TESTIMONY OF PATRICK J. MICHAELS TO THE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT OF THE COMMITTEE ON ENERGY AND COMMERCE, U.S. HOUSE OF REPRESENTATIVES.

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This Subcommittee asks important questions: What are implications of climate change for national security, economic development and public health?

The answers to the important questions about the implications of climate change are driven by a series of computer models and mathematical simulations. First, one estimates changes in climate. Then changes these are input into a series of subsidiary models to estimate their impact. Finally, one compares putative costs of the climate change compared to the costs of mitigation by reduction or stabilization of the concentration of atmospheric carbon dioxide.

We often hear that "the science is settled" on global warming. This is hardly the case. While almost all scientists agree that global surface temperature is warmer than it was a century ago, there is considerable debate about the ultimate magnitude of warming, as evinced by the broad range of future mean surface temperature given by the United Nations' Intergovernmental Panel on Climate Change.

The primary drivers of the impact models are therefore the models for climate change itself. I must report that our models are in the process of failing. When I say that, I mean the ensemble of 21 models used in the midrange projection for climate change by the IPCC. I am an active participant on this Panel, providing extensive reviews and comment on several iterations of their scientific summaries, as well as invited text for their Second Assessment.

If it is demonstrable that these models have failed, then there is no real scientific basis for any estimates of the costs of inaction. I will now perform that demonstration.

Remember this: a climate model is really nothing more than a scientific hypothesis. If a hypothesis is consistent with observations, then it is standard scientific practice to say that such a hypothesis can continue to be entertained. In this case, that hypothesis can then serve as a basis for other subsidiary models or, in reality, subsidiary hypotheses.

If the hypothesis is not consistent with observations, it must be rejected. That does *not* mean that human-induced climate change may or may not be real, but it does mean that (in this case) the magnitude of prospective change has—with high probability—been overestimated. That means that all subsidiary hypotheses on economic costs, strategic implications, or effects on health are similarly overestimated.

Figure 1 shows the various model projections for the IPCC "A1B" emissions scenario for the period 2000-2020. This is the "midrange" estimate. Actual emissions rates that are above these values will produce higher projected rates of warming, and vice-versa for lower ones. The actual accumulation of carbon dioxide in the atmosphere, in parts per million, has been very close to the A1B estimates, so it serves as a very useful point of analysis.

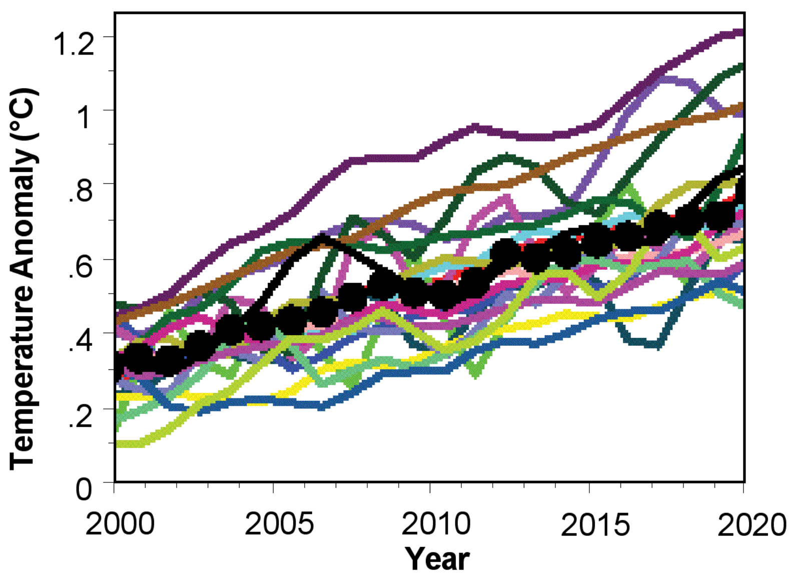

Figure 1. Climate model projections (colored lines) and climate model ensemble mean (black circles) of global average surface temperature anomalies, 2000-2020, under the IPCC A1B emissions scenario.

Figure 2 shows the observed surface temperatures from the University of East Anglia record since the second warming of the 20th century commenced in 1977. This history, designated HadCru3, and its predecessor versions, are the most cited histories by the IPCC. For designation, I refer to this as the IPCC surface data hereafter in this testimony.

