# 47. Global Warming

***Congress should*** resist attempts to impose costly reductions in the emissions of greenhouse gases in order to limit global warming.

## Background

The United Nations Framework Convention on Climate Change (FCCC) and the subsequent Kyoto Protocol require the United States to reduce the net emissions of carbon dioxide and other important greenhouse gases to 7 percent below 1990 levels, on average, for the five-year period beginning in 2008. The Framework Convention and the protocol are based on a naive interpretation of a science that now views reductions in carbon dioxide as a very inefficient way to influence climate change. As a result, the economic costs of the convention and protocol are enormous, and the benefits are undetectable. Even if all the world's nations met their commitments under the Kyoto Protocol, there would be no discernible effect on the globe's climate.

The Framework Convention was signed by the United States at the Rio de Janeiro Earth Summit in 1992. As originally conceived, the purpose of the convention was "to prevent dangerous human interference in the climate system." The original goal was to reduce emissions of carbon dioxide, the principal human "greenhouse" gas, to 1990 levels by the year 2000. Only two nations have met that goal, and they have done so because of historic changes unrelated to environmental concerns. In 1990 the reunification of Germany resulted in the absorption of the wildly polluting East, whose economic inefficiency was so great that much of its industry was simply shut down. Great Britain met the target because of privatization of the coal industry.

Carbon dioxide emissions in the United States have risen approximately 15 percent since 1990. But at Kyoto in December 1997 the Clinton

administration, under the leadership of Vice President Al Gore, agreed to a protocol to the FCCC that requires us to reduce our emissions 7 percent *below* 1990 levels over the averaging period, 2008–12. Because of recent increases in emissions, this constitutes a reduction of between 30 and 40 percent (depending on whether the increase since 1990 is assumed to be exponential or merely linear) beneath where they would be under a "business as usual" scenario. That "business as usual" has resulted in one of the greatest explosions in wealth creation in the history of the world.

The next meeting of the Conference of the Parties to the FCCC took place in November 2000 at The Hague. This important gathering was charged with the responsibility to define the mechanisms for compliance with the Kyoto Protocol. The outcome of that meeting will define prospective legislation in the 107th Congress.

Why should Congress resist passage of such legislation? There are several reasons—scientific, economic, and political. Here we deal mainly with the science of climate change.

Members of Congress should note that calls for dramatic emissions reductions are usually accompanied by lurid rhetoric about weather and climate disasters. The purpose of this chapter is to provide the facts that counter such emotional appeals.

No credible argument counters the notion that the 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 would clearly change from bad to good. 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 would be that global warming is a terrible disaster. But what if gentle spring rains increase while the severity of hurricanes declines?

Figure 47.1 details the surface temperature history of the Northern Hemisphere (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 had little if anything to do with changes in the earth's greenhouse effect, as three-quarters of the greenhouse emissions occurred 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.

