CATO Congressional Testimony

Kyoto Protocol:
"A useless appendage to an irrelevant treaty"

Testimony of
Patrick J. Michaels
Professor of Environmental Sciences, University of Virginia,
and Senior Fellow in Environmental Studies at Cato Institute

to:
Committee on Small Business
United States House of Representatives
Washington, D.C.

July 29, 1998

Thank you for soliciting my testimony on the science of climate change as it pertains to the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

Nearly ten years ago, I first testified on climate change in the U.S. House of Representatives. At that time, I argued that forecasts of dramatic and deleterious global warming were likely to be in error because of the very modest climate changes that had been observed to that date. Further, it would eventually be recognized that this more moderate climate change would be inordinately directed into the winter and night, rather than the summer, and that this could be benign or even beneficial. I testified that the likely warming, based on the observed data, was between 1.0 and 1.5°C for doubling the natural carbon dioxide greenhouse effect.

The preceding paragraph was excerpted verbatim from my last testimony before this House, on November 6, 1997. Since that last testimony, new scientific advances have been published in the refereed literature that have now

proven the validity of this position. The key findings include:

- Documentation that observed climate change is several *times* below the amount predicted by the climate models that served as the basis for the Framework Convention on Climate Change (Hansen et al., 1998),

- Documentation that observed changes are largely confined to winter in the very coldest continental airmasses of Siberia and northwestern North America (Balling et al., 1998),

- Documentation that the variation, or unpredictability, of regional temperatures has declined significantly on a global basis while there was no change in precipitation (Michaels et al., 1998),

- Documentation that, in the United States, drought has decreased while flooding has not increased (Lins and Slack, 1997),

- Documentation that carbon dioxide is increasing in the atmosphere at a rate below the most conservative United Nations' scenarios, because it is being increasingly captured by growing vegetation (Hansen et al., 1998),

- Documentation that the second most important human greenhouse enhancer—methane—is not likely to increase appreciably in the next 100 years (Dlugokencky et al., 1998),

- Documentation that the direct warming effect of carbon dioxide was overestimated (Myhre et al., 1998), and

- Documentation that the Kyoto Protocol to the United Nations Framework Convention on Climate Change will have no discernable impact on global climate within any reasonable policy timeframe (Wigley, 1998).

In toto, these findings lead inescapably to the conclusion that the magnitude and the threat from global warming is greatly diminished. They should provoke a re-examination of the need for the United Nations Framework Convention on Climate Change, and the subsequent Kyoto Protocol.

Historical Background

Ten years ago, on June 23, 1988, NASA scientist James Hansen testified before the House of Representatives that there was a strong "cause and effect relationship" between observed temperatures and human emissions into the atmosphere. His testimony coincided with a very hot, dry period (much worse than the summer of 1998), and subsequent polls showed that, as a result of his testimony, the public believed that the 1988 drought was caused by human-induced global warming.

At that time, Hansen also produced a model of the future behavior of the globe's temperature, which he had turned into a video movie that was heavily shopped in Congress. That model was one of many similar calculations that were used in the First Scientific Assessment of the United Nations Intergovernmental Panel on Climate Change ("IPCC", 1990), which stated that "when the latest atmospheric models are run with the present concentrations of greenhouse gases, their simulation of climate is generally realistic on large scales."

That model predicted that global temperature between 1988 and 1997 would rise by 0.45°C (Figure 1). Figure 2 compares this to the observed temperature changes from three independent sources. Ground-based temperatures from the IPCC show a rise of 0.11°C, or more than four times less than Hansen predicted. Lower atmosphere temperatures measured by ascending thermistors on weather balloons show a decline of 0.36°C and satellites measuring the same layer (our only truly global measure) showed a decline of 0.24°C.

The forecast made in 1988 was an astounding failure, and IPCC's 1990 statement about the realistic nature of these projections was simply wrong.

This failure did not surprise me. On a 100 year time scale, the models were predicting a warming of about 1.5° by

1988. The observed change was 0.5°C. That the models continued to fail in the last ten years at the rate that they were failing in the previous century was strong evidence for my original thesis. How much might we have saved, including the notorious Kyoto Protocol, if we had just listened to nature instead of a manmade computer?

