GLOBAL CLIMATE CHANGE - PAST/PRESENT/FUTURE:*

Is the CO2 'Greenhouse' the Biggest Hoax of the 20th Century?

Probably - at least the evidence makes it a strong candidate.

As an earth scientist, I've been troubled in recent years by claims that increasing C02 in the atmosphere is affecting our current climate and by predictions it will cause drastic change in the future. Geologists know that glaciers covered most of Canada not that many years ago. This glacial period represented a major change in climate - yet there was no possibility that CO2 created from human activity caused the change. What might be the explanation for climate change? The following discussion examines the subject of past and present explanations of climate change and looks at possibilities for the future.

PAST CLIMATES

When geologists talk about 'the past' they often use some big numbers. Veevers (Univ. of Ottawa) in 1990 plotted changes in global temperature in various geological ages for over one billion years. His research showed that there were three Supercycles with a cycle consisting of a long warm period followed by a short ice age; which is followed by a shorter warm period; and then by a longer ice age. Veevers predicts that we are now heading into a shorter warm period.

A more direct and closer example of climate change is present at Lake O'Hara in the Rocky Mountains. Coppold and Powell (Univ. of Calgary) have studied the glacial moraines and lake sediments to deduce glacial and plant history (Figure 1). About 10,000 years ago, a glacier extended from the top of Opabin Pass down to Lake O'Hara. Then about 8500 years ago the glacier started to retreat and by 7000 years ago it had completely disappeared. By 3000 years ago, lodgepole pine, fir, spruce and shrub-herb growth was established all the way to the top of the Opabin Pass. Then about 3000 years ago the glacier began to form again. Today it is part way back down to Lake Opabin and the shrub and tree population has decreased below the Lake. As Patterson mentions - <u>this is climate change in action.</u>

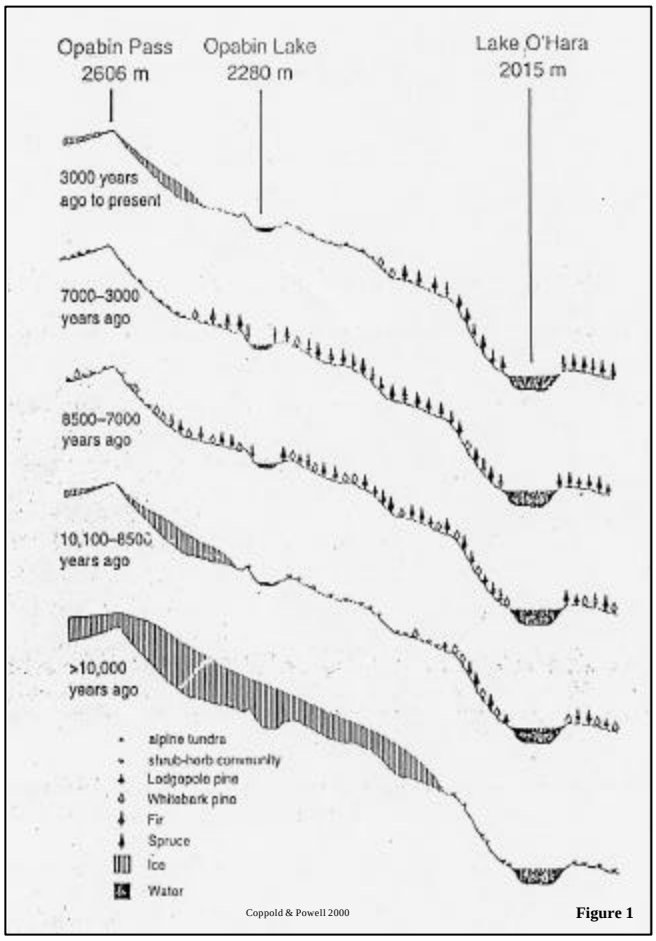


Figure 1

**This report has been prepared by D.L. Barss based on the inspiration and material given in a presentation by Mr. A. Patterson to Probus Club on January 3, 2002. Numerous discussions with other individuals: D. Christensen, R. Erickson, J. Martin, C. Simpson, A. Shepard and G. Wells have contributed to the material presented. Appreciation is also given to Rosetta Exploration Inc. (C. Brown) for their assistance in preparing the illustrations.*

The best documented evidence covering global climate change is based on scientific grounds and historical records. The period covered is from about 900 AD to almost the present day. As more and more snow falls, the lower part comes under pressure, and with increasing pressure - forms into grains of ice. In those grains are entrapped the atmosphere at the time of snowfall.

In many areas, such as Greenland and Antarctica, snow has continued to fall for many centuries. Ice cores have been taken from glaciers around the world, and by analysis of the oxygen isotope ratios of the atmosphere entrapped within the ice grains, scientists can determine historical temperature and other climate conditions. Accurate data on past climate change can be recorded over many thousands of years.

Our interest is the time-span from about 1000 AD to the present, as shown in Figure 2, an illustration taken from the Intergovernmental Panel on Climate Change (IPCC) report of 1995. This graph of temperature over the past 1000 years shows two remarkable periods of climate change; the Medieval Warm Period from about 1000 AD to about 1350 AD, and the Little Ice Age centered about the time - 1500 to 1700 AD.