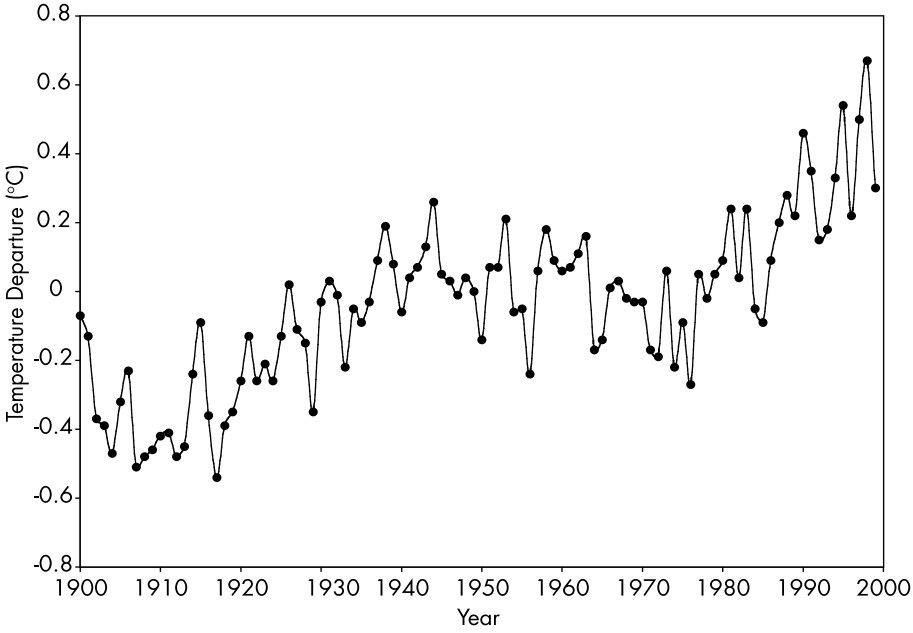


**Figure 47.1.** Northern Hemisphere annual temperature history, 1900–99.

## *Warming Occurs Primarily in the Winter, Not the Summer*

### *The Largest Warming Is in the Coldest, Deadliest Airmasses*

The second warming, which began about 30 years ago, is much more interesting. Greenhouse-effect physics predicts that human-induced climate change should take place more in the winter than in the summer, and that it should further be concentrated in the coldest air of winter. The propensity for greenhouse warming to occur in frigid dry air has enormous implications that have largely been ignored in the raucous debate about climate change.

In fact, observed warming since World War II is twice as large in winter as it is in summer. In the winter, three-quarters of the total warming is confined to the frigid airmasses that reside in Siberia and northwestern North America.

Summer warming has been, predictably, much less than winter warming. Less than one-third of the observed warming of the second half of the 20th century occurred in the summer, while two-thirds occurred in the winter.

An individual living in Siberia or northwestern North America has, for the last 50 years, experienced a winter half-year warming of nearly 1.1°C. Cold airmasses that originate in these regions, on the "edge" of winter

(April and October), are usually responsible for the last freeze in the spring and the first freeze in the fall in temperate latitudes. Reducing the inherent coldness lengthens the growing season. There are several lines of evidence in the scientific literature indicating that this is occurring.

### *Temperature Variability Is Declining, Not Increasing*

One of the common arguments for emissions reductions is the notion that the weather has become more variable. The opposite is true.

Economic and ecological systems are adapted to both average conditions and expected variation. So, as the temperature warms, do annual and seasonal temperature swings become more erratic? In the last century, some years were warm and some cold. This natural variability allows us to examine whether the seasonal and monthly variability in those years is different from the variability in years with near-mean temperatures.

Figure 47.2 shows monthly variability in the last 100 years. Before 1940 (including the warming of 1910–40) there was little change. In the last third of the 20th century, there was a considerable decline. In other words, as the greenhouse enhancement has warmed the extremely cold air of Siberia and northwestern North America, the within-year variability

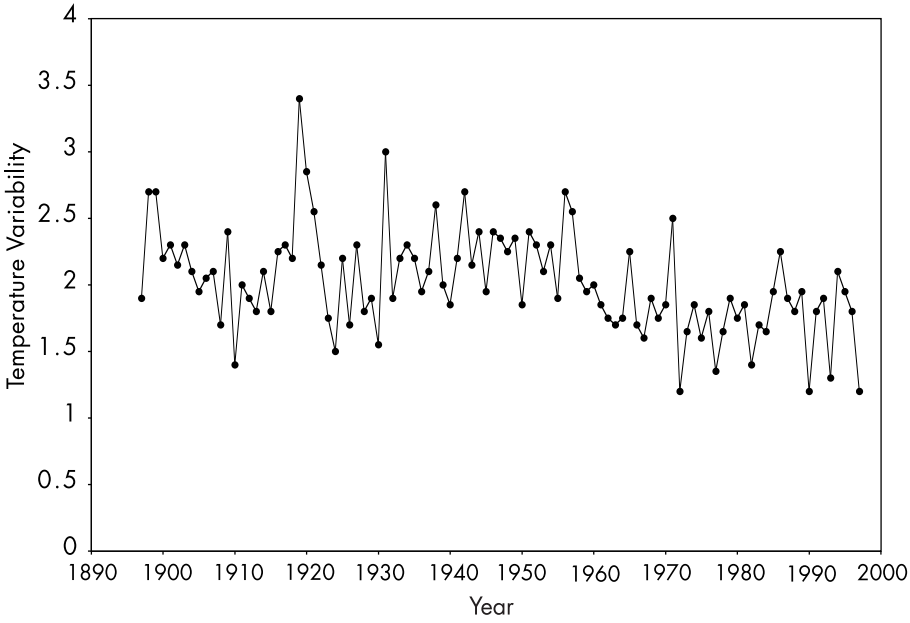


**Figure 47.2.** Intra-annual global temperature variability. Temperature variability has been declining since greenhouse warming began.

has dropped. There is no evidence that the fluctuations in the earth's temperatures are greater now than they were at the beginning of the 20th century. Conversely, most evidence suggests that temperature has become less variable.

