Making the Esoteric Pertinent: A talk with Inez Fung

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"This is a large puzzle and we have been playing chess with someone much smarter than us." Dr. Inez Fung said as she discussed the future of climate change research.

I was fortunate enough to have time to sit down with **Dr. Inez Fung**—a professor of atmospheric science at the University of California, Berkeley who is a member of the National Academy of Sciences and a fellow in both the American Geophysical Union and the American Meteorological Society. We talked about the current state of **climate and climate change research**, better **climate communication**, and her relationship with a close colleague of hers that recently passed away, **Piers Sellers**.

Dave Bonan: Hi, Dr. Fung. Thanks for taking the time to talk today. There are two direct paths to go within the study of climate and climate change—communicating climate changes' impacts to the masses or scientifically pursing the truth—where do you see the most effectiveness?

Inez Fung: One takes the long term view or one takes the short term view. I always take the long term view—I am a climate scientist. There is so much that is still not known. We have made a lot of progress; however, I would always go back to the fundamentals of science—go back to the laboratory. I am thinking of the next decade and the next fifty years. We talk a lot about extreme weather events—changes in precipitation regimes—how is that going to change?

DB: There is a lot of uncertainty.

IF: There are is a lot of uncertainty and there is a lot of room for research.

DB: With plenty of room for research. Does there need to be more science for the communication to be more effective?

IF: There has to be more science. However, communication is definitely important. After Thanksgiving—note the date—I was at a small meeting called the Climate Impacts on National Security. It was a very interesting group and I was the first speaker and I had no idea who these people were...

DB: You mean the national security advisors?

IF: Personnel from the military, and intelligence and diplomatic communities. This was a high level meeting and it was totally non-partisan. It was really encouraging that they truly cared about climate change. These officials have to worry about anything that is a nonzero probability. They have to be prepared on how to deploy troops to hostile regions and not just that, but the infrastructure and assets along coastlines. However, the meeting kept coming back to the issue of communication.

IF: After about two days, people start to get more comfortable with each other and one of the officials told my colleagues and I—the climate science community—that we have the wrong approach to communication. He said, we come off as too elitist and arrogant.

DB: As in "I have the scientific knowledge".

IF: We come in with our finger wagging and we do not end with any positive messages. We just scare people! We do not connect on a personal level with the people we talk to. It was a very good conversation and we were quite frank. The participants could relate changes in their environment to climate change.

DB: You were basing the evidence on data and numbers while he was basing the evidence off of personal connections.

IF: He was telling me I was not connecting to people. A theme that was apparent in this meeting was that the audience has to connect with whoever is talking. The climate community needs to find the right message.

DB: Is it a scientists' duty to communicate that closely? Surely, physicists are not running to the press to communicate their subatomic level discoveries.

IF: A big aspect of this climate communication is how to translate our warnings into actions. Different groups have different beliefs and ideologies. Dealing with climate may require actions and regulations that go against all of their beliefs.

DB: Does a scientist have a large role in implementing this shift?

IF: Well, I think of myself as not just a scientist, but as an educator.

DB: A citizen?

IF: Yes, a citizen. A role of trying to figure out how do you bring education to these people.

IF: The other thing one of the participants brought up was about a Jon Stewart piece. The piece talked about a Senator who said the sea level will not rise because the ice is already in the water. Jon Stewart took a glass with ice in the water and ice out of the water, and showed the difference. He made fun of the argument and discredited the Senator's claim. However, what Jon missed, is future engagement with those people.

DB: Instead, he just alienated them...

IF: Yes, and to make fun of someone in a public way like that only alienates them further.

DB: Do you have any better tactics to approach such false claims?

IF: I do not personally know how to fix this problem. In the past, conversations were about debate and not a way of recruiting people to one political side. A few years ago, when I was debating someone, my opponent would just lie and do what "nay-sayers" do. What we—climate scientists—kept saying was "there you go again". We should not be rebutting every misstatement the person had. We want the audience to realize the person is sub-sampling, making their argument weak.

DB: The person was cherry picking.

IF: If you could get the audience to witness that cherry-picking and see the falsehoods, they would be more inclined to decide for themselves and I believe they would choose what is right—the truth. In another way, that tactic alienates him and makes him feel bad, and this is where I have not thought through what is best. I have only had a few months to ponder it!

IF: This conversation is good though. It is forcing me to think about more effective local ways of communication.

DB: LuAnne Thompson has a good example of this. From what I remember, she said her family has land in Nebraska, and when she was down there, the farmers she was talking to asked her about what she does. She said she studies climate and they started to ask her questions about climate change. Once she connected to them on a personal level—how the change will affect crop yields and rain patterns—they listened deeply. She connected to them about ways climate change will affect their livelihoods.

