

Molly Graham This begins an oral history interview with Dr. Russell Schnell for the NOAA 50th Oral History Project. Today's date is August 9, 2022, and Dr. Schnell is in Boulder, Colorado. The interviewer is Molly Graham, and I'm in Scarborough, Maine. Dr. Schnell, we've had a number of conversations, and there were just a couple of items we've left out of the record. So, we're recording a short addendum to our oral history series. Where I wanted to start, and I was remiss in asking you about previously, was when you were recognized as a co-recipient of the 2007 Nobel Peace Prize along with Al Gore, as a contributing member of the IPCC [Intergovernmental Panel on Climate Change]. Maybe you could just start by telling me a little bit about the IPCC, its purview, and the background leading up to that award.

Russell Schnell: The IPCC, Intergovernmental Panel on Climate Change, is a group of scientists who get together every few years to look at all of the published data and analyze it and put together a report. There are many sections to it. There's a section on temperature, a section on oceans, da-da-da-da. It's a huge document. In the end, it's hundreds and hundreds of pages long. It looks at all of the published literature in the field that we're working in, and I just happened to be contributing to one section on carbon dioxide while I was the director of the Mauna Loa Observatory, with no idea that anything would ever become of it other than it being included in the report. There are hundreds of scientists recognized. It's not a singular issue. The IPCC scientists are made of many hundreds of scientists. Most of them in the US are from NOAA because that's our focus. But, of course, there were people from all over the world. Then just one day after Al Gore was announced as getting the Peace Prize, you receive a letter saying, "Congratulations, you are a co-recipient. NOAA is very proud of you, da-da-da-da." That's about it. It's Nobel written with a very small "n," I always say.

MG: Well, can you detail a little bit more about your contribution and what your part of the report covered?

RS: NOAA and the Scripps Institution of Oceanography have the longest records of the CO₂ in the background atmosphere, which means – that's the well-mixed atmosphere on Earth that shows you the lowest amount of CO₂. That's considered kind of a baseline. At Mauna Loa Observatory, where most of these measurements have been made, both with Scripps and with NOAA, it's considered the world standard. Doing those measurements at Mauna Loa takes a lot of effort and a lot of quality assurance. Every measurement is calibrated back to standards so that somebody looking at the measurements twenty years from now will say, "Oh, well, I believe this because there's a standard." It also compares back to what it was thirty years ago. So you can look at all the data and say, "Okay, I accept this. I accept this. I accept this." Because it's all been calibrated, it's all public. Anybody can look at the data. Anybody can check it. Anybody can criticize it, and that happens occasionally. Then, it goes through another QA/QC [quality assurance/quality control]. That's very important so that everybody can trust the data. This was amplified recently when the CFC-11, which is a gas controlled by the UN [United Nations], one of the four gasses that destroy stratospheric ozone that are controlled. NOAA started seeing from Mauna Loa data that it was going up. It wasn't going down like it should be. The scientist, Steve Montzka, from our lab, figured out that it was probably coming from China. He told it to the UN, and he told it to China, and both believed him right away. The UN because they understood it; China because they knew of the records. China, within probably a few months, stopped leaking that. The government did not know probably that some company

making refrigerators or using insulation was using that gas, and it's heading back to normal again very quickly. So those are the kinds of trusts that have been built up over many, many years, that if somebody looks at the NOAA data, especially for Mauna Loa, it's believable, and you just can't argue it and say, "No, it's baloney." You can question it, but then being questioned, it'll be checked again to see that, in fact, it was valid. That was very good that China just accepted it. Steve Montzka went to China more than once, presented the data, talked with the people. The politicians, of course, checked with their scientists. Their scientists said, "Yes, it's probably valid." That's the same thing that occurred with the carbon dioxide measurements from Mauna Loa. Yes, they are true. There's just no question about it. There might be a few little tweaks and errors, but in general, ninety-nine percent of the story is a hundred percent verifiable. That's where I was included in it. There were other people in our lab also included in there.