### *Precipitation, Droughts, and Floods Show No Ominous Changes*

The standard measure of drought is known as the Palmer Drought Severity Index. Figure 47.3 shows the percentage of the lower 48 U.S. states experiencing severe Palmer drought back to the beginning of the record in 1895. Clearly, there is no overall trend; what's more, the drought periods in the 1930s and 1950s dwarf anything we saw in the last quarter of the 20th century.

What about rainfall? The Palmer Index measures wetness as well as drought. Here we do see a slight but statistically significant increase. This is clearly a net benefit of climate change. Every summer most of the United States experiences a moisture deficit, as solar-driven evaporation dries the soil at a greater rate than rainfall can replenish moisture. So any increase in precipitation is likely to be welcomed by American agriculture. Figure 47.4 demonstrates this increase.

Even this salutary trend has been twisted in the service of climate doomsaying. On Earth Day 1995, Vice President Gore, speaking at George

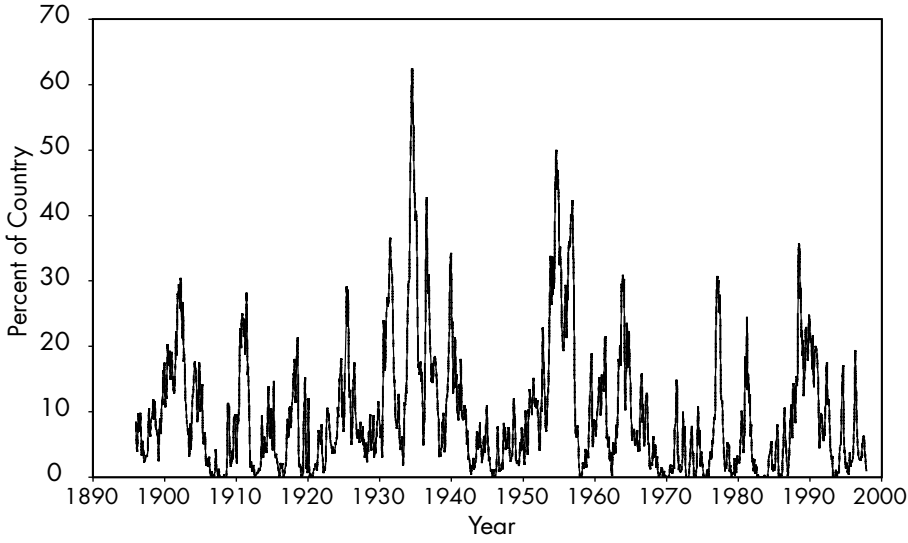


**Figure 47.3.** The percentage of the United States experiencing severe or extreme drought conditions fluctuates from year to year but shows no long-term trend.

