

**Professor Roger A. Pielke, Sr.'s May 14 Presentation to the Marshall Institute entitled  
"Considering the Human Influence on Climate"**

**Summary and Comments by Michael MacCracken, May 16, 2009**

**Overview**

The presentation was to an audience of several dozen, including a number from the community of those who generally think that climate change due to human activities is unproven and the effort to limit climate change is fruitless and misdirected. Professor Pielke's basic point was somewhat different than this, namely that the climate change issue is more complicated than just considering carbon dioxide emissions, which he indicated appears to be virtually the sole focus of media coverage, Congressional discussions, and statements from officials of the Obama Administration such as Secretary of State Hillary Clinton (whom he quoted). He was clear in acknowledging that there are significant human influences and that the CO<sub>2</sub> increase is due to human activities and having some effect on climate. However, he then went on to posit that failing to consider all of the aspects of climate change, both its natural and human caused components, was leading to too much attention being focused on limiting CO<sub>2</sub> emissions and so to too narrow a focus on useful policy responses. On its face, this is not an unreasonable point. How he got there and how he then drew conclusions from this point is where he ventures onto less solid ground.

**"Climate change" and "Global warming" aren't the right terms**

As groundwork for explaining his list of reasons illustrating why the issue is more complex than just considering CO<sub>2</sub>, Pielke noted that the term "climate change" was not the right term to be using because climate was always changing. True, but by how much and how rapidly really matters. The recent pace of change is very unusual, given the present set of surface conditions (i.e., we do not have continental ice sheets melting around the Northern Hemisphere). With chaotic behavior not being an adequate explanation, the change is being driven by some forcing factor; the changes are clearly not just a random fluctuation, even though this might not yet be totally proven through rigorous statistics, as one person in the audience commented during the question period. Pielke also said that "global warming" is not the right term as climate change is more complex than just warming. Agreed.

**On the CO<sub>2</sub> increase—and whether it is a pollutant**

Pielke indicated that the CO<sub>2</sub> increase is due primarily to human activities and that the increasing CO<sub>2</sub> concentration is causing a warming influence. Agreed. He then made the point that CO<sub>2</sub> is not like a traditional pollutant in that CO<sub>2</sub> is and has always been a part of the climate system. He later said that it should not therefore be regulated like a traditional pollutant—suggesting that it would seem that with EPA treating it as a pollutant needing to be regulated, in the future EPA could regulate water vapor and land cover. On these points Pielke is being quite sloppy—methane, non-methane hydrocarbons, carbon monoxide, nitrogen oxides, and ozone are all present naturally and are being regulated as pollutants. In addition, ozone, at least in the stratosphere, is also beneficial to natural ecosystems and humans, so having some redeeming

value is not an escape from regulation. Finally, while Pielke may not want to call CO<sub>2</sub> a pollutant, the Supreme Court ruled that it meets the definition of a pollutant under the Clean Air Act, and thus it is to be considered under the same statutory requirements as are other pollutants—in this key respect, at least, it is like the other pollutants.

### **The climate change issue is more than CO<sub>2</sub>**

Pielke went through quite a range of what he suggested were illustrations of the climate change issue being more complex than can be explained by just the effects of CO<sub>2</sub> emissions. Well, of course, and the IPCC covers a lot more forcings of climate than just CO<sub>2</sub> and so do the proposed legislation and international negotiations. The focus solely on CO<sub>2</sub> is mainly in the media and so in the public discussion—mainly to keep the matter focused and not to make things overwhelmingly complex. In addition, for the long-term (over centuries to millennia), CO<sub>2</sub> is the major factor contributing to climate change (as indicated by the recent paper in *Proceedings of the National Academy of Sciences* by Susan Solomon). I would suggest that virtually all of those making policy and dealing substantively with the issue know this (which is why the concepts of *Global Warming Potential* and *CO<sub>2</sub>-equivalent concentration* are part of the discussion). Thus, in my view, Pielke's main criticism is really more aimed at the media and the level of public understanding (or misunderstanding).