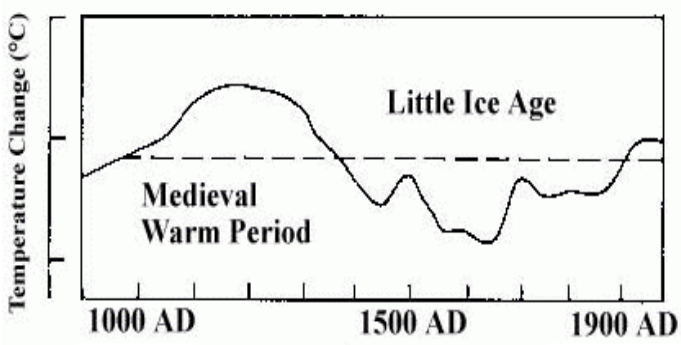


Figure 2 **Daly 2000**

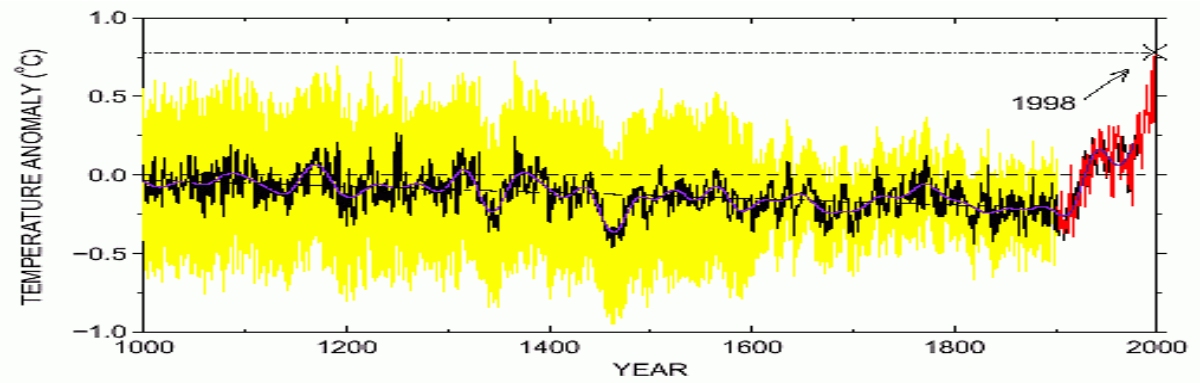
The Warm/Ice-Age periods are well known from historical records. In Europe during the Medieval Warm Period, agriculture flourished, (including vineyards in Scotland); Denmark was colonizing and establishing agriculture in Iceland and Greenland; and during this time, Leif Ericsson made several voyages from Greenland and established a settlement at L'anse aux Meadows in Newfoundland. Figure 2 shows that the Medieval Warm Period was warmer than today. Cooling followed this period and by 1500 AD the earth entered into the intense cool part of the Little Ice Age. This period is well known as the sea-ice froze and the Danes couldn't get to Iceland or Greenland to re-supply their colonies which virtually perished in addition to the settlement in Newfoundland being abandoned. Elsewhere in Europe, crops failed, people were undernourished, and became susceptible to plagues. In Venice, they were skating on the canals.

As Patterson has commented, "people hear about the changes in global climate and say 'My God what's happening, the world climate is changing.'" In truth, the world climate has always changed, it has never been stable and it will change in the future".

Some other views on the past 1000 years of climate: As pointed out by Daly, some scientists within IPCC "...do not challenge the existence of the Medieval Warm Period and the Little Ice Age as they are too well recorded...instead these events were presented as being purely local to Europe and Greenland but absent elsewhere in the world." Daly goes on to present extensive scientific data that completely demolishes the contention that the climate changes were Europe - centered. He provides climate data for the following localities: Sargasso Sea (Bermuda area), Caribbean, West Africa, Kenya (East Africa), Quelccaya Glacier in Peru, Taiwan and China, Tasmania, South Africa, east-central Idaho, Argentina, and California. At all of these localities, Daly comments..."To that end, 'exhibits' of physical evidence are presented ..to prove.... that the Medieval Warm Period and the Little Ice Age were not only very real - put also global in extent." Patterson notes a local case…"when we examine the glacier cores from the Columbia Ice Fields in Alberta, we can match the Little Ice Age with Daly's data."

In 1999, Mann authored a paper in which he attempted to rewrite the global temperature history over the past 1000 years using tree ring growth. In doing so, he managed to remove the Medieval Warm Period and Little Ice Age events. Furthermore, by crudely grafting the 20th century temperatures onto the 19th century tree ring record, it produced a visually dramatic temperature rise in the 20th century; his overall temperature history over 1000 years gives the appearance of 'hockey stick.'(Figure 3)

Figure 3 **Daly 2000**



There are questions with Mann's 20th century temperatures as he has not adjusted for the 'heat islands' that major population centres and airports represent. However, the main criticism here is of Mann's science and methods. Daly points out…"As a piece of science and statistics it was seriously flawed as two data series representing such different variables as temperature and tree rings simply cannot be credibly grafted together into a single series." Some of the weaknesses and error in the tree ring theory are highlighted by Daly:

- "Tree rings are laid during the growing season, not the whole year, and so they tell us nothing about annual climate;
- Tree rings do not even record night temperatures since photosynthesis only occurs in the daytime;
- Tree rings are influenced by numerous factors other than temperature, such as rainfall, sunlight, cloudiness, pests, competition, forest fires, soil nutrients, frosts and snow duration. Thus they are not even a good daytime temperature proxy for the few months of the growing season;
- Trees only grow on land. Since 71% of the planet is covered by oceans, seas and lakes, tree rings can tell us nothing about the maritime climate, even though oceans are known to be the prime determinants of climate conditions;
- A final weakness arises when calibrating the tree rings against temperature - when measuring the width or density of a tree ring, exactly what temperature is represented by that measurement?"

