

Global Warming Naysayers' Flawed Analysis of Temperature Trends

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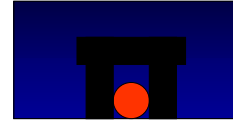
CO₂ Science Magazine (www.co2science.org) describes itself as a weekly review and repository of scientific research findings pertaining to carbon dioxide and global change. It is certainly an interesting, information packed resource but its authors have made up their mind on global warming – it is not happening.

Their arguments that there has been no global warming for the past 70 years is set out in an editorial commentary dated July 2000 (www.co2science.org/edit/v3_edit/v3n13edit.htm). The evidence reviewed to substantiate their claim includes:

1. satellite microwave-sounding-unit temperature record, which they claim in the absence of the massive 1998 El Nino heat pulse shows no warming whatsoever from 1979 to the present;
2. the weather-balloon temperature weather record, which they claim for the same circumstances also shows no warming.
3. the surface- and satellite-derived temperature records of earths polar regions, which they also claim shows no warming; and
4. the high-quality U.S. Historical Climatology Network database, which they also claim shows no statistically significant warming.
5. Observations gleaned from tree-ring reconstructions of surface air temperature, which is also claimed to show no evidence of global warming.

I will be evaluating these claims progressively, but it is worth pointing out that satellite observations since 1979 tell us nothing about the last 70 years, which is their claimed period for observing no evidence of global warming. This article concentrates on point number 4 – the U.S. Historical Climatology Network Data Set¹.

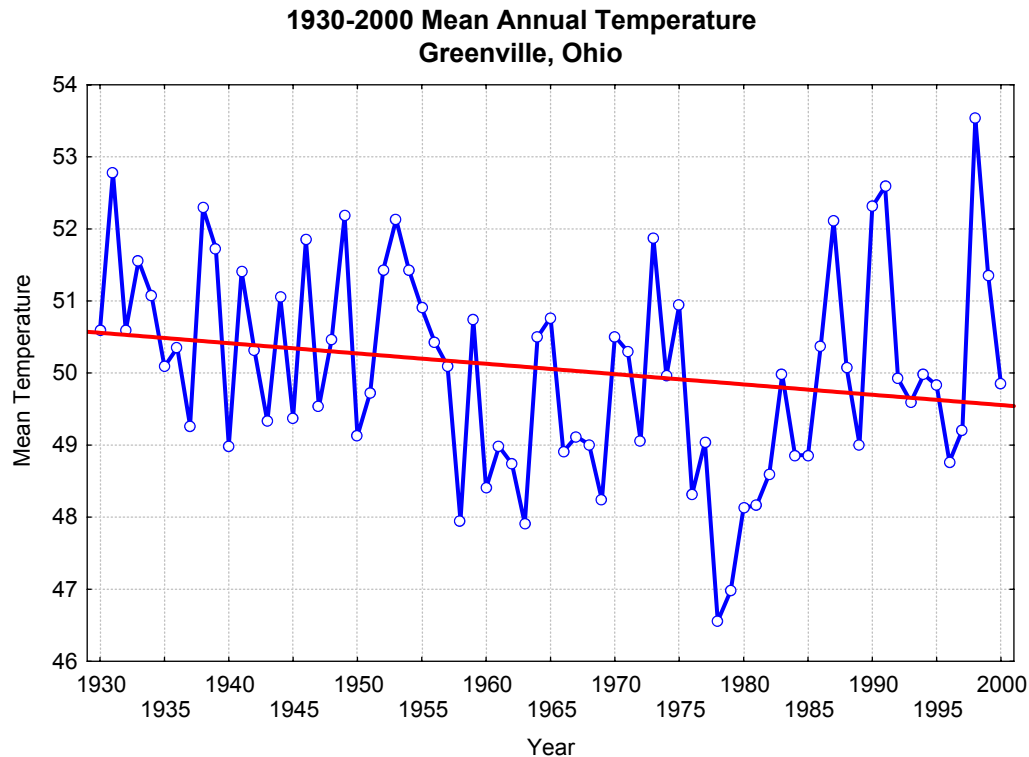
Each week, CO₂ magazine analyses the temperature record of a town in the USA (“to bolster our claim that there has been no global warming for the past 70 years”) and typically concludes that there is no sign of global warming. The first analysis I encountered (on 25 January 2003) was for Greenville, Ohio which I reconstruct, and deconstruct their conclusion, below. Then follows a more recent analysis (13 March 2003), for Williamstown, Kentucky. The analysis of a small number of individual towns can lead to incorrect conclusions about overall trends. As well as progressively adding analyses of individual towns, we will analyse aggregate in other articles.



Greenville, Ohio

Chart 1 is a reconstruction of the one that appeared in CO₂ Science. They analysed the period from 1930 (“during the period of most significant greenhouse gas buildup over the past century”) and concluded that Greenville’s mean annual temperature has cooled by 1.00 degrees Fahrenheit. “Not much global warming here!”

