AMERICAN LEGISLATIVE EXCHANGE COUNCIL

The State Factor

Jeffersonian Principles in Action

Global Warming and the Kyoto Protocol: Paper Tiger, Economic Dragon

by Patrick J. Michaels

Foreword

The summer of 1988 was excruciatingly hot and dry in the eastern United States. Vast farm acreage in the Midwest lay bare, lacking water even for germination. Civil War relics buried in the mud of the Mississippi since 1864 were unearthed to historians. Temperatures skyrocketed.

On June 23, a NASA astrophysicist, James Hansen, stunned a joint Congressional hearing with his statement that there was a "strong cause and effect relationship between the current climate and human alteration of the atmosphere." Strictly, he merely meant that a slight warming of planetary mean temperature was consistent with small changes in the earth's natural greenhouse effect, brought on largely by the combustion of fossil fuels.

NASA employs rocket scientists. As surely as they can track a projectile through space, they can project the downstream trajectory of a press release. Hansen and NASA knew that his testimony would unleash a bonfire of global warming hysteria, tremendous amounts of taxpayer money for research, and create an international treaty and protocol, with enormous economic implications for the United States.

Hansen's testimony was not as well received by many scientists, as compared to the press. In response, a school of "skeptical" scientists (a strange moniker given to those who thought Hansen's view was irrationally pessimistic) arose, who argued for much more benign and limited climate change based upon observed climate and emission trends. This view largely (but not completely) prevails in the present Administration, and is what is mainly responsible for President Bush's outright rejection of the Kyoto Protocol. Global warming turns out to be a paper tiger, and the Kyoto protocol a dangerous economic dragon.

This paper details the evolution of that argument, and the economic and scientific poverty of the Kyoto Protocol on global warming.

I. Introduction

Recently, global warming celebrated its 100th birthday. After nine centuries of decline, global surface temperatures began to rise around the year 1900. In 1896, Svante Arrhenius published a paper in the journal *Philosophical Transactions* that predicted that if human beings doubled the concentration of atmospheric carbon dioxide (mainly from burning of fossil fuels) they would increase the surface average temperature around 9ºF. This forecast differs very little from one published by NASA's Hansen nearly 100 years later. Arrhenius also argued that if we increased the concentration by 50 percent, the surface temperature would rise 5º Farenheit. Thanks to the addition of several other "greenhouse" gases besides carbon dioxide, Homo Sapiens accomplished this change in the greenhouse effect in the 20th century, but the large temperature rise did not occur.

Arrhenius was wrong.

Instead, there was a modest rise in surface temperature, of about 1ºF. While he missed the magnitude, Arrhenius correctly predicted its distribution. In 1896, he wrote:

> "The [warming] influence is in general greater in the winter than in the summer…is in general somewhat greater for land than for ocean… the effect will be less there [in the southern] than in the northern hemisphere…[it] will of course diminish the difference in temperature between day and night."

All of these things accompanied the warming of the last half of this century, and it is this constellation of climate change that serves as the basis for the benign synthesis of climate change, rather than the apocalyptic vision championed by extremists who are long on rhetoric but devoid of data. The way the planet warms is much more important than whether it warms, and the patterns, seasonality, and timing of observed warming paint a rather benign, if not beneficial picture.

Life span has doubled, crop yields have quintupled, and average wealth has increased to levels beyond the imagination of someone alive in 1900. All of that occurred as the planet warmed.

No credible argument counters the notion that the measured planetary average surface temperature is warmer than it was 100 years ago. But what does that warming mean? If that warming were in the coldest air of winter, rather than in the heat of summer, the overall effect is hardly bad. Although most mathematical simulations of climate predict an overall increase in precipitation, is more precipitation really a bad thing? If there were a sudden and dramatic increase in the frequency of severe floods with no concomitant positive effects, then obviously the answer is yes. But what if gentle spring rains increase while the severity of hurricanes declines?