As specific illustrations of his assertion, Pielke showed the trends in satellite-derived observations of tropospheric and stratospheric temperatures (interestingly, and sensibly, using the RSS data set), indicating that while the former showed warming over the last four decades and the latter showed cooling over this period, the results for the last 10 years did not show the expected trends. True, not exactly what is expected for the last 10 years for just the effects that CO<sub>2</sub> is expected to induce, but then one really needs to be comparing to the combined effects from all forcings and over periods long enough to average out natural variability. Pielke also cited the new satellite results for the troposphere, which, he suggested, show that the temperature for the last 10 years is at about the long-term average. Given how long it takes to get new instruments calibrated and the need to have a long enough record for estimating trends, it was not clear what the point of mentioning this record was.

For sea ice, Pielke suggested that Arctic sea ice had recovered its average area this past winter and Antarctic sea ice cover had recently been increasing, drawing the conclusion that sea ice feedback is not monotonic. Well, yes, but the thickness of Arctic sea ice has not recovered, so we will see what happens this coming summer, and Antarctic sea ice is affected by a number of factors, including the effects from changes in atmospheric circulation being caused by changes in the stratospheric ozone concentration. Indeed, Pielke argues that the issue is complex and then for some reason seems to object when the observed record is more complex than would be expected from just the CO<sub>2</sub> increase.

For sea surface temperature, Pielke indicated that the oceans have not yet warmed to above their 1997 value during the very large El Niño event. And similarly, he suggested that sea level seems to have stopped rising—at least the observed increase in heat content has stopped. Pielke argued strongly that the right metric to keep track of climate change is upper ocean heat content and not global average surface temperature, which is an inadequate and likely flawed record.

Pielke favorably cited the recent Heartland Institute report with its photographs of the locations of US observation stations, indicating that most are problematically sited, so the record is very likely influenced by development around the station. In addition, he suggested, measuring the temperature at 2 meters above the surface tends to yield a warm bias—for reasons that seemed to me a bit obscure during his lecture. Even if the land surface temperature record has a few problems (and much work has gone into improving it), many other variables suggest that the surface temperature is rising. For example, snow cover is retreating; ranges of species are shifting, etc. In addition, of course, two-thirds of the Earth is covered by water, so the change in global average temperature is determined by far more than land surface observations. Finally, surface temperature is important because it is the longest instrumental record, and it is what people experience—so it does matter, and it is changing.

Given that the climate does not seem to be responding purely to CO<sub>2</sub>, as his problematic examples indicated, Pielke reiterated the point that there are many forcings, natural and anthropogenic, affecting the climate. In support of this point, Pielke cited the National Research Council report, *Radiative Forcing of Climate Change*, on which he served as a panel member. Rather than illustrating the obvious point that Pielke made about there being multiple forcings, Pielke's citing of this report and his role seemed to me to be an example of how the scientific community has not, at least not totally, excluded him from the national and international assessment process, as he complained of more or less throughout his presentation.

### **An illustration of the effect of land cover change**

To illustrate how land cover change could make a difference, Pielke showed some results from his study of how development changed land cover in Florida during the 20<sup>th</sup> century and how this led to changes in the sea breeze, weather, drying of the surface, max/min temperatures, and water resources. In that these changes have induced changes in Florida's climate that are larger than the changes in climate caused by the increase in greenhouse gas concentrations, he wondered why there is not regulation of changes in land cover if there is going to be regulation of CO<sub>2</sub>. Well, I'd answer, land cover change is not causing warming that threatens to raise sea level by many meters (bye-bye Florida) nor causing a strengthening of hurricanes (more Florida evacuations) nor a shift in the latitudinal zones of climate, so changing the length of the wet and dry seasons (burn, Florida, burn). Thus, it seems to me that while land cover change can indeed affect local weather, even by significant amounts, and might well need to be locally regulated, the increase in the CO<sub>2</sub> concentration is very dramatically altering the underlying baseline climate for everyone in the world—and so it has drawn the attention of international regulators. It seems to me that Pielke's argument is like arguing that the type of clothes you wear can affect how warm or cold you feel, and so why worry about the change in the seasons during the year—that may be a valid notion in Florida, but not over much of the world.

