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The Dessler Cloud Feedback Paper in *Science*: A Step Backward for Climate Research

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How clouds respond to warming – the 'cloud feedback' problem – will probably determine whether manmade global warming becomes either the defining environmental event of the 21st Century, or is merely lost in the noise of natural climate variability.

Unfortunately, diagnosing cloud feedback from global satellite observations has been surprisingly difficult. The problem, however, isn't the quality of the data. The problem is figuring out what the cloud and temperature behaviors we observe in the data mean in terms of cause and effect.

So, a new paper by Andy Dessler, a Texas A&M climate researcher, in *Science* this week is potentially significant. It claims to have greatly closed the gap in our understanding of cloud feedback.

Dessler's paper claims to show that cloud feedback is both positive and generally supportive of the cloud feedback assumptions exhibited by the IPCC's computerized climate models. This would, in turn, support the IPCC's claim that anthropogenic global warming will become an increasingly serious problem in the future.

Unfortunately, the central evidence contained in the paper is weak at best, and seriously misleading at worst. It uses flawed logic to ignore recent advancements we have made in identifying cloud feedback.

In fact, the new paper is like going back to using only X-rays for medical imaging when MRI technology is already available.

What The New Study Shows

What is the new evidence of positive cloud feedback that Dessler has published? Well, actually it isn't new. It's basically the same evidence we published in the *Journal of Geophysical Research* earlier this year, available at:

http://www.drroyspencer.com/wp-content/uploads/Spencer-Braswell-JGR-2010.pdf

Yet we came to a very different conclusion, which was that the only clear evidence of feedback we found in the data was of strongly negative cloud feedback.

But how can this be? How can two climate researchers using the same dataset come to opposite conclusions?

The answer lies in an issue that challenges researchers in most scientific disciplines – separating cause from effect.

Dessler's claim (and the IPCC party line) is that cloud changes are caused by temperature changes and not the other way around. Causation only occurs in one direction, not the other.

In their interpretation, if one observes a warmer year being accompanied by fewer clouds, then that is evidence of positive cloud feedback. Why? Because if warming causes fewer clouds, that would let in more sunlight which then amplifies the warming. That is positive cloud feedback in a nutshell.

But what if the warming was caused by fewer clouds, rather than the fewer clouds being caused by warming? In other words, what if previous researchers have simply mixed up cause and effect when estimating cloud feedbacks?

A Step Backwards for Climate Science

What we demonstrated in our JGR paper earlier this year is that when cloud changes cause temperature changes, it gives the illusion of positive cloud feedback – even if strongly negative cloud feedback is really operating!

I cannot overemphasize the importance of that last statement.

We used essentially the same satellite dataset Dessler uses, but we analyzed those data with something called 'phase space analysis.' Phase space analysis allows us to "see" behaviors in the climate system that would not be apparent with traditional methods of data analysis. It is like using an MRI to spot a type of tumor that X-rays cannot see.

What we showed was basically a new diagnostic capability that can, to some extent, separate cause from effect. This is a fundamental advance.

The Dessler paper is like someone publishing medical research that claims the tumors do not exist because they still do not show up on our latest X-ray equipment ... even though the new MRI technology shows that they do exist!

We even replicated the behavior seen in the satellite data that was analyzed with phase space analysis — our MRI for the climate system – by using a simple forcing-feedback climate model containing a negative feedback component. We demonstrated that the satellite data Dessler analyzed are actually showing negative cloud feedback, not positive feedback.

Why Dessler Assumed We Are Wrong

To Dessler's credit, he references our paper. He then immediately discounts our interpretation of the satellite data.

Why?

Because, he claims, (1) most of the climate variability during the satellite period of record (2000 to 2010) was due to El Nino and La Nina (which is largely true), and (2) no researcher has ever claimed that El Nino or La Nina are caused by clouds.

This simple, blanket statement was then intended to negate all of the evidence we published.

But that is not what we claimed, nor is it a necessary condition for our interpretation to be correct. El Nino and La Nina represent a temporary change in the way the coupled atmospheric-ocean circulation system operates. Any change in the atmospheric circulation can cause a change in cloud cover, which can in turn cause a change in ocean temperatures. We even showed this behavior for the major La Nina cooling event of 2007-08 in our paper!

It doesn't mean that "clouds cause El Nino," as Dessler suggests we are claiming, which would be too simplistic and misleading of a statement. Clouds are complicated beasts, and climate researchers ignore that complexity at their peril.

Very Fortuitous Timing

Dessler's paper is being announced on probably THE best day for it to support the IPCC's COP-16 meeting here in Cancun, and whatever agreement is announced tomorrow in the way of international climate policy.

I suspect – but have no proof of it – that Dessler was under pressure to get this paper published to blunt the negative impact our work has had on the IPCC's efforts.

But if this is the best they can do, the scientists aligning themselves with the IPCC really are

running out of ideas to help shore up their climate models, and their claims that our climate system is very sensitive to greenhouse gas emissions.

The weak reasoning the paper employs – and the evidence we published which it purposely ignores! – combined with the great deal of media attention it will garner at a time when the IPCC needs to regain scientific respectability (especially after Climategate), makes this new *Science* paper just one more reason why the public is increasingly distrustful of the scientific community when it comes to research having enormous policy implications.