Apart from the critique by Daly of Mann's science and method, his work wiped out the Medieval Warm Period and the Little Ice Age, an impossibility considering the solid scientific and historical evidence that is available.

Unfortunately, with the release of the draft of the Third Assessment Report (TAR-2000), the IPCC without scientific evidence reversed its 1995 view of the Medieval Warm and Ice Age periods by accepting Mann's 'Hockey Stick' theory. The 'theory' gained wide acceptance by the greenhouse industry. The lack of an objective scientific critique of Mann's theory on climate change is a shocking indictment of the scientific community. This is particularly true when one learns of Mann's current position on editorial boards, advising government and teaching. As reported by Daly…"He is now lead author of the 'Observed Climate Variability and Change' chapter of the IPCC Third Assessment Report (TAR-2000)...is also on the editorial board of the 'Journal of Climate' and guest editor for a special issue of 'Climate Change'. He is also a 'referee' for the journals of Nature, Science, Climatic Change, Geophysical Research Letters, Journal of Climate, JGR-Oceans JGR-Atmospheres, Paleo oceanography, Eos, International Journal of Climatology and NSF, NOAA and DOE grant programs...and was appointed as a scientific advisor to the U.S. Government (White House OSTP) on climate issues." The foregoing is a truly frightening state of affairs.

THE PRESENT CLIMATE

There are numerous articles appearing in the press and sometimes in Government brochures telling us of the impending catastrophes due to increase temperature that has already happened and/or in the future is going to become much worse: *scary scenarios*, which are intended to grab a lot of public attention. Usually, the opening line contains 'greenhouse gas' and 'global warming'. What are the facts?

- during the 100 years, 1900 to 2000, the global average increase in air temperature was 0.5 degrees Celsius. It is significant that in that century, "… a strong warming trend of about 0.5 degrees Celcius began in the late nineteenth century and peaked around 1940." (Baliunas) This warming trend occurred before big increases in burning fossil fuels. Surprisingly, a cooling trend ensued from 1940 to the 1970s when a warming trend started, and that warming has continued to the present time;

- there are temperature records available at numerous localities around the world. None show any specific increase in temperature or trend in increase. See examples Figures 4 (Reykjavik), Figure 5 (South Pole), Figure 6 (Frobisher Bay);