By 1995, in its second full Assessment of climate change, the IPCC admitted the validity of its critics' position: "When increases in greenhouse gases only are taken into account...most [climate models] produce a greater mean warming than has been observed to date, unless a lower climate sensitivity [to the greenhouse effect] is used...There is growing evidence that increases in sulfate aerosols are partially counteracting the [warming] due to increases in greenhouse gases."

IPCC is presenting two alternative hypotheses: Either the base warming was simply overestimated, or, some other anthropogenerated emission is preventing the warming from being observed. IPCC omitted a third source for the error: Perhaps the greenhouse gases were not increasing at the projected rate.

As evidence comes in, the first and third reasons appear to be carrying the day. The direct warming effect of carbon dioxide was overestimated (Myhre et al., 1998). Carbon dioxide is not accumulating in the atmosphere at even the lowest rate estimated by IPCC in 1992 (Hansen et al., 1998), and the the second most important greenhouse emission, methane, began to decrease its rate of increase in 1981 (Etheridge et al., 1998), some 15 years before the recent IPCC report that projects an *increased* rate of emissions for the next 50 years.

Only the sulfate hypothesis allows the exaggerated notion of climate change any credibility. It is not surprising that this is the one that IPCC continues to champion because it raises the spectre of "dangerous" interference in the climate system, which is what the Framework Convention on Climate Change was designed to prevent. If there is no "dangerous" interference, there is no need for the Convention, or the subsequent Kyoto Protocol, and the IPCC has failed in its mission. The U.N. General Assembly, more than ten years ago, directed the IPCC to provide the basis for the Convention.

Why did it not warm as predicted?

a. The sulfate hypothesis

Are sulfate aerosols responsible for the now-admitted dearth of warming? In previous testimony I have shown how poorly this argument stands the critical test of the data. Suffice it to say that the entire record of three dimensional atmospheric temperature does not appear consistent with this hypothesis. Instead of repeating that argument, I would simply point out that the southern half of the planet is virtually devoid of sulfates, and should have warmed at a prodigious and consistent rate for the last two decades. Unfortunately, we have very few longterm weather records from that half of the planet, and almost all come from the relatively uncommon landmasses. However, we do have nearly two decades of satellite data (Figure 3). They show a statistically significant decline in temperature—exactly the opposite to what the sulfate hypothesis predicts.

b. Was the sensitivity overestimated?

If sulfates do not explain the lack of warming, one option is that the sensitivity to climate change was overestimated. The large warmings predicted by the failed models that back the Framework Convention rely on a roughly threefold amplification of carbon dioxide warming by increased atmospheric moisture. Yet Spencer and Braswell (1997) have found that the expected moisture is not there.

Perhaps even more remarkable is that amount of direct warming by carbon dioxide was also overestimated (Myhre et al., 1998). *This is the basic driving force behind the entire issue!*

c. Was the increase in greenhouse gases overestimated?

Dlugokencky et al. (1998) recently demonstrated that the concentration of methane in the atmosphere—currently 30% of the human greenhouse potential—is rapidly stabilizing. It has done this because its concentration is coming into chemical equilibrium with other atmospheric reactants. His calculations strongly suggest that the concentration will remain stable in the future. The IPCC assumed that, without any controls, the methane warming

effect would *double* by 2050 and increase by 125% by 2100.

Hansen et al. (1998) recently calculated that the concentrations of carbon dioxide in the atmosphere are increasing at approximately 60% of the rate that is normally projected. Notably, he argues that the biosphere is absorbing CO2 at a rate much faster than anticipated, as he wrote that "Apparently the rate of uptake by CO2 sinks, either the ocean, or, *more likely the forests and soils* (our emphasis) has increased."

DECLINING PROJECTIONS OF GLOBAL WARMING

In the ten years since my first testimony, estimates of global warming to the year 2100 have declined. When the latest findings are factored in, the projected warming is now at the lower limit I noted in 1989. Following is a summary of that decline in median projected warming for the next century:

IPCC 1990 initial estimate: 3.2°C

IPCC revised 1992 estimate: 2.6°C

IPCC revised 1995 estimate: 2.0°C

After allowing for overestimation of direct CO2 warming: 1.7°C

After allowing for flattening of Methane concentration: 1.4°C

After allowing for decrease in carbon dioxide accumulation: 1.0°C

The Nature of Observed Change

Winter Warming

Greenhouse physics predicts that the driest airmasses should respond first and most strongly to changes induced by human activities. These, in fact, are generally the coldest airmasses, such as the great high pressure system that dominates Siberia in the winter, and its only slightly more

benign cousin in northwestern North America. When the jet stream attains a proper orientation, it is this airmass that migrates south and kills orange trees in Florida.