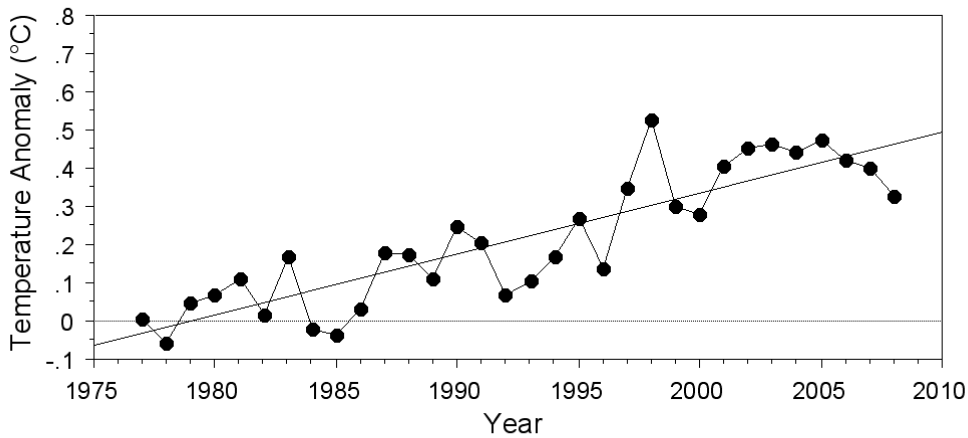

Figure 2. Annual global average temperature anomalies, 1977-2008, from the HadCru3 temperature history.

Several things should be apparent.

First, the ensemble behavior of the A1B models is largely linear in this time frame. In other words, the tendency of both the individual models (colored lines) and the average of the models is a constant rate of warming. Indeed, the observed warming in the HadCru3 record, back to 1977 (when the second warming of the 20th century commences) is also constant. This is true despite a lack of overall trend since 1998, but it is noteworthy that 1998 was an obvious high point in the observed record because of a strong El Nino and an active sun, in addition to the warming pressure from increasing carbon dioxide.

We now examine the distribution of warming trends within the 21 A1B models for various time periods. We use the set of models available at http://climexp.knmi.nl/, a standard reference. The models begin in 2001 and end in 2020. Note that the modeled warming rates in the first half of this period, which we are nearly through (by 2010), are the same as they are in the second half. In other words, the modeled rate of warming is constant.

We first analyze various modeled trends beginning with a five-year window and then on up to 15 years, using the 2001-2020 reference period. We ran successive monthly iterations of each model. Consequently the sample size is very, very large. The results are shown in Figure 3.