Figure 4

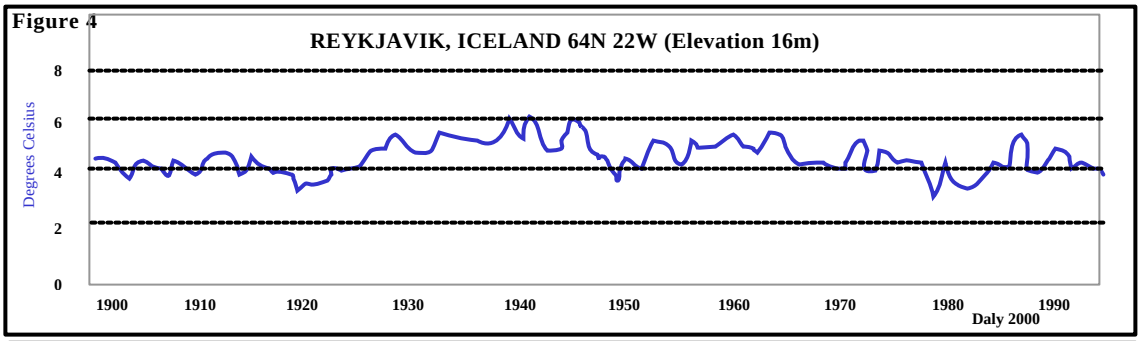


Figure 5

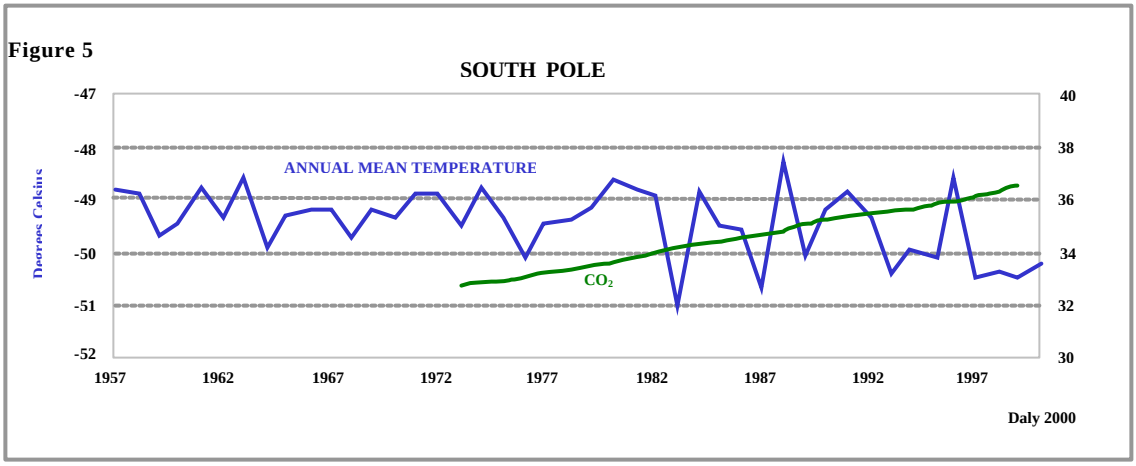
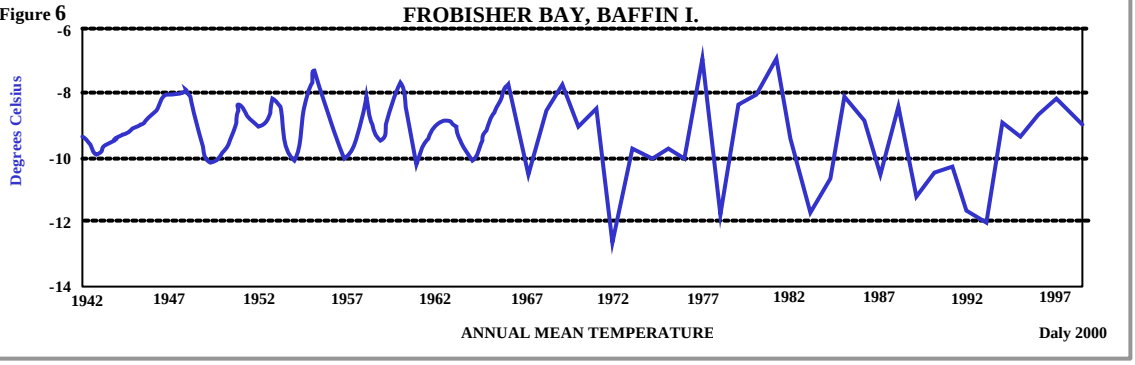


Figure 6



- NASA's James Hanson now predicts an increase 0.7 degrees Celsius warming over the next 50 years. As we will discuss later, this may be a response to natural global climate change; the modest increase is not cause for concern;

- reliance on temperature records for a few years such as the last decade is invalid. 'Heat islands' (large cities and airports) are changing with relatively rapid urban growth; volcanic activity in 1992 caused a worldwide drop in temperature; the warming in 1998 was due to a record El Nino affect;

- we are warned of severe weather events such as droughts, hail, tornadoes taking a heavy toll on life - when in fact the records do not support this claim. McKitrick comments "Over the past century, despite the observed warming, there is no upward trend in the frequency of storms, nor is there any upward trend in the severity of storms (Landsea et al., 1996, Zang et al., 2000)";

- some more examples of the "Sky is Falling, The Sky is Falling": Patterson comments "In 1998 ... a paper was published (Rothrock) saying that 43% of the thickness of Arctic Ice cover has decreased in the last 40 years. Then in 1989 a Russian cruise-ship made it all the way to the North Pole. This created headlines around the world, and was taken as proof that the ice caps were disappearing. In 1998, an immense iceberg, the size of the State of Delaware, broke away from Antarctica." However "...in the 1950's Mr. Hobson of the Geological Survey led a team ...camping on the {Arctic} ice fields,...noted about 10% open water at the North Pole every June with the leads opening and closing with the shifting ice...a cruise ship...18 hours later would not have gotten within miles of the Pole. ....Holloway from the Ocean Science Institute of the Pacific went up to check on the reported loss of 43% of the Arctic Ice. ....his observation was that in the western Arctic, the loss might be in the range of 3% - well within the limits of error, while elsewhere, there appeared to be a slight increase in ice thickness." The third catastrophe, the huge iceberg from Antarctica should be put in perspective. "....US Navy records show that larger ones broke off in 1854, 1855, 1927, and in 1956, one four times larger broke away."

What about CO2? James Hanson is often referred to as the "father" of the theory of Global Warming which he proposed in 1988. The essence of the theory is that increased production of CO2 from burning fossil fuels will add to the earth's 'greenhouse' and cause global warming. The theory has fallen on hard times as we summarize:

- Mr Hanson (2001) reversed his views on the CO2 linkage to global warming. His priority is now to reduce pollutants - NO2, SO2, and particulate matter;

- Both McKitrick and WCReport 7/10 point out that IPCC's projection of CO2 emissions are far overstated. McKitrick comments that "IPCC simulations typically assume that CO2 concentrations will grow by at least 1%per annum for the next century. The...growth since the record began in 1954 is just under 0.4%...Clearly, if the rate of growth...is less than half that assumed in IPCC projections, then any climate change will be less dramatic as well...remember that any temperature effect is proportional to the logarithm of the CO2 concentration meaning that emissions have declining marginal impacts";