Chart 1



The downward trend, amounting to 1 degree Fahrenheit over the 70 years, is not quite statistically significant (the probability that this is a chance result is 0.08, above the preferred 0.05 or one in twenty).

What is disturbing about this analysis is that the data seems to exhibit two distinct trends – a downward trend until 1978, followed by an upward trend since.

I have fitted separate trends to the periods 1930 to 1978 and 1979 to 2000. The earlier period has a statistically significant downward trend of 0.43 degrees per decade (less than one chance in a thousand that this is a fluke result). The later period has a statistically significant **upward** trend of 1.25 degrees per decade (less than one chance in fifty that this is a fluke result).

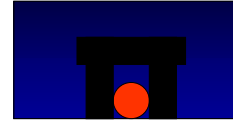
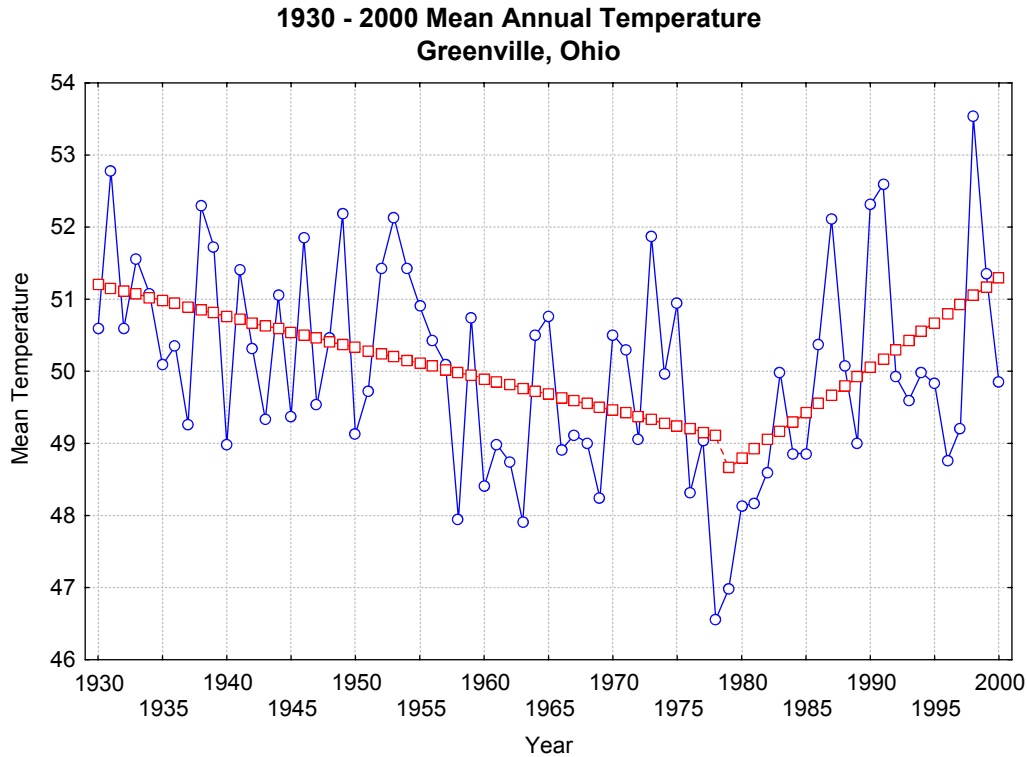


Chart 2 shows the result of fitting separate trends for these two time periods.

Chart 2

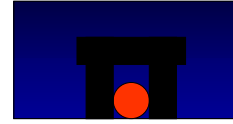


We now have to find a reason that explains both trends and the sudden change in the late 1970's. The most obvious culprit is sulphur dioxide².

Sulphur dioxide is emitted by coal-burning power stations. The direct impact of sulphur dioxide particles in the atmosphere is a cooling effect. Short wave solar radiation is scattered back to space leading to a cooling tendency which is larger than the warming effect due to absorption of long wave reflected radiation by soot particles. Action to reduce sulphur dioxide emissions was initiated in the 1970's, in order to reduce the health impact of this pollution and to reduce acid rain. In the USA, the EPA reports a 39% reduction between 1980 and 2000, while in Britain a reduction of 76% has been achieved between 1980 and 2000.

The impact of increasing sulphur dioxide pollution until the 1970's was a net cooling and since then the decline in pollution has tended to warm the atmosphere. This has masked the impact of global warming caused by carbon dioxide, making it difficult to make reliable predictions about future warming.

There are many influences on temperature, including sulphur dioxide, methane and carbon dioxide emissions, El Nino and other ocean cycles, the sun's output and the sunspot cycle, variations in the earth's orbit and albedo (reflectivity) amongst possibly others.