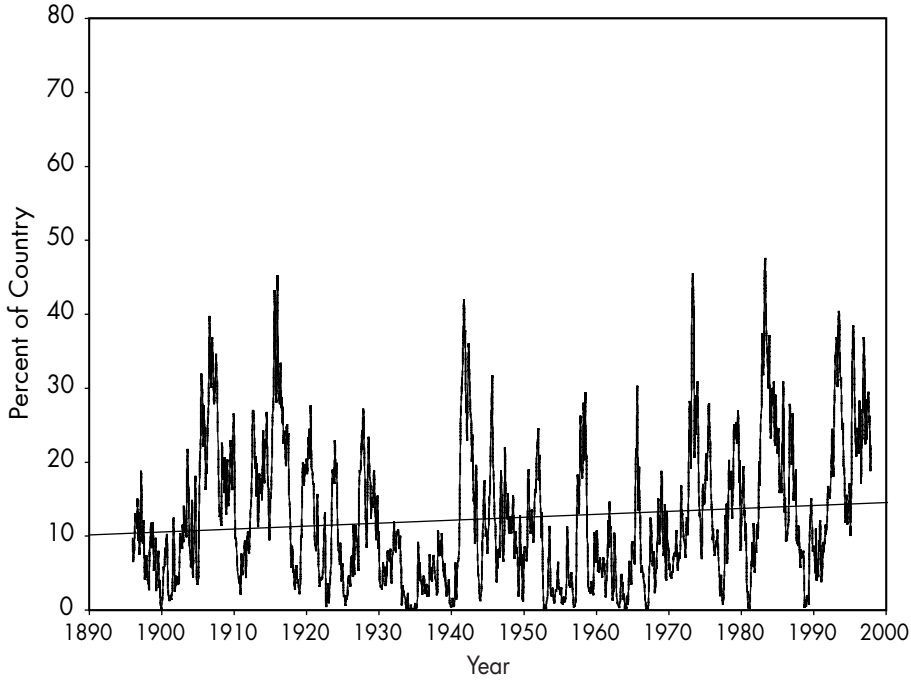


**Figure 47.4.** The percentage of the United States that is substantially wet shows a statistically significant increase. This is largely beneficial for American agriculture.

Washington University, said, "Torrential rains have increased in the summer in agricultural regions." He was referring to a then-unpublished paper by climatologist Tom Karl. Karl examined U.S. precipitation records and found that the percentage of annual rain falling during two-to-three-inch-per-24-hour storms had increased, with recent decades showing 11 percent of all rain coming from such storms, compared with 9 percent at the beginning of the 20th century. A simple calculation reveals that the entire annual amount of rainfall Gore was referring to was 0.95 inches in an average year.

In fact, Karl's study, which was published in *Nature* several months after Gore's speech, showed that a similar change in precipitation took place between 1935 and 1950, before much of the greenhouse alteration had occurred.

Another way to look for precipitation extremes is to examine streamflow data in undammed basins. In 1999 U.S. Geological Survey scientist Harry Lins published a paper showing no increase in the frequency of flooding streamflow but a decrease in the frequency of the lowest (drought) flow

categories. That is to say, streamflow records indicate decreased drought and no change in floods.

### *There Is No Increase in the Frequency or Severity of Hurricanes*

The notion that global warming is making the most destructive storms worse or more frequent is one of the most compelling appeals for greenhouse emission reductions. It has absolutely no basis in fact.

Figure 47.5 shows the number of hurricanes striking the United States per decade. It is obvious that, if anything, recent decades are notable for their lack of storms. Of even more interest is the fact that the maximum wind velocity measured in Atlantic and Caribbean Basin storms has actually declined significantly in the last 50 years, as shown in data published by the United Nations Intergovernmental Panel on Climate Change (IPCC) (Figure 47.6).

### *Heat-Related Mortality Is Declining, Not Increasing*

The popular perception is that heat-related deaths have increased, and will continue to increase, with global warming. The IPCC says, "[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."

