# CAUSE AND EFFECT?

EXAMINING THE RELATIONSHIPS BETWEEN HUMAN ACTIVITY, CARBON DIOXIDE, AND TEMPERATURE.

A layman's application of the Scientific Method to the hypotheses that form the basis of the ideas behind Anthropogenic Global Warming (AGW) and "Climate Change".

by
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(Full version)

The purpose of this document is to assist ordinary people who may not have extensive scientific training, to understand the often confusing stories we see and hear in the media about "Climate Change" or Global Warming".

In the period following the "enlightenment" it was possible for serious and educated people to possess a wide range of knowledge of very diverse topics. With the explosion of knowledge, particularly in the past 100 years, each of us has found it a requirement for being successful, and to being able to earn a living, to concentrate our knowledge in an ever increasingly narrow field. Just as we have come to expect others to defer to our expertise in our narrow area, we have come to assume that we need to defer to others who have a deeper comprehension of seemingly complex topics such as the science related to climate change.

Although deferring to the opinions of "experts" who are much more knowledgeable than the average person, may sound like a good idea, when it comes to addressing the science that underlies such questions, this is not necessarily the case. Although this is "science", it is not "rocket science". As Dr Kary Mullis, who won the Nobel Prize for Chemistry in 1993, says in his book "Dancing Naked in the Mind Field"

> **"Scientists who speak out strongly about future ecological disaster and promote the notion that humans are responsible for any changes going on are highly suspect. Turn off the TV. Read your elementary science textbooks. You need to know what they are up to. It's every man for himself as usual, and you are on your own. Thank your lucky stars that they didn't bother to change their clothes or their habits. They still wear priestly white robes and they don't do heavy labor. It makes them easier to spot."**

In order to follow the advice of Dr. Mullis it is useful to take out our junior high school textbooks and reacquaint ourselves with the principles of "The Scientific Method" and then subject the hypotheses that form the underpinning of the AGW movement to the rigours of the Scientific Method. The Scientific Method is simple, and understandable when followed correctly, although it must always be applied rigorously, and without bias. No theory in science is ever above being questioned, or indeed being falsified. If this were not the case we would still believe the earth to be flat.

Applying the Scientific Method includes the following steps:

**1)** Observe (preferably empirical data).

**2)** Explain observation (hypothesis).

**3)** Test explanation by an experiment that evaluates the prediction of the hypothesis.

**4)** Analyze the results and draw a conclusion.

**5)** If steps 3) and 4) confirm the hypothesis, it may be on its way to being accepted as a scientific theory, provided that others are able to independently duplicate the results. If the experimental results do not confirm the hypothesis, it is necessary to return to steps 2), 3) and 4) and revise the hypothesis and/or the experiment until results and analysis demonstrate the accuracy of the hypothesis.

**6)** Openly publish the methodology of the experiment and the results and data. It is necessary to rigorously, openly, and without bias question all possible problems or reservations.

In science a single, ugly, fact can destroy a beautiful theory!

**The unproven "theory" of Anthropogenic Global Warming (AGW) is based on two hypotheses:**

**Hypothesis 1:** Increases in the total amount of "human-caused" $CO_2$ emissions released into the atmosphere (from less than 8 million metric tons in 1800 to more than 8000 million metric tons today) are the primary cause of the measured increase in $CO_2$ concentration in the atmosphere.

**Hypothesis 2:** The increased concentration of $CO_2$ in the atmosphere is the primary cause of an increase in average global temperatures.

## Testing Hypothesis 1

**Increases in the total amount of "human-caused" $CO_2$ emissions released in to the atmosphere are the primary cause of the measured increase in $CO_2$ concentration in the atmosphere.**

**Problem:** Do the annual "human-caused" $CO_2$ emissions (which have increased more than ten fold over the past 100 years) account for the annual measured increases in $CO_2$ concentration?

**Observation:** The proponents of AGW theory suggest that there is a 90% certainty that "human-caused" $CO_2$ emissions have overtaken natural climatic variations and have become the "driver" responsible for increased atmospheric $CO_2$ concentration (and elevated global temperatures). They also suggest that in order to stop, and hopefully reverse dangerous "Climate Change", mankind must collectively reduce its "carbon footprint" and dramatically reduce $CO_2$ emissions. The size of this effort has the potential to consume a large amount of both public and private resources and to dramatically alter the way societies and industries behave. It would be prudent to ensure that there is a reliable method of measuring whether or not any changes that are undertaken, or are mandated by governments, have the desired outcome.

**Method:** To examine this problem it is necessary to design an experiment that will provide data that documents the level of annual release of "human-caused" $CO_2$ emissions over a period of time, as well as data that reliably documents the level of $CO_2$ in the atmosphere over the same period of time. The analysis of such data must indicate some form of identifiable cause and effect relationship.

**Experiment:** This experiment has been in progress for quite some time. Various organizations have calculated the magnitude of "human-caused" $CO_2$ emissions. One of the most comprehensive studies of this activity has been done by the Carbon Dioxide Information Analysis Centre at Oak Ridge National Laboratory in Tennessee, USA and their data contains estimated figures for the release of emissions from the burning of solid, liquid and gaseous fossil fuels, plus cement production, and gas flaring going back as far as 1751. The data from this portion of the experiment is available at:

**The Carbon Dioxide Information Analysis Center (CDIAC)**
http://cdiac.ornl.gov/ftp/ndp030/global.1751_2005.ems

In January of 2009 a Japanese satellite named Ibuki (breath) was launched that will use a spectrometer that measures sunlight reflected from the Earth's surface and can detect changes in $CO_2$ concentration as small as one part per million. (Ironically, a launch failure means that a second, similar, NASA satellite will instead spend its life at the bottom of the ocean near Antarctica.) Over the last two hundred years, a number of scientists have documented the concentration of $CO_2$ in the atmosphere, but to date, the only significant longitudinal study with consistently measured data over a significant period of time is from

the National Oceanic and Atmospheric Administration Earth System Research Laboratory at Mauna Loa Hawaii, which has been collecting daily data on $CO_2$ in the atmosphere since 1958. The Mauna Loa Observatory (MLO) data from this portion of the experiment is available at:

**The Carbon Dioxide Information Analysis Center (CDIAC)**
http://cdiac.esd.ornl.gov/ftp/trends/CO2/maunaloa.CO2

**Results:** The data have been imported into an Excel spreadsheet from which the following graphs and charts have been created that focus on various aspects of the data.

**Chart 1** **Mauna Loa Observatory CO2 measurements, Monthly and 13 month smoothed data 1960 to 2007**

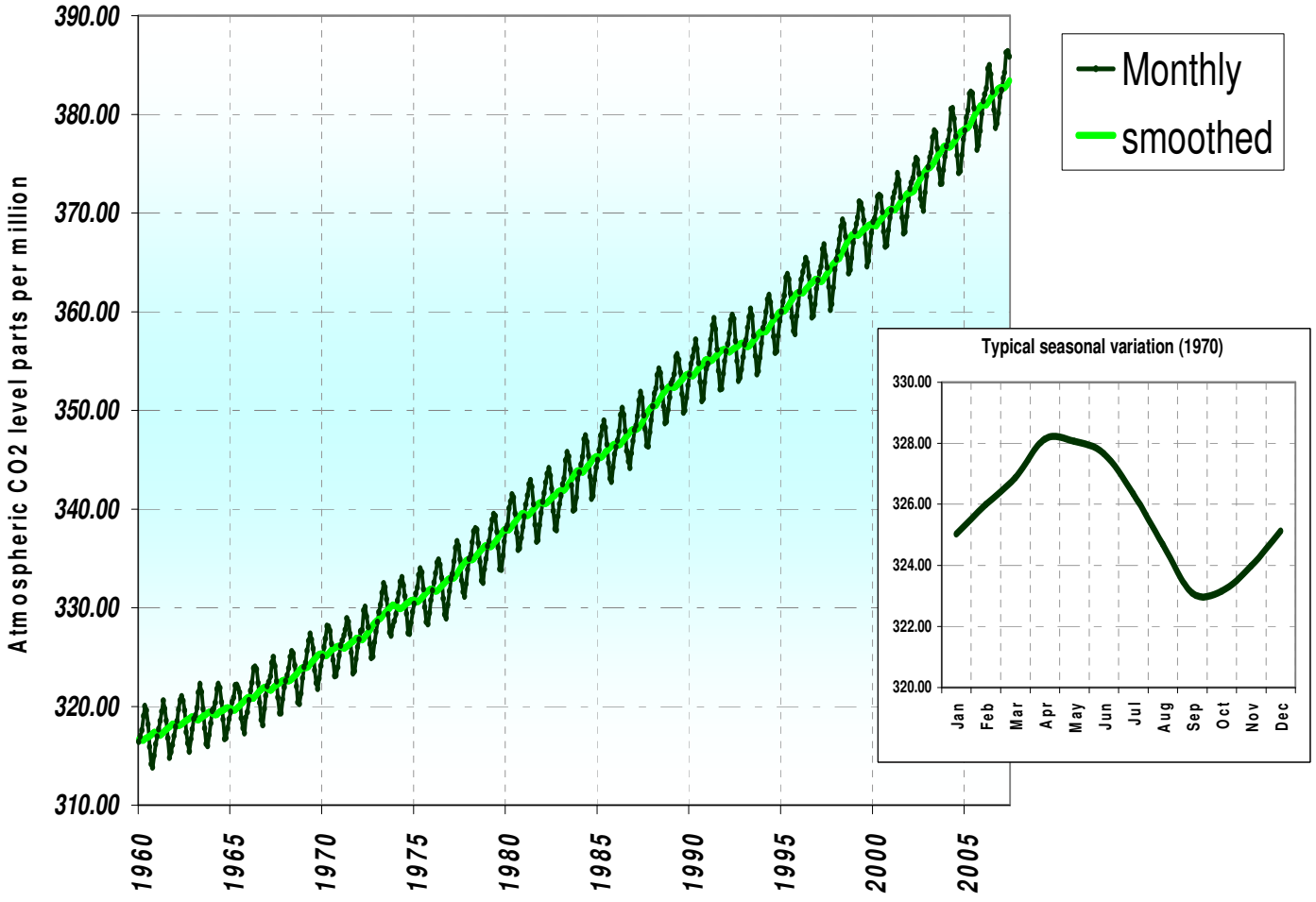


Chart 1 shows the change in measured increase in monthly $CO_2$ concentration in the atmosphere from 1960 to 2007 and notes the annual cyclical change. The scale on the left side of the above plot is parts per million of $CO_2$, from the MLO dataset. Over each year, the