IF: Of course. Dennis Hartmann just told me that whenever he goes to the community, he talks about his family and upbringing.

DB: My favorite explanation is about all of our interests in the environment. I live with many future engineers and you have been surrounded by many engineers. As a group, we take the same principles of physics and

mathematics as the people who build public bridges, cars, and cellphones. We are not biased towards this theory and truth—this is not fake science.

DB: Do you have advice for people uncomfortable with communication?

IF: I am uncomfortable. There is training—I went to a training seminar and one of the trainers said to me, "the sky is green". I was told to not argue, but to provide substance and not make the false accuser feel threatened. To provide facts towards unsubstantiated claims. There are certainly questions where you can have a deep conversation, but when it becomes ridiculous, you do not want the ridiculous statements to corner you into a space.

IF: One of my main arguments to this committee in November was that the answer has not changed. Since I started in 1980, there is more richness and detail.

DB: The basis of a hypothesis and theory.

IF: One aspect that we failed to do well—when I interacted with the Bush administration—was about uncertainty.There are some legalities towards legislative action with uncertainty, and I am not a lawyer, but I quickly saw the impact.

IF: Some of the participants talked to me about the uncertainty we see. However, myself and a few others respond with an point that we fight over sea level rise of 1 foot or 30 feet, but any sea level rise would cause indisputable damage.

IF: We get caught up in the uncertainty, but the large message of sea level rise and temperature increases is forgotten. We have not been effective at communicating what is robust.

DB: Where do you see the future of climate research?

IF: There is so much! This is a large puzzle. We have been playing chess with someone much smarter than us. Whenever we uncover a move, there is another algorithm spit out at us. A surprise.

DB: That is a great way to look at it.

IF: The first aspect of research is to have observations. For example, think of a human fever. My body temperature is 98.6°F and let's say I get a fever. I would then go to the doctor and they would say the fever is going to spike. What do you do? One would monitor me and put me in the ICU. Now take that to the climate, we see steady increases in CO_2 records from the Mauna Loa record, NASA GISS temperature record, and other measurements. These are the ICU monitors.

IF: Then, once we figure out what to monitor, we should ask why? We see that there is a fever and a problem but how do we diagnose it?

IF: You monitor and then you build the theories. With climate change, we have no precedent for such a large change. I am learning as I am predicting. I have to be prepared that the theory now might not apply to the theory in the future. Climate change is a Taylor series and it is dependent on x_0, however x_0 is changing. You cannot use stationary statistics. The observations have to advance and the theory has to advance. We do not have good theories for all of the severe weather and that is a huge area of study.

IF: There is so much we do not know. For example, we have this warm patch of water over the pacific. We can say there were clear skies and high pressure, therefore, it is direct heating. But why is that? Why is the patch stuck there? What are the reasons behind that?

IF: Right now we produce course resolution models and you want to make high resolution models for the impacts of local climate change? Variance is greatest at the local scale and decision making has to be done at the local scale. There is an immense amount of work to be done to get there.

DB: Will there be a deep understanding anytime soon?

IF: With observations, computing power, and tracers, of course. We have field sites that are far more advanced than ever before. We can measure the hydrological cycle at 15 minute intervals. We currently have four years of data at this rate. The higher the resolution, the better you can understand the behavior. I am always counting on new observations and technologies.

DB: Lastly, I have more of an inspirational note for the greater general audience. You worked closely with Piers Sellers throughout your career, could you tell us what it was like to work with him and how it impacted you?

IF: How could I describe Piers? Piers was an inspiration. He was always full of energy and he was always positive about everyone. His positivity, charisma and energy was beautiful. He was a funny character. Piers, along with many others, really took land surface modeling global. Piers implemented the "paint by numbers" for land models by choosing the colors of the land in regions where there are no observations. He was very loyal to his friends and I believe that is the reason we are talking about him today.

IF: However, the thing I am most envious about Piers is that he got to see the rotation of the Earth. Jim Tucker and I were sitting there watching the television when Piers was up in space and we could see what he saw.

DB: Meanwhile, you have been looking at the rotation of the Earth through computer simulations, but there he was witnessing it in real time...

Before I could ask **Dr. Fung** more about **Piers Sellers** and other inspirational figures, our time was over. Dr. Fung provided clarity and insight into the **future of climate communication** and **climate research**. Her perspective of the climate science field comes from observations, modeling, policy making, and communication. This allows for a truly well-rounded perspective that encompasses the greater message of climate.

Check out my past interview with Bill McKibben here .
