

Critical Analysis of Data

There is much controversy amongst scientists and others about whether or not global warming is actually occurring, and if it is whether the activities of humans are a significant cause. Many articles, reports and books have been written giving different views on this phenomenon. There is a whole host of websites that offer a point of view towards the subject of global warming. I will be looking at a website and try to decide whether the conclusions and the sources used to base the article on are accurate or whether there is any bias.

Introduction

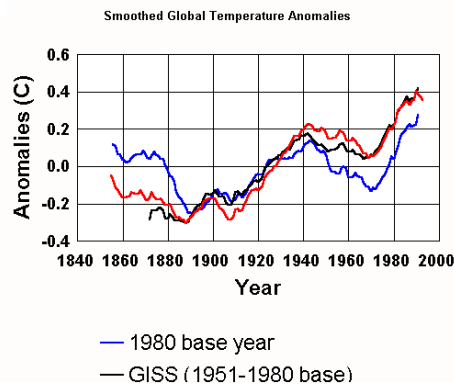
In this assignment, I will be looking at sets of data compiled by someone else. I will be looking at the data and saying if the data is reasonable, of reasonable timescale, has good solid conclusions and is not biased towards either side (for or against global warming). I will be using the website <http://users.erols.com/dhoyt1/index.html> which is a website produced by David Lawrence Dewey who is an author and syndicated columnist.

The Data

All the data in graphs and tables is included below. Below all the tables and graphs, I have included some conclusions that the author has made from the data available. I will be analysing the graphs and tables, and the conclusions separately. I could draw the following conclusions:

- The graphs and tables and the conclusions are both accurate.
- The graphs and tables and the conclusions are both inaccurate.
- The graphs and tables are accurate but the conclusions are inaccurate.
- The graphs and tables are inaccurate but the conclusions are accurate.

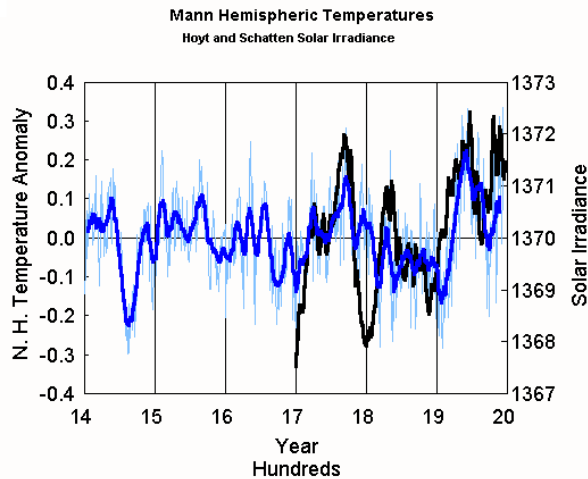
Here is the graphs and tables from the website, in the order they appear on the website.



In the plot of the time series above, they are smoothed with an 11-year running means so the two derivations of the time series can be compared easily. The red line is our reconstruction and the black line is the GISS (Goddard Institute for Space Physics) reconstruction. GISS divides the globe into about 8000

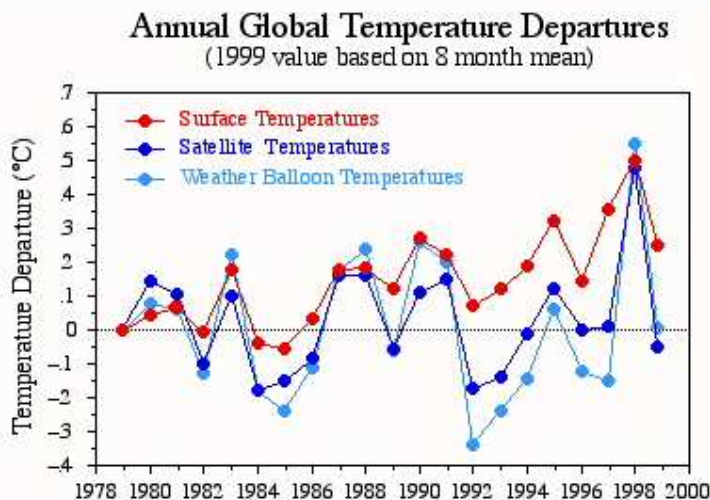
regions. GISS and the author of the website used air temperature measurements only and not sea temperatures.

Mann's reconstruction is shown in the figure below as the blue line and



bold blue line with an 11-year smoothing. In this version of Mann's temperature reconstruction, the temperatures have been adjusted so that the long-term trends agree with the 6000 borehole measurements of Huang et al. (1997).

In the plots above and from the GISS reconstruction, there is a definitive



warming of the Earth since 1979. Yet, satellite observations using the Microwave Sounding Unit (MSU) show no warming over the same interval as shown in the figure below from Pielke et al. (JGR, 1998). Note that in this figure, three

methods, two using balloons, show no trend for 1979-1996.

In the two tables below, we summarise the trends for the troposphere and surface respectively, as determined by a variety of techniques. The IPCC model predictions are also given. Most methods show little or no warming.