monthly levels of $CO_2$ as measured by MLO vary seasonally by up to 4 or 5 parts per million (every year without any significant variation between years) or by about 0.004% of the atmosphere as a whole.

The smoothed figure is used to reduce "noise" in the monthly data in this case the "noise" appears to be a seasonal fluctuation. The smoothed figure used here are a 13 month smoothing. (Temperature data used in testing hypothesis 2 was smoothed in the same way.) The smoothing is calculated by adding six months prior and six months after a given month together and dividing the sum by 13. This is repeated for each month in the record. For clarity, the first and last 6 months of any data set smoothed using in testing hypotheses 1 and 2 have not been included, as there would not be 13 months to add together. Consequently the smoothed data sets are slightly shorter than the monthly data sets.

**Chart 2** MLO RoC month to month per year 1960 to 2007

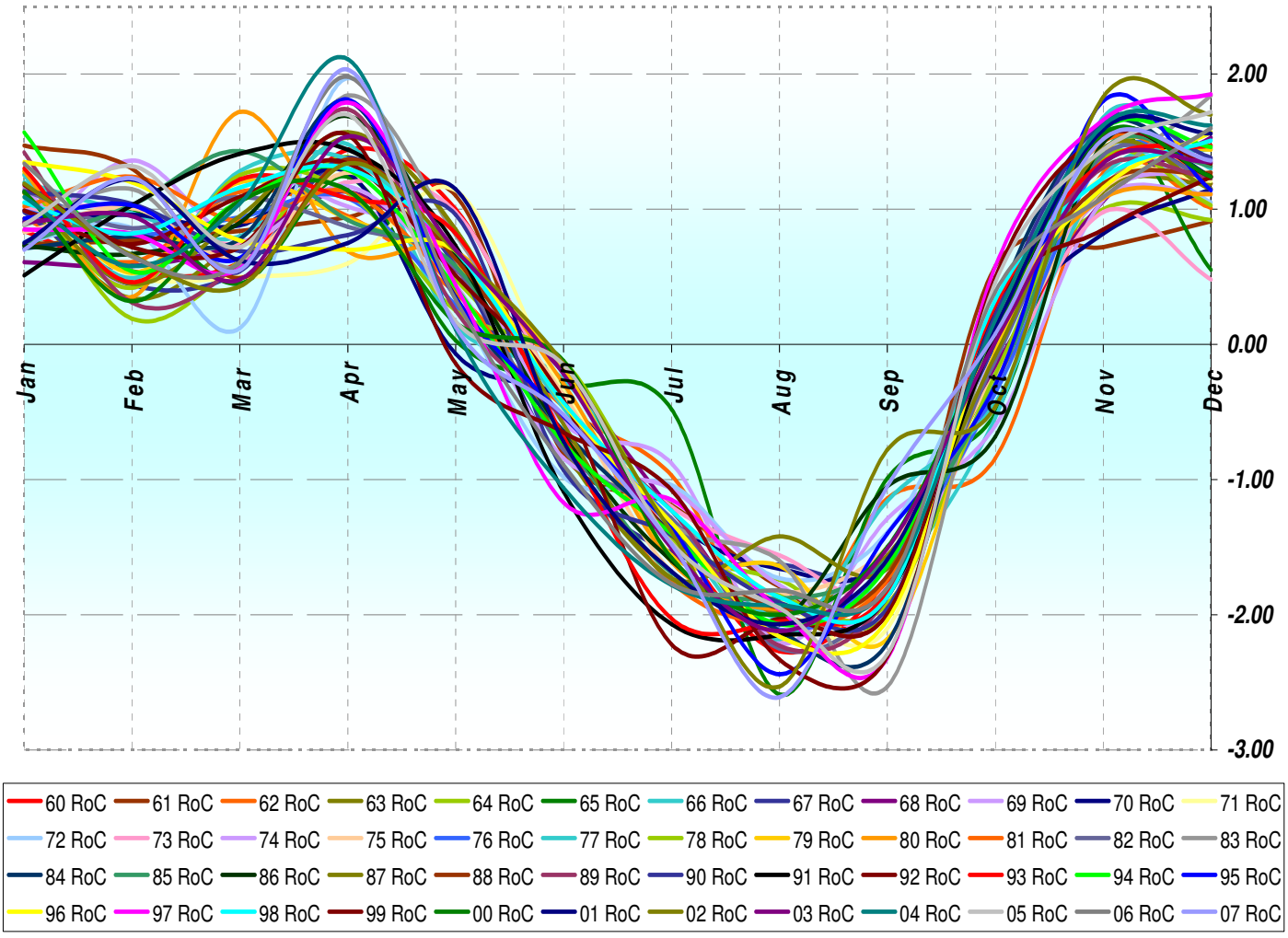


Chart 2 shows the month-to-month Rate of Change (RoC) in parts per million in $CO_2$ concentration in the atmosphere from 1960 to 2007 as measured by MLO. Each year is plotted on the chart as a single line, so on this plot there are 47 separate lines. The RoC is

defined as follows: If in January of a year the monthly measurement was, for example, 350 and in February 351, and in March 353, then the RoC for February would be 351 minus 350, or +1, and for March the RoC would be 353 minus 351 or +2. January's RoC is calculated by subtracting the previous December's figure. Each year can then be plotted as a single line of RoC from month to month.