A look at the trends in the satellite data—our only truly global record of lower atmosphere temperature—is remarkably revealing. While there is no overall global warming trend, there is a pronounced warming trend in the coldest winter regions.

Balling, Michaels, et al. (1998) examined surface temperature records since 1945 and found also that warming was largely confined to the coldest winter airmasses, in agreement with the satellite. A warming of the coldest, driest airmasses, is by definition, a relative warming of the nights compared to the days. And, by extension, this is the type of climate change that slightly lengthens the growing season, as the coldest temperature occurs at night.

Climate Variability

Michaels et al. (1998) recently examined the surface temperature history in order to answer three questions:

Is the temperature becoming more variable from year-to-year? We found a statistically significant decline in interannual variability worldwide (Figure 4) .

Is the variation from day-to-day increasing? We found no statistically significant change.

Are the number of record high or low temperatures increasing? We found no statistically significant change.

In summary, here is what the climate has done during the greenhouse enhancement: The most notable change is that the coldest airmasses of winter in Siberia and North America have warmed slightly. The only change in weather variability has been a tendency towards reduced year-to-year variability.

Our results should be integrated with a recent study of U.S. streamflow by Lins and Slack (1997). In an investigation of undisturbed sites, they found *no change* in the frequency of

highest flow (flood) events, but a decrease in the lowest flow (drought) events.

We are not entering a world of increased variability, unpredictability and peril, but rather the opposite. If this is a human interference in the climate, it is hardly "dangerous."

The Kyoto Protocol: How Much Warming is Prevented?

This analysis assumes the IPCC's "consensus" estimate of 2.0°C of warming by the year 2100 in the absence of substantial emissions stabilization. Please note that my testimony indicates this is a considerable overestimation.

The Kyoto Protocol requires that the United States reduce its overall greenhouse gas emissions by a remarkable 43% for the 2008-2012 average, compared to where they would have been if we continue on the trajectory established in the last two decades. The economic costs are enormous, they are but not the subject of this hearing. What are the climate benefits?

Wigley (1998) recently calculated the "saved" warming, under the assumptions noted above, that would accrue if *every* nation met its obligations under the Kyoto Protocol. According to him, the earth's temperature in 2050 will be 0.07°C lower as a result. My own calculations produced a similar answer. Wigley is a Senior Scientist at the U.S. National Center for Atmospheric Research.

0.07°C is an amount so small that it cannot be reliably measured by ground-based thermometers. If one assumes the more likely scenario that warming to the year 2100 will be approximately half of the IPCC estimate, the saved warming drops to 0.04°C over the next fifty years.

This is no benefit at an enormous cost.

*****

In conclusion, the observed data on climate and recent emissions trends clearly indicate that the concept of "dangerous" interference in the climate system is outmoded within any reasonable horizon. This makes the Kyoto

Protocol a useless appendage to an irrelevant treaty. It is time to reconsider the Framework Convention.

Figure 1. Hansen's global temperature projections from his 1988 model
(Hansen et al., 1988.)