<u>Temperature Measurement Method (Troposphere)</u>	<u>Trend (degrees C/decade) For 1979-1997</u>
Weather balloon thermistors (Angell/NOAA)	-0.070
Thickness derived temperature (1000-300 mb) (Pielke et al, JGR, 1998)	-0.029
Weather balloon thermistors (Parker/UK)	-0.020
MSU observations (Spencer and Christy, 1998), corrected for orbital decay and for east-west orbital drift	-0.010 +0.035 (1979-2001)
MSU observations (Wentz and Schabel, 1998), corrected for orbital decay only	+0.070
IPCC model predictions (2001)	+0.40

Temperature Measurement Method (Surface except TOPEX observations)	Trend (degrees C/decade) For 1979-1997
Thickness derived temperature (1000-850 mb) (Pielke et al, JGR, 1998)	-0.056
Northern Hemisphere summer temperatures from tree rings through 1994 (Briffia et al., Nature, 1998)	-0.038
Mean & standard deviation of 12 lower tropospheric data sets (Santer et al., JGR, 1999) [for	+0.008 +/- 0.066

1979-1993]	
Our analysis without urban heat island corrections	+0.055
TOPEX/Poseidon observations showing 0.9 mm/year global mean sea level rise for 1992-2001 which gives upper limit to ocean temperature rise	+0.045 (maximum, 1992-2001) +0.025 (probable, 1992-2001)
UK Met Office analysis	+0.150
IPCC model predictions (2001)	+0.360

There are three important points to make about the reported warming of the last 20 years:

1. The warming has occurred mostly at night and not during the day. This result is inconsistent with a warming caused by greenhouse gases, but is consistent with urban heat island and other surface effects.
2. The reported warming has occurred only at the surface and not in the upper atmosphere. This type of warming is completely opposite to what is predicted if greenhouse gases are the cause. Again these observations are consistent with problems in the surface measurements.
3. The warming has occurred primarily in the Northern Hemisphere mid-latitudes with little in the polar and tropical regions. This result is consistent with urban influences, but is incompatible with the climate warming predicted from greenhouse gases which predict it to be largest in the polar regions.

In short, the reported warming is inconsistent with warming due to greenhouse gases in its temporal, vertical, and geographical distribution. The reported warming is consistent with problems in the surface network.

Analysis of the Data

The data sources are that the author of the website has started looking at the Greenhouse Warming Hypothesis. They start by looking at changes in the global mean temperature or global temperature anomalies as measured by surface thermometers and by satellites. As in put data I used the approximately 3000 stations from the Climate Research Unit (CRU) in the UK. The Goddard Institute for Space Physics (GISS) uses a similar data set. GISS uses 1951-1980 as a base period to calculate temperature anomalies. CRU uses 1950-1979. We use the year 1965. GISS divides the globe into about 8000 regions. CRU divides the globe into 2592 regions.

We divide the globe into 720 equal areas. GISS and the author used air temperature measurements only. CRU also use sea surface temperatures.

The three graphs shown on the website look like they have been accurately presented. I will look at every graph in turn and consider the accuracy of the data, the source of the data, the relevance of the data and if the data is biased in any way.

1. Graph one shows the Global Temperature Anomalies between 1840 and 1995. The graph lines have been smoothed so they can be compared easily. This may lead to inaccuracy in the data as the lines may average some data sets, which may lead to some bias within the data. The data for this graph comes from the authors research and the GISS (Goddard Institute for Space Physics). This is a credible source and it is unlikely that the data is bias or has been modified in any way to conform to the trends.
2. Graph two shows the Hemispheric temperatures and solar irradiance. There is a timescale of about 600 years, which is a long time. In the bit that came with the graph, the author said that the temperatures have been adjusted so that the long-term trends agree with the 6000 borehole measurements of Huang et al (1997). This means that this data is not accurate and has been changed to fit a pattern. This means, therefore, that this graph is an unfair representation of the actual results and this graph is strongly bias. The sources are Mann, Hoyt and Schetton who are all known in the field of climate study in America.
3. Graph three shows Annual Global Temperature Departures from surface, satellite and Weather Balloon temperatures. 1999 value based on an 8 month mean means that 4 months of the year were not included in the temperature recorded. This is not very accurate as the whole of the year should be used to make the measurement. These results do not follow the pattern as shown in the other two graphs. This could be due to the measurements, scale or the other two graphs were inaccurate. The source of this data is Pielke et al. (JGR, 1998).

What is confusing about this website, is I have never heard of their sources and they are difficult to trace.

The tables that were included as proof of global warming either existing or not existing show some interesting results. There is a list of companies and research units that have been taking results regarding global warming since about 1979 and the figures that they collected

about temperature change makes interesting reading. Some of the institutions have found that the temperature actually decreased while some has found an increase. Obviously, both these can't be right because the Earth either had to warm up or cool down and not do both. I would not know which is correct but looking at the results, I can see that there is more warming stats than cooling down, so I will assume that this is right.

The table looks quite accurate as I have checked some of the figures on the websites of the companies and have found that they match exactly. There is a good level of accuracy in the results as there is decimal points. The sources of the data within the table all look credible enough. There seems to be no bias within this table as both positive and negative figures. This means that the author of the website is not on either side of the argument. This is good because therefore the table is not bias and the data hasn't been changed to make one of the sides win.

Overall, as this website is from America, we have to be a bit careful because American's are bound to say that global warming does not exist because possibly they are putting too much CO₂ into the atmosphere so they say there is none. What is different about this website is that this website is neutral and is not bias towards no global warming which is good. The data that this website uses comes from known sources and this investigation has been conducted over a number of years. The aim of the site was to sort the fact from the fiction