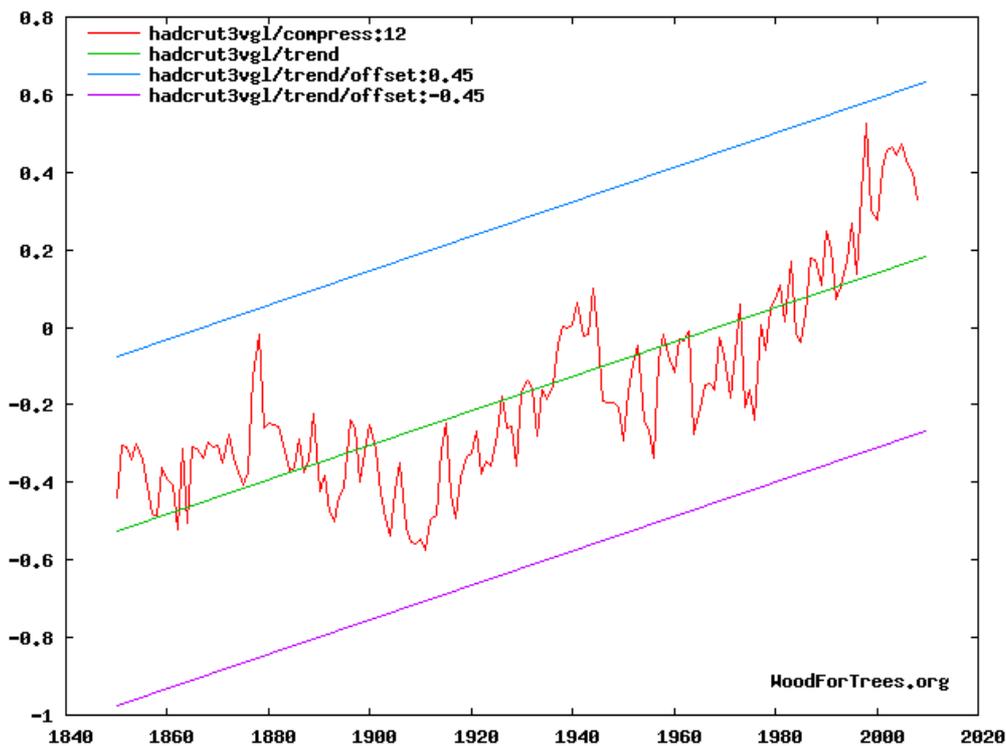CO2 DRIVEN GLOBAL WARMING IS NOT SUPPORTED BY THE DATA

Girma J Orssengo, MASc, PhD

10-Oct-2009

Let us start from the data. The plot of the mean global temperature anomaly in deg C for the data from the Hadley Centre from year 1850 to 2008 is shown below.

Figure 1. Mean global temperature anomaly in deg C for data from the Hadley Centre.

The above graph shows a linear warming trend line given by the following equation.

Linear Warming Component of Anomaly in deg C = 0.44(Year-1850)/100 - 0.52

Superimposed on this linear warming component of mean global temperature anomaly (linear anomaly), there is an oscillating component of the mean global temperature anomaly (oscillating anomaly) that moves up and down about the linear anomaly line given by the equation:

Oscillating Anomaly = Anomaly – Linear Anomaly.

Now, the question that must be answered is that after significant increase in human emission of CO2, do the temperature anomaly data show a shift in mean global temperatures in the last century?

In order to answer this question, let us address the following three questions:

1. How does the linear warming in the last century of 0.44 deg C/100 years, shown above, compare with the linear warming two centuries ago?

2. Is the oscillating anomaly in the last century, after widespread use of fossil fuels, unusual?

3. What is the current trend in the mean global temperature anomaly?

1. How does the linear warming in the last century of 0.44 deg C/100 years, shown above, compare with the linear warming of two centuries ago?

