Ralph Cicerone Interview on Climate Change Science

Bob Ryan: This will get a lot of attention because it is the science basis of climate change, global warming. What do you think this report will mean to the average person?

Ralph Cicerone: That's probably a harder prediction than climate change itself is; I think what the writers are intending it to mean is that they've looked at the growing body of evidence, trying to discern whether or not the climate is really changing and how fast, and whether or not the change can be attributed to human activity, and the report is saying yes. The evidence is accumulating, it is getting clearer.

BR: Is it unequivocal, would you say?

RC: I don't know what final word they're using, they were arguing over that particular word the last I had heard. They are trying to use a rough assessment of the odds. And the odds they're coming up with are very high that it's attributable to humans. The problem is we don't have a statistical number of worlds to play with. You can't go into a laboratory and run the experiment, say, a thousand times and then calculate the odds very exactly, like how many times did it happen and how many times did it not happen. So estimating the odds of these climate changes, I think it's just estimates, but their estimates are getting harder and firmer and clearer this time around. That's clear.

BR: What is the importance the report versus previous reports, this being a scientific report?

RC: A sophisticated message is that this is the way the science works. You just have to keep gathering evidence, testing it against better and better calculations and they're saying things are getting clearer. There's a lot of other lessons here. That the longer period of time elapses, the more clear you become because you get more data, and therefore you can reassure yourself that the actions you're going to commit yourself to have better basis. For example, energy efficiency or commitments that a government or company might have to make - there is more assurance that they're doing it for a good reason.

BR: And how, in your opinion, how solid is the science behind this report? How solid is the science that indeed humans are having an impact on the climate, and global warming? How solid is the science?

RC: It's more solid than I expected. Going back five, six, seven years, what I would have predicted for the year 2007 is that we would have seen a little bit of this, a little bit of that, and it wouldn't have become so clear. But instead, what has happened the last six years, and I think that's what that report is saying, is that in almost every case things have become clearer than people had expected. The temperature record is clearer, the sea level record is clearer, more amounts of ice are melting and disappearing than people have been able to, thought that they were going to be able to document, and the opposing ideas, that is, that these changes were not attributable to humans, they've been dying off because they're getting undercut with evidence.

BR: Many people who don't want to or don't believe this would say well, we've gone through warm periods before, it's a part of the natural cycle of climate, and this is just another part of changes that have happened in the past.

RC: Well, as you know from your own work in meteorology, nature has a lot of surprises. We will probably never be completely, absolutely, sign your name, bet the farm at high odds, sure, but the evidence keeps accumulating and it's become clearer and stronger than, I think, any of us were prepared to believe it would be. For example, some of the other ideas - that the sun was causing the climate change – it's become, the evidence that has come in the last six or seven years, says no, that isn't what's happening. There were some discrepancy of temperature records with different instruments, satellites and balloons and surface level thermometers; almost all of those discrepancies are gone now. But for a while they caused people some concern, so the fact that the records become clearer and that opposing ideas haven't held out all adds up to the same picture.

BR: Some people say that the global warming is only a theory.

RC: I would disagree with that. The data that people are acquiring, as I said on the surface temperatures, the fact that the temperatures are going up everywhere and not just in a few isolated spots. The only exception is over in Antarctica and it looks as if we understand why Antarctica is not moving, not, warming, but everywhere else is. The fact that the sea ice and the ice over Greenland is not only shrinking horizontally but it's shrinking vertically, and that the ice thickness in the Arctic Sea is getting thinner; that the seasonal distribution is almost disappearing in the summer; that the climate calculations are predicting these things; that sea level rise can be measured now in so many different ways and the new instruments are actually showing up more rapid rates of sea level rise than had been documented earlier; all of these things are adding up. So people who say it is only a theory, I think, are behind the time.

BR: And some people say, you know, that the models that they use to predict our day-to-day weather have errors, and that you can't predict day-to-day weather beyond 7 or 8 days. Why should we believe a model about the climate 50 years from now?

RC: That's something that hits you in the face every time you get a bad weather prediction or we fail to predict the arrival of a severe storm, but the key there is that if you try to make a prediction over a larger area you have much higher odds of getting it right than you do if you try to make a prediction over a smaller area. So, for example, as important as New Orleans is or San Francisco or any other city is, it is much more difficult to make a prediction for that small area than it is for a big area, so the predictions of these global scale models now are very, very good and we can understand fundamentally why those predictions are easier than making a more detailed prediction of, say, the Ohio River Valley on a particular day of the year, it just doesn't work like that.

BR: A recent Nielson survey indicated that 13% of Americans never heard of global warming.