**Chart 3**

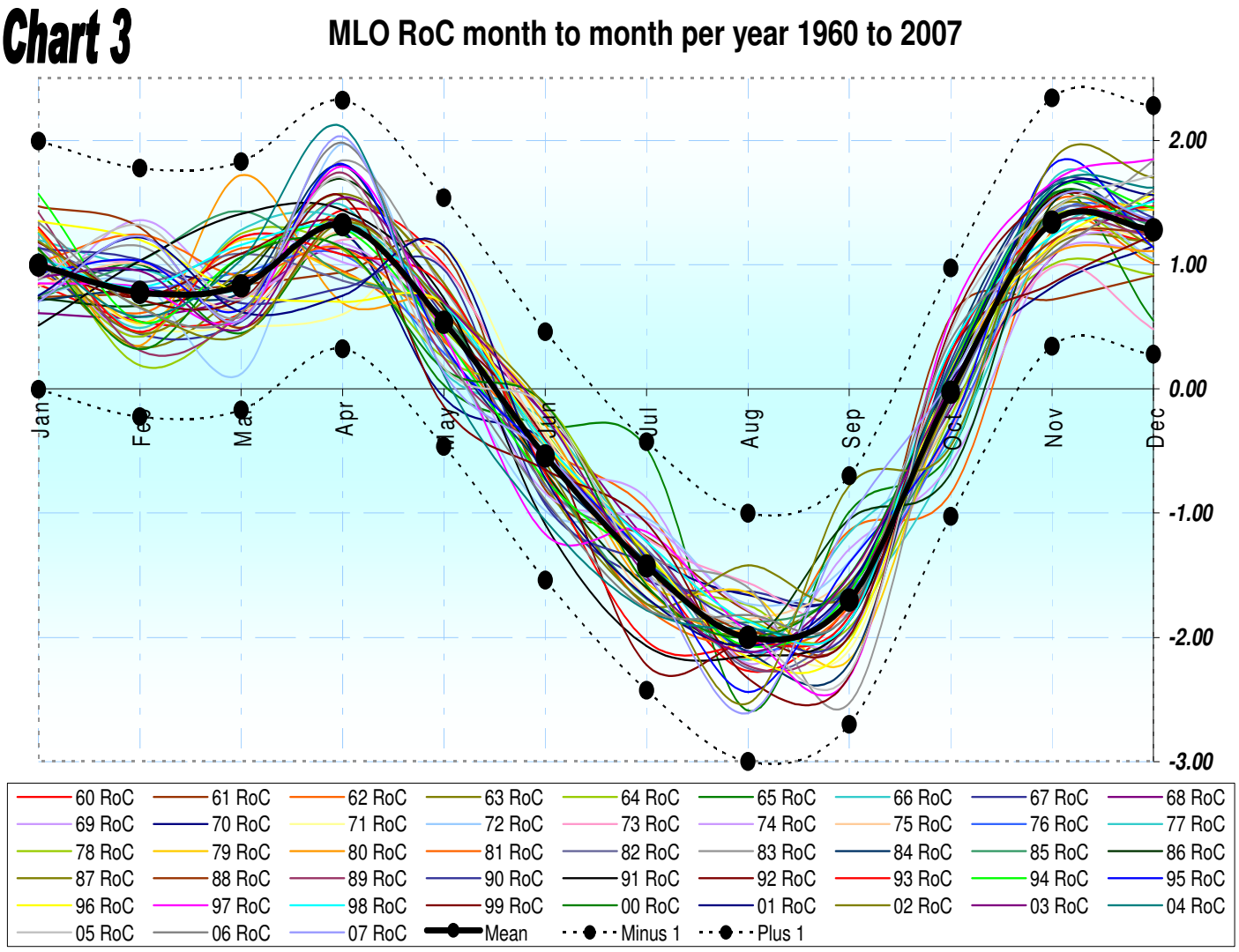


Chart 3 is Chart 2 repeated, but with the individual year RoCs plotted with thin lines. All 47 years are plotted. The mean of all 47 monthly figures for each month has been added. This has produced the thick black mean line on the plot. Then 1 was added and subtracted to each month's mean figure, these +1 and -1 lines are plotted as the dashed upper and lower black lines. In the 47 year record there is not a single outlier. This shows that in the MLO record all the monthly RoCs have varied less than plus or minus one part per million.

# Chart 4

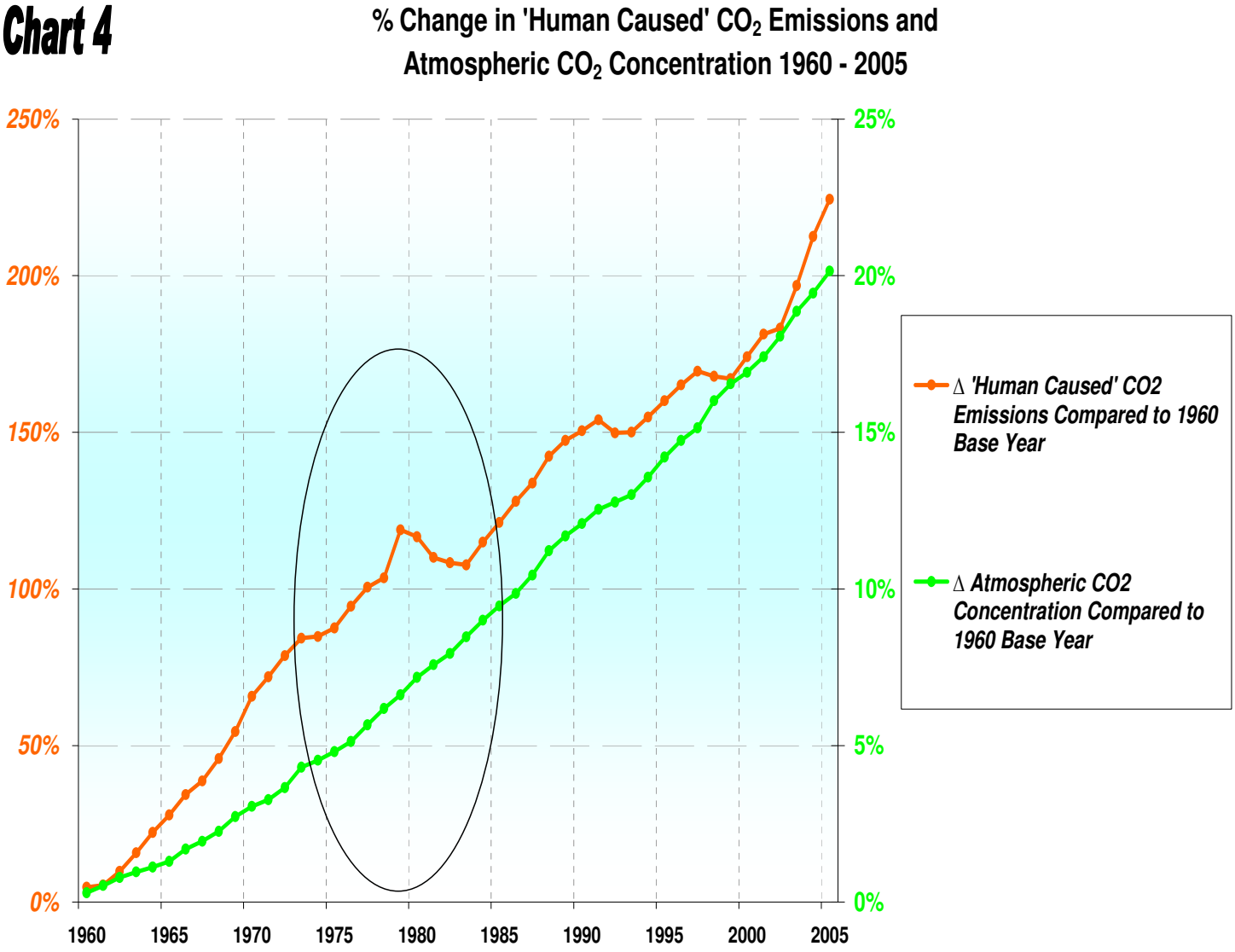


Chart 4 shows the annual percentage change (beginning in the base year of 1960) in the "human-caused" $CO_2$ emissions and in the atmospheric $CO_2$ concentration from 1960 to 2005. Over this 45 year period, "human-caused" $CO_2$ emissions have risen by 224% (from 2,576 million metric tonnes of Carbon in 1960 to 7,985 million metric tonnes of carbon in 2005). In the same period the atmospheric $CO_2$ concentration has risen by 20% (from 316.91 to 379.67 ppm). The highlighted section of the graph draws attention to period of time when the "human-caused" $CO_2$emissions declined for 4 consecutive years.

# Chart 5

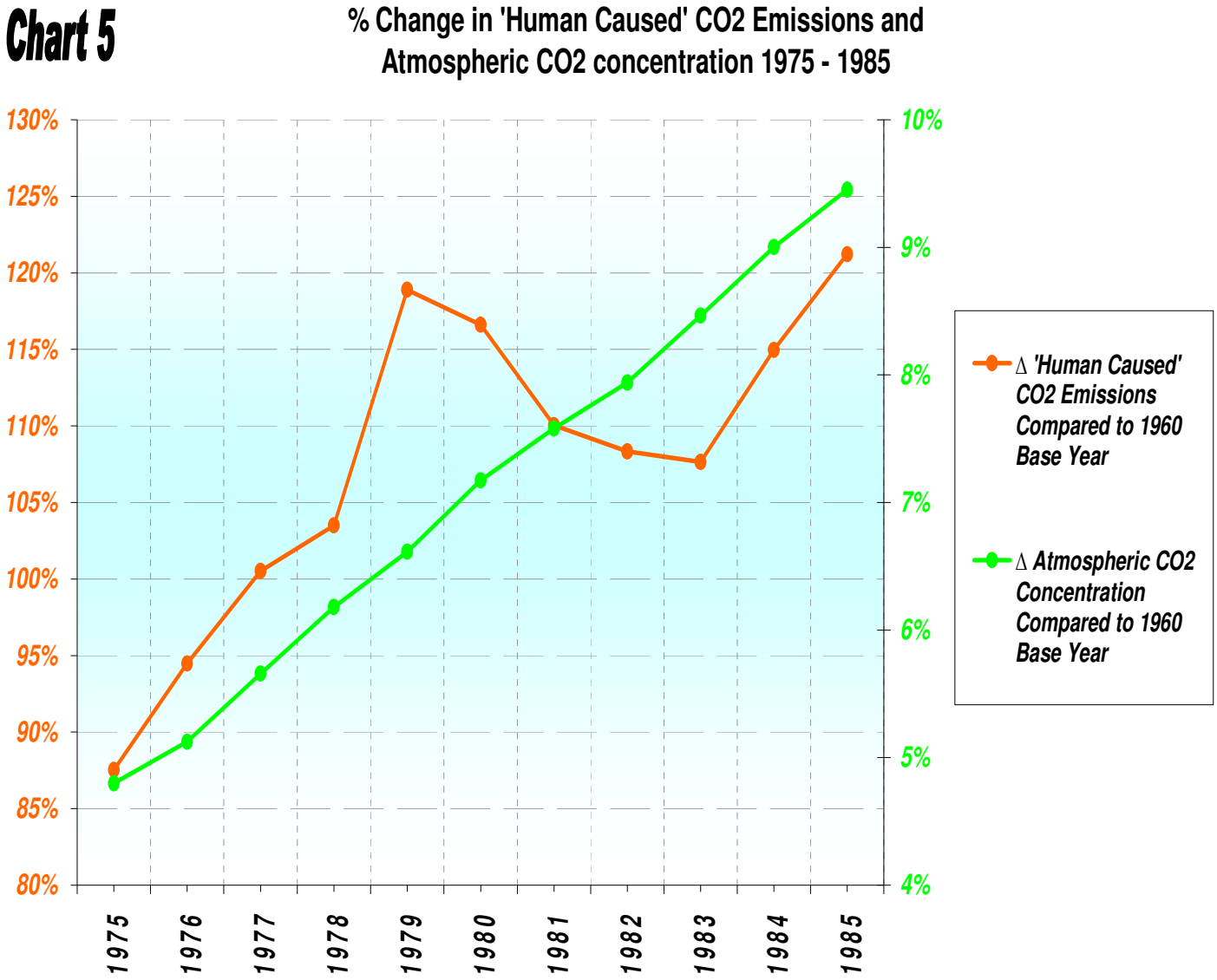


Chart 5, which concentrates on the highlighted section of the previous chart, shows the annual percentage change (beginning in the base year of 1960) in the "human-caused" $CO_2$ emissions, and in the atmospheric $CO_2$ concentration from 1975 to 1985. Over this 10 year period, "human-caused" $CO_2$ emissions rose 33% (from 88% to 121%) from the 1960 base year value, while the atmospheric $CO_2$ concentration rose 4.7% (from 4.8% to 9.5%) from the 1960 base year value.