As there were no direct temperature measurements before 1850, tree-ring temperature data may be used to plot the linear warming from 1810 to 1910 as shown below.
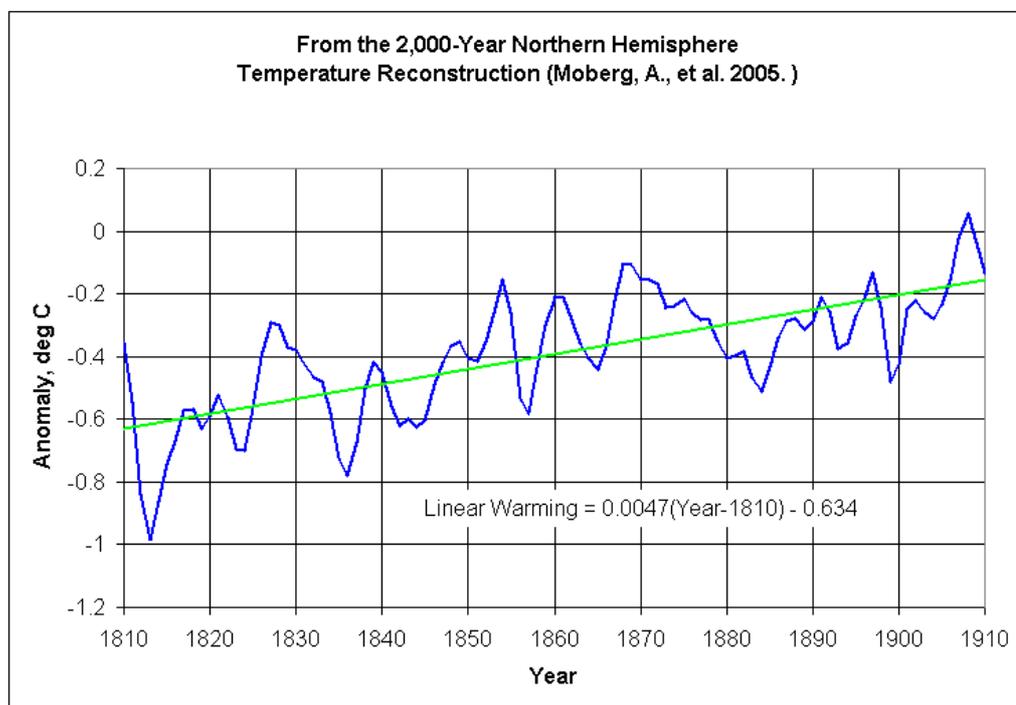

Figure 2. Mean global temperature anomaly before 1910 from tree-ring data.

The above plot shows a linear warming trend line given by the following equation.

Linear Anomaly in deg C = 0.47(Year-1810)/100 - 0.63

This linear warming of 0.47 deg C/100 years, two centuries ago, is of similar magnitude to that of the last century's value of 0.44 deg C/100 years. There was no significant change in the linear anomaly in the previous two centuries. As a result, the linear warming of the last century was not caused by human emission of CO_2.

2. Is the oscillating anomaly in the last century, after widespread use of fossil fuels, unusual?

As the linear warming in the last century was not caused by CO2 emission, we now look at the oscillating anomaly to see for any shift in temperature as a result of increased CO2 emission.