MG: Who else?

RS: Good question. I know Tom Conway. I think Peter Tans. And I would think a couple others. But nobody ever made a big deal of it. It was just, "This is the way business is."

MG: So you didn't attend the ceremony in Oslo?

RS: No, not at all.

MG: How did Al Gore become the figurehead of the Nobel prize that year?

RS: Because he's been working for years on the issue. The Nobel Prize, you never have more than three people as prime. Generally, it's only two. Al Gore has been pushing it for a long, long time. He used the IPCC data. Al Gore never makes field measurements of that nature himself. He just takes other people's data, amalgamates it, makes stories, and talks to politicians. So he was the figurehead. There would have been others, of course, but he was the most widely recognized and understood person.

MG: When did your involvement with the IPCC begin? When did you start contributing to the reports and how did you get involved?

RS: There's a committee that you apply to. Some people have to apply; other people are just asked, and I was asked just because I was running the Mauna Loa observatory. My contribution was fairly small, really, compared to others, but the IPCC casts a very wide net. They go to every country on Earth that's in the UN, which is basically all of them, and they asked for contributions. It's a totally open system. It takes a year or two to write the report. Each section has a leader, and then there's contributions, and then each section is looked at by a group. Word by word, you go through it, and it takes – da-da-da-da – until everybody pretty well agrees. There are occasions where ninety percent agree, and ten percent don't. So that ten percent is listened to, and if there's a way you can nuance it, yes. So those reports are really the best consensus that you can get on a particular – of course, there are errors now and then. One of them many years ago was they never included glaciers in the early time. These reports come out every four years, I think. But now glaciers are a big issue because people realize that if a glacier melts, that means that the atmosphere is warming up, and the oceans are only going to really rise

when the glaciers in Greenland and Antarctica melt. The glaciers on land are a very, very small amount of ice compared to what's in Greenland. In Greenland, the ice is two miles thick. That's a lot of ice. Same in Antarctica. In Antarctica, there's islands underneath. It's not a piece of land solid. There's a few islands here and there, and the ice is just piled up. So eventually, if that melts, you'll get down, and you'll have these new islands appear, but that'll be a long, long, long time from now.

MG: About how long?

RS: For Antarctica to melt? Thousands of years. But in the meantime, in spaces of tens and twenty years, you'll see more ice coming out than being preserved. A lot of the ice around Antarctica is floating. There's the ice, and then it goes out, and then it's level. It's hinged by islands and little barriers. But if it gets high enough that that ice can float, then the whole ice shelf will move away. You've heard of the Larsen B Ice Shelf, which covers an area bigger than many, many US states. If that ever floats, then one day, you'll have thousands of square miles of ice floating away, and then that'll float up and melt! Once those things start to happen, and the ocean gets higher, more and more, and more of that will happen. In Greenland, it's a little different. The glaciers come down to near the edge, and then they calve and break off. The ocean might be miles away. So it goes into a river or to a fjord. So it's a different situation there. Interesting times

MG: Didn't the IPCC come under some controversy when it released its 2011 report? Was that when "climategate" occurred, where there were some emails leaked?

RS: Something on that order. But that was mostly just smoke and mirrors, really. There are a lot of emails that go around between scientists before it becomes public. Of course, if you have a thousand people looking at one topic, there might be twenty world experts and then 950 people who know a lot about it but don't have the real idea. So they send emails back and forth. "I don't agree with that paper you wrote." The guy will say, "Yeah, I was a little off, da-da-da-da." Eventually, it boils down to hopefully the truth. There are always people who want to challenge ideas, even though the ideas might be true. You see that all the time. Then politics creeps in, of course, now and then – or always.

MG: Did you face that ever directly?

RS: No, not really. I've had people question it, but not much. Some US senators came to Mauna Loa. But when they left, they realized we were telling them the truth. What you do with the truth is something quite different.

MG: What do you mean?