**Analysis:** Chart 1 demonstrates that in the 45 year period from 1960 to 2005 the atmospheric concentration of $CO_2$ has risen 20% (from 316.91 to 379.67 ppm) or an average annual rate of 0.44%, or 1.39 ppm, but that in each of the 45 years there have also been seasonal or month-to-month variations of as much as 5 ppm as measured at the Mauna Loa Observatory.

Chart 2 demonstrates that the measurement system in place at Mauna Loa is apparently capable of recording seasonal or month-to-month variations. Therefore any changes in "human-caused" emissions, if they have a noticeable effect on atmospheric $CO_2$ concentration, should show up very quickly in the MLO record. MLO states that the accuracy of their measurements is within 0.1 ppm.

Chart 3 shows the difference between the average concentration recorded in any two months has been no more or less than + or -1 ppm different than the difference between the same two months in any other of the 47 years. This indicates that the rate of change (RoC) of the atmospheric $CO_2$ concentration has remained virtually constant over the 47 years at an average increase of 0.44% per year which is an incredibly consistent rate of change!

The data also indicate that the annual variance in atmospheric $CO_2$ concentration is greater than 4 ppm and that the average annual increase in atmospheric $CO_2$ concentration represents approximately 35% of the annual, seasonal variation in atmospheric $CO_2$ concentration.

Chart 4 demonstrates that in this 45 year period the atmospheric $CO_2$ concentration has increased by 20% (from 316.91 to 379.67 ppm), or an average of 0.44% per year. Over the same period "human-caused" $CO_2$ emissions have increased by 224% (from 2,576 to 7,985 million metric tonnes of carbon) or an average of 4.97% per year. Not only is the average annual rate of change of "human-caused" $CO_2$ emissions more than 10 times the average annual rate of change in atmospheric $CO_2$ concentration, there is a significant variation (as noted in the highlighted portion of the graph) in the amount of "human-caused" $CO_2$ emissions released in different years.

It is certainly possible that a 10% increase in the release of "human-caused" $CO_2$ emissions yields only a corresponding 1% increase in the $CO_2$ concentration, but since the MLO measuring system is apparently capable of recording seasonal or month-to-month differences in $CO_2$ concentration as small as 0.1 ppm, then if there is a cause and effect relationship between the release of "human-caused" $CO_2$ emissions and atmospheric $CO_2$ concentration, there should be at least some measurable decline in the $CO_2$ concentration during an extended period when there is a reduction in the amount of "human-caused" $CO_2$ emissions.

Moreover, if such a link can not be demonstrated, then there can be no confidence that if mankind were to implement a global regime that significantly reduced the annual amount of $CO_2$ emissions, we could reasonably expect to see a measurable decrease in the measured atmospheric $CO_2$ concentration.

Chart 5 which is an expanded portion of the highlighted section of Chart 4, demonstrates that over the 4 year period from 1979 to 1983, while the annual output of "human-caused" $CO_2$ emissions declined by 11% (or an average of 2.75% per year), atmospheric $CO_2$ concentration increased by 1.86% (or an average of (the still virtually unchanged) 0.46%.

In addition, the above graphs clearly demonstrate that the data indicate no change in the slope of the atmospheric $CO_2$ concentration plot, and there is also not any delay (over the entire period of the data) in recording any cause of an increase in atmospheric $CO_2$ concentration as a result of either "human-caused" or natural $CO_2$ emissions. This would indicate that even though the total annual output of "human-caused" $CO_2$ emissions has risen to more than 8 million metric tons of carbon today, this amount of additional $CO_2$ is undetectable in the MLO dataset and does not even show up as "noise" in the monthly and seasonal fluctuations that remain extremely predictable from year to year.

**Conclusion:** The proponents of AGW hypotheses suggest that in order to stop and hopefully reverse dangerous "Climate Change" mankind must collectively reduce its "carbon footprint" and dramatically reduce the annual production of $CO_2$ emissions. Given these data, there is no reason to expect that if humans were to be successful in curtailing the total of the global annual "human-caused" $CO_2$ emissions there would be any reduction at all in the level of atmospheric $CO_2$ concentration.

At no point over the time when data is available is it possible to show a period of time when atmospheric $CO_2$ concentration declined except for small and very predictable and repeated seasonal fluctuations.

In spite of the fact that atmospheric $CO_2$ concentration does decline when seasonal changes reduce the amount of $CO_2$ released into the atmosphere from more "natural" causes, at no point during the period when data is available, can a time be identified when, or after, "human-caused" $CO_2$ emissions have declined, that there has been a measurable decline in atmospheric $CO_2$ concentration.

If national economies and resources are stressed further by a natural climatic cooling phase (as may be about to happen) humans could end up having to cope with the exact opposite problem than the AGW hypotheses and its associated Global Climate Models (GCMs) predict. We will after all have been "preparing" for a climatic warming according to an unproven hypothesis that is not occurring. At the same time humans would be failing to prepare for, and adapt to, yet another inexorable cooling cycle that we know has been responsible in the past for much more human misery and death (as a result of cold temperatures and reduced food production) than has been the case for periods of warmer climate conditions.

The notion that atmospheric $CO_2$ concentration has overtaken "other" natural factors as the "driver" of elevated atmospheric $CO_2$ concentration is also not supported by the data. While there may be many good reasons why it would be wise to reduce our reliance on fossil fuels and to conserve energy, the data and the Scientific Method demonstrate the expectation that such a policy is likely to reduce atmospheric $CO_2$ concentration is not one of them.

Hypothesis 1 fails. Q.E.D.

## Testing Hypothesis 2

**The increased concentration of $CO_2$ in the atmosphere is the primary cause of an increase in average global temperatures.**

**Problem:** Is the increased concentration of $CO_2$ in the atmosphere the primary cause of an increase in average global temperatures?

**Observation:** The proponents of AGW hypotheses suggest that there is a 90% certainty that the underlying cause of increased temperatures in the latter part of the 20th century has been a rise in the atmospheric concentration of $CO_2$. They also suggest that in order to stop, and hopefully reverse dangerous "Climate Change", mankind must collectively reduce its "carbon footprint" and dramatically reduce $CO_2$ emissions. Even if we were to assume that "human-caused" $CO_2$ emissions were responsible for increased atmospheric $CO_2$ concentration, it would be important to understand any evidence of a "cause and effect" relationship between atmospheric $CO_2$ concentration and temperature. The size of this effort recommended by the supporters of this hypothesis has the potential to consume a large amount of both public and private resources and to dramatically alter the way societies and industries behave. It would be prudent to ensure that there is a reliable method of measuring whether or not the changes in the "average global temperature" can be correlated with changes in atmospheric $CO_2$ concentration.

Measuring a global mean temperature is at best "problematic". At any location on the globe, daily temperature varies greatly. For instance how would one measure the mean temperature for a location in a desert? During the day the temperatures soar, and at night they plummet, so what is the significance of a "mean daily temperature"? Satellites take a more overall view, but any calculated mean is still a statistical product, being the result of the assumptions and methods used. A longer record is an improvement, as what is measured is the change over time using the same assumptions and methods so that at least the degree of change and sign are probably reasonably accurate.

Some datasets are known to have problems, such as the GISS dataset as a result of the "urban heat island effect" on many stations. The fact that there are a number of different organizations that regularly tabulate temperature data from around the globe and generate inconsistent datasets should in itself be a powerful piece of evidence that the science of climate change is clearly "not settled".

It is also noted that the analysis of ice core samples from both Greenland and Antarctica have demonstrated that during previous transitions from cooler to warmer climate conditions, increases in $CO_2$ concentration have typically occurred many years after increases in atmospheric temperature were recorded.

**Method:** To examine this problem it is necessary to design an experiment that will provide data that documents the level of $CO_2$ concentration in the atmosphere over a period of time, as well as data that reliably documents how global temperatures have changed over the same period of time. It will also be useful to examine how recorded temperatures in more recent years compare with the predictions of Global Climate Models (GCMs) used by the UN Intergovernmental Panel on Climate Change (IPCC). The analysis of such data must indicate some form of identifiable cause and effect relationship.

**Experiment:** This experiment has been in progress for quite some time. Over the last two hundred years, a number of scientists have documented the concentration of $CO_2$ in the atmosphere. To date, the only significant longitudinal study with consistently measured data over a significant period of time is from the National Oceanic and Atmospheric Administration Earth System Research Laboratory at Mauna Loa Hawaii, which has been collecting daily data on $CO_2$ concentration in the atmosphere since 1958. The Mauna Loa Observatory (MLO) data for this portion of the experiment is available at:

**The Carbon Dioxide Information Analysis Center (CDIAC)**
http://cdiac.esd.ornl.gov/ftp/trends/CO2/maunaloa.CO2

The Carbon Dioxide Information Analysis Center (CDIAC) is the primary climate change data and information analysis center of the U.S. Department of Energy (DOE). CDIAC is located at the DOE's Oak Ridge National Laboratory (ORNL) and includes the World Data Center for Atmospheric Trace Gases.

