

The Washington Post

Studies differ on climate change and warming severity, researchers trade jabs

By Jason Samenow – 12/6/12

Two heavyweight climate scientists have published very different ideas about how much the Earth is going to warm in the coming decades. And neither has much regard for the other's estimate - casting light on a long-standing, thorny issue in climate science.

Future warming is likely to be on the high end of predictions says [Kevin Trenberth](#) of the National Center for Atmospheric Research who has been a lead author for the United Nations Intergovernmental Panel on Climate Change (IPCC).

But [Michael Schlesinger](#), who heads the Climate Research Group within the Department of the Atmospheric Sciences at the University of Illinois, has just published a study with his group finding warming will be at the low end of projections.

How much the Earth warms in the coming decades is an important societal and environmental issue. The more it warms the more difficult it will be to adapt to warming, avoid unwelcome consequences, and implement effective measures to slow it, namely reducing greenhouse gas emissions.

The range of warming predictions for doubling carbon dioxide in the atmosphere - the so-called climate sensitivity - spans about 2 to 4.5 degrees C. according to the 2007 IPCC report. The Schlesinger group study says the most likely sensitivity is 1.5-2 degrees C, whereas Trenberth told [New Scientist](#) he thinks it is more like 4 degrees C, though he calls 3 degrees C "very viable."

One rationale for Trenberth's higher estimate is the [headline-generating](#) study he and UCAR colleague John Fasullo published in [Science](#) November 8. The study revealed the computer models that predict the most warming have the best track record in accurately simulating humidity in the atmosphere over a recent 10-year study period. The warmer models should be trusted the most, both Trenberth and Fasullo assert.

“The models at the higher end of temperature predictions uniformly did a better job,” [Fasullo told the Washington Post’s Brian Vastag](#), adding that the models predicting less temperature change “should be outright discounted.”

But Schlesinger said he finds the Fasullo and Trenberth analysis “very unconvincing” and would have rejected the study had he been a reviewer.

“The Fasullo and Trenberth study is meaningless,” Schlesinger said. “[I]t does not address the zeroth-order question: What [climate sensitivity] best reproduces the observed changes in ... temperature from the 19th century to the present?”

The [Schlesinger group study](#) does exactly this, applying their in-house model to analyze historic changes in temperature to narrow predictions of the future. This method yields an average warming estimate of just 1.5-2 degrees C for doubling CO₂.

The result is notable primarily for two reasons.

First, just a decade ago, Schlesinger had [published research](#) concluding “there is a 70 percent chance [the climate sensitivity] exceeds the maximum IPCC value of 4.5 degrees C.” He and co-author Natalia Andronova at the time opined: “This is a disquieting result.” The new estimate of 1.5-2 degrees C is a striking reversal.

Second, it is the among the lowest estimates of climate sensitivity among actively publishing climate researchers. Only a small handful of studies have reached similar conclusions, and they have primarily been published by scientists unconvinced manmade climate change poses major risks. For example, Pat Michaels (and colleagues) of the libertarian Cato Institute [published a paper](#) in Climate Research in 2002 arguing warming would be at the low end of the IPCC’s projections (around 1.8 degrees C). And in 2011, Roy Spencer, a University of Alabama researcher and [expert](#) for the conservative-leaning Marshall Institute, published a [controversial paper](#) (with colleague William Braswell) asserting climate models with lower sensitivities do a slightly better job matching observations.

Scientists often say a single study is not gospel, particularly if the results depart drastically from the overwhelming body of existing literature. Contrary to Schlesinger’s result, the majority of state-of-the-art four-dimensional “general circulation models” (GCMs) - the kind used in the Trenberth and Fasullo study - estimate the climate sensitivity is closer to 3 degrees C. The 2007 IPCC report stated 3 degrees C is the “most likely” number.

Trenberth and Fasullo expressed major concerns about the Schlesinger paper and its much lower estimate.

“[Schlesinger’s] numbers have no sound or physical basis,” Trenberth said. “The problem is the paper uses a very simple model, one that has no hydrological cycle, and one where the ocean structure is fixed.”

Fasullo added: “Crude models such as the ones used in the [Schlesinger] study should not be used as a surrogate for GCMs as they are by their very nature simplistic and small changes in their basic assumptions can yield widely varying results.”

It’s beyond the scope of this blog post to evaluate the merits (and/or limitations) of the Trenberth and Schlesinger papers. That is best done in the peer reviewed literature and forthcoming assessments.

But the disparity in the estimates of Trenberth and Schlesinger and their sharp criticisms of each other’s work highlights how little progress has been made in narrowing down climate sensitivity estimates since the 1970s.

In 1979, at the request of the White House, a National of Academy of Science (NAS) convened a study group “to assess the scientific basis for projection of possible future climatic changes from man-made releases of carbon dioxide”. The [group concluded](#): “We estimate the most probable global warming for a doubling of CO₂ to be near 3 degrees C with a probable error of plus or minus 1.5 degrees C.”

Thirty-three years later, while huge advancements in understanding of climate change have occurred, this range has not meaningfully changed. And it’s not clear breakthroughs are coming.

A [2011 study](#) in the Journal of Climate which evaluated efforts to constrain climate sensitivity using models cautioned they may not yet be up to the task. It states: “...measures of model fidelity that are effective at narrowing the distribution of future projections ... may be poor measures of the likelihood that a model will provide an accurate estimate of climate sensitivity.”

The wide range of possible climate sensitivities poses challenges for policymakers who must decide how urgent cuts in greenhouse gas emissions are and how much to cut them.

Schlesinger, in addition to his revised estimates of climate sensitivity, published a companion analysis which outlines a strategy for avoiding the worst impacts of climate change through emissions reductions, titled “[A Revised Fair Plan to Safeguard Earth’s Climate](#).”

“Schlesinger sees the papers, taken together, as providing good news, implying that the task of limiting warming could be more feasible than many analyses have concluded,” [blogged the New York Times Andrew Revkin](#).

Despite Schlesinger’s more optimistic outlook, he stresses sharp emissions reductions must begin, in case his estimates are wrong.

“...for argument’s sake, let’s suppose the [climate sensitivity] is larger than the values we determined....humanity must act sooner and more rapidly...”
Schlesinger said.