RS: [In] politics, you see that right now. "Oh, gee whiz, don't get a vaccination. It will cause your children to be deaf." There's absolutely no reason for that other than politics or beliefs that have less basis than the science itself. Sometimes the truth in science is very hard to accept. It's very obvious that we have to cut back on fossil fuels. Okay. We believe that. But when it

comes to, “Okay, I’m not going to have air conditioning. My car gasoline is going to cost twenty dollars a gallon,” that’s a very different story.

MG: Since we last spoke, I interviewed Tom Karl of NOAA’s National Centers for Environmental Information. I have a better understanding of how NCEI operates and its collection, management, and preservation of climate data. What was your interaction with the National Centers for Environmental Information, formerly the National Climatic Data Center?

RS: I visited it a few times and talked to them. Karl got himself in a little tie-up at one point. He told you all about that. But they take the data and keep it and check it. So it’s not that the data is kept in one place. It’s spread around, and people check it and check it. Yeah, I don’t quite remember how it all worked out with Tom. He had to retire, didn’t he, or resigned because of that?

MG: He retired. I think he was supported by the right people. This was in the wake of that “climategate” issue.

RS: Yeah. Just politics, you see those issues like that. He was good to stand up and say what he did. He’s a good man at heart and a good scientist.

MG: I agree. Did you rely on their data or contribute to their data archives with your research?

RS: Oh, yeah. Our data all went into that, and they looked at it. Even within their institution, there was some acrimony on the data and how to view it. As you’ve probably heard, there was one person that was kind of antagonistic against him – or two.

MG: Yeah, he dealt with some controversy, but came out on top.

RS: Well, now there’s little doubt that we’re starting to get the effects of climate change. But climate change will be some years, you’ll see [the effects]; other years, it’ll go the other way. There’s a lot of variability in there because you’re talking about atmosphere, ocean, and land of the whole world, and there’s a lot of inputs there. But in general, the carbon dioxide and methane are going up, and those are the two drivers. Until that levels out or comes down, the absolute truth is we’re going to get warmer.

MG: Is there anything else you want to say about your involvement with the IPCC or the Nobel Prize in 2007?

RS: No, it was a nice honor. But again, it wasn’t something that people made a lot of noise about because it was distributed among so many scientists. We were all thankful to be recognized, but again, it wasn’t a big deal. You don’t put it on your – you don’t say on your business card, “Nobel Prize” or anything like that. At least, I don’t.

MG: Well, your family must have been very proud of you.

RS: Surprisingly, a little bit, but not much. Life goes on.

MG: Something else we sort of skipped over – and this is going back in time – was your involvement with the Naval Research Lab. I don't think I got a full understanding of what that work looked like when we talked earlier.