A number of temperature datasets are available for analysis and for this experiment the following datasets will be examined:

**Met Office Hadley Centre observation datasets**
Hadley Crut (HadCRUT) data available at:
http://hadobs.metoffice.com/hadcrut3/diagnostics/global/nh+sh/monthly

The basic dataset (HadCRUT) is a combination of land air temperature anomalies and sea surface temperature anomalies on a 5° x 5° grid-box basis. Both components of the dataset are expressed as anomalies from 1961-90, as this makes merging much easier. The dataset has been extensively used in the various IPCC reports (see, e.g., Nicholls et al., 1996).

P. Brohan, J.J. Kennedy, I. Harris, S.F.B. Tett and P.D. Jones, Uncertainty estimates in regional and global observed temperature changes: a new dataset from 1850. J. Geophys. Res, 111, D12106, doi:10.1029/2005JD006548. (pdf 1.2Mb)

**The NASA Goddard Institute for Space Studies (GISS),**
**at Columbia University in New York City.**
GISS data available at:
http://data.giss.nasa.gov/gistemp/tabledata/GLB.Ts+dSST.txt

The current analysis uses surface air temperatures measurements from the following data sets: the unadjusted data of the Global Historical Climatology Network (Peterson and Vose, 1997 and 1998), United States Historical Climatology Network (USHCN) data, and SCAR (Scientific Committee on Antarctic Research) data from Antarctic stations.

**Remote Sensing Systems**
RSS temperature data is available at:
http://www.remss.com/data/msu/monthly_time_series/RSS_Monthly_MSU_AMSU_Channel_TLT_Anomalies_Land_and_Ocean_v03_2.txt

RSS is a world leader in processing and analyzing microwave data collected by special satellite microwave sensors. The mission of the website is to provide research-quality geophysical data to the global scientific community.

**Atmospheric Science Department at the**
**University of Alabama in Huntsville.**
UAH data available at:
http://vortex.nsstc.uah.edu/data/msu/t2lt/uahncdc.lt

The predicted temperatures as projected by the IPCC computer models are available at:

**Intergovernmental Panel on Climate Change**
**Working Group 1: The Physical Basis of Climate Change.**

http://ipcc-wg1.ucar.edu/wg1/wg1-report.html
and
http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch10.pdf

The temperature projections are in table 10.5 in Chapter 10. To plot the IPCC's temperature projection over this time period (1980 – 1999) the mean for the HadCRUT 1 year triple centred smoothing was calculated to give the 1990 "starting point" of the IPCC temperature projection used here. Then the appropriate projected changes to 2020 were simply added to the starting point.

The relationship between atmospheric $CO_2$ concentration and temperature from the Vostock ice cores is available at:

**The Carbon Dioxide Information Analysis Center (CDIAC)**

ftp://cdiac.ornl.gov/pub/trends/CO2/vostok.icecore.CO2
and
ftp://cdiac.ornl.gov/pub/trends/temp/vostok/vostok.1999.temp.dat

**Results:** The referenced MLO, HadCRUT, GISS, RSS, UAH and Vostock Ice Core data have been imported into an Excel spreadsheet from which the following graphs and charts have been created that focus on various aspects of the data.

**Chart 6**

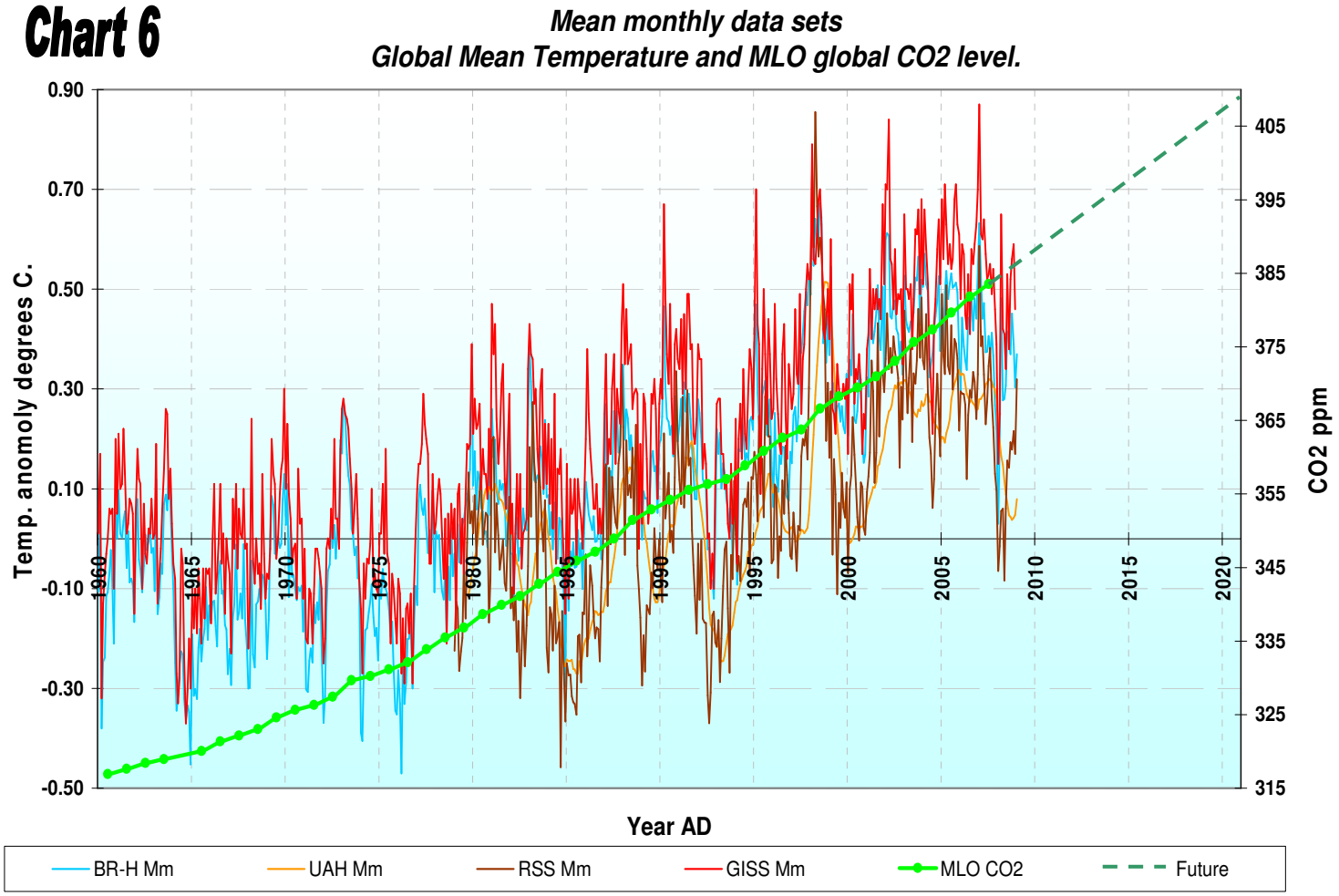


Chart 6 is repeated below using (13 month) smoothed data for each of the temperature data sets.