This paper examines the history of how climate changed over the 20th century and what that change portends. It is very difficult to demonstrate a large negative net effect of these changes, at least in free societies: Life span has doubled, crop yields have quintupled, and average wealth has increased to levels beyond the imagination of someone alive in 1900. All of that occurred as the planet warmed. Global warming may not have created all those benefits (although there is some evidence for a positive agricultural impact), but it surely did not prevent them.

II. Overall History

Figure 1, on page 7, details the surface temperature history of the Northern Hemisphere where data is available for the last 100 years. (Southern Hemisphere records are not as reliable because of paucity of coverage over the vast Southern Ocean and Antarctica). There are two distinct warmings of similar magnitude. The first occurred from 1910 to 1940, and likely has little if anything to do with changes in the earth's greenhouse effect, as three-quarters of the greenhouse emissions are in the postwar era. NASA scientists Judith Lean and David Rind and Harvard astrophysicist Sallie Baliunas have argued persuasively that this early warming is largely a result of solar changes.

The second warming, which began about 35 years ago, is much more interesting. Greenhouse-effect physics predicts that increasing concentrations of carbon dioxide will warm very dry air much more than moist air. In general, the driest air masses in the planet are very cold high pressure systems that dominate continental interiors during the winter.

The propensity for greenhouse warming to heat dry air has enormous implications that have largely been ignored in the raucous debate about climate change. This is because a warming of dry air is largely a warming of very cold air. At –40ºF, the amount of water in the atmosphere averages about one one-thousandth of what resides at +105ºF (this encompasses the earth's natural temperature range), so the effect of adding carbon dioxide to frigid air is to produce a stong warming.

Figure 2, on page 7, details the observed difference between winter and summer warming. The darker the shaded area (where data is available), the more the planet has warmed in the winter vs. the summer. It is quite obvious that the lion's share of warming is taking place in Siberia and northwestern North America in the winter.

Note the large areas of the map that are colored black. These are regions where there isn't enough reliable data to estimate a temperature trend since World War II. The expanse of the Southern Hemisphere that is not covered is truly astounding—it is virtually everywhere south of 40º. For a comparative perspective in the Northern Hemisphere, this would mean there would be no data for every location north of Chicago.

Siberia and western North America are home to the great Northern Hemisphere cold "anticyclones," or high-pressure regions. The high barometric pressure simply means that there is a more air present in these regions. Occasionally the jet stream kicks one of these air masses southeastward toward the eastern United States. In the Christmas 1983 anticyclone, about 40 perished in South Carolina alone.

Summer warming has been, as predicted by greenhouse theory, much less than in the winter. In fact, less than one-third of the observed warming of the second half of the 20th century occurs in the warm half-year, while two-thirds is in the cold half-year.

The apocalyptic argument on global warming—that increased temperatures will increase drought by evaporating more moisture—is simply wrong.

I recently demonstrated, in a technical article in the journal *Climate Research*, that the amount of warming is indeed directly related to the amount of cold air available. In dry environments, such as Siberia or Northwestern North America, the colder it is, the more it warms.

These cold airmasses are usually responsible for the last freeze in the spring and the first freeze in the fall over temperate latitudes. Reducing their inherent coldness lengthens the growing season, and there are several lines of evidence indicating that this is occurring. A study by David Thompson of Bell Laboratories, published in *Science* in 1995, found that the spring warm-up has progressed about three days forward in our latitude. In 1997, R.B. Myneni et al. found, using satellite data, that the high latitudes were "greening up" a week earlier in the 1990s than they were in the 1980s.

III. Warming and Temperature Variability

Along with the spectre of global warming comes the notion that "extreme weather" is getting worse. Our research team tested this notion and found it dead wrong. The results can be found in another article in the technical journal *Climate Research*.

We examined the U.S. temperature history, because it is one of the best-maintained networks in the world. As is apparent from Figure 3 (on page 8), there is no strong overall warming trend. But there are three "epochs" of American climate in the last 100 years:

- A period of warming in the first third of the 20th century. In this epoch, the hottest days of the year warmed the most, making the climate more extreme.
- A period of cooling in the middle third of the 20th century. In this epoch, the coldest days of the year cooled the most, which is also a tendency towards a more extreme climate
- Another period of warming in the last third of the 20th century. In this epoch, the largest warming was in the coldest winter temperatures. This period, which coincides most with greenhouse effect changes in the atmosphere, therefore exhibits a tendency towards less extreme climate.