RS: Okay, let's give some background history. At one time, the Naval Research Lab conducted research on how to change the climate and cause earthquakes and destruction like that in other countries. That was their mandate. So there was a division in the Naval Research Lab that was involved with affecting climate change, making it rain or shut rain off, or making storms and earthquakes, and how to make earthquakes by maybe pumping water or some lubricants down to the fault lines, things like that. They were studying that pretty seriously. But just before that was taken away from them – it was a lot of political issues, and then that mandate was taken away. I was at the University of Wyoming. We were receiving funding to see if we could change ice nucleation in the atmosphere, either add it or, better yet, shut it off. Because earlier on, the US believed that Russia was able to turn on nuclei and cause storms and hide. We talked about that issue in the northern Atlantic, where a Russian naval armada was north of a US naval armada. A big storm came up. Then, after the storm was over, the armada was gone, and the US couldn't find it. So they believed that they had turned on the storm. So a lot of money came in. Since it was a Navy issue, the Naval Weapons Center became involved. Since the University of Wyoming was, at that time, one of the preeminent people studying clouds, ice nuclei, [and] how to change it in clouds, we got funding for that. Then, since I was working with ice nuclei, I got the funding and did work with them. We did some interesting work. But in the end, we found out that on our scale, we couldn't shut off the nuclei very easily, or we couldn't add them very easily. But in a lab, we could shut off the ice nuclei. I worked on that. We never publicly published that, but we gave the report to the Naval Weapons Center. Then, through those contacts with the Navy, we were brought into other research projects and stuff, but eventually, the Navy Research Lab – well, it was three different entities in the Navy. There's [the] Office of Naval Research, which funds all the research in the Navy, and then there's the Naval Research Lab, which does a lot of that work, and then there's a large facility in Washington where they have ships that do work; it's a lab. So we worked with the people at the Naval Weapons Center in California, which was doing the work on changing the climate, and they were also the people who had dozens of small nuclear reactors that they had used to power submarine detections under the ocean. In the Atlantic Ocean, there's a network of sensors to spread all over, hundreds of sensors all hooked together by wires, so that when submarines and boats go by, you can listen to them and you know, “Okay, that's Russian Submarine 241 because I can hear the clank in that engine, and they have that all signaturized.” But how do you power that? So the Navy developed small nuclear reactors that they would drop down and power this thing all over the place. But then, they powered it differently from shore. From Scotland and from Newfoundland and Greenland, they would power it. So they had all these nuclear reactors. They were looking to see if people could use a power source on land. So I was sent out to the Naval Weapons Center to see if we could get one of these reactors to monitor on top of a mountain, where we had an observatory in Wyoming. But it turned out the physical and legal aspects of having a little nuclear reactor on top of a mountain in Wyoming just didn't make sense. We just didn't want it. Even though they were proven for many years to work – they were sealed. They were big balls. They just worked for years and years and years, and years and years, produced electricity. I don't know what they ever did with them. But they were offering us one or two.

And again, that's when a lot of the public issues about nuclear power and stuff weren't front and center like they are now. We're talking late '60s. That's a long time ago. There were a lot of those types of things going on that people kind of knew about but didn't really know about. I only had a very low-level secret clearance. So I could go up, but I couldn't learn the whole issue. And then, I gave up my clearance after a few years.

MG: What is the Naval Research Lab doing today, or is it still pretty top secret?

RS: A lot of it is public work. They look at the atmosphere. The rest of it, of course, is the secret and things I never knew about [and] never will know. The Navy aspect of nuclear deterrence is very secret. It's the one arm of the nuclear triad that is very hard to counter. Airplanes carrying missiles and bombs, you can shoot them down. All of the missiles in silos, Russia and China know exactly where they are and how deep they are, and things like that. But the submarines moving around are almost un-trackable, except Russia was tracking the US for many years that they didn't know about. They were doing it really kind of weird. They were watching with remote sensors on the ocean. When a submarine goes along under the water, it produces little disturbances, and those disturbances get washed away as they go up. But if you look at the smallest ones from the surface, you can see the trail of a submarine. But the US has now figured out a way to get rid of that. So there's all kinds of things like that that people who don't have clearances eventually hear about or find out about, more by accident than anything else.

MG: Well, is there anything else to say about your work there?

RS: No, not really. We had funding for a few years. And then, I was on the US HAYES cruise from the Naval Research Lab in Washington that went out to look at fog and figure out why fog forms, how it forms, if you can make fog, if you can shut fog off, what are the physics of it. That was a two-week trip where I found out that the oceans were releasing little biological ice nuclei into the fog and into the clouds, which was a very interesting discovery. We kind of knew it was going to be like that, but you had to prove it. That was funded by the Navy. What they ever did with it, who knows. A lot of research goes on that doesn't have military applications at all. They're always looking for that one little bright spot. Of course, other countries are doing the same thing. When you have a billion-dollar submarine that somebody could find in the ocean, that's a big issue. You'll spend millions to find out if people can see it or if you can hide it – things like that.

MG: This summer, you've been helping two refugee women from Ukraine get settled in Boulder. Can you talk about how that happened?