### **On the role of aerosols—and changes in the weather**

In addition to changes in the concentrations of CO<sub>2</sub> (and other greenhouse gases) and in land cover change, Pielke suggested that aerosols are also an important factor in affecting the climate. On this, there is scientific agreement, if not yet convincing understanding. Pielke goes an

important step further in pointing out that the aerosol loading has quite strong spatial gradients and that this will have a much larger effect on local weather (that is, on the local movement of air masses, etc.) than will the smoothly and slowly varying forcing of greenhouse gases (he suggested that the ratio of the gradients was roughly 60). As to the variations in weather being most important for those in particular regions, I am in agreement with Pielke, and have been urging the modeling community to be doing more to report their results in terms of the changes in frequency and likelihood of various weather types and events rather than mainly in terms of the slowly varying, large-scale annual average temperature. Doing this we might well be able to explain, for example, how climate change is contributing to changes in extreme weather events in the upper Great Plains, with the reduction in sea ice extent and thickness causing a reduced outflow of very cold air from the Arctic in fall and early winter, thus allowing moist air from the Gulf of Mexico to push north, creating very unusual conditions such as two-foot snowstorms and even tornados in the Dakotas and Wisconsin, respectively.

I also agree with Pielke that the spatial variations in aerosols and their forcing should be considered, but I am more interested in scales larger than in the more localized areas that Pielke seemed to focus on. For example, for most of the 20<sup>th</sup> century, sulfate aerosol effects were most important in the North Atlantic basin, just where some find that the supposedly natural Multi-decadal Oscillation has been suggested as the cause of, for example, multi-decadal variations in hurricane intensity. The observational record must be cautiously interpreted because it is virtually all from the time when human activities were affecting land cover on both sides of the North Atlantic and when sulfate aerosol loading was changing significantly (first going up, and now down). In addition, there were also volcanic eruptions and more. It seems to me that it is not well demonstrated that what is happening in that region is a natural chaotic event rather than a sequence of changes caused by changes in forcing, some natural and a lot human-induced. Now, with SO<sub>2</sub> emissions in the Atlantic basin going down and emissions in East Asia region going up sharply, a large change must be occurring in the spatial pattern of the aerosols forcing, especially because the sulfate loading in the Pacific basin is at a lower latitude and so may well be having a larger effect on solar radiation than would the same amount of SO<sub>2</sub> emissions in the North Atlantic basin.

### **On the limitations in scientific assessments**

At this point in his talk, Pielke seemed to me to go off in a not very productive direction. Because the media and public are mainly reporting on and hearing about only CO<sub>2</sub> and not the other forcings, Pielke jumps to the assertion that this is because the IPCC assessments, the US Climate Change Science Program (CCSP) synthesis products, and statements and reports by panels of the American Geophysical Union (AGU), American Meteorological Society (AMS), and National Research Council/National Academy of Sciences are all being prepared by the same people involved in the research or their close colleagues and so all of these analyses are biased and, by implication, incomplete and wrong-headed. He argues that all such assessments should be done by independent scientists so the authors do not have a conflict of interest. And he argues for an improved peer-review process where the comments and response to them are made public.

Well, on the peer-review issue, the IPCC and CCSP both make all comments available (well, in the latter case, at least during the Bush Administration, all but those of the White House offices and federal agencies in the last round of the review, where final matters are decided, which sort of perverts the process). When I asked about the openness of these review processes, Pielke then said the problem was that authors were not responding to the reviewers' comments. That attention is paid to comments, however, is enforced by review editors (and I was one for the IPCC for the Fourth Assessment), and so Pielke is apparently really faulting the review editors. Near as I could discern, he believes the main problem is that IPCC and other assessments are not, even after review, sufficiently accounting for his views on the effects of land cover change on the regional weather and climate. Quite clearly, land cover changes can have local influences and as faster computers allow climate models to use finer resolution, coming down from roughly 200 to 50 kilometers, land cover changes, even though pretty slow and limited in scale, will have to be accounted for—to date, doing this globally has just not been possible.