To study the oscillating anomaly separately, we remove the linear warming trend from the anomaly plot using an online software at WoodForTrees.org by using a value of DETREND=0.706, which rotates the warming trend line shown in Figure 1 clockwise to a horizontal line. The anomaly plot with its linear warming removed (oscillating anomaly) is shown below.
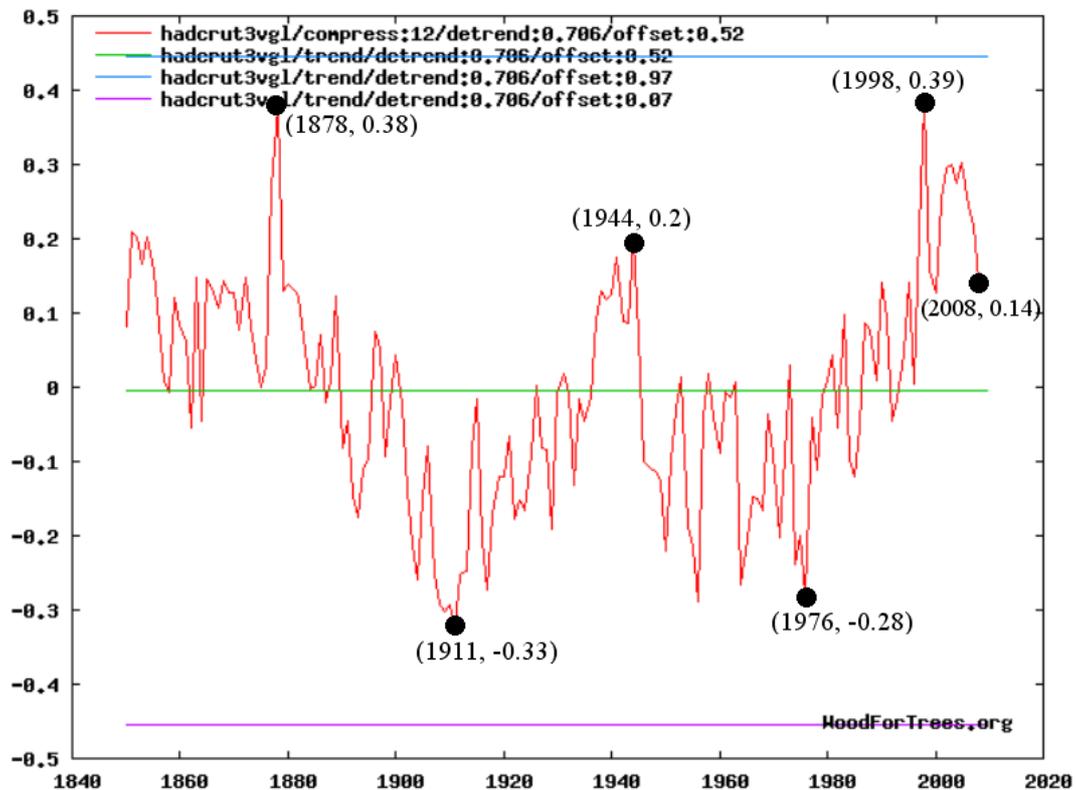
Figure 3. Oscillating anomaly in deg C for Hadley Centre data.

The above plot clearly shows the following shifts in mean global temperatures:

Global cooling by 0.71 deg C from 1878 to 1911, for 33 years.

Global warming by 0.53 deg C from 1911 to 1944, for 33 years.

Global cooling by 0.48 deg C from 1944 to 1976, for 32 years.

Global warming by 0.67 deg C from 1976 to 1998, for 22 years.

In addition to the data above that show cooling and warming phases of mean global temperature anomalies, there exist supporting documents that describe the climate of those periods in the media:

3

For the global cooling from 1878 to 1911, the headline in The New York Times on 24-Feb-1895 was PROSPECTS OF ANOTHER GLACIAL PERIOD.

For the global warming from 1911 to 1944, the headline in The New York Times on 15-May-1932 was Melting Polar Ice Caps to Raise the Level of Seas and Flood the Continents

For the global cooling from 1944 to 1976, the headline in Newsweek on 28-April-1975 was The Cooling World.

The above cooling and warming phases of mean global temperature anomalies are also supported in the literature by Nathan Mantua, Ph. D.:

Several independent studies find evidence for just two full PDO [Pacific Decadal Oscillating] cycles in the past century: "cool" PDO regimes prevailed from 1890-1924 and again from 1947-1976, while "warm" PDO regimes dominated from 1925-1946 and from 1977 through (at least) the mid-1990's (Mantua et al. 1997, Minobe 1997).

Figure 3 shows an oscillating anomaly of 0.39 deg C for 1998, which is of similar magnitude to the value of 0.38 deg C for 1878. As a result, the temperature maximum for 1998, after widespread use of fossil fuels, is not unusual.

To study whether there is any shift in mean global temperatures, Normal Probability Plot can be drawn for the oscillating anomaly. In the normal probability plot, if most of the oscillating temperature data points approximately lie on a straight line, they are then normally distributed.