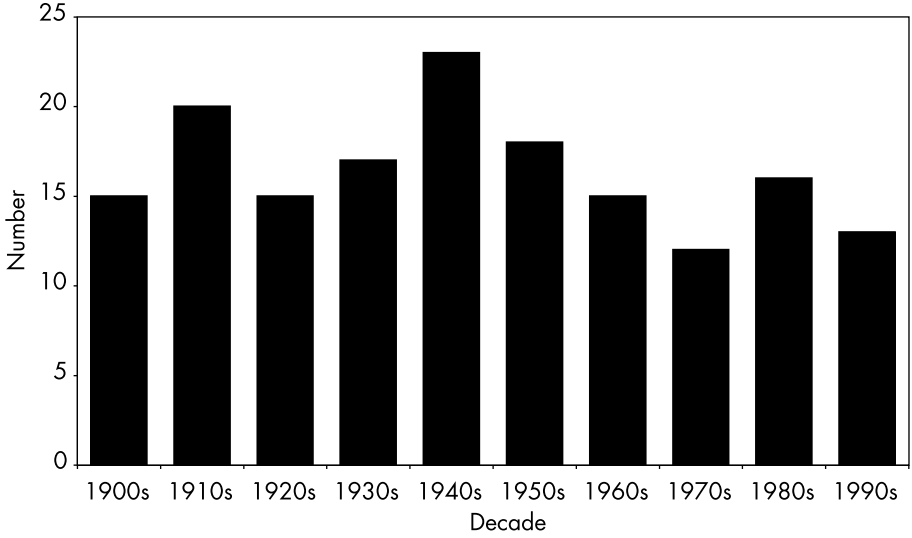


**Figure 47.5.** Number of hurricanes striking the United States per decade. If anything, recent decades have had fewer storms than average.

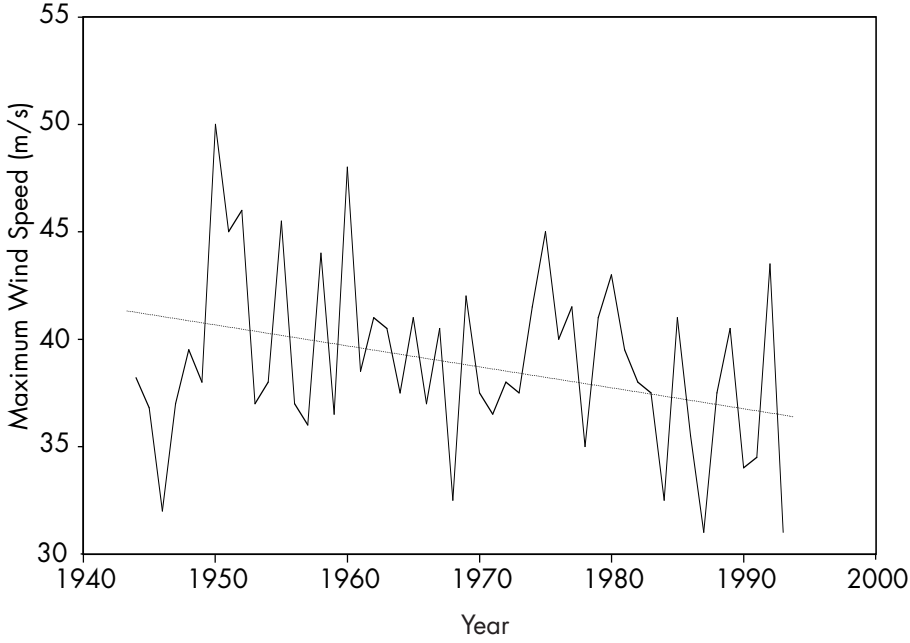


**Figure 47.6.** Maximum winds measured by aircraft in Atlantic and Caribbean storms show a statistically significant decline (IPCC 1996), despite stories of increased severity.

Research shows that this is just plain wrong. Figure 47.7 shows the relation of death rates in Philadelphia, a typical urban core, to "effective temperature," which is the combination of heat and humidity that makes people uncomfortable. In general, heat-related deaths *decline* with effective temperature, although there are a few days that show remarkable death excursions at high temperature—the few dots that can be seen in the upper right portion of the graph. These are death excursions similar to Chicago's July 1995 heat wave, which was responsible for what in the final analysis appear to be about 200 excess deaths.

But, as Figure 47.8 shows, as we progressed through the last half of the 20th century, the increase in the number of people who died at high temperatures declined to near-zero values. This is a result of increased use of air conditioning, effective medical care, and public education about the dangers of excessive heat. In other words, over time, the same technology that slightly raises the surface temperature (fossil fuel–driven electricity production) saves lives. Proposals to make energy more expensive as a means of fighting climate change will have the perverse effect of killing those who can least afford expensive electricity, resulting in a return to the heat-related death patterns of the past.