In another study, we found that warmer years tend to display less season-to-season differences. This is because, as noted above, changing the greenhouse effect tends to warm the coldest air of winter much more than it warms the summer. The result is an annual climate of greater equanimity.

What about U.S. precipitation? Over the last 100 years, American rainfall has increased by about 10%. Because there has been no important warming, this increase in rainfall has not evaporated away; instead it has been beneficial for agriculture and water supplies. The apocalyptic argument on global warming—that increased temperatures will increase drought by evaporating more moisture—is simply wrong.

There are many different measures of drought. One of the standard indices known as the Palmer Index, takes into consideration precipitation, evaporation, runoff into rivers and streams, and storage in the soil. As shown in figure 4, on page 8, there is simply no trend towards increasing drought in the United States.

IV. Heat-Related Deaths

Almost every summer, climate alarmists point to urban death statistics in heat waves. The popular perception is that heat-related deaths will increase with global warming. Here are two disparate sources touting this common assumption:

"On a warmer planet, intense heat waves alone are by 2050 likely to result in increases in death by cardiac and respiratory ills of several thousand a year—especially in urban areas and among the elderly and very young…" (Wall Street Journal, October 19, 1999)

"[Based upon data from several North American cities], the annual number of heat-related deaths would approximately double by 2020 and would increase several fold by 2050." (United Nations Intergovernmental Panel on Climate Change, 1996)

Our research shows that this perception is dead wrong. After standardizing U.S. mortality data for age distribution, we first plotted death rates against "apparent temperature"—a combination of temperature and humidity that accounts for the multiplicative impact of moisture on heat stress at a given temperature. In general, heat-related deaths decline with apparent temperature, although there are a few days that show remarkable death excursions at high temperature (Figure 5)—events such as July 1995's Chicago heat wave, which was responsible for what in the final analysis appears to be about 200 excess deaths.

It is clearly politically untenable to impose grave economic damage in return for no detectable environmental change — even if one assumed that global warming was a terrible threat.

There are no excessive heat deaths in cities in the southern United States, which means that people adapt to their climatic expectations. Perhaps more interesting is that deaths at high effective temperatures have been declining in northern cities such as Philadelphia to the point that they are now near zero (Figure 6).

People clearly adapt to changing climate conditions by adopting technologies, such as insulation and air conditioning, which ameliorate heat-related discomfort and death. It would be the height of folly to artificially raise energy prices in this situation. The result would clearly be more heat-related death.

V. What Does The Future Hold?

By now, climate modelers have run dozens of different computer simulations to estimate future warming. How do you decide which, if any, is likely to be correct?

The key to the future lies in the rather extended period for which humans have already altered the natural greenhouse effect—roughly from the start of the Industrial Revolution in the late 19th century to the present. The concentration of atmospheric carbon dioxide—the main greenhouse emission resulting from human activity varied from between 260 and 320 parts per million (ppm) between the end of the glacial stage, 10,800 years ago, and the Industrial Revolution. The average value during that period has been near the low end of that range, about 280ppm. The current concentration is 365ppm, about a 30 percent increase.

Nearly 20 years ago, a few climate scientists (including this author) noted that the planet had not warmed as much as would be expected from early computer simulations of greenhouse warming. By 1996, United Nations Intergovernmental Panel on Climate Change (IPCC) acknowledged that this observation had become the consensus of the broad scientific constituency. Yet at the same time, the IPCC concluded "the balance of evidence suggests a discernible human influence on global climate."

As we have seen, that influence is largely on the coldest temperatures of the winter and has been rather modest. It also tells us much about future warming.