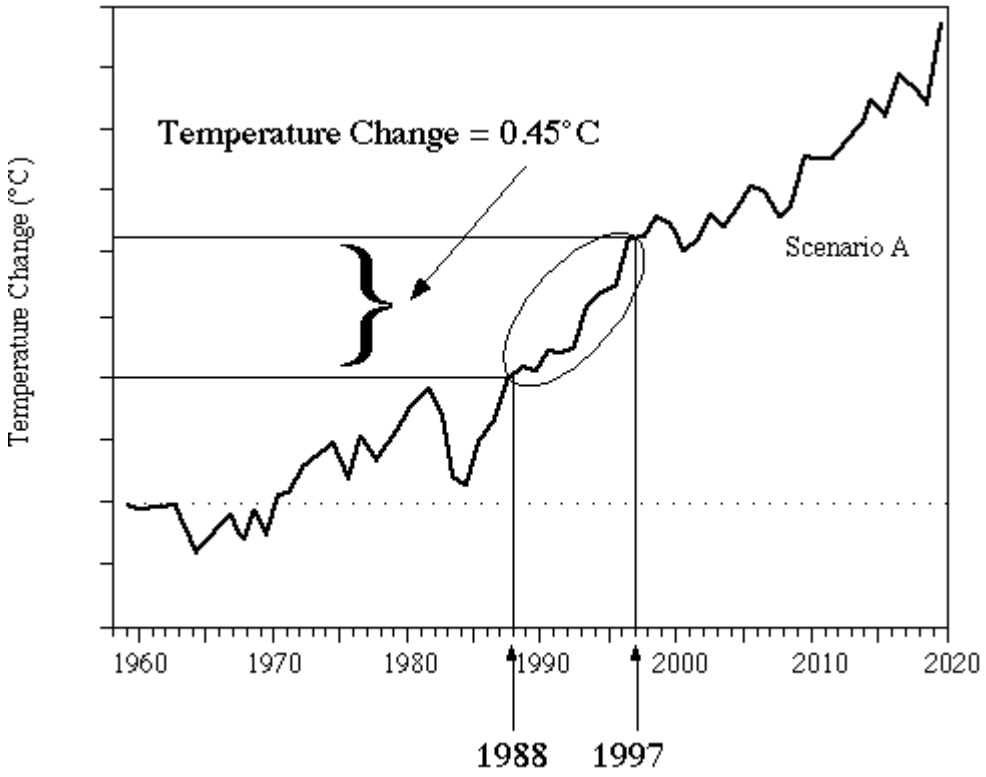


Figure 2. Hansen's global temperature projections from his 1988 model versus three independent observations of mean temperature during the period 1988 through 1997.

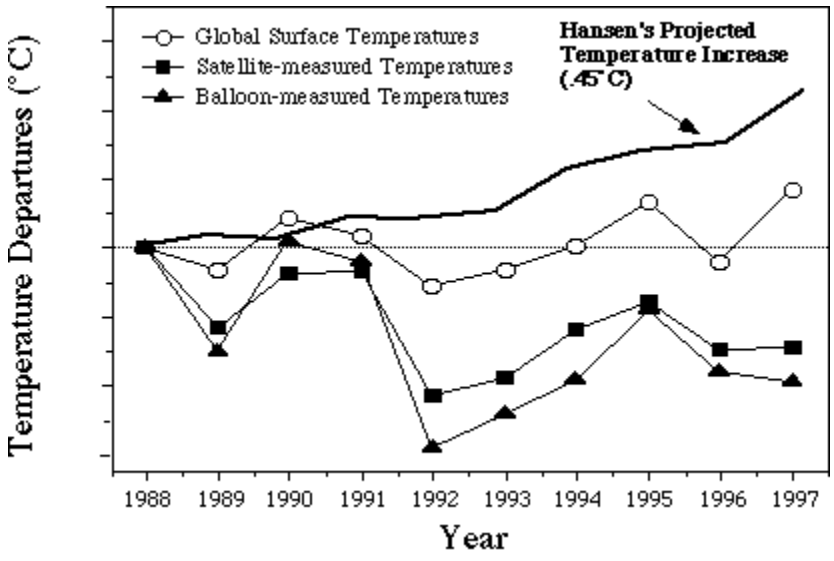


Figure 3. Satellite measured temperatures for the Southern Hemisphere show a statistically significant decline since records began in 1979.