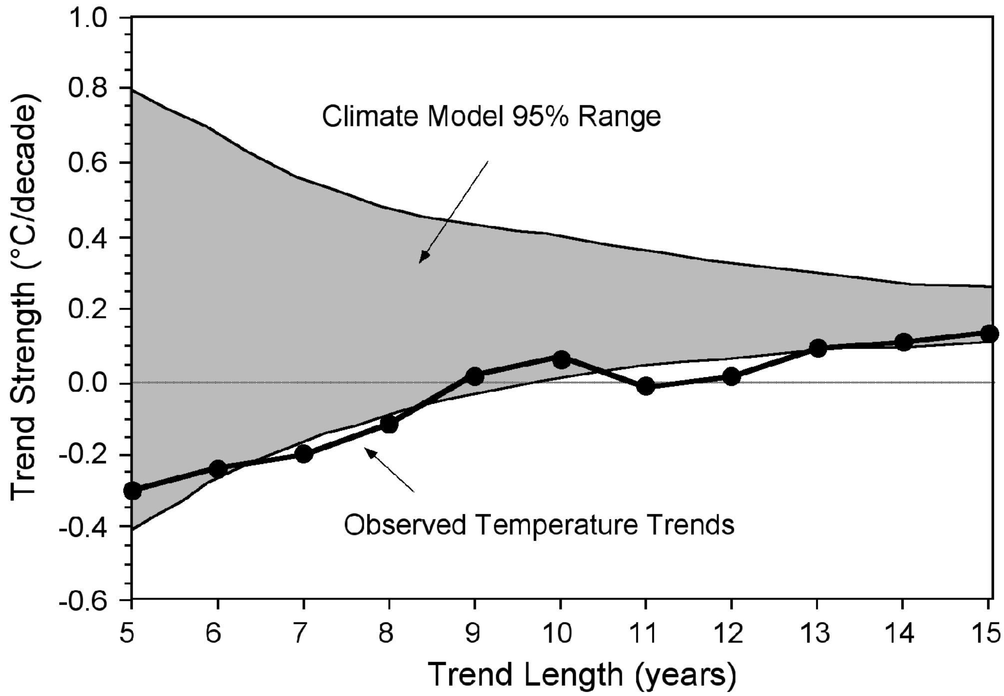

Figure 3. Climate model 95% confidence range of projected surface temperature trends of varying lengths (gray area) and the current observed values for these trends (through December 2008) (black line).

We then calculated the percentile ranges of temperature change for the model ensembles at the .025 level on both the "warm" and "cold" sides of the model distributions. This is analogous to the 95% confidence bounds for the model ensemble. Generally speaking, hypotheses are either rejected or continued to be entertained at the .95 level, so our test of the models is consistent with normal scientific practice.

Also in Figure 3 are the observed temperature trends for periods from five to fifteen years from the IPCC history, ending in December, 2008. It is very clear that temperatures are running at the lower limit for the .95 confidence level. In other words, the ensemble of the AIB models is *failing*.

While much ado has been made about the lack of warming from 1998 through now, the analysis is clearly quite stable across other trend periods. However, the longer that the current regime persists, the worse the models fail. Figure 4 assumes that 2009 mean surface temperatures are the same as 2008, which is a very reasonable assumption at this time. We are currently in the cold phase of El Nino, called La Nina, which decreases the likelihood that this will be a very warm year.

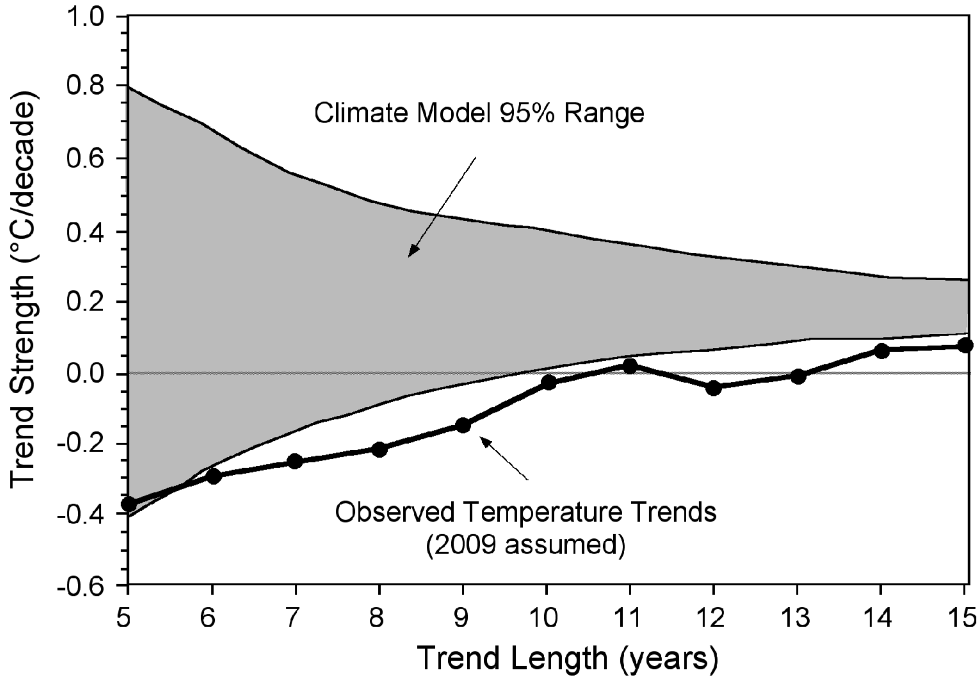

Figure 4. Climate model 95% confidence range of projected surface temperature trends of varying lengths (gray area) and the expected values for these trends assuming the temperature in the coming year is similar to the temperature in 2008 (black line).

In Figure 5, we run the analysis for the last 20 years of observed IPCC temperatures (1989-2008), rather than the last 15. There is a clear warming trend in this period, but, again, it is so low as to fall again along the .95 level. The ensemble model failure is not a product of the selection of recent years; rather it is a systematic failure of the models as a whole to accommodate temperatures in recent decades.