Figure 7, on page 10, is a representative sample of so-called general circulation climate models for human warming in the atmosphere. Note that the rates of warming that they project are different, but that they are all straight lines—in other words, once human warming starts, it takes place at a constant rate for the foreseeable future. It is worth noting that climate alarmists argue for an exponential (increasing rate) of warming, which is clearly counter to the consensus of the scientific models.

In fact, the warming of the last third of the 20th century in the surface average temperatures has been a straight line, and its concentration in very cold, dry air argues that it is from greenhouse changes. This allows us to determine which (if any) of the model projections are likely to be correct, simply by superimposing the observed trend on the various modeled trends (Figure 8). This must be adjusted for the fact that a small portion of the recent warming (about 15%) is thought to be from solar changes.

Assuming that the sun reverts to its long-term average behavior, we can expect about 1.6ºC of warming, averaged over the surface, in the next 100 years or 0.8°C in the next fifty years. This is a very modest amount, and will be distributed roughly 2:1 between the winter and the summer. It is similar to what has been witnessed over much of the second half of the 20th century, a period of unprecedented economic expansion, longevity increases, and technological development. It is difficult to understand the alarmist logic that suddenly, somehow, this will all change if conditions continue to warm as they have been for most of our lifetimes.

In 1900, life expectancy at birth in the United States was 42 years. After 100 years of global warming it was twice that number. Urban infrastructure in the United States has adapted so well to both average and warmed climates that heat-related deaths are disappearing. After a warming of 0.6ºC, U.S. crop yields quintupled. World food production per capita has increased by nearly 50 percent in the last half-century. An as yet untold story is that carbon dioxide itself makes most crops grow better: by the year 2050, that direct stimulation of planetary greening will feed an increment of 1.5 billion people the equivalent of today's diet.

Europe is isolated in its adherence to the environmentally irrelevant Kyoto Protocol, not the United States, and the U.S. demonstrated science-based leadership when it finally rejected Kyoto.

VI. Can It Be Stopped?

No known mechanism can stop global warming.

Upon the return of the U .S. negotiating team from Kyoto, Japan, in 1997, Vice-President Gore asked federal scientists how much warming the Kyoto Protocol would save. The answer, which was published by T.M.L. Wigley in the journal *Geophysical Research Letters,* was stunning: a mere 0.07ºC by 2050 and, owing to the linear nature of the warming models, 0.14ºC, or twice that figure, by 2100. This assumes that all nations of the world comply with their Kyoto agreements. In case of the United States, that would mean reducing our emissions of Carbon Dioxide to 7% below 1990 levels by the period 2008-2012. We are currently about 15% above 1990 levels, and meeting this target is simply impossible.

Ironically it was Wigley's calculation that, more than anything else, provided the scientific logic for President Bush's withdrawal from the Kyoto Protocol in spring of 2001. Because of the intransigence of European environment ministers, mainly Germany's Jurgen Trittin and Frances Dominique Voynet, at subsequent international negotiations designed to implement the Kyoto Protocol, the mechanism imposed on the U.S. would have been disastrously expensive. As shown recently by economist William Nordhaus, after all is said and done, the U.S. assumes virtually all of the costs for Kyoto!

It is clearly politically untenable to impose grave economic damage in return for no detectable environmental change—even if one assumed that global warming was a terrible threat. Once the Clinton Administration scientists had revealed that Kyoto would have no detectable effect on the earth's temperature, there was no choice to any president but a graceful withdrawal.

Bush's withdrawal threatened the entire Protocol, because it does not take force until a collection of nations responsible for 55% of the industrialized world's carbon dioxide emissions agrees to participate. In fact, this level could only be achieved in the absence of the U.S. if the Japanese became a party, and they were reluctant because they, too, perceived major economic damage. As an inducement, the Kyoto signatories further weakened the prospective Japanese and Russian commitments so substantially that the net warming that would now be "saved" by the Kyoto Protocol is a mere 0.02ºC by 2050. There is no measurement system that could ever isolate this small factor from year-to-year variations in the earth's temperature, which are approximately ten times as great.

