pushing through things like tubes in their bodies to cool and they recorded on that day the birds flew and then [slaps the table] dead. So there's going to be dramatic challenges unless we get off the fossil fuel addiction quickly. That's why I like working with an intergenerational group because it's the chance to pass on our experiences. Certainly in New Zealand, they know that being in New Zealand you have a chance when regarding a map of the world; I think you referred to this with Peter Thiel and that [buying up land in New Zealand for luxury 'doomsday bunkers']. In the Northern Hemisphere, the survival places are the tundra and Taiga. In the Southern Hemisphere, the southern tip of South America, South Island of New Zealand and Tasmania. That's it. So there's going to be all sorts of pressures and migration pressures. It's not looking good. But our young people, I guess, probably because where we are, have a positive outlook for the future.

Sarah Dry 1:53:20
You mean in New Zealand?

Jim Salinger 1:53:21
Yes. I should say in New Zealand because of where we are. I don't know how this is going to play out in politics. That's unfortunate that the globe gets distracted by inflation, which is everywhere, and other things, because this is a long burn. It's not going to be tomorrow; it'll carry on for ages and the climate system with the oceans is a huge flywheel which takes a lot of slowing down. I hope we're up to the challenge.

Sarah Dry 1:54:03
Thank you, Jim. Thank you so much for spending the time.

Jim Salinger 1:54:06
You're welcome.

[END OF INTERVIEW]