- WCReport makes similar comments and illustrate that CO2 growth rate has been relatively flat since the mid-1970s (Figure 7);

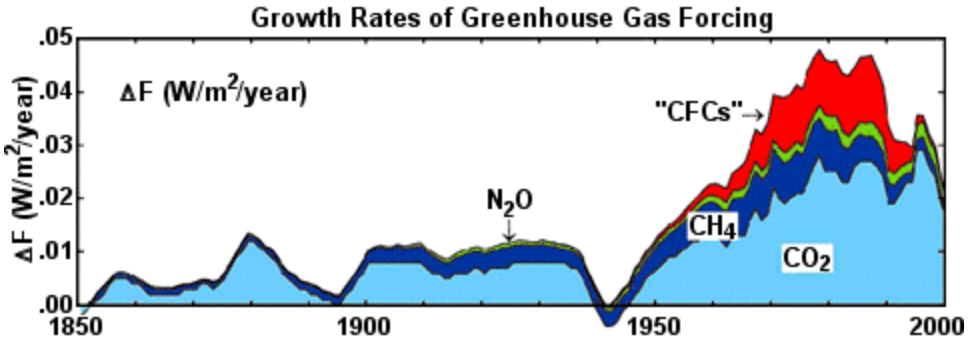
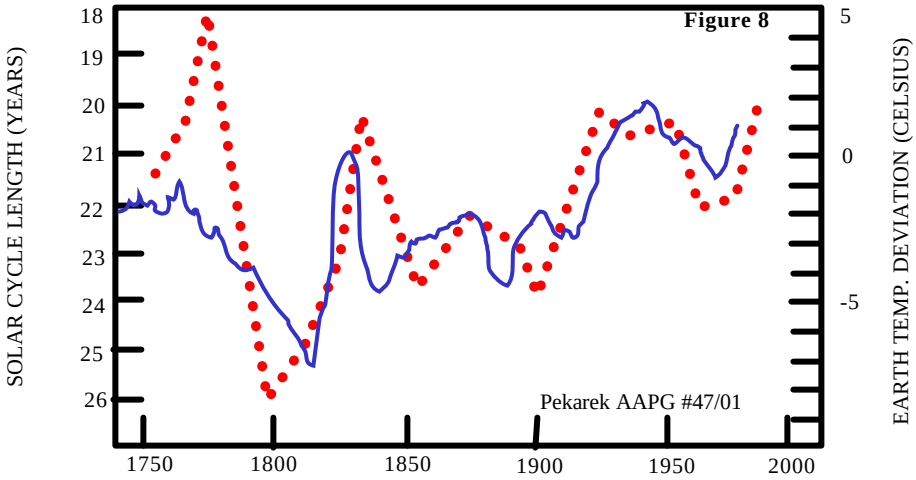


Figure 7 (From WCR). The growth rate of major greenhouse gas warming potentials peaked around 1980 and has since fallen; notice that CO_2's growth rate has been relatively flat since the mid-1970s—a fact that the IPCC's projections have yet to take into account, though WCR has been pointing it out for years.

That evidence seems not to have been recognized by the Federal Department of the Environment nor by the General Circulation Model group. A number of different lines of evidence indicate that CO2 is not a direct cause of global warming:

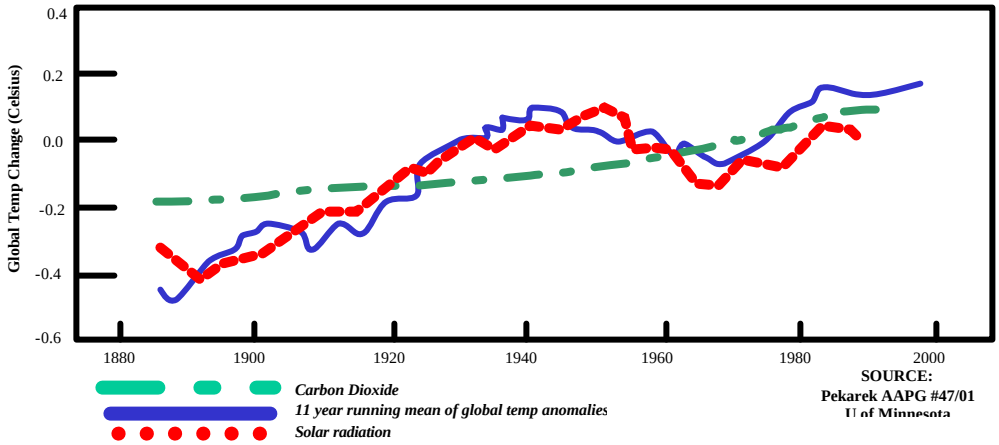
✍✍ Dr. Jan Veizer published in the journal 'Nature' (NP, Dec 7/00) that based on fossil evidence, "... What we are showing is that in the past, in very big climate changes, there is no correlation with CO2. "...If CO2 is a driver how can you get an ice age when CO2 was 15 times higher than they are today."