# Chart 7

***Smoothed***
***Global Mean Temperature and MLO global CO2 level.***

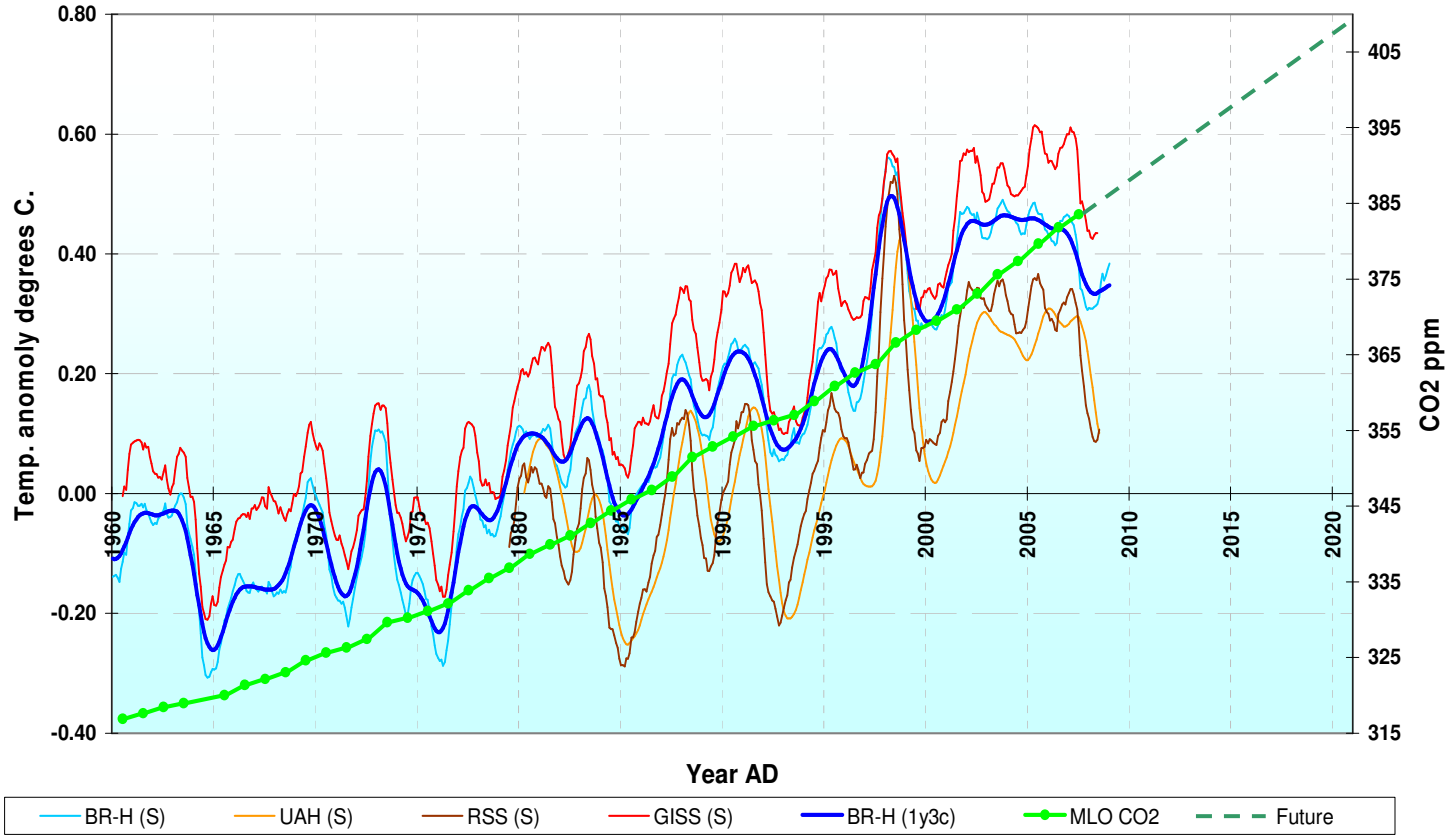


Chart 7shows the plot of atmospheric $CO_2$ concentration from the MLO data (green line) over the period from 1960 to 2008. A separate, dashed, (dark green) portion of this line on the graph projects what the atmospheric $CO_2$ concentration would be for the period until the year 2020 if this concentration continues to rise with the exact same annual average that it has faithfully risen by in each of the years since measurements began at Mauna Loa in 1958. This same chart plots the temperature anomaly for the period from 1960 to 2008 as recorded by the various datasets (thin coloured lines) referenced above. The thicker blue line is a I year, triple centred, smoothed HadCRUT plot.

# Chart 8

***Smoothed Global Mean Temperature, MLO global CO2 level, and IPCC temperature projections.***

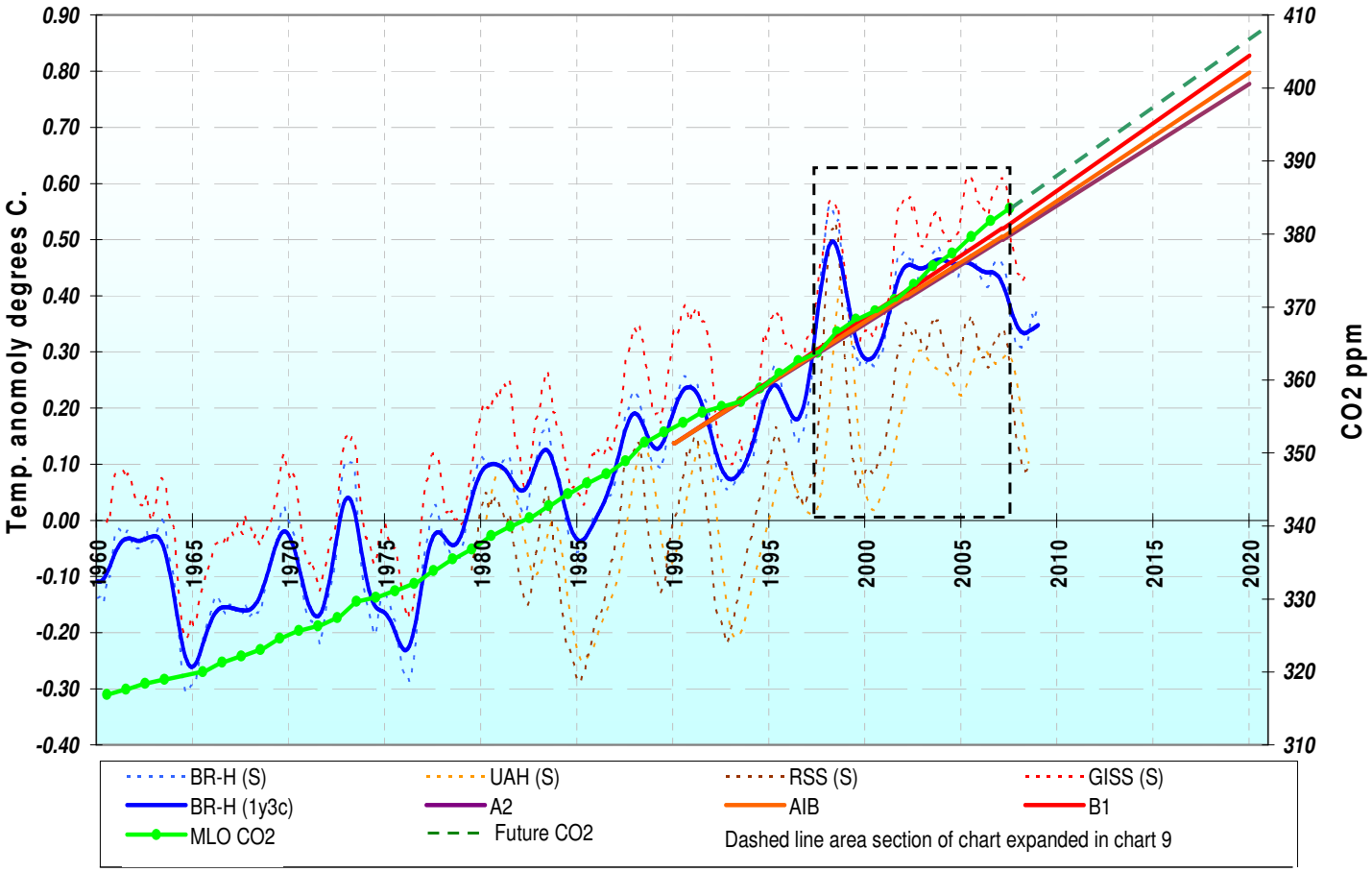


Chart 8 includes plots of the projected A2, A1B and B1 temperature anomalies projected for the period from 1990 to 2020 by the IPCC computer models as reported in the IPCC AR4 report of 2007.

The highlighted section of Chart 8 draws attention to a 9 to 10 year period of time when the "Global Mean Temperature" has not risen or declined significantly. The period indicated by the black dashed box is from May 1997 to January 2008.

**Chart 9** *Smoothed Global Mean Temperature, MLO global CO2 level and IPCC temperature projections from January 2002 to June 2007*