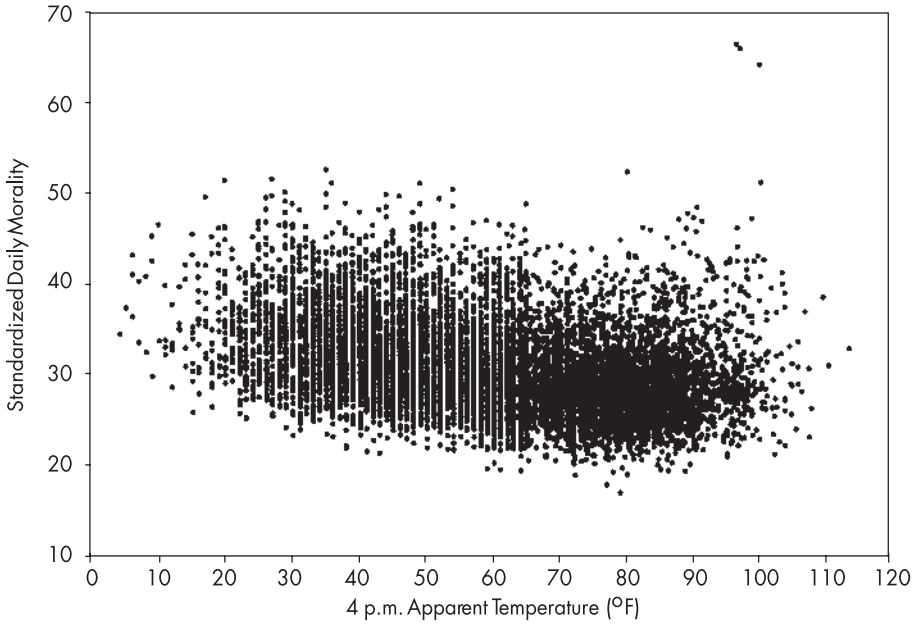


**Figure 47.7.** In Philadelphia, typical of most American cities, the daily mortality generally decreases with temperature, with the exception of the very hottest days.

## *Future Warming Is Likely to Be Modest in Scale*

By now, dozens of different computer simulations that estimate future warming have been executed. How do we decide which, if any, is likely to be correct?

The key to the future lies in the rather extended period during 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 260 to 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 was near the low end of that range, about 280 ppm. The current concentration is 365 ppm, about a 30 percent increase.

But there are other emissions that increase the atmosphere's natural greenhouse effect. Methane emissions, for example, contribute a warming of another 20 percent beyond the enhanced carbon dioxide greenhouse effect. Another 15 percent increase comes from chlorofluorocarbons, refrigerants whose atmospheric concentrations have yet to decline much, despite the Montreal Protocol against their manufacture because they might

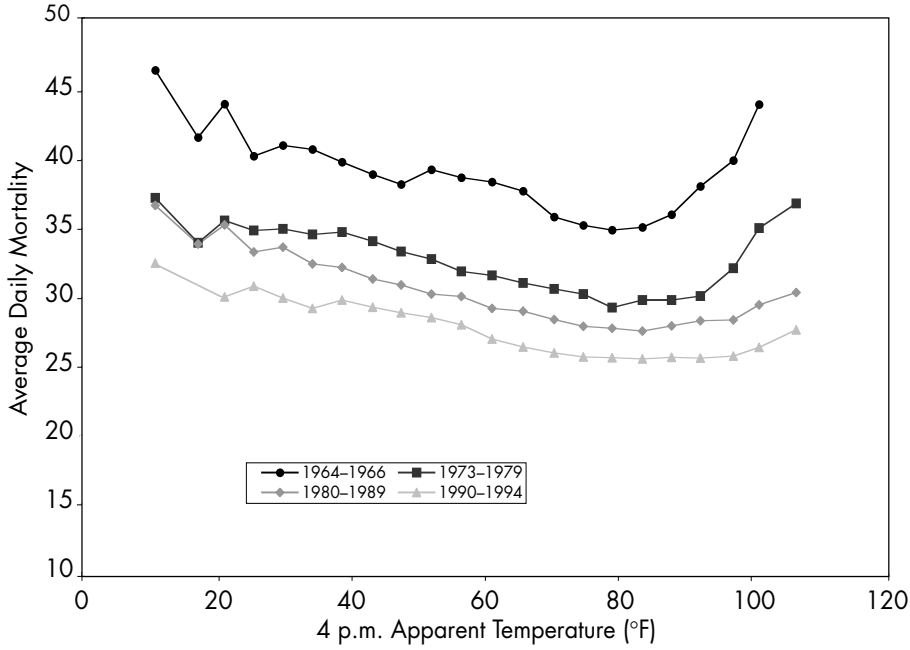


**Figure 47.8.** In a northern city, such as Philadelphia, where extremely hot conditions occur less frequently than in the South, the population exhibits a higher mortality rate on hot days. However, over time, the population of Philadelphia's sensitivity to high temperatures has been declining.

reduce high stratospheric ozone. A host of other anthropogenic emissions contribute much smaller additional increments. When all is said and done, in toto the emissions produce a "carbon dioxide equivalent" concentration that is about 60 percent above the background levels recorded prior to the Industrial Revolution.