Moving 11 year average of terrestrial northern hemisphere temperature deviations from 1951-1970 mean

Solar magnetic cycle length - the shorter the cycle the more active & brighter the area

✍✍ Dr. Pekarek, State University in St. Cloud Minnesota in plotting solar magnetic cycles against temperature found a near perfect fit (Figure 8). A similar outstanding fit is shown by Soon et al(1996) in plotting TSI(solar radiative forcing) and the 11-year running mean of observed global surface temperature anomalies. Pekarek observed that from 1880 to 1993 that "… solar forcing alone would account for 71% of the observed global mean temperature variance" and deFrietas comments that 80% of the increase in $C0_2$ occurred after the initial rise in temperature. (Figure 9)



- Prof. de Freitas, a member of the IPCC Technical Committee from New Zealand makes a similar observation; in three intra-glacial warmings mapped from ice cores in central Antarctica the CO2 rise lagged behind the temperature rise by 600 years.
- In the Antarctic, temperatures are cooling, but CO2 levels are showing a gradual rise.

Judging by some institutes, the Federal Department of the Environment (including General Circulation Model group) and authors, the credibility of the CO2 'greenhouse' seems not to have been recognized. Are some scientists in denial? How is it possible to ignore the scientific evidence that CO2 is an unlikely contributor to the CO2 'greenhouse' and global warming? Of course a large number of others have demonstrated scientific objectivity, many of which are the source for the preparation of this paper. Dr. de Freitas mentions that in the US, 17,000 scientists signed a petition against the Kyoto Protocol and this was sent to Clinton. Another scientist, Lomborg, has incurred the wrath of the environmental industry by publishing a book titled the "The Skeptical Environmentalist." In it he asserts that the global warming issue is overblown.

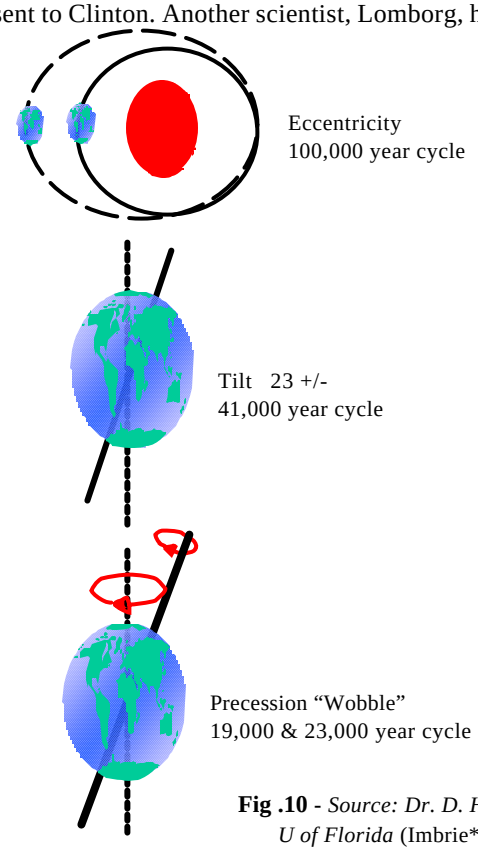


Fig .10 - *Source: Dr. D. Hodell U of Florida* (Imbrie*)

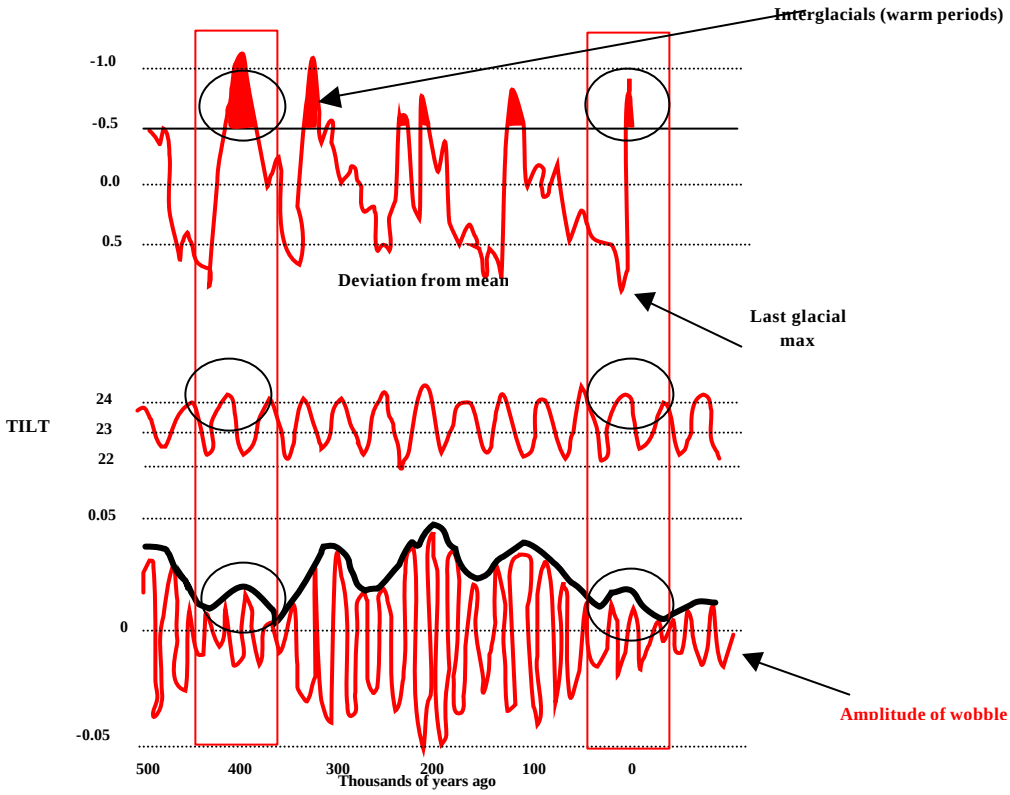
PROBABLE CAUSES of GLOBAL CLIMATE CHANGE