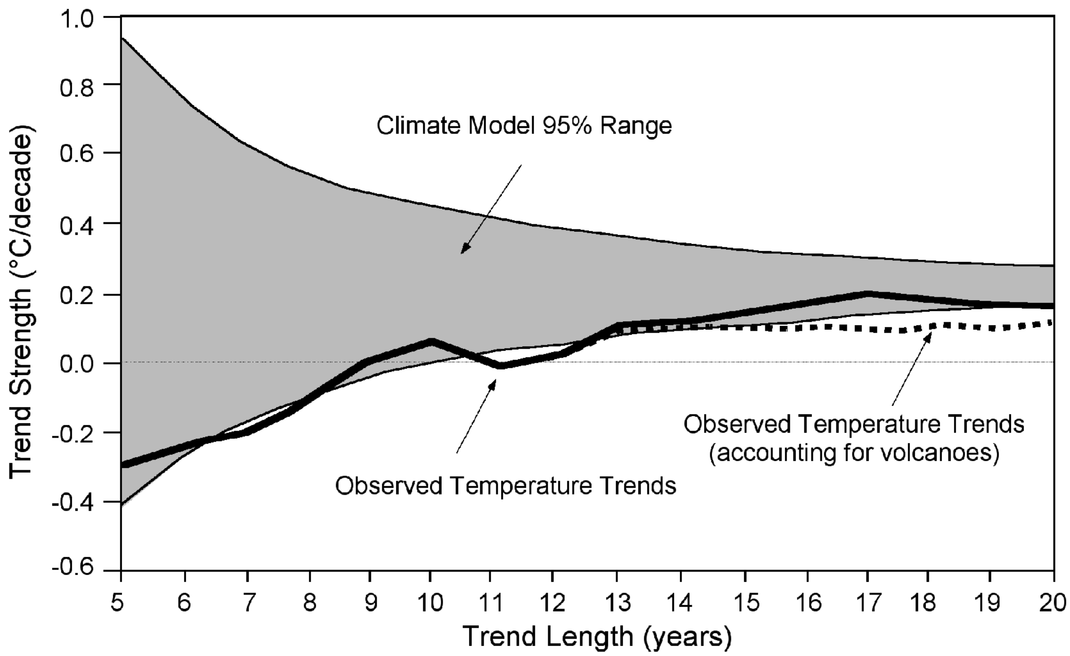

Figure 5. Climate model 95% confidence range of projected surface temperature trends of varying lengths (gray area) and the current observed values for these trends (through December 2008) (thick black line) and when the observations are adjusted to account for the impact of Mt. Pinatubo (dotted black line).

The failure becomes even more obvious when the effect of the 1991 eruption of Mt. Pinatubo is removed. This results in a more appropriate comparison of the model ensemble with observations because the models themselves contain no volcanoes. Being near the beginning of the 20-year analysis period, Pinatubo introduced a temporary cooling early in the study, which results in more "apparent" warming than was observed. As a consequence of this adjustment, the observed temperature trends fall away from the .95 level for trends of 15 to 20 years in length.

"The Science is Settled"?

One implicit assumption in calculating the "costs of inaction" is that we know with reasonable confidence indeed what climatic changes will ensue as atmospheric carbon dioxide concentrations increase. With regard to climate, we often assume a common Washington mantra: with regard to global warming, "the science is settled".

This demonstration shows how far from the truth this oft-repeated sentence actually is. One can say this. "The science is settled" inasmuch as surface temperatures have increased from the late 1970s. That this is shown in the surface record has not been in dispute, so claiming some finality for such a truism is hardly noteworthy. What is true, however, is that the rates of warming, on multiple time scales, have now invalidated the midrange suite of IPCC climate models. No, the science is *not* settled. In fact, judging from these results, it's time for climate scientists to get back to work and generate models which will be able to estimate the recent past and present within their normal confidence ranges.

Until that is done, all we know is this: calculations of the costs of inaction, based upon models that are clearly overestimating warming to the point that they can no longer be relied upon, are likely to be similarly overestimated. In that eventuality, the costs of drastic action can easily outweigh the costs of a more measured response, consistent with what is being observed, rather than what is being erroneously modeled.