### **On having neutral author teams**

On the question of having the author teams be neutral, I don't think a coherent vision emerged. For this to be implemented, these neutral authors would, at the start, have to not be doing research in the area, for it would not be helpful to change the process if all that we ended up with was a new set of authors citing their own work. Given the degree of research going on and the depth and subtleties involved in each research area, however, coming up to speed from knowing virtually nothing about an issue would take a tremendous amount of time, and given the rapid advances in the science, the likelihood of making mistakes on the subtleties would be quite significant. As a result, those involved in the research (but not the writing, if this were done) would likely be writing very long reviews about shortcomings. To get highly qualified scientists to do this, the initially neutral scientists would have to be paid for their extensive time (which would likely limit participation from developing nations, etc.). Doing this, however, would then create its own potential conflicts of interest, for the initially neutral scientists would, much more than the scientists now involved who take on these assessments for no compensation other than travel costs, become attached to the income from their assessment activities. Thus, to my mind, the proposed cure is worse than the disease.

What the IPCC has done to work to overcome the potential conflict of interest problem is to assure that each author team has strong international representation and that there is a strong, and supervised, multi-stage, open review process, overseen by review editors (and then the public, who can examine and analyze the reviewer comments and author responses). Complaining as Pielke does about the IPCC process reminds me of Winston Churchill's comment: "Democracy is the worst form of government except for all those others that have been tried." Based on experience through four assessments and adjustments over time, the same could be said to apply to the IPCC. Or maybe Pielke would like evaluation of the best cancer treatment left to doctors who do not treat cancer.

### **On getting to the best policies**

Pielke suggested that a more complete understanding of climate change and its many causes, along with a cost-benefit analysis of climate change and other issues, would help to identify win-

win policy approaches. He argued that this would especially be the case if efforts started at the local-to-regional level and worked up to larger scales, evaluating vulnerability and resilience in order to identify actions that could make resource systems more robust to changes in climate resulting from any cause (or other stress).

On this, we generally agree. In fact, the US National Assessment (1997-2001), which Pielke has criticized in the past, actually worked to do this, posing four questions to those attending each regional workshop and participating on each assessment team. The four questions (paraphrased here) were: What are the other long-range (mainly environmental) problems the region is facing? How might climate change alter the projected or actual impacts and introduce new stresses or benefits? What more research would be helpful to better address these questions? and What win-win strategies can be identified to help deal productively with multiple stresses? By structuring the National Assessment in this way, the intent was to use “climate change” as sort of a stalking horse to get regional groups to address long-term issues generally (sometimes grouped together and called sustainability issues). This actually worked pretty well, and in a couple of the cases, climate change aspects ended up not being the main focus—which was considered fine if the participants wanted a different focus.

In seeking win-win strategies, Pielke also urged that the climate effects of all factors, including natural variability, be accounted for in addition to the climate change effects of greenhouse gases. Well, the National Assessment urged that as well. Indeed, regional assessment leaders were urged to consider three types of scenarios for the 21<sup>st</sup> century: (a) a repeat of the 20<sup>th</sup> century climate, but with altered societal conditions; (b) the changes in climate projected by a set of climate models (unfortunately, appropriate and complete model results were then available from only two modeling groups, although less complete results could also be used in some analyses); and (c) based on longer-term paleoclimatic data (derived, for example, from tree-ring reconstructions and other means), evaluate where sensitive thresholds might be and their likelihood and consequences. It is true that the first (and so far only) time through the National Assessment process most of the emphasis was on the use of the model-based scenarios, but the intent was there (although unfortunately not the resources and the time)—the effort really needed to be continued and improved rather than halted as the Bush-43 Administration ended up doing.