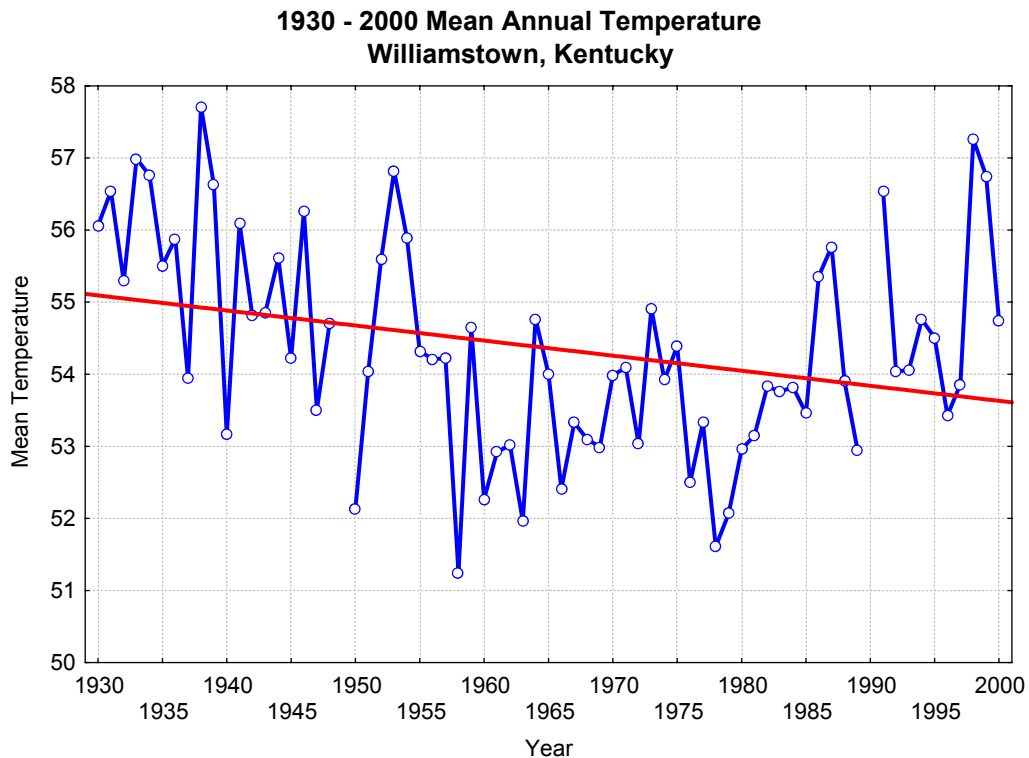


But the simplistic analysis by CO₂ Science Magazine shows the symptoms of a closed mind when they claim “not much global warming here!”

Williamstown, Kentucky

This town is almost a carbon copy of Greenville, Ohio. CO₂ Science Magazine say “not much global warming here.” Chart 3 reconstructs the CO₂ Science Magazine analysis.

Chart 3

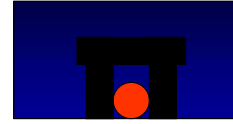


From the period 1930 to 2000, the downward trend is 0.2 degrees Fahrenheit per decade and is statistically significant (the probability of a fluke result like this is less than one in 50).

But for the period 1930 to 1978, the downward trend is a statistically significant 0.7 degrees per decade (probability of a fluke result less than one in a thousand) while for the period 1979 to 2000, the **upward** trend is a statistically significant 1.2 degrees per decade (probability of a fluke result is less than one in one hundred).

Conclusion

CO₂ Science Magazine’s unquestioning analyses seem to have been contrived to (erroneously) reach the conclusion they had already made. The data reveal statistically significant indications of warming since the late 1970’s. We now need to



better understand the causes and implications for the future, rather than sweep matters under the carpet.

References

1. U.S Historical Climatology Network Data Set

The U.S. Historical Climatological Network (USHCN) data set is a product of the Carbon Dioxide Information Analysis Center (CDIAC) and the National Climatic Data Center (NCDC). It is composed of monthly temperature and precipitation data from 1221 stations located within the conterminous United States.

Easterling, D.R., Karl, T.R., Mason, E.H., Hughes, P.Y., Bowman, D.P., Daniels, R.C. and Boden, T.A. (Eds.). 1996. *United States Historical Climatology Network (U.S. HCN) Monthly Temperature and Precipitation Data*. ORNL/CDIAC-87, NDP-019/R3. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

2. The Impact of Sulphur Dioxide

See a 1999 Environmental News Network report on research conducted by Michael Schlesinger, a professor of atmospheric sciences at the University of Illinois, Urbana-Champaign.

www.enm.com/news/enm-stories/1999/07/071999/sulfur_4414.asp