For the oscillating anomaly data since 1850, the normal probability plot is shown below.
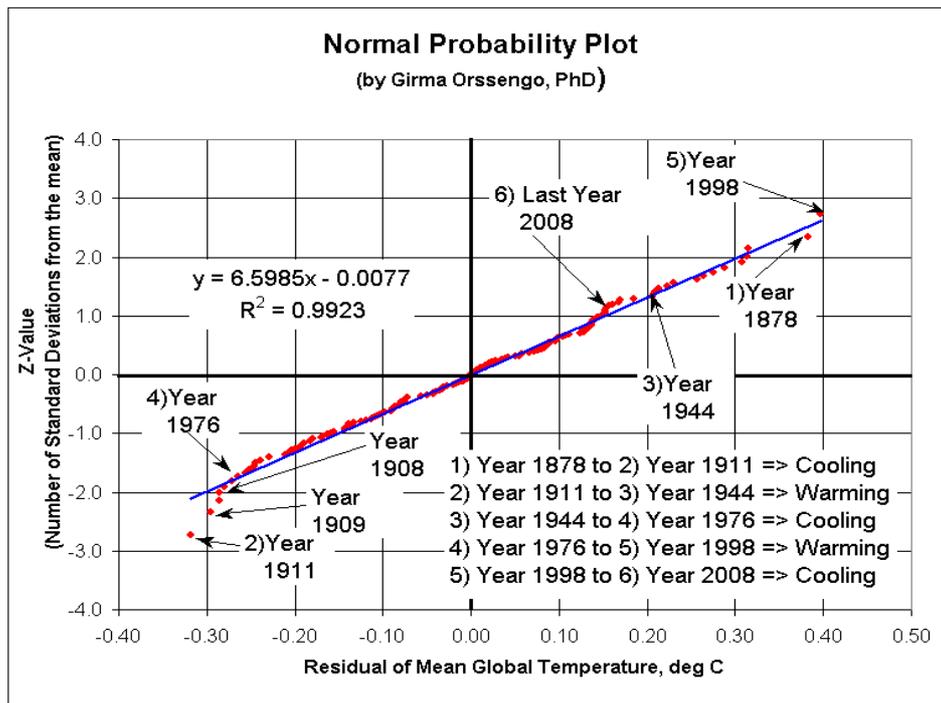
Figure 4. Normal probability plot for the oscillating (residual) anomaly.

Figure 4 shows most of the oscillating anomaly data points lie on a straight line with a high correlation coefficient of 0.9923. Out of the 159 data points, only two temperatures, for 1911 and 1909, are outliers, and this indicates shift in temperatures. However, as this shift occurred long before widespread use of fossil fuels, and a second similar global cooling occurred in the 1970s after the cooling in 1911, the cause of this shift is unlikely to be related to CO_2 emissions.

As the oscillating anomaly is normally distributed, we can calculate an upper and lower temperature limits for the oscillating anomalies. The reciprocal of the slope of the line in the normal probability plot is equal to the standard deviation, σ. Therefore, from Figure 4, $\sigma = 1/6.6 = 0.15$ deg C. For the oscillating anomalies, 99.73% of the data lie between +/- 3 σ = +/- 0.45 deg C. These upper and lower limit values envelop all the anomaly temperatures from 1850 to 2008 as shown in Figure 3.

From Figure 4, based on the 159 years data, global temperatures changed from a valley of –0.32 deg C to a pick of 0.4 deg C, a change of 0.72 deg C. As a result, mean global temperature increase from valley to pick (global warming), or decrease from pick to valley (global cooling), by 0.72 deg C is natural variation of mean global temperatures. Added to these oscillating temperatures, there is a linear global warming of 0.44 deg C/100 years.

From Figure 4, all the temperatures on the right hand side of the plot, which are related to global warming, all lie close to the straight line. As a result, there is no shift in global warming temperatures. No CO_2 fingerprint. None.