Thus Kyoto is scientifically and politically dead in the United States. In fact, while European ministers posture that the U.S. is an environmental "rogue nation" because of its view on Kyoto, in fact it is the Europeans that are out of step with the world. There is no Kyoto commitment from India, China, all of South America, all of Africa, and much of the former Soviet Union. Europe is isolated in its adherence to the environmentally irrelevant Kyoto Protocol, not the United States, and the U.S. demonstrated science-based leadership when it finally rejected Kyoto.

VII. Policy Leadership

Having established that the Kyoto Protocol will have no detectable effect on average temperature within any reasonable policy time frame of 50 years or so, what constructive policies can engage global climate issues?

In a simple phrase: private investment. We cannot envision the energy technology that will power the world 100 years from now, but one thing seems certain: it will produce power much more efficiently than we do today. That is because market forces inevitably reward production efficiency. Today, we produce a constant-dollar of GDP for 40% less energy than we used a mere thirty years ago. These increases in efficiency did not result because of fears about global warming. Instead, they came about because of investment in energy efficiencies that are dictated by a competitive economy. It seems doubtless that these trends will continue, as long as our elected officials do not confiscate investable income, tilting it at the windmill of disastrous global warming. This is a problem that will fix itself if we are wise enough to leave it alone.

Conclusion

The scientific argument in this paper is fairly straightforward. In essence, it says that because human activity has been slightly changing the atmosphere's natural greenhouse effect for nearly 100 years, nature has had plenty of time to display its response. Using that logic, the amount of prospective warming for the next 100 years becomes relatively inconsequential, compared to the boisterous projections made over a decade ago. This projection is for 0.8°C in the next fifty years, or 1.6°C in the next hundred.

In December 2001, NASA's James Hansen, whose testimony was instrumental in igniting the global warming issue, published a new paper in the *Proceedings of the National Academy of Sciences*. The paper argued that observed changes in the concentrations of global warming gases were much less than had been previously anticipated, and that a continuation of these trends, which have included increased efficiency, would yield an "additional warming in the 50 years of 3/4 ± 1/4°C".

It appears that the "skeptics" have prevailed. Over the period in which this issue has been politically active, they have argued that observed trends in human activity and global temperatures would presage only a modest warming. They were right. Global warming is a paper tiger.

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ABOUT THE AUTHOR

Patrick J. Michaels is a Professor of Environmental Sciences at the University of Virginia.

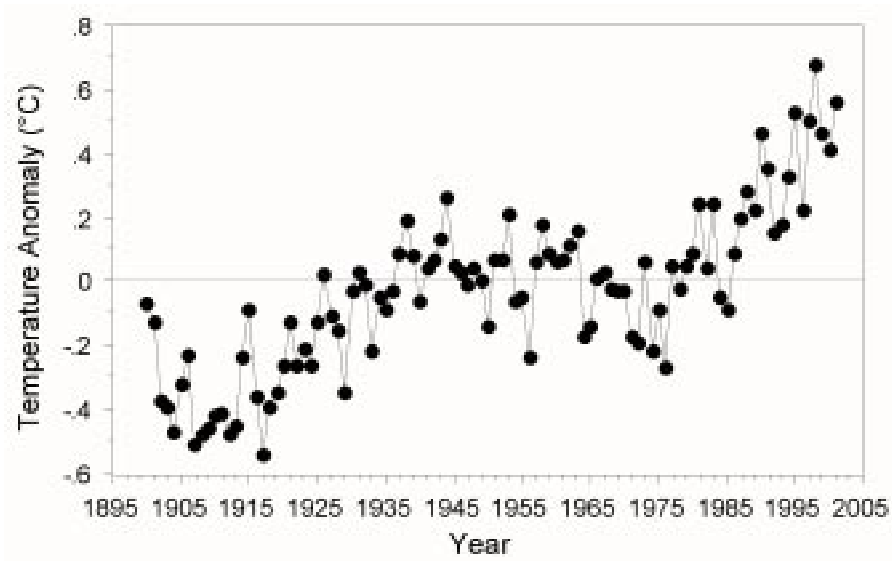

Figure 1. Northern Hemisphere annual temperature history, 1900–2001.