Nearly 20 years ago, a few climate scientists noted that the planet had not warmed as much as would be expected from early computer simulations of greenhouse warming. By 1996 the IPCC acknowledged that that observation had become the consensus of the broad scientific constituency. Although it has been fashionable to try to "explain" the lack of warming by the presence of sulfate aerosols, a product of combustion that was thought to cool the surface, that explanation has never withstood simple tests. The alternative explanation put forth by the IPCC is that the sensitivity of surface temperature was simply overestimated.

Evidence leads us to conclude that the warming we saw in the last third of the 20th century was largely from greenhouse changes. It is very linear (constant in rate) at about 0.15°C per decade at the surface. A small

solar component is calculated to be around 0.02°C per decade. That leaves us with about 0.13°C per decade as a human greenhouse signal.

Figure 47.9 shows the warming since 1960 as well as output from a large suite of climate forecast models. The models' forecasts are also all linear, but note that they differ in the slope of their projected warming. These differences result from internal model dynamics and assumptions, including the rate of increase of greenhouse changes. For example, the rate of greenhouse increase has been running at about 75 percent of the UN's "central" estimate for decades. Most computer models assume an even larger value than the UN's already high figure; indeed, several researchers have recently demonstrated that the true value is a mere 45 percent of the modeled assumption.

Nonetheless, with few exceptions, all the climate models predict warmings over the next century that are essentially linear (i.e., constant in rate). It seems logical to now let nature adjudicate what the proper rate for warming is; this is also shown in Figure 47.9. By the middle of this century, we are left with an additional surface warming of 0.65°C to 0.75°C, with 0.75°C to 0.85°C in the winter half year and 0.60°C to 0.65°C in the summer.

Interestingly, these 50-year figures are quite similar to the warming that occurred during the late 20th century.

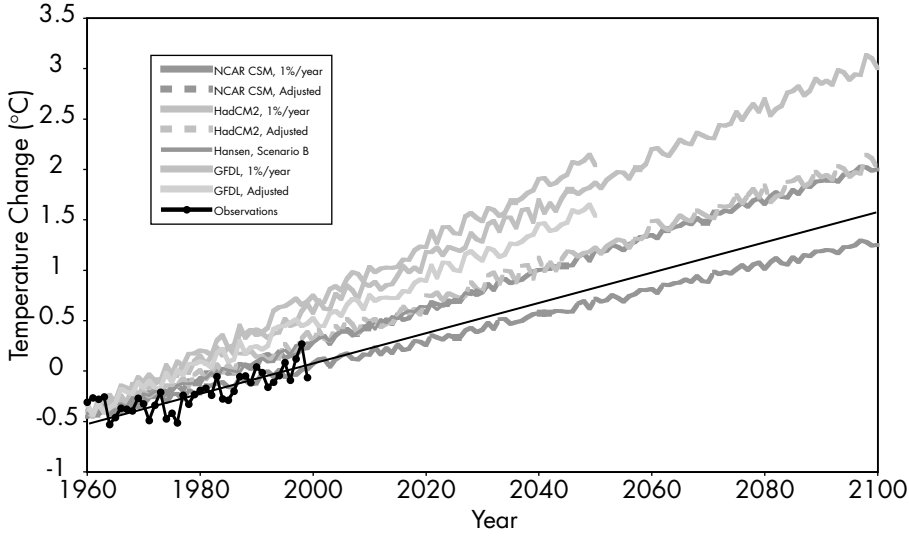


**Figure 47.9.** Observed warming of the last three decades superimposed on typical climate model projections. The observed linear trend is near the lowest value that the climate models predict and considerably below the mean projected warming.