3. What is the trend in the mean global temperature anomaly at the moment?

5

In the plot for the oscillating anomaly below, look at the right end of the red anomaly curve for last year, 2008.
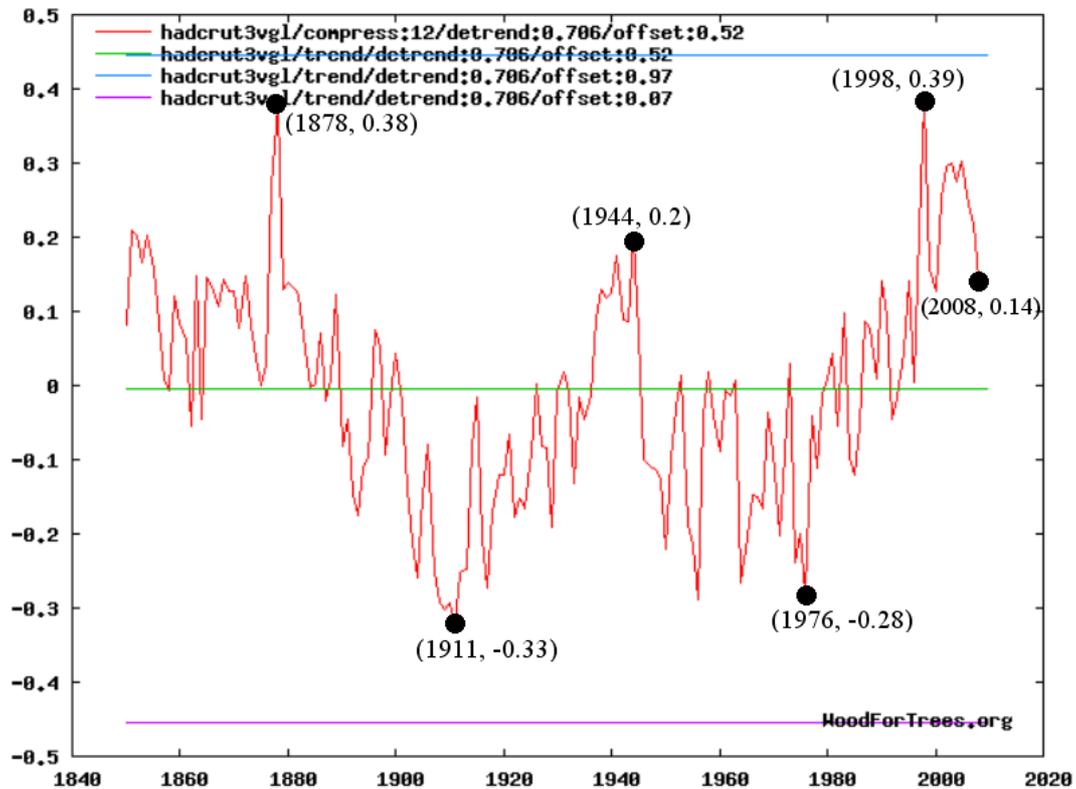
Figure 5. Oscillating anomaly in deg C for Hadley Centre data.

Look also at the right end of the green horizontal line for anomaly of 0 deg C. In the coming years, will the red anomaly curve move downwards towards the horizontal line and cross it, or will it do a 180-degree somersault and move away from the horizontal line to its previous maximum value, and then move to values greater than the previous maximum?

As the oscillating anomalies are normally distributed, the probability for the temperature to return to the maximum value of 1998 is less than 1%. The more probable case is to rely on historical patterns and the current trend. From Figure 5, for anomaly pattern after 1998, we use the anomaly pattern after 1878, with global cooling for 33 years. If this pattern is repeated, we will have about 22 more years of global cooling until about 2031, to anomaly temperature values similar to those in the 1970s, wiping out most of the increase in temperature during the last three decades of the last century.

From Figure 5, for 1998, near the end of the last century, the oscillating anomaly happened to be at its maximum; as a result, the increase in mean global temperature anomaly for the last century is the sum of 0.44 deg C from the linear warming and 0.39 deg C from the maximum oscillating anomaly, giving a value of 0.83 deg C. This increase in mean global temperature in the last century has caused natural global climate change.

6

It was unfortunate that the maximum of the oscillating anomaly occurred in 1998 near the end of the last century. This was just a coincidence. At the end of the last century, if the oscillating anomaly had been at its minimum, as in 1911 with an oscillating anomaly of –0.33 deg C, there would not have been any significant change in mean global temperature (0.44 – 0.33 = +0.11 deg C) in the last century. As a result, depending on whether we have the maximum or minimum oscillating anomaly coincide with the end of a century, we may have a global warming of 0.83 deg C or hardly any warming in a century!

Science is about the data. Science is not about consensus or authority.

The linear global warming of the last century was similar to that of two centuries ago. The oscillating warming by 0.67 deg C from 1976 to 1998 is as natural as the oscillating cooling by similar amount from 1878 to 1911. From Figure 4, there is no shift in mean global temperature anomaly in the last century as a result of CO2 emission. None.

CO2 driven global warming is not supported by the data.

Girma Orssengo, MASc, PhD
orssengo@lycos.com