RS: Yes. When I was younger, I had thought I would never have a retirement or a job that would provide retirement, or I'd never have social security because where I grew up, those types of things didn't – I grew up two hundred miles from any city, and you were totally self-sufficient. So you planned and took care, [made] sure you had food to eat and stuff like that. So when I moved to Boulder, I had student debts, and I had to pay for my wife's education that she had in Singapore. I met a friend who – we decided that we were either going to be totally bankrupt or fairly rich. So we extended ourselves and bought a few apartment buildings. That's when

apartment buildings – there was a downfall in the '70s when real estate crashed. So we were able to buy a couple of these old, dilapidated things and fix them up. We've kept them over the years. And, of course, it turned out to be very well. So about a month or so ago, the manager of one of these buildings in Broomfield called and said there were two women with three children. They wanted to sleep inside the apartment building on the floor because they had nowhere to go, and they didn't have any luggage or anything. So the manager said that there was an empty room that they could sleep in. This was like eleven or twelve at night. So then he put them on – they slept on the floor, but they were safe and inside. And then, the next day, he called myself and my partner, who own this building. We said, “Yeah, let them stay there. We'll see what we can do.” I put something in a kind of a next-door neighborhood [site] on the internet and said, “These ladies and their three children – their luggage didn't come.” Or, if they had luggage, I didn't know. But there was no luggage, and they looked thin and hungry. I said, “If you have anything to donate. It was incredible. I had up to 170 people respond with food, money, beds, clothing. I have an old pickup truck. So I'd go around and load up all the stuff and take it out there. Within a week or two, they had a very nice household – dishes more than they could use. One lady who used to know me at NOAA paid for a whole month of free rent. Other people gave cards – five hundred dollars [to] go to Walmart. Another person from Spain sent five hundred dollars cash. A lady in Abu Dhabi sent five hundred dollars through a friend because she used to live in Boulder. It's just incredible. There's still people donating clothing, kids' bikes, and cards. The first time I took one of those cards out for Walmart, they didn't understand it. But a lady from a church that they got involved with took them to Walmart. Of course, then they understood what this card was. So the second time I took a Walmart card out, they didn't speak English much, but all [the kids said], “Walmart, Walmart,” because there's a little logo on there; they knew exactly what that was because they'd gone there and seen that you could get food and clothing and stuff. The people have been generous. I had more or less shut everything off now just because they're doing well in the church that helped them get over here but didn't know they were showing up that day. [The church] has taken over, and the people speak Ukrainian, some of them. So they are well organized now. Two of the children are school-aged [and] have been registered to go to a school nearby. So things are working well for them, considering how they started out.

MG: Can you say a little bit more about that and provide historical context for what they're escaping?

RS: Yeah. Their apartment was completely destroyed, and all of their paperwork and everything. Nobody was hurt. Well, then they became refugees. They went into Poland. But their husbands, of course, couldn't go because they have to stay back to either be in the militia or to do important jobs. They don't want the males to leave, or otherwise, some male in the country would be gone, and the country would be lost. When they got into – as I understand it, they got into the refugee camp. There's people there to help them. “You're planning on going back?” “Oh, yeah.” “Well, what are you going to do when you get back?” “Well ...” And they don't know because they can't go back at the moment because they don't have housing. And, of course, they chose to take options. They were sent to Germany, where there's more support for them. I don't know the details of how they got into the US, but one day they appeared in Denver. Then, they needed a place to stay. They knew an older lady in the apartment buildings. They

didn't just show up out of nowhere. They knew of a lady in her eighties who lived in that apartment somehow, and that's why they came there. One thing led to another.

MG: Are there a number of other refugee families coming from Ukraine to Boulder?

RS: Yes, I was surprised. There's a whole group of them. I don't know how many, and I haven't been in contact with them. But I had them contact me and say, "Look, we came over four months ago. We know the system. Please give them the information and contact points." So they are well connected now. There are programs – I didn't realize – to help these people, especially with housing. Housing is very expensive now. When we first had that apartment, we were renting out rooms – two bedrooms for 120 dollars a month. Now, the competitors are doing it for two thousand a month. We do it for twelve hundred. That's why we never have anything empty.