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Climate Explorer (http://climexp.knmi.nl/start.cgi?someone@somewhere), The Royal Netherlands Meteorological Institute, as described in: Oldenborgh, G.J. van, et al, 2009. Western Europe is warming much faster than expected. *Climate of the Past*, **5**, 1-12 .

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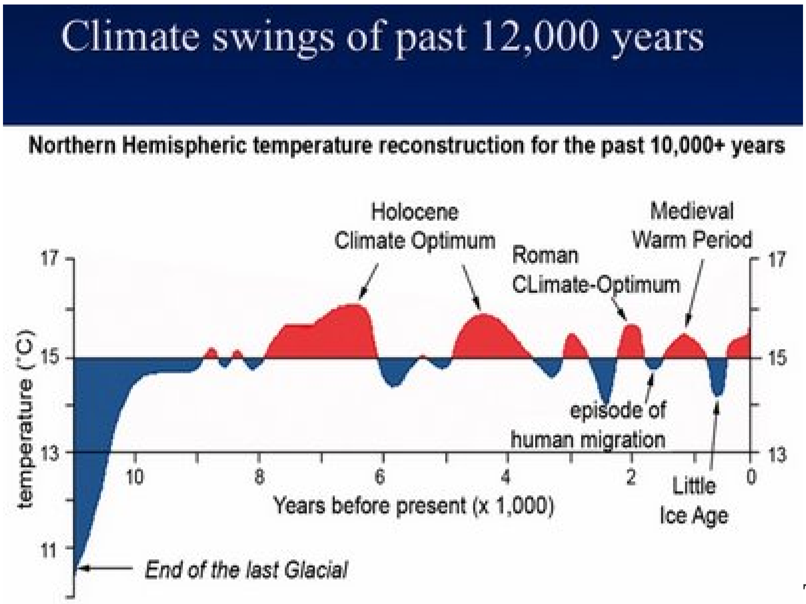
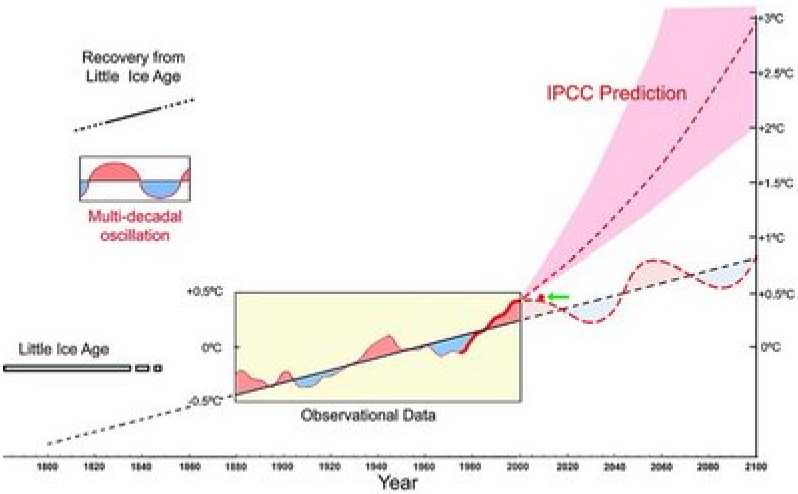
Global Warming Hoax Refuted

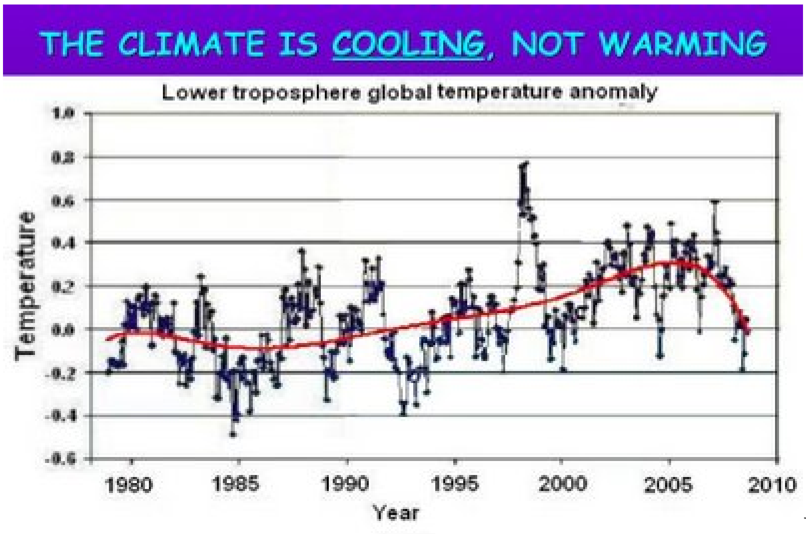
The following charts are from the Heartland Institute sponsored, 2009 International Conference on Climate Change in New York.