RC: Well that means that 6 out of 7 people have, and only one out of those 7 or 8 people haven't. Well, that doesn't hit you in the face everyday. We have to become more sophisticated in realizing what is hitting us in the face, like, for example, our energy needs – the electricity demand on hot days when we run our air conditioners – those things are adding up. I've been going through some data recently on how the electricity demands change in places that depend now on air conditioning. Some of the harder things that the scientists have to keep working on are what we call the "extreme events" - the severe storms - where exactly they are going to hit; how strong they're going to be in terms of winds and water dumping; what is it that's causing drought frequencies to increase, flood frequencies to increase. So that's where the real money is, so to speak, and the science has to keep working at those predictions of extreme events over smaller areas.

BR: Do you feel those extreme events are going to become more likely in a warmer world?

RC: That in fact is some of the evidence that this IPCC report is summarizing. Not only are they seeing in the actual data more of these extreme events, but it's where the models say they should be happening. I want to be very careful as I read through this report to gauge that evidence for myself. But that is a statement that is made in the summary of the report.

BR: And some people say now that the scientific debate over human-caused global warming is over.

RC: Well, in one sense we're getting close that humans are causing the change, but in a much more important sense we're not, because we've got to keep pushing the science here to become more useful. For example, on those weather variables that really matter, can we get to the point that we can see how the storm patterns are changing, how the extreme temperature distributions are changing, not just the average temperature. So, in that sense the science is far from being over. We are just getting useful.

BR: But the long-term impacts - the idea that humans have an effect on global warming - that debate is over, scientifically?

RC: Just about, it's hard. We're always hoping that somebody can come up with an idea to say "you know, you haven't thought of this yet". But so far no one has been able to. The ideas they've come up with have been beaten back by actual data. I'd like to think that one of us is going to come up with this great idea tomorrow that says all bets are off, that there's some other cause, but we can't do it. We haven't been able to.

BR: If we were having this conversation 50 or 100 years from now, what so you think weather in Washington and Washington climate would be like?

RC: Hmmm…Well, the nighttime temperatures for a while were rising faster than the daytime temperatures, and that would make things different when it doesn't cool off at night. But, this new report says that in the last few years, the daytime and nighttime temperatures have risen at the same amount so that is one prediction I would have made a few years ago which I couldn't make anymore. But, I think you know what the predictions are, not just for Washington, but the surrounding area. More extreme heat events; the odds of having a cold winter will go down and the odds of having a hot summer will go up; the odds of having a warm winter will go up and the odds of having a cool summer will go down. But it will never be complete; there will always be day-to-day fluctuations which will keep the TV weathermen in business, I think. We're going to need the TV weathermen.

BR: What should the average person take from this report, what should the average person do for the world, especially the young people?

RC: Well, I suppose that if the evidence, if you say that the evidence that humans are causing this global scale climate change, then some major responsibility has to fall to all of us, as individuals and businesses and governments, to do what we can to slow it down. Unless we were convinced that all of the climate change is going to be good for everybody, including wild animals, which I don't think we're going to be able to do, we're going to have to accept some responsibility and figure out what we can do to slow down the changes until we get to the point that we can understand them better and figure out whether we're going to be able to deal with it.

BR: As you mentioned, some people would say that if we do take some policy changes now, it will only slow down the changes, that the changes are inevitable. So what is the difference?

RC: We can adapt to slow changes if we understand and can anticipate them. Where were going to have trouble adapting is with a sudden, quick, large change, especially one that we didn't predict. Now it's important to say who "we" is. If you're living in a rich country with a lot of knowledge and technological capability and money to invest, you can adapt to larger and faster changes better than if you were in a poor country with no ability to foresee what's coming, no money to invest, no technological capability. There is going to be a big difference in the way the world responds to climate changes, and that would include things like sea level and whether or not more irrigation can make up for lost rainfall in the right times of season in agricultural areas. So as we try, that's why I like this process of having these reports issued every five or six years. We don't really know everything that should be done today and it would be very difficult for us to make all the right decisions today. We have to keep refining the science, keep evaluating the science of what's predicted, and what's being observed, and then navigate into the future based on what were learning a little bit at a time.

BR: What's the responsibility of the scientist today in this area of obviously political changes and policy? How do you separate the role of the scientist from the politician and the policy makers?

RC: It is getting harder because what we need from scientists first and foremost is what we've always needed – that they have to be absolutely open-minded and tough-minded in evaluating the evidence and conducting experiments and doing calculations. They have to let the chips fall where they may. But what is making it harder is that as each of these fields of sciences becomes deeper and more specialized and more dependent on 20 years of learning before you can do anything, it makes it harder to communicate to the rest of us who are not specialists of what all these individuals know. So, we are actually asking scientists now, at least some of them, to do more than we asked of them in the past. We need rigorous, hard-nosed, extremely skeptical scientific attitude that is very independent-minded. On the other hand, we are asking them to communicate across all professions and across all livelihoods at the same time.

BR: Quite a Challenge.