

cities, and observations earlier in the century.

The observations in the Southern Hemisphere and the earlier observations are not very good. There are no observations in cities there. So, if you put all these things together—errors of the observing system, the natural fluctuations, particularly in the atmospheric system—what has gone on does not indicate that the CO₂ effect is there.

Interview: Fred Wood, Jr.

No signs of reduction in snow cover or glaciers

Dr. Wood is Senior Associate in the Congressional Office of Technology Assessment. This interview reflects his views based on independent research on climate change, and does not necessarily reflect the policy of the Office of Technology Assessment or of the Congress.

Q: The one thing everyone seems to agree with is that James Hansen lacks a scientific basis.

Wood: I think it's fair to say that he has overstated, at least the scientific certainty and scientific consensus in his testimony before Congress. His scientific, refereed papers are not as extreme, but in his public statements, I think you're right. I think he's in a very small minority with his claims that we are 99% certain that we have already detected the greenhouse warming, which I think is his statement.

Q: Yes.

Wood: That is an extreme position not held by most. Most of the scientists that I have talked to, including many mainstream scientists who do their research in detection, do not agree with Hansen. The problem they have is that he and a few other people have most of the air time, and it keeps getting repeated over and over. It suits the purposes of some environmental groups and some government agencies like the Environmental Protection Agency to try to accelerate policy action. As a result, through the conventional media the impression is given that there is no longer any scientific debate over climate change through greenhouse warming, and this is not the case.

I would say though, that most of what these people are saying is dealing with a very important problem, in that these trace gases are at unprecedented levels. People ought to be very concerned about that. Where there is disagreement is that some of us are saying that we don't yet really understand what is happening or what is likely to happen from a scientific point of view.

Q: How can the news media so systematically cover up what most scientists are saying and just limit themselves to a small group that claims the greenhouse effect is here?

Wood: It's not entirely the media. There have been a dozen or more congressional hearings in the last two or three years, and the type of scientists that get invited or tend to participate in these hearings are, in general, people who are prepared to make strong statements, like Hansen—strong, unequivocal statements. Those are the things politicians like to hear because it makes things appear to be easier to understand.

And then the press: Congressional hearings tend to have

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a lot of credibility, even though you know as I do that you can get junk at congressional hearings, nonetheless there tends to be an amplification process from them.

There has not been a hearing to my knowledge that has taken on the scientific issues. Most of the testimony has been either done by scientists like Hansen, Watson or MacDonald, or Schneider. There are several of them who have testified repeatedly on the certainty of the greenhouse effect. There are a number of scientists who testify on the impact. A lot of these people simply accept the scientific input on the actual greenhouse effect. They will just accept what Hansen says, so that you again get an institutionalization.

That's part of it. I think another part of it is that the scientific establishment in the governmental bureaucracies in this area is not fully candid. I'm not going to suggest that there's some kind of conspiracy, although you can't throw that out. I think that people are concerned about getting funding, and the more that they can appear that there is a consensus on the urgency, etc., that may help get more funding. And frankly, some of the people in the controlling positions in the scientific establishment and in the governmental bureaucracies believe that the problem is real.

They are doing what they can to bias the presentation to Congress to help accelerate the degree of urgency. For example, I've talked to one major climate modeler, who as a scientist knows the uncertainties, he admits them, but he is extremely concerned about the trends and he's worried that by the time we find scientific certainty, or close to that, it will be too late to do anything and the problem will be much worse. So some of these guys believe that we've got to take

action, and they tell themselves, "I'm going to get out there and say whatever it takes." Some of these guys may well be acting on their true view of environmental protection. If you see what I'm saying.

Q: Yes, but the [Rep.] Claudine Schneider [R-R.I.] bill is very explicit in specifically calling for the U.S. to cut off all loans to the Third World nations which would invest money in building up industry there. She claims that this must be stopped because it would aggravate the greenhouse effect. She also proposes that hydroelectric plants not be built because that destroys the land and rain forests. Instead, she proposes that the Third World use wood as an energy source and raise sugar cane to make ethanol to replace gasoline. From the work I have done this is a major reason why the rain forests have been destroyed.

Wood: Yes, I don't know the particulars, although I have a copy of the bill. But I think your point is well taken. The complexities are very great. Even if the nations of the world decided that climate change is a top priority issue, what you decide to do about these things is not straightforward, because this is such a complex area.

Q: Several of the scientists that I have interviewed state that not only has the Earth not warmed, but there is a lot of evidence that the Earth is actually cooling. Is it possible that we are entering a new glaciation?

Wood: The evidence that is clear is that in geologic terms, we would be expecting to see close to the end of this interglacial period. There is a great deal of evidence that the interglacial periods are normally around 10-12,000 years long. It's hard to estimate exactly, but there's been roughly 11,000 years since the last glacial period. This is based on evidence from ice cores, from sediments in interglacial lakes, and so forth. It would make geological sense normally to expect an ending of the present interglacial period soon, but can you say whether that's happening right now, or in 100 or 500 years, or maybe even 1,000? It could be today, but then again it could be a few hundred years down the line.

In terms of the current indicators, I've tried to look at most of them, and I will say this—that supposedly we had in the last decade, the warmest decade on record according to Jim Hansen and others. There's been, at least as far as I can find, no indication that there's been a reduction in snow cover, or in alpine glaciers, or in the ice sheets during that period of time. Now I don't know that they have increased either. But, I guess what I'm saying is, it is hard for me to find the evidence that there is a global glaciation. But on the other hand, the indicators that one would have expected to be detected from the kind of warming that we have had, or allegedly had, haven't been turning up either.

One thing you have to keep in mind here is that this warming that we've been having has been observed at the lower latitudes and not at the higher. That could be a way to

possibly explain why there hasn't been a radical change in snow cover, because if, in fact, the warming is not at high latitudes, then you wouldn't expect to see a change. But, if *that* is true, that is not consistent with the usual scenario, where you have amplified warming in the high latitudes. So, I guess what we're saying here is that the evidence at the moment is not really supportive of the original greenhouse warming theory.

Interview: Kevin Trenberth

'Warming trend has been exaggerated'

Dr. Trenberth is from the National Center for Atmospheric Research (NCAR) at Boulder, Colorado.

Q: I've been talking to a number of people on their criticisms of the greenhouse effect.

Trenberth: You probably already found out that there are some people who are emotional at both extremes. I would be somewhere in the middle. I'm certainly familiar with the data. The people who have often been the stronger advocates, have tended to ignore inconvenient facts that perhaps don't show things quite as strongly as they might like at this time.

I think there's no question that the greenhouse effect is a real thing. I think it's very clear that the climate in the future is going to be different from what it has been in the past. Where the main scientific debate is occurring, I think are the questions—how quickly is it going to be different, how will it be different, and how much will that difference be?

One of the main things used as a basis for making statements about this, is climate models of various kinds. Some people have tended to believe the results of climate models, much more than I think is warranted, and have tended to make statements that I think cannot really be justified, because if you look at two different climate models, they give you two different results.

There is quite a lot of uncertainty as to exactly what climate change will occur in an individual location. For example, there is a fairly nice graph figure that has been put together by Jones and Wigley which shows trends in temperatures, over the Northern Hemisphere, over the last 40 years. What it shows, is regions where the temperature has increased, and regions where it has decreased. And in fact, over the last 40 years, that's a particular period where there hasn't been very much net change. Because any time you