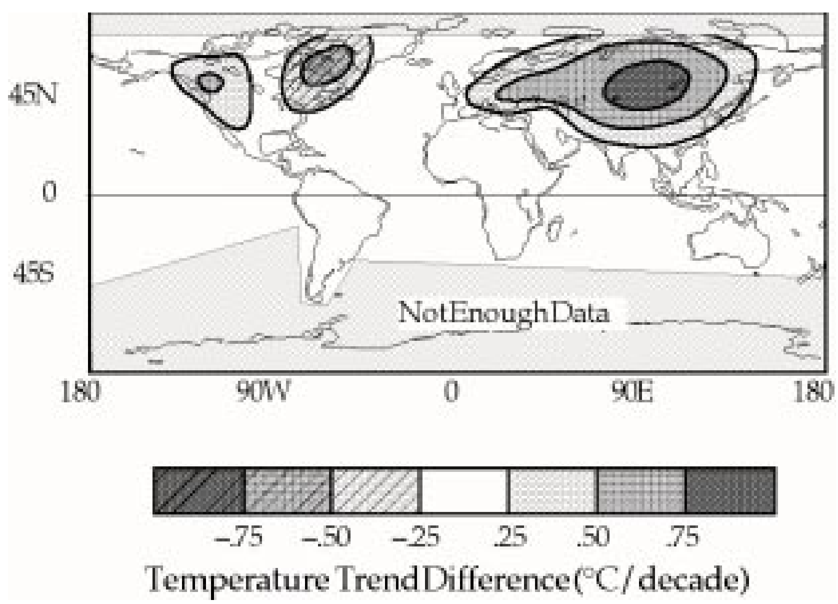

Figure 2. Surface temperature trends (°C per decade) during the cold half-year (October–March in the Northern Hemisphere, April–September in the Southern Hemisphere) from 1946–1995.

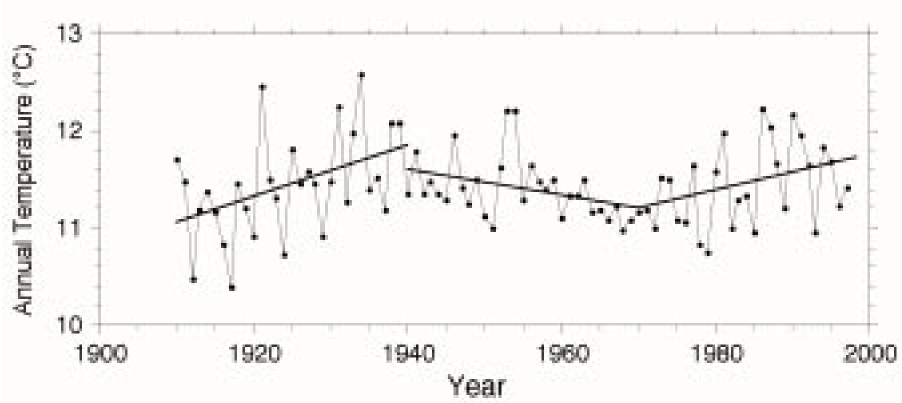

Figure 3. Annual average temperature history from the United States, 1910-1997, showing three distinct epochs of change.