Since life on earth depends on our sun, wouldn't the place to look for causes of climate change be the sun – particularly as cyclical climate changes have occurred long before humans were burning fossil fuels? Specific papers address that subject.

Gerhard (Kansas State Geological Survey) proposed that the SOLAR SYSTEM GEOMETRY is one of the Prime Drivers of the Solar System. Professor Hodell of the University of Florida examined its main components: Eccentricity, the orbit that the earth makes around the sun varies from more circular to elliptical on a cycle of 100,000 years; Tilt, the earth has about a 23 degree tilt varying by +/- 1 degree on a 41,000 year cycle; and Precession, the wobble, like a spinning top, has a 19,000 to 23,000 cycle (Figure10). Since these cycles all have different

*Imbrie et al describes the solar system geometry and acknowledges Milankovich, the originator of the theory. Milankovich's papers were published in German so that for accessibility, we refer to Hodell and to Imbrie.

frequencies, there will be times when they coincide for a maximum effect and times when then they cancel each other out. When comparing these cycles against temperature, he found that when the maximums occur, the mean global temperature is at its highest, while at a minimum, the mean global temperature was at its lowest (Figure 11).



Shape of the Earth's orbit (black line) and the amplitude of its wobble (red line) today are similar to those of 400,000 years ago

Figure 11 *- Dr. D. Hodell*
U of Florida.

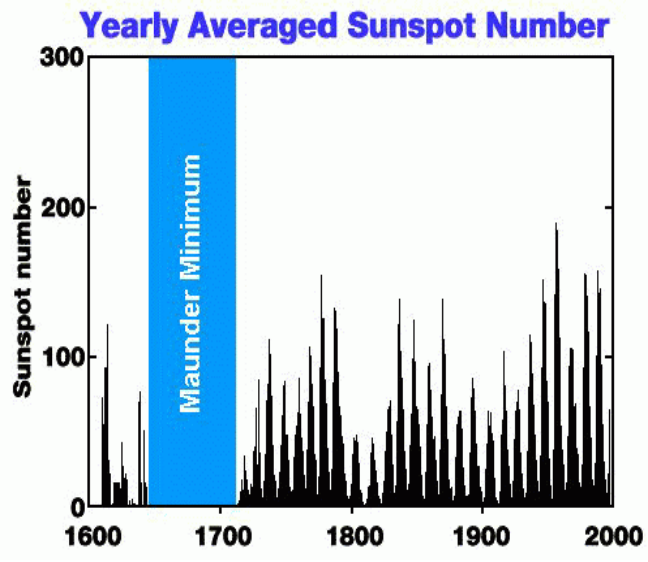


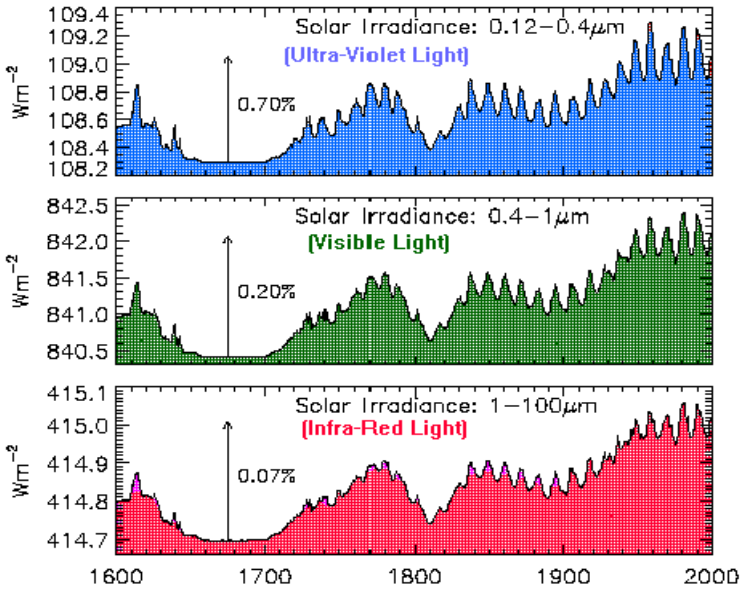
Figure 12 –Source Daly

A second possible source of the Sun's impact on global climate is discussed by Daly. In the Little Ice Age, "...the most probable cause is the variable sun,..." This is because we have direct observations of sunspot counts going back to 1600 AD, which allow us to compare variation in the sun with variations to global climate." (Figure 12). It is known that sunspot activity follows an 11-year cycle. He comments, "The most striking feature of the 400-year record of sunspot activity...is the Maunder Minimum, a 70-year period on the sun in which there were practically no sunspots at all. It's as if the sun had 'stopped breathing.'" The observation follows that it is likely a variable sun that caused the Little Ice Age.