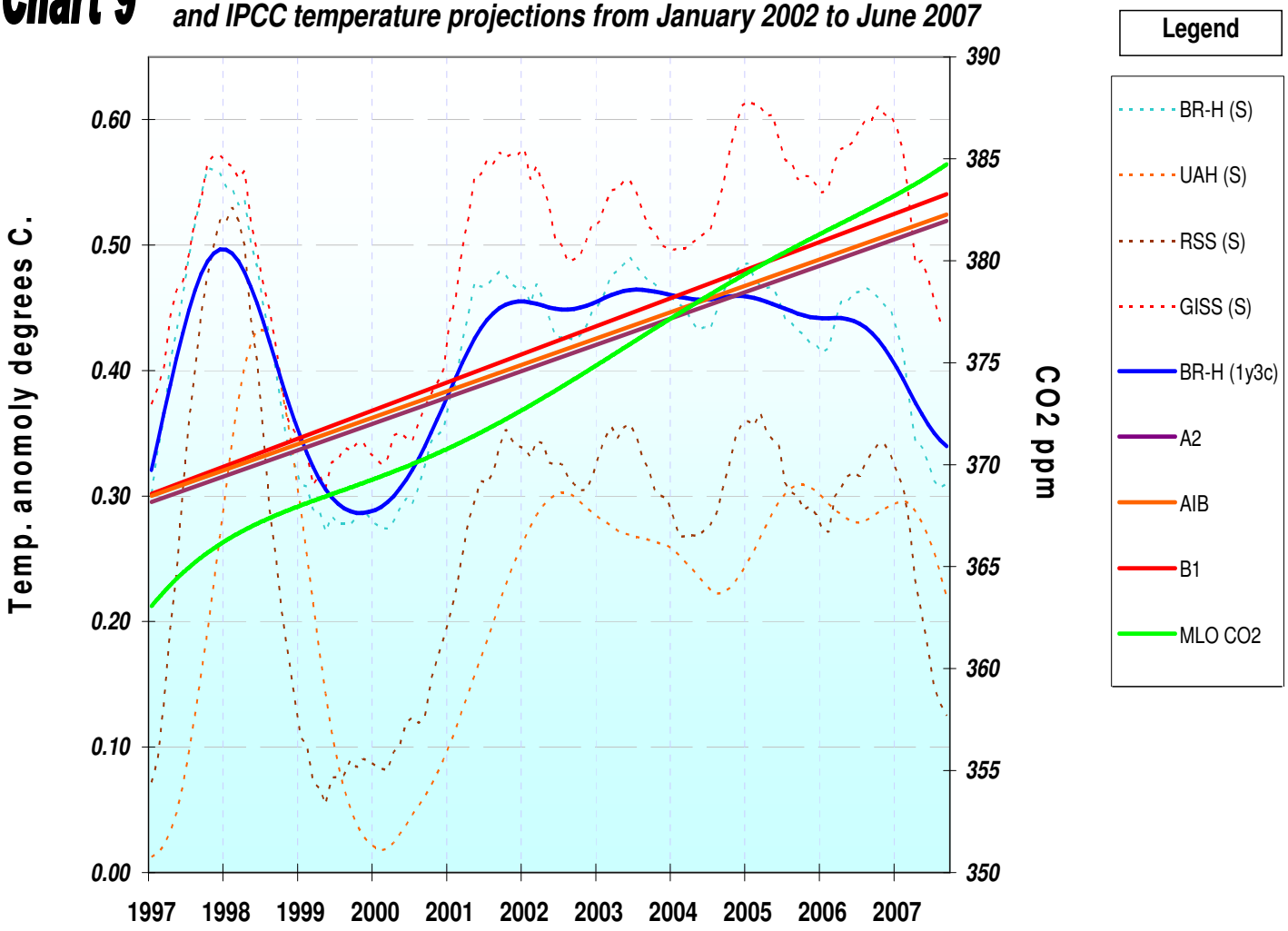


Chart 9 concentrates on the highlighted section of Chart 8 and shows the plot of atmospheric $CO_2$ concentration from the MLO data over the period from 1997 to 2008. The temperature anomalies from the four datasets are also plotted along with the IPCC projected temperature changes.

# Chart 10

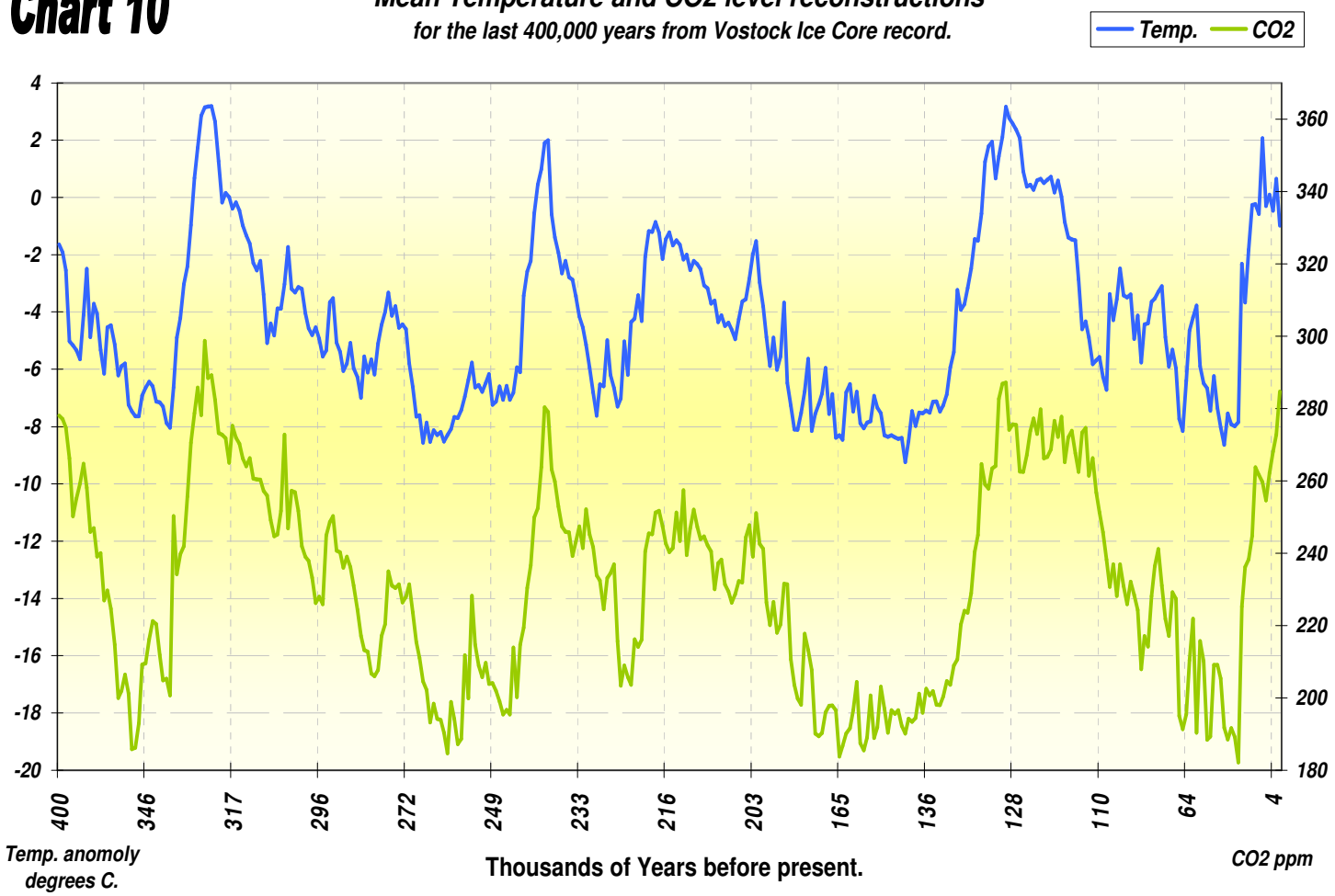


Chart 10 is a Plot of Temperature and $CO_2$ concentration reconstructions from Vostock ice cores. The vertical scaling has been adjusted so that the plots do not overlap.

# Chart 11

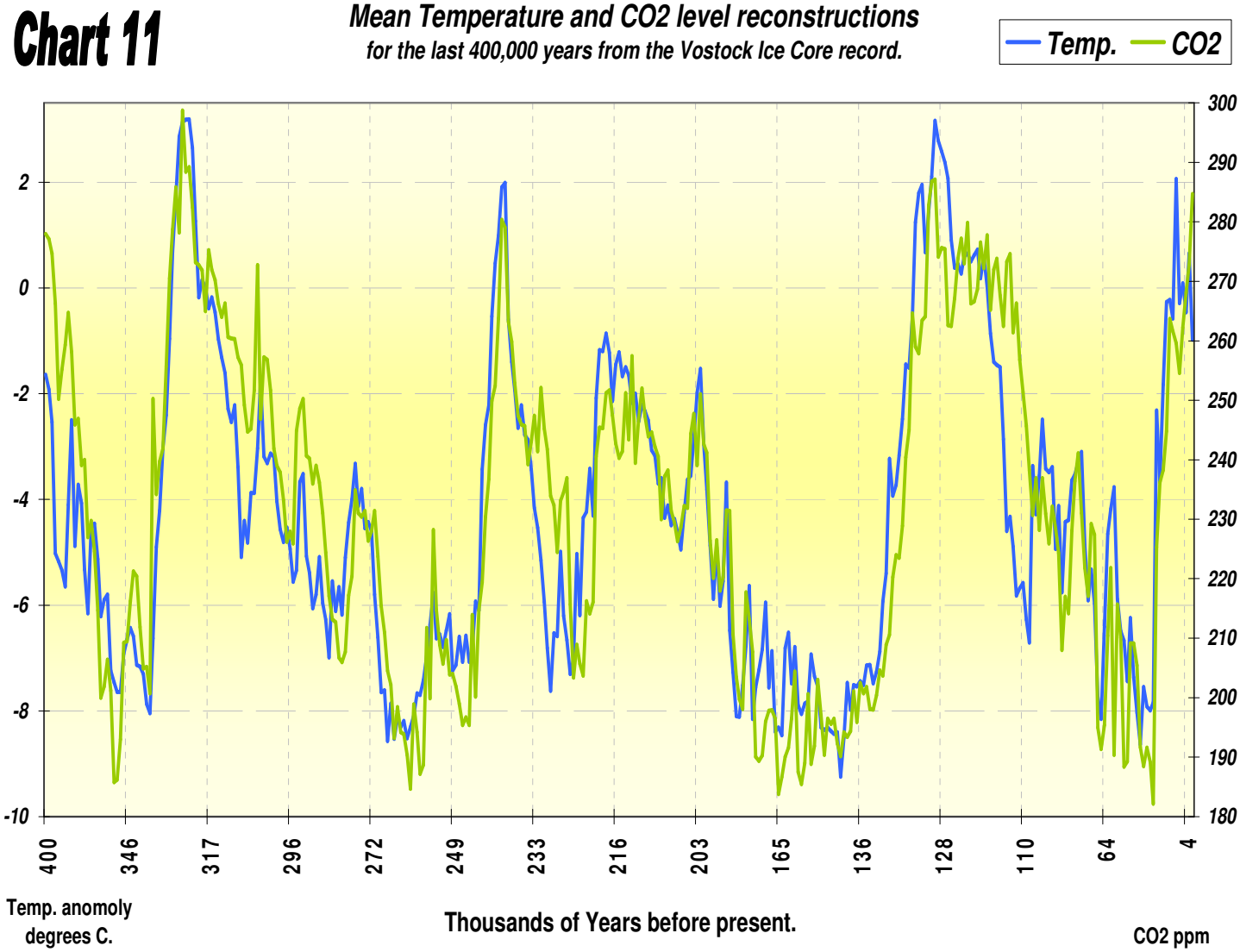


Chart 11 is Chart 10 repeated with the vertical scales altered to overlap the plotted data sets for temperature and $CO_2$, as reconstructed from the ice cores.