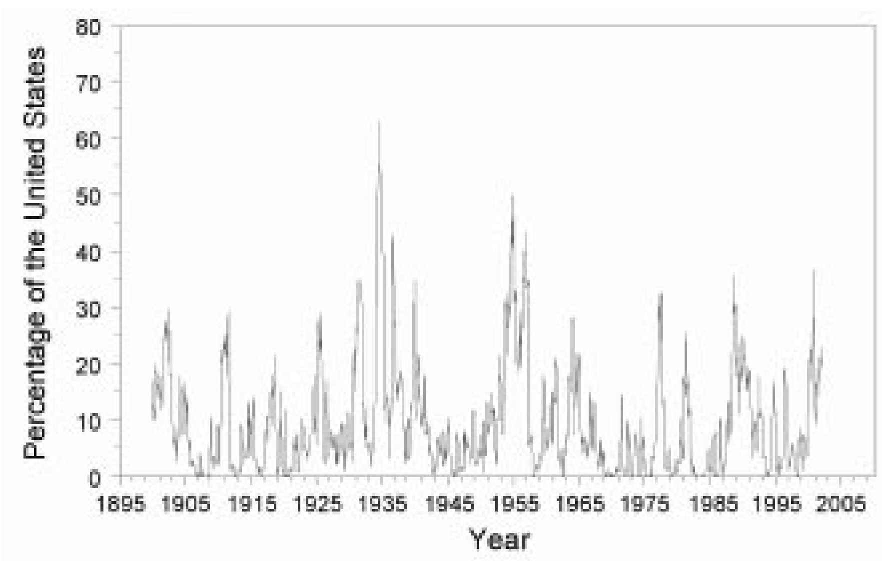

Figure 4. Percentage of the United States experiencing severe or extreme drought conditions.

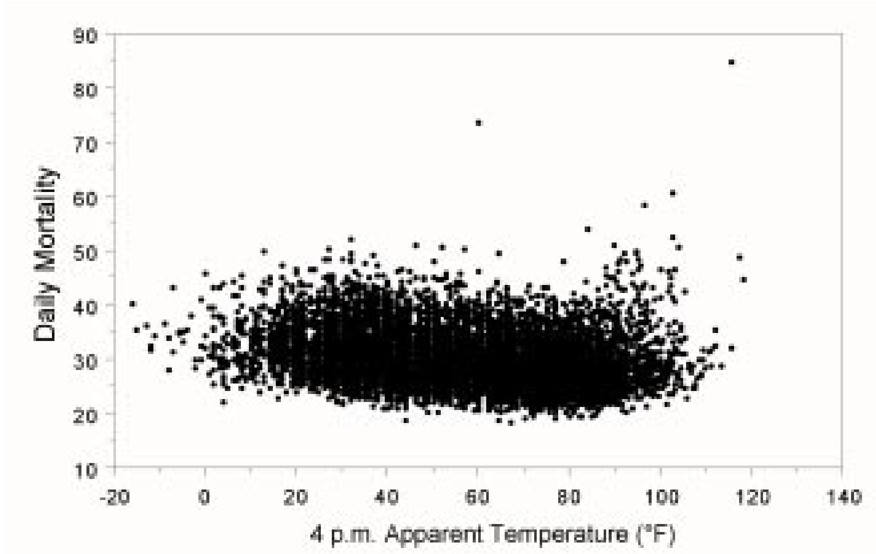

Figure 5. Daily mortality versus 4p.m. apparent temperature in Chicago, IL. There is a negative relationship between temperature and daily mortality throughout most of the temperature range. However, on the very hottest days, daily mortality can become greatly elevated.

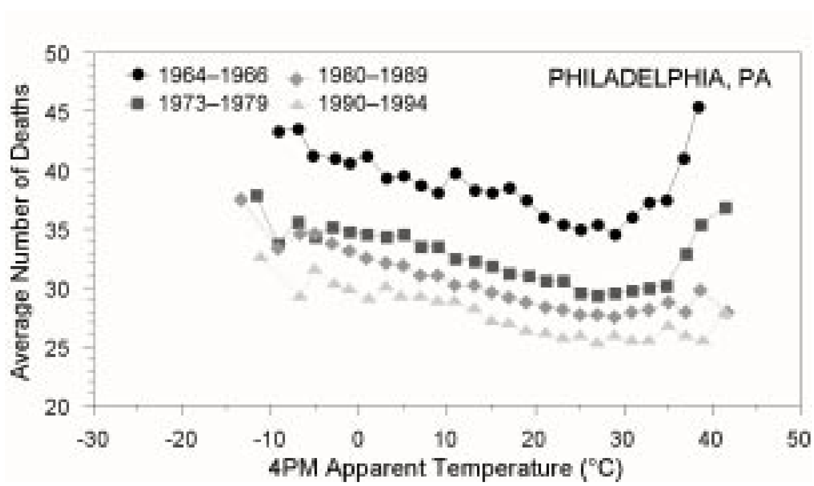

Figure 6. Average Daily mortality versus 4 p.m. apparent temperature in Philadelphia, broken down into decades. The population's sensitivity to extremely high temperatures has declined in more recent decades.

