Subject: **Re: powerpoint from your UNC presentation?**

From: **William Happer** Wed, Sep 10, 2014 at 7:55 PM
To: David Burton

Dear David,

Thanks for the kind note. A copy of the UNC slides is attached.

Nobody seems to be quite sure what modtran really does. I think it has a far-wing cutoff but I am not at all sure of that. It is hard to find anyone in the climate-science community who really knows. The best answers I have gotten are from outside users of modtran, notably Gea-Banachloche at the University of Arkansas. I am attaching a nice paper by Giea Banacloche and his student Wilson on the topic. I had meant to cite the paper in my UNC talk but I was distracted and forgot to include it on one of the slides. When I wrote to them to ask if they really used a Lorentzian lineshape factor, as their Eq. (6) implies, Gea-Banachloche wrote back to say that he believed there was a cutoff in modtran. As I mentioned in the talk, only at altitudes on the order of 50 km is the collision broadening small enough that it is even worth using a Voigt profile instead of a Lorentzian profile.

I was very interested in your comment that modtran results seem to be changing over the years, with water vapor feedback.

Good luck and stay in touch.

Best wishes,

Will

From: David Burton
Sent: Wednesday, September 10, 2014 5:36 PM
To: William Happer
Subject: powerpoint from your UNC presentation?

Dear Prof. Happer,

I very much enjoyed your two lectures in NC Monday, and I learned a lot, though a lot of the UNC material was over my head.

I'm the guy who was seated front and center at the UNC lecture, right behind you before it started.

Would you mind sharing your UNC powerpoint file with me, please? (Gail Combs, the lady whose husband has perfect pitch, would also like a copy; I'll forward it to her.)

Also, I thought of a question that I failed to ask you when I saw you. The question is this: is MODTRAN afflicted by the 40% overestimate of the warming effect of CO2 that you discussed?

Background (ignore if you're in a hurry):

Some time ago I ran some calculations using U.Chicago's MODTRAN interface, to get a feel for the effect on steady-state temperature of various CO2 concentrations. Curiously, I found that after an update of their site I got different numbers.

The numbers were the same for constant water vapor pressure (i.e., with no water vapor amplification). But for constant relative humidity (i.e., taking into account water vapor feedback amplification), the newer version shows a lot less water vapor amplification, and, hence, a lot less warming:

http://www.burtonsys.com/climate/MODTRAN_etc4c.html

MODTRAN tropical atmosphere, effect on temperature of doubling CO2 (from 285 to 570 ppmv)...

clear sky, const rel humidity
old version: +1.45°C (calculated as +0.79 - -0.66)
new version: +0.96°

cumulus 0.66km-2.7km, const rel humidity

old version: +1.00°
new version: +0.81°

The cause of the difference is mysterious, and I don't know which version is more likely to be correct.

If MODTRAN's calculated warming is also off by by +40% because of use of Voigt profiles for the CO2 spectral lines, that would be another problem with those calculations.

Warmest regards,

Dave Burton
www.sealevel.info

2 attachments

UNC-9-8-2014.pptx
8354K

2012 Wilson AJP - simple model CO2 greenhouse effect.pdf
1008K