

E-mail exchange between Dessler and Spencer

Dessler's initial e-mail to Spencer:

Roy-

Dick Kerr sent me your comments on my paper. Since I'm sure you'll blog about this, I thought I'd send you my response so you could accurately reflect my views in your blog post.

Much of what you say I agree with. However, there are a few key points where I disagree. Much work has been done on ENSO over the past few decades and pretty much everyone agrees that it's a stochastically triggered, coupled dynamic mode of the atmosphere-ocean system. I've never seen any suggestion that it's triggered by clouds. To the extent that clouds amplify ENSO, that's the cloud feedback, and that is what I measure in my paper. As you say in your 2010 paper: "Significantly, nonradiative forcing of temperature is very important to feedback diagnosis because it is the only type of temperature forcing for which the radiative feedback response can be clearly observed in the radiative flux data." I think this caveat applies to my approach. Thus, I don't really think your fundamental objection to my paper has much merit.

I would add that I respect your work and always find it interesting. Keep thinking out of the box!

Thanks!

Spencer responds:

Andy:

Thanks for the input, and your willingness to discuss this. Not many researchers are.

I understand your tendency to think of a circulation-induced change in cloudiness as a feedback on temperature, but the fact that a loop appears in phase space diagram of temperature-versus-radiative flux indicates this is not the case (or at least not completely).

I want to make sure you understand this point, because it is fundamental. The satellite data themselves give us information about the direction of causation! Go back and look at the 2007-08 La Nina event in our Fig. 4. There is definitely an element of clouds => temperature there (again, the looping indicates a time-lagged response, which then indicates the direction of causation).

The very fact that the data are so poorly correlated should at least make you consider this possibility, Andy, because this is exactly what the theory predicts for clouds forcing temperature. Temperature forcing clouds, in contrast, is highly correlated in the data.

Again, thanks for the opportunity to discuss this.

-Roy

Dessler responds to Spencer:

Hi Roy-

I think our disagreement comes down to a disagreement on the cause of ENSO. I guess I'm not convinced by your argument for a few main reasons:

First, people have been studying ENSO for decades and my sense is that the basic theory that it is caused by changes in surface winds driving changes in ocean circulation seems to be quite successful and explains almost all of the details of the observations (e.g. the evolution of thermocline depth).

Second, I did a quick back of the envelope calculation and in order to get 1°C of warming in a 50 m column of water in one year you need about 7 W per square meter of heating. That seems a bit high. And if the warming occurs in just a few months (which it can, then the required radiative heating would be correspondingly larger).

Third, I follow your argument in figure 4 of your paper. However, I don't think this type of lead-lag argument works if the cause of ENSO is non-radiative.

Fourth, I really don't find the scatter between global average surface temperature and the energy trap by clouds to be all that troubling. As you showed in your 2007 paper (which has influenced my thinking greatly), the MJO has a big impact on cloud forcing, but no impact on surface temperature. Thus, I think that what my measurements are showing is a positive cloud feedback combined with essentially random MJO-induced noise. I think the MJO is doing the same thing as if there was a lot of noise in the CERES measurement.

Finally, one of the things that really troubles me in your 2010 paper is that you switch back and forth between correlations with the surface temperature and with the mid troposphere temperature. I have looked at enough of this data to know that the correlations you get are completely different depending on which one of these data sets you use. You do acknowledge that in your paper, but this still causes me great concern. Someone needs to go through your paper and re-do the analysis to use just one temperature data set to settle this - -- perhaps a good project for a UAH grad student.

I do agree that clouds are playing a role in amplifying ENSO, but that's the cloud feedback and that's what I'm trying to measure. That said, I certainly acknowledge that my analysis is not definitive and may even be completely wrong ... but in my humble opinion it's a step in the right direction. I'm certainly not dropping this problem and am hard at work on a few follow-up pubs. In a few years I think we'll know if I was right or not.

Thanks again for the feedback (pun intended).

Andy

Spencer responds:

Andy:

While I agree with you on the MJO, I guess we will have to agree to disagree on ENSO for now.

As far as our use of surface AND tropospheric temperature observations in our 2010 paper, that was to illustrate how one can be misled by using surface temperatures on short time scales when estimating feedbacks. I thought we made that clear, but maybe it wasn't clear enough.

Of course, our simple forcing-feedback model did not distinguish between ocean and tropospheric temperatures -- which in effect assumed they were slaved to each other with no time lag.

Anyway, welcome to the cloud feedback debate! I'm actually happy that your paper will help to bring more visibility to a problem that *I* believe is still far from solved.

Good luck!

-Roy

Dessler responds:

Hello, Roy. Just a quick comment on ENSO. If you have two variables and know that one of them causes the other, then I agree that you can use lead-lag relations to determine the direction of causality. But if there is a third mechanism that may be responsible for changes in your two variables, then a lead-lag analysis will not tell you anything. Thus, I do not see how the argument you're making about leads and lags rules out the mainstream view of the causes of ENSO. As I see it, this is a pretty big logical flaw in your argument. Thanks!

End of exchange