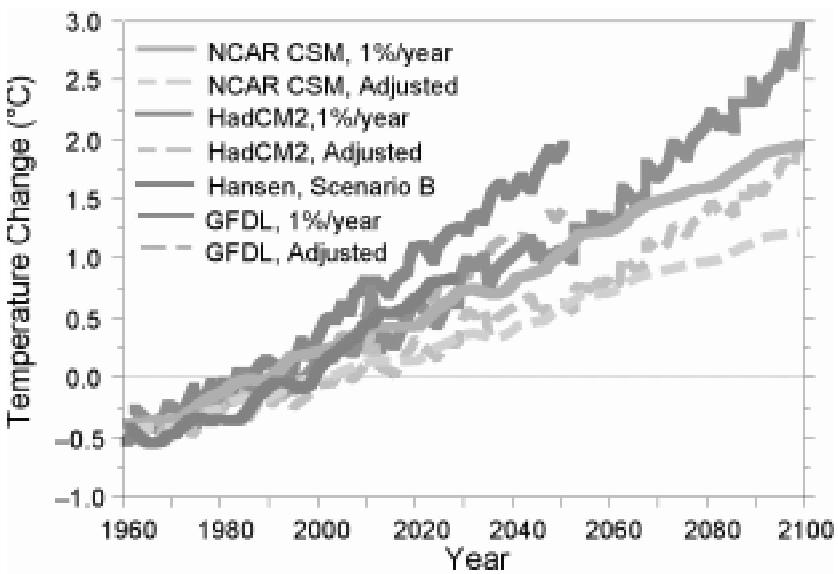

Figure 7. Typical climate model projections of future temperatures. Notice that the temperature rise is nearly linear in all cases, and that only the slope varies from model to model.

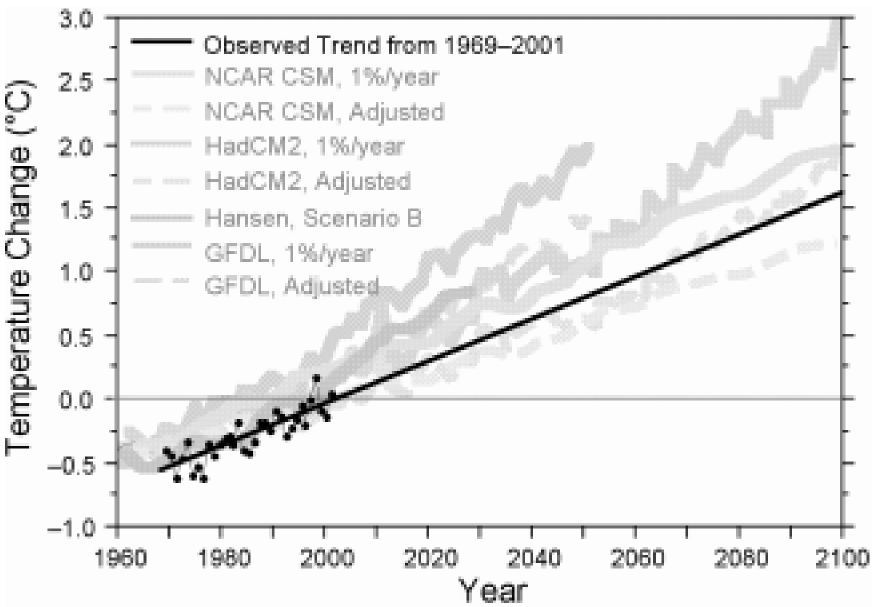

Figure 8. Observed warming of the last three decades superimposed on typical climate model projections. The observed linear trend is near the lowest value that the climate models predict and considerably below the mean projected warming.

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