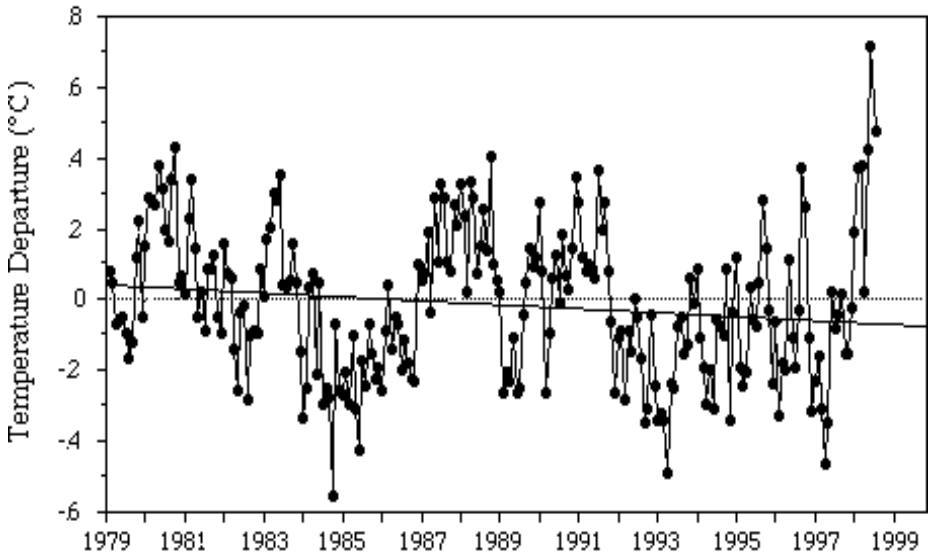
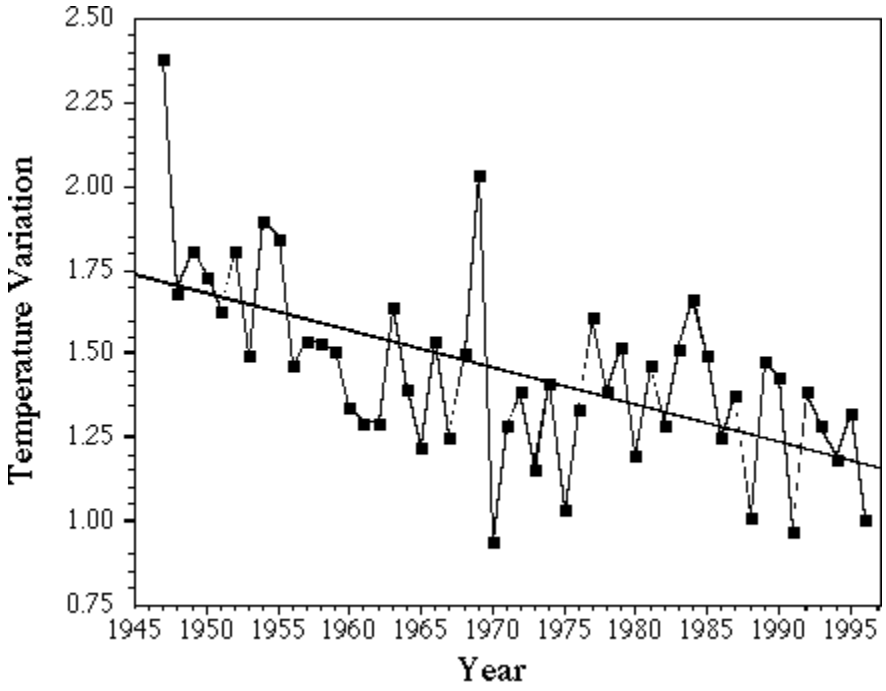


Figure 4. Annual temperature variation is declining, not increasing, on a global scale. From Michaels et al., 1998.



References

Balling, R.C., Jr., et al., 1998. *Cli. Res.*, **9**, 175-181.

Dlugokencky, E.J., et al., 1998. *Nature*, **393**, 447-450.

Etheridge, D.M., et al., 1998. *J. Geophys. Res.*, **103**, 15979-15995.

Hansen, J.E., et al., 1988. *J. Geophys. Res.*, **93**, 9341-9364.

Hansen, J.E., et al., 1998. *Proc. Nat. Acad. Sci.*, **95**, 4113-4120.

Intergovernmental Panel on Climate Change, 1990. *Climate Change: The IPCC Scientific Assessment.*

_____, 1996. *The Science of Climate Change*.

Lins, H. and J.R. Slack, 1997. Amer. Geophys. Union, San Francisco. Abstract. 12/8/97.

Michaels, P.J., et al., 1998. *Cli. Res.*, **10**, 27-33.

Myhre, G., et al., 1998. *Geophys. Res. Lett.*, **25**, 2715-2718.

Spencer, R.W. and W.D. Braswell, 1997. *Bull. Amer. Met. Soc.*, **78**, 1097-1106.

Wigley, T.M.L., 1998. *Geophys. Res. Lett.*, **25**, 2285-2288.