**Analysis:** Chart 6 and Chart 7 demonstrate that there is in reality very little correlation between Global Mean Temperature and atmospheric $CO_2$ concentration, at this timescale. The second hypothesis of AGW that is being examined here states that it is a rise in atmospheric $CO_2$ concentration that is the cause of increased Global Mean Temperatures, and that in order to reduce the Global Mean Temperature in the future it is necessary to reduce the atmospheric $CO_2$ concentration.

The data (Charts 8 and 9) demonstrate that Global Mean Temperatures have been declining for a five to seven year period, while the atmospheric $CO_2$ concentration has continued to rise at virtually the same average rate that it has over 50 years of data collection. The establishment of a “cause and effect” relationship is severely undermined.

This does data does not prove that there is no link between atmospheric $CO_2$ concentration and Mean Global Temperature. The data does however demonstrate that it is disingenuous at best for promoters of the hypothesis to point to periods of time when atmospheric $CO_2$ concentration and Mean Global Temperatures are both rising, and to claim that this correlation provides evidence of causation. The question of why increasing atmospheric $CO_2$ concentration from 2002 to 2009 no longer continues to cause an increase in Global Mean Temperatures remains to be answered.

Chart 8 demonstrates that the average global mean temperature, as measured by the different datasets, has not been increasing as predicted by the IPCC forecasts. Moreover, during the ten year period after 1998 when the annual global temperature ceased to rise, the concentration of $CO_2$ in the atmosphere has continued to rise each year at the same amount it has increased every year since the initial Mauna Loa readings were recorded in 1958.

Chart 9 simply focuses on the highlighted portion of Chart 8 and serves to demonstrate how during this period the atmospheric $CO_2$ concentration and the IPCC GCMs model predicted temperatures have a positive slope, while the various mean global temperature datasets have the opposite slope, which undermines the notion of cause and effect

Chart 10 plots the reconstructed atmospheric $CO_2$ concentration and temperature curves from the Vostock ice core samples, separated by scaling.

Chart 11 overlays the curves in Chart 10 in order to highlight that historical ice core records have established that increases in atmospheric $CO_2$ concentration follow increases in temperature by approximately 800 years! This is most likely because of the amount of time required before the temperature of the vast amount of water in the earth's oceans could rise to the point where the oceans would give off additional $CO_2$ that would be released into the atmosphere.

The data clearly show that the Global Climate (computer) Models, used by the IPCC, predict that Global Mean Temperatures should continue to rise as long as the atmospheric $CO_2$ concentration continues to rise. The fact that measured Global Mean Temperatures actually exhibit the opposite slope during approximately the past decade, (the only period when such models have been available to evaluate) calls into question the accuracy and reliability of these GCMs.

The factors influencing local and regional weather are so complex and incompletely understood that the most sophisticated computer models are incapable of yielding predictions for a week hence that are any more reliable than a random chance prediction. Needless to say, in order for the IPCC's GCMs to even attempt to make "Global" predictions, they must by nature be infinitely more complex than any models used to predict local or regional weather. Nevertheless, supporters of the AGW hypotheses and, even the IPCC itself, expect the public to believe that the GCMs used to support their position can be relied upon with a confidence level of 90% to predict the impact

of increased atmospheric $CO_2$ concentration on Global Mean Temperature 50 years or more in the future. The available data and the track record of the GCM models, since they have been available, in yielding modelled results that conform to actual experience unequivocally undermines the value and efficacy of these models and reduces them to the category of GIGO more commonly known in the information technology world as "garbage in – garbage out".

**Conclusion:** The proponents of AGW hypotheses suggest that the escalation of the concentration of $CO_2$ in the atmosphere is the cause of increasing Global Mean Temperatures. The data shows that there is no proven or demonstrated "cause and effect" relationship between atmospheric $CO_2$ concentration and Global Mean Temperature. The "evidence" cited to support the hypothesis is the projections of the IPCC Global Climate Models (GCMs). During the short period of time since the release of these projections, the data indicates that the Global Mean Temperature, rather than rising as predicted by the GCMs, has instead been falling.

The only available empirical evidence indicates that increases in atmospheric $CO_2$ concentration follow increases in temperature by on average 800 years and that recently measured increases in atmospheric $CO_2$ concentration are very likely the "effect" of a prior warm period. Historical, geological, and other evidence indicates that during what became known as "The Medieval Warm Period", approximately 800 years ago, Global Mean Temperatures were as much as 3 or 4 degrees Celsius warmer than today. Given these data, there is no reason to expect that the Global Mean Temperature is driven by changes in atmospheric $CO_2$ concentration.

Moreover, there is no reason to expect that if humans were to be successful in curtailing the total of the global annual "human-caused" $CO_2$ emissions there would be any reduction at all in the level of atmospheric $CO_2$ concentration or any impact on Global Mean Temperatures.

If national economies and resources are stressed further by a natural climatic cooling phase (as may be about to happen) humans could end up coping with the exact opposite problem than the AGW hypotheses and their associated GCMs predict. We will after all have been "preparing" for a climatic warming according to an unproven hypothesis (AGW) that is not occurring.

At the same time humans would be failing to prepare for, and adapt to, yet another inexorable cooling cycle that we know has been responsible in the past for much more human misery and death (as a result of cold temperatures and reduced food production) than has been the case for periods of warmer climate conditions.

The notion that atmospheric $CO_2$ concentration has overtaken "other" natural factors as the "driver" of elevated atmospheric $CO_2$ concentration is also not supported by the data. It is disingenuous at best for promoters of this hypothesis to suggest that temperature increases that may be associated with natural phenomenon (such as El Niño – La Niña cycles) are attributable to

increased atmospheric $CO_2$ concentration, when over the entire El Niño – La Niña cycle, when Global Mean Temperatures increase and then fall, there is no identifiable change in the sign or slope of atmospheric $CO_2$ concentration.

While there may be many good reasons why it would be wise to reduce our reliance on fossil fuels and to conserve energy, the data and the Scientific Method demonstrate the expectation that such a policy is likely to reduce Global Mean Temperatures is not one of them.

Hypothesis 2 fails. Q.E.D.

Notes:

**A.** What is truly scary is the potential of this belief system to severely undermine the credibility of science and scientists, along with a huge and long term risk of undermining the public support for crucial financial commitment to other important scientific efforts. The "scientists" who have failed to understand the importance of applying the scientific method to the testing of this hypothesis, or who have abandoned the Scientific Method because of potential enhancement of their own narrow interest in career advancement, attention, prestige, grants, wealth, or whatever, will have been responsible for undermining of the credibility of science. It will however, be all scientists who will pay the price of the public's scorn for those who have abused their trust and supported unsupportable hypotheses and financial schemes that are ultimately paid for by the public.

**B.** Individuals interested in learning more about the perils of failing to apply the rigour of the Scientific Method to the investigation of such matters may also be interested in reading the address to the 1974 commencement class at Caltech by one of the world's most famous physicists – Richard Feynman. Dr. Feynman's ability to explain complex phenomena in terms that were understandable by virtually anyone was legendary. His 1974 commencement address entitled "Cargo Cult Science" can be found in his book Surely You're Joking, Mr. Feynman! and is also available at:
http://wwwcdf.pd.infn.it/~loreti/science.html

**C.** There is another important hypothesis that the AGW movement and the IPCC rely on which has not been covered in this paper. This is the notion that the "Greenhouse effect" is a valid idea that can be substantiated. This is a much more complex topic but those whose interest in this subject has been piqued by this document, may be interested in accessing the 115 page paper "Falsification Of The Atmospheric CO2 Greenhouse Effects Within The Frame Of Physics" Version 4.0, January 06, 2009 which is available at:
http://arxiv.org/PS_cache/arxiv/pdf/0707/0707.1161v4.pdf The paper appeared in the International Journal of Modern Physics B, Vol. 23, No. 3 (30 January 2009), 275-364.

**D.** In an interview covered in major Canadian newspapers on March 16, 2009, Canada's chief climatologist was quoted as follows: "the most common mistake Canadians make is assuming the accuracy of today's forecast is the same as that of the last day in a seven-day forecast. While Day 1 predictions are correct within three degrees 95% of the time, accuracy drops to 65% by Day 5 and is akin to "flipping a coin" by Day 7." This statement acknowledges that the factors influencing local and regional weather are so complex and incompletely understood that the most sophisticated computer models are incapable of yielding predictions for a week hence that are any more reliable than a random chance prediction. The full story is available at:
http://www.nationalpost.com/news/canada/story.html?id=1394443

**E.** Anyone wishing a copy of the accompanying Excel sheets containing the data, work out, and plots presented here can obtain copies by email. Please visit, www.globalwarmingskeptics.net go to the forum and contact Derek by PM. You will receive a copy as soon as possible.