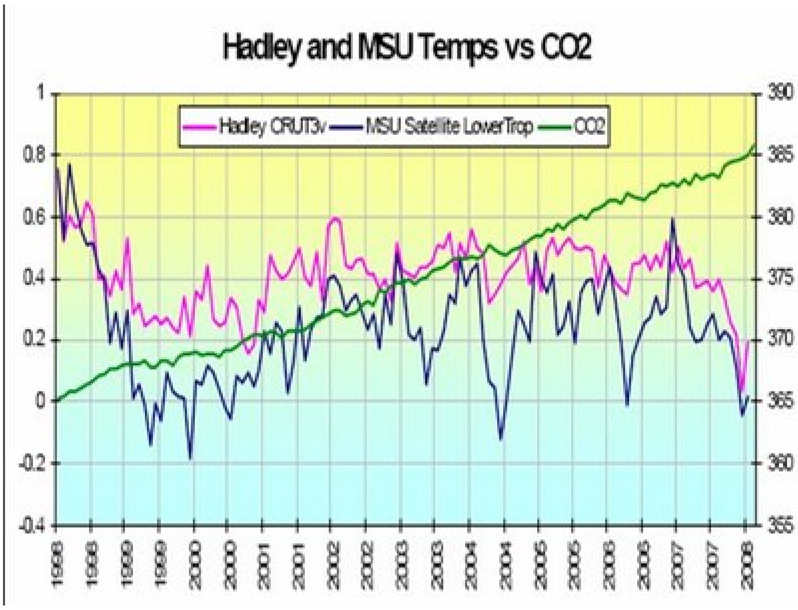
This one, by Dennis Avery, puts the climate swings of the last 12,000 years (i.e., since the last Ice Age) in perspective.



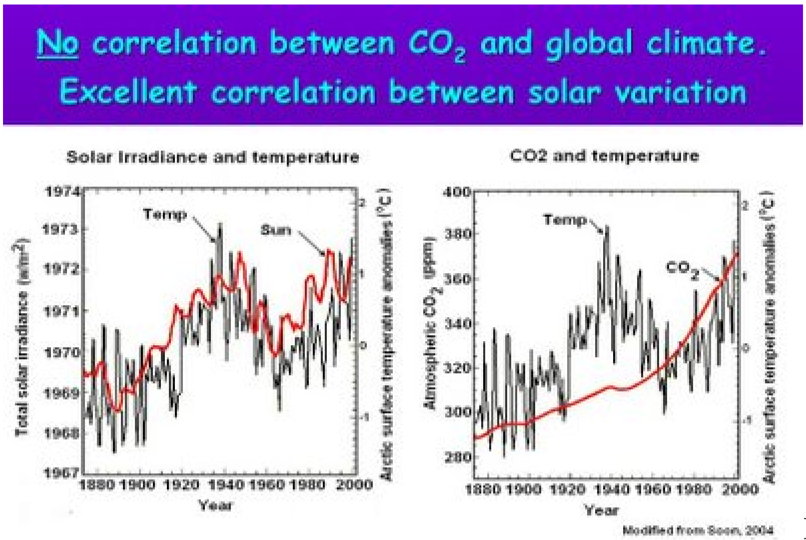
This one, by Syun Akasofu, also takes a long-term view, and compares the politically-driven prediction by the UN's IPCC with the historical trend as the earth has recovered from the Little Ice Age.



Don Easterbrook makes the basic point that, contrary to the hysterical predictions of the alarmists, the earth is cooling, not warming.



This one by Dennis Avery shows the lack of any correlation between atmospheric CO2 and temperatures in the atmosphere.



Don Easterbrook compares the correlations of solar activity and CO2 concentration to temperature. It seems pretty obvious where the explanation for fluctuations in temperature lies.

Thanks to powerlineblog.com