

To All,

As one of the signers of the recent Austin-Cohen-Lewis petition submitted to the Council urging it to amend its 2007 statement on global warming, I wanted to use this 11th hour opportunity to write personally to several of you whom I've met on occasion during my brief escapades in the arena of science public policy, to once more reinforce my support of the petition.

What I find especially grating...other adjectives that might apply being egregious, insulting, arrogant and misleading...is the use of the word "incontrovertible" to describe the possible connection between anthropogenic emissions and global warming. Moreover, I don't even believe the containing sentence construction is correct English, as the pre- and post-colon phrases do not mention emissions at all, and it is the connection between those and warming, which, I assume, is the very point attempting to be established.

Here is how I handle this issue when giving one of my "Rotary Club" talks.

Get hold of your local high school physics teacher, and ask her/him to set up the following experiment for their class: Fill up a bell jar (inverted beaker on a wet towel works too) with carbon dioxide (from a lab cylinder, but it's best to make it yourself by burning something...if you get a little water vapor in there too, that's fine...it's a GHG as well). Shine light from a 150 W tungsten bulb through the glass. Better yet, if it's sunny, bring everything outside. Go take a lunch break. On return, the "jar" is considerably warmer. Why? The homework assignment will involve the physics of black body radiation and C-O bond resonance reflection/absorption.

So. CO₂ (and H₂O and CH₄ and SF₆ and...) forcing of atmospheric warming is physically plausible. Plausible. Maybe...indeed, there is an argument that the invention of agriculture some 8-9 millennia past resulted in methane emissions that saved us from a "scheduled" ice age. But certainly none of this speculation is incontrovertible! I once heard Freeman Dyson remark, "The central difficulty in the study of climate, is that human civilization has not existed long enough to establish a reliable observational time series, anecdotal evidence notwithstanding."

On Earth (Not on Venus or some of the moons of our outer lying planets) there is a "small complication" due to the complexity of our "chemical shell" (ocean currents, wind, land, clouds, ionosphere, ice caps, solar absorption, rotation, polar tilt...and much more), requiring application of the non-linear, compressible, Navier-Stokes equation to the simple black-body/IR resonance model (incidentally, President Obama apparently has picked up on Navier-Stokes as a "buzz phrase" for climate change...I heard him quote it on a cable news channel just three days ago...however, it seems his staff didn't tell him an existence proof for a 3D solution of NV remains to be revealed). I have some experience with the vagaries of non-linear differential equations, my day job at IBM during the 1970s and early 80s being the density-functional and fermion Monte-Carlo computational physics of exotic superconductors. You can wind up very quickly in some mathematically stable, but physically incorrect "valley!"

In July, 2007, I was invited to participate in a DOE BES Snowmass workshop on "Climate Change Impacts and Integrated Assessment." It was an eye-opening behind-the-scenes experience. I was one of a sprinkling of physicists asked to speak (two others were Bob Rosner (ANL) and Nate Lewis (CalTech)), the attendees in large part made up of a mixture of modelers and economists. Many of them had contributed to various IPCC-sponsored studies, but at Snowmass did not have their hands tied by the IPCC-required unanimity of that agency's final reports. It was clear to me there was visible nervousness

and uncertainty amongst the modelers regarding regional variations and time scales. On the topic of GHGE mitigation, there was general agreement that the requisite science and technology (e.g., renewables, nukes, hydrogen, energy efficiency...) exists and is "on the shelf" ready for deployment. The central mitigation issue is economic, not technical, and much discussion ensued over the societal costs surrounding implementation, and, frankly, whether it was all worth it. Bill Nordhaus (Yale...rumored to be on the short list for a future Nobel) pointed out historically those nations consuming the greatest amount of fossil fuels evolved the most robust economies. In fact, Nordhaus suggested that perhaps, for the next eight decades, exploitation of fossil reserves continue to be vigorously pursued, and, should significant GHGE-forcing of global climate warming indeed be proven, the wealth to adapt to such change will have been created and available.

All in all, my sense is that the focus of the majority of the climate change "scholar" community...modelers, economists and technologists...has shifted from mitigation to adaptation, and rightly so. Yet the word "adaptation," or a similar term, does not appear at all in the current Council statement...and it should. As Nate Lewis points out, simply due to the amount of heat presently stored in the oceans from whatever cause, the release of that alone will likely cause some atmospheric warming and concomitant infrastructure, agricultural and water resource dislocation driving the need to develop novel and massive adaptation technologies (e.g., nuclear-enabled desalinization coupled to a superconducting MHD-driven pump water delivery network). The adaptation scenario falls well within the aegis of the last paragraph of the proposed Council Statement revision:

"The APS supports an objective scientific effort to understand the effects of all processes – natural and human --on the Earth's climate and the biosphere's response to climate change, and promotes technological options for meeting challenges of future climate changes, regardless of cause."

Thanks for listening. I hope I haven't burdened you with a polemic. You judge. Anyway, I look forward to seeing all in Portland next March, and maybe we can carry this discussion forward lubricated by appropriate refreshment.

Best Regards, -Paul