A third possible influence of the sun's power to cause climate change - Daly

states…" has been reinforced by a large body of recent research that shows it is not only the cyclic warming and cooling of the sun (manifested by the 11-year sunspot cycle) causing our climate to change, but also to changes in the solar spectrum towards greater ultra-violet radiation compared with the visible or infra-red light." (Figure 13). The disproportionate enhancement of the ultra-violet part of the solar spectrum affects the ozone layer and other atmospheric chemistry, which may amplify any warming. In addition, recent changes to magnetic activity on the sun influence cosmic radiation reaching Earth which in turn modulates low level cloudiness and therefore temperature"

Figure 13 – Daly 2000



FUTURE CLIMATE CHANGE

In spite of data to the contrary, we continue to read exaggerated predictions of future temperature increases. For example, the Federal Government recently is sued a glossy 4-page 'sheet' saying average temperatures in some regions of Canada could rise by 5 to 10 degrees celsius by 2100. This was followed up by an article (NPFeb 20/01) that said "...federal report projects a 15-fold increase in heat-related deaths in Toronto by 2010..." and that could rise to 563 deaths by 2050, says the Third National Report on Climate Change" and the article goes on to quote Environment Minister Anderson as lashing out…"What is the cost of drought in southern Alberta now, which is one of those climate-related weather situations?" He is apparently unaware of the Prairie Drought Project at the University of Regina, which based on a study of prairie lakes "…indicates a 15% probability of a drought within three decades equivalent to the 40-year severe dry spell which began in 1680." (AR Feb 4/01) Would Minister Anderson explain the human-caused CO2's of 1680? This is an example of the 'scary scenarios' being offered to the Canadian public. Meanwhile, the IPCC's (which was referenced above) prediction of temperature in year 2100 has gone from 3.2 degrees made in 1990; to 2.6 degrees made in 1995; then to 2.0 degrees in 2000; and now in 2001 the prediction for 2100 is 1.1 degrees

There's an important point to recognize with respect to current and future forecasts of temperature. As outlined above, there is a probability that we are entering into a natural warming period - nothing to do with CO2. Remember, we had a Medieval Warm Period without human-caused emissions - we could have another one. Should natural warming conditions ensue, we should not accept it as a negative consequence. As McKitrick comments "…By accounting for feasible adaption to changing growing conditions, more recent studies have shown net gains in agriculture (Mendelsohn et al. 1999, 2000) and forestry (Sohngen and Mendelsohn, 1998) due to climate warming. Manufacturing and other indoor production is pretty much unaffected by local climate." Also, we must recognize that CO2 is beneficial to plant growth and is sometimes used as the CO2 fertilizer in actual greenhouses: it is not a pollutant

The failure of the General Circulation Models (GCM's) in predicting future climate change is apparent. After spending millions of dollars, we find as described above that the forecast for global temperature for the year 2100 has had to be adjusted downward three times since 1990. For a better understanding of the GCM's, and their inherent weaknesses, one is referred to McKitrick: " ...greenhouses stay warm by physically impeding convection of warm moist air...The earth is not a greenhouse .. .climate models do not "predict" anything ...only politicians and the media use the term 'predictions.' ...Simplified models such as those used for the recent Third Assessment Report are programmed to a pre-determined 'climate sensitivity' chosen by the researcher...Models that always predict temperature increases in

response to CO2 doubling must be parameterized to do so. In practise, they all are. Unfortunately, the fact that they all now 'predict' temperature increases is taken as evidence that temperatures will increase as carbon concentrations go up...Signal detection studies...work by using climate models to generate estimated changes in global average temperature anomalies...Current signal detection methodology ultimately embodies a circular argument. It presupposes that the models that generate the signals are correct. The models build in the assumption that warming always occur in response to IRAG {infrared} increases. This assumption is then justified on the evidence of signal detection studies....the burden of proof still rests on climate modellers to demonstrate that their models are reliable enough for forecasting...recent failures to reproduce twentieth century climate history (Delworth and Knutson, 2000: Dai et al. 2001), make me skeptical."

As a further comment on modellers there are more fundamental questions; why is there evidence that CO2 increases have lagged temperature increase? And if CO2 levels have been modest since the mid-1970s (0.4%/annum as McKitrick shows), why are models using 1%/annum? Lastly, why are the CO2/'greenhouse'/global climate modellers not being held accountable for ignoring very credible science? As discussed above, the probability is that global climate changes are linked to sun's energy output and as well to the solar system geometry (eccentricity, tilt, and precession).

In summary, there can be little doubt that human-caused CO2 emissions is not a driver of climate change. Future financial, research and technical effort should be directed toward the elimination of pollutants (NO2, SO2, particulate matter) as Hanson suggests. There is of course much work to be done in explaining why CO2 increase follows temperature increase and on the exchange of atmospheric gases with oceans, land and flora. With respect to future climate change, however, the priority lies in future research on the sun's impact on earth's climate and on an honest presentation of science to the public.

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