### **Pielke’s recommendations**

Pielke closed with three recommendations (the first of which has been posed to AGU as a challenge):

- 1) The climate science community should be polled on the question of whether they believe:
  - a. Human influence is minimal and natural forces are dominating;
  - b. While natural variability is important, human influence is significant and involves multiple forcings; or
  - c. Human influence on climate is dominated by changes in greenhouse gas concentrations.

Pielke indicated that he believes that science has demonstrated that (a) is not the case, and that the many factors contributing to climate change make (c) not supportable, leaving (b). What these options fail to address is the time-scale that he is referring to. My answer would be that we have been moving from (a) to (b) and are now becoming committed to (c), and that this is just

what IPCC is and has been saying—not, as Pielke is suggesting, that CO<sub>2</sub> is the only issue. I would also note that I do not think that scientists should be asked what they “believe,” but instead what their analysis and interpretation of the evidence indicates.

- 2) National and international climate assessments should be written by climate scientists without significant conflicts of interest. Pielke indicated that he is not questioning the sincerity or integrity of the authors—just making the point that they are not, in his view, presenting the full picture. Well, in that for four IPCC assessments there has been unanimous acceptance of the IPCC chapters by the nations of the world without any nation taking exception, this recommendation seems to me to make his point sound as if it is more serious than it actually has been in practice, as noted earlier. I think what is more important is having an open process with an extensive and open review process—IPCC has really strived to do this well, something virtually none of the summary analyses by skeptical scientists have even attempted.
- 3) In working on policy, the focus should be on reducing the threats from climate variability and change and from other environmental stresses, and the focus should be resource-based and on local and regional variability—not mainly on long-term change. As one aspect of a comprehensive approach, this seems a very good point, reinforcing what the National Assessment attempted and some regions have been able to carry forward at least a bit, but long-term change is going to be having an increasing influence and cannot in any reasonable way simply be treated as background noise.

### **Q&A discussion of the presentation**

The questions raised had a sharper critical tone than Pielke’s talk, with Pat Michaels talking about a “sickness” in the science community—which Pielke seemed to indicate was further than he wanted to go with his criticism (basically, Pielke was accepting that human-induced climate change is real, just not dominant, while Michaels seemed to be totally dismissive of it). Other discussion focused on problems perceived and experienced with the peer-review process—basically that comments of some in the audience on the assessment documents did not lead to the changes in the text that they wanted (that the comments may be biased in their own way did not seem to be considered a possible reason for this), and that attempts to publish views not in line with the prevailing view have been rejected. In that peer-reviewed journal articles are the basis of the IPCC review process, one questioner indicated that he got back review comments that said his journal article should not be published in a particular peer-reviewed journal because it would give ammunition to Skeptics. I would agree this is not an acceptable reason not to publish, but without a lot more information about other possible shortcomings in the article, it is not possible to tell if this was the primary reason or just a flippant comment. Basically, it is not enough to be written—articles must be related to the fundamental understanding of how the Earth system works now and has worked in the past; journals at not just reproduction and distribution systems, they have been established to build rigorously on the scientific traditions and knowledge of the past.

In my view, the way around complaints about the review is to make it fully open (so everyone can comment) and to post on the Web both the comments and the name and affiliation of the person making the comments, as IPCC and the CCSP have been doing. This would, I would suggest, help make sure that review comments are seriously made and seriously considered.

Indeed, this rule change could make the review process a lot more work, but I think it would make the actual assessments better and more likely to be seen as done fairly. Pielke favored posting the review comments on the Web (and presumably the response to the comments by the authors), but to not associate the name of the reviewer with their comments, a position that I think would allow all sorts of irresponsible comments to come in with no incentive for reviewers to be thoughtful and careful in their analyses.

### **Summary impression**

Overall, my sense was that this was a more thoughtful discussion of the issues than Prof. Pielke has presented in the past—and one that one could engage with. So, that's progress.