MG: And the families are doing well today?

RS: They sure seem to be. I'm going out again this week. I have another card. This time it's for a grocery store, a particular grocery store. I have some skates, rollerblades for one of the kids, a little bike for the girl, and some clothing. But last time I was there, they said, "We're overloaded." The older lady, obviously, at some time in her life, had studied English. But she hadn't used it for a long time. So she has a little cell phone, and she can write in Ukrainian and then translate it to English, and I can do the same. Pretty soon, we're talking. The kids know, "Thank you," "please," "God bless you," [and] things like that. They're learning quickly. Once they get into school, it will be pretty interesting.

MG: You'll have to stay in touch.

RS: Yeah, we will. But they seem to be so very well connected with the local community.

MG: Dr. Schnell, I think I've gotten to the end of my questions. Is there anything else you wanted to share with me about your career, your life, and what you're up to today?

RS: Right now, I'm building little free libraries still. I might have told you about that. I'm up to seventy-five now on every continent except South America, and I'll work on that. But I'm making higher quality, really interesting ones with little turrets and stuff like that. There was a girl visiting neighbors, and she saw me doing that. She wants to learn how to do woodwork. She's about ten years old. So her and her father are coming over on Thursday, and I'm going to start teaching her how to do basic woodwork. We'll probably build her a library. But first, we're going to build a little train like your daughter had. It's quicker, easier, and more satisfying. But I haven't built one of those since I built that one. That was the last one I built. So I'm trying to get pieces of wood and wheels and stuff together. About a year ago, another girl and her mother were walking in the neighborhood. She's an autistic girl. She can't really speak very well. But she saw a library and got all excited and indicated to her mother that she would like one. The mother said, "Well, we'll think about it." I said, "Well, contact me in a month or two, and I'll build you one." She never contacted me. But I remembered this, and I knew roughly what part of Boulder she lived [in]. So I contacted some people in that area and said, "Do you know of a

lady with an autistic girl about eighteen or fifteen?” I couldn't guess her age. One lady said, “Oh yeah, my daughter knows of a girl.” So she gave me the name and address. I went over there and talked to the lady. She said, “Yes, she'd love it.” So last weekend, myself and a friend installed the library. They weren't home. They were away on vacation. I made a special little plaque. The girl's name is Abigail. I called it “Abigail's personal little free library” and put it in there. And then, when they came home, she was so excited. They wrote me a thank you note, and they painted a little – I don't know if you can see that. She painted a little picture. She cannot write, so she dictated or told her mother – she said, “Thank you for the little free library. I'm going to put a Pokeman sticker on it. I will take care of it. Sincerely, Abigail.” [On] the bottom, it says, “Mother dictated the [note].” So she's obviously involved.

MG: Well, that's lovely. I am impressed with all the ways that you've connected with people and left your mark on the community.

RS: I come from a large family. I sent you a picture of one of our family dinners. It's got two hundred people. It's bigger now. I go up to Canada every year I can and visit as many as I can.

MG: Yes. Did you have a family reunion this summer?

RS: No. But we're going to in September or October. By that time, everybody should be inoculated and, hopefully, the virus – because this current virus is not a very bad one. I had it [and] a lot of my friends and family. It's not a very big deal.

MG: Yeah, I think things are loosening up, and people are becoming more relaxed about getting sick. Well, Dr. Schnell, this has been such a treat. I'm so glad we had an excuse to talk again.

RS: Well, thank you very much for your time. What happens now? Do you put this all together and stick it in an archive somewhere?

MG: Yep. Let me just turn off the recording, and I'll explain a bit more about that.

RS: Okay.

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Reviewed by Molly Graham 12/28/2022

Reviewed by Russell Schnell 12/29/2022

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