What have we to show for a century of warming? In 1900 life expectancy at birth in the United States was 42 years. After 100 years of global warming, it was exactly twice that number, 84 years. Urban infrastructure in the United States has adapted so well to both average and warmed climates that heat-related deaths are disappearing. After a global warming of 0.6°C, U.S. crop yields quintupled. World food production per capita has increased by nearly 50 percent in the last half century. An 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.

## *The Kyoto Protocol Does Nothing about Global Warming*

No known mechanism can stop global warming in the near term. International agreements, such as the Kyoto Protocol to the United Nations Framework Convention on Climate Change, would have no detectable effect on average temperature within any reasonable policy time frame of 50 years or so—even with full compliance. Climate modelers at the U.S. National Center for Atmospheric Research calculate that full compliance with the Kyoto Protocol by all signatory nations would reduce global surface temperature by 0.07°C by 2050, and 0.14°C by 2100. Congress should note the dangers of an expensive environmental accord with no benefit.

Recently, NASA scientist James Hansen, whose 1988 congressional testimony started the global warming furor, wrote that reducing carbon dioxide is a highly ineffective means of slowing global warming in the 50-year time horizon. Rather, he argued, concentrating on the other greenhouse gases, such as CFCs and methane (which has stopped increasing in the atmosphere for only partially known reasons), is much more effective and politically acceptable than the costly Kyoto Protocol, which, he wrote, "cast the developed and developing worlds as adversaries."

But beyond 50 years we have little, if any, idea what the energy infrastructure of our society will be. To highlight the folly of any such projection, compare the energy-related concerns of 1900, when pundits cautioned that major U.S. cities would be knee-deep in horse "emissions" by 1930 unless we saw fit to "act now," with those of 2000. We simply cannot predict our technological future. Rather, the more serious question the facts on global warming provokes is this: Is the way the planet warms something that we should even try to stop?

### Suggested Readings

Balling, R. C. Jr., P. J. Michaels, and P. C. Knappenberger. "Analysis of Winter and Summer Warming Rates in Gridded Temperature Time Series." *Climate Research* 9 (1988): 175–81.

Davis, R. E., et al. "Decadal Changes in Summer Mortality in the United States." *Proceedings of the 12th Conference on Applied Climatology,* Asheville, N.C., 2000, pp. 184–87.

Hansen, J. E., et al. "A Common-Sense Climate Index: Is Our Climate Changing Noticeably?" *Proceeding of the National Academy of Sciences* 95 (2000): 4113–20.

_____. "Global Warming in the Twenty-First Century: An Alternative Scenario." *Proceedings of the National Academy of Sciences* (2000). PNAS early edition, www.pnas.org.

Intergovernmental Panel on Climate Change. *Climate Change 1995: The Science of Climate Change: Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change.* Edited by J. T. Houghton et al. Cambridge, Cambridge University Press, 1996.

Karl, T. R., R. W. Knight, and N. Plummer. "Trends in High-Frequency Climate Variability in the Twentieth Century." *Nature* 377 (1995): 217–20.

Lean, J., and D. Rind. "Climate Forcing by Changing Solar Radiation." *Journal of Climate* 11 (1998): 3069–94.

Lins, H. F., and J. R. Slack. "Streamflow Trends in the United States." *Geophyisical Research Letters* 26 (1999): 277–330.

Michaels, P. J. "The Consequences of Kyoto." Cato Institute Policy Analysis no. 307, May 7, 1998.

_____. "Long Hot Year: Latest Science Debunks Global Warming Hysteria." Cato Institute Policy Analysis no. 329, December 31, 1998.

Michaels, P. J., and R. C. Balling Jr. *The Satanic Gases: Clearing the Air about Global Warming*. Washington: Cato Institute, 2000.

Michaels, P. J., et al. "Analysis of Trends in the Variability of Daily and Monthly Historical Temperature Measurements." *Climate Research* 10 (1998): 27–33.

Michaels, P. J., et al. "Observed Warming in Cold Anticyclones." *Climate Research* 14 (2000): 1–6.

Wittwer, S. H. *Food, Climate, and Carbon Dioxide.* Boca Raton, Fla.: CRC Press, 1995.

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