



REVIEW OF CLIMATE CHANGE CAUSALITY



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Dr. Jackson was born in Northern Ireland in March 1941 and migrated to Australia with his parents at the age of 16. While working with the Engineering and Water Supply Dept. in Adelaide, he studied part time at the Adelaide University for a Degree in Civil Engineering. He moved to Melbourne in 1974 with his wife and two children and, while working for the Department of Transport and then the SEC, he studied at Swinburne Technical College and achieved a Masters Degree in Civil Engineering. He retired in the early nineties and became very interested in the problems facing our environment. Then, through RMIT University, Melbourne, in 1996 he commenced a Ph.D. and completed it in 2006. Jim passed away on the 18th November 2006.

ABSTRACT

This article briefly examines the causality of global climate change. The alleged link between anthropogenic greenhouse gas emissions, global warming and climate change is examined. The article postulates that there is an alternative premise to greenhouse gas causality of climate change, namely natural variability. This alternative path leads to the same destination as that of the proponents of the greenhouse gas premise, namely that climate change is occurring. The article argues that the need to respond and prepare for the effects of climate change is the only sensible option, as opposed to trying to change the climate.

Keywords: Climate Change; Greenhouse Gases; Global Warming; Terrestrial Dynamics.

INTRODUCTION

In attributing the causality of global warming there is a vociferous mantra, expressed by those who have little or no knowledge of the issue and by some scientists who should know better, that anthropogenic greenhouse gas emissions are solely responsible. This mantra has been adopted as policy by the Intergovernmental Panel on Climate Change (IPCC, 2001) and has resulted in a global deception (Michaels, 1998). It is surprising, therefore, to realize that this policy decision has not been subjected to a globally balanced, rigorous scientific review (Oxley, 2005) that embraces a comprehensive evaluation of causality.

Evidence, presented in this article, strongly supports the view that anthropogenic greenhouse gas emissions cause a very small rise in average global temperature; however, they are not the prime cause of global warming. Terrestrial warming and cooling fluctuations appear to be due to natural variability.

To focus on the chimera of greenhouse global warming while ignoring real threats posed by natural variability of the climate system is self-delusion on a grand scale (Kinimonth, in Carter, 2004).

1 CARBON DIOXIDE AND CLIMATE CHANGE

Although not the first to link carbon dioxide (CO₂) and global warming, James Hansen (1988) in testimony to the US Congress reiterated this obvious connection. This resulted in all and sundry blaming CO₂ for global warming. In the following decade the palaeoclimatologists Mann, Bradley and Hughes (1998) attempted to determine average global temperatures over the past millennium to show that CO₂ was **the prime cause** of global warming and hence climate change. Since direct temperature measurements only go back to 1860 then, for earlier periods, they had to use indirect or 'proxy' records of temperature derived from; annual tree rings, isotope ratios on corals, ice cores and lake sediments AD (Pearce, 2006). The initial absurdly short time span for their analyses extended back to 1400. Using regression curve-fitting techniques, Mann et al. (1998) produced their now famous 'hockey stick' graph; this work was accepted by the IPCC who adopted it to formulate policy.

The 'hockey stick' graph is not only flawed but also non-representative for the following reasons:

- (1) It does not show the 'Little Ice Age' from about 1550 to 1850 or the Medieval Warm Period after 1000 AD, whereas most tree ring chronologies clearly show these periods (Pearce, 2006).
- (2) Statistical flaws in the work were confirmed by Stephen McIntyre, an expert statistician and Oil Industry Consultant; and Professor Ross McKittrick, an economist at the University of Geulph, Ontario (McIntyre and McKittrick, 2003, 2005a, 2005b). They showed that Mann's computer program is set up to force or create a hockey stick type graph. No less than nine types of fundamental data processing and statistical errors were found in the work. To prove their point, McIntyre and McKittrick (2005a, 2005b) used the Mann et al. (1998) data and produced a revised graph (figure 1), which showed a rise in temperature in the 15th century; which is very similar to present day temperature values. This increase in temperature does not appear in the Mann et al. (1998) graph but, in contrast to their flawed original plot, the revised graph now displays a big kink.
- (3) One of the problems with Mann's initial analysis is the short period used for data input extending back in time to AD 1400. Stinging scientific criticism of this inappropriately short time span forced Mann to revise his work and to extend the input back to a cut off in AD 1000. This revised period is also considered to be inadequate and it remains as an absurdly short time span in relation to the main Pleistocene to Holocene glacial cycles of some 100,000 years.

As a consequence of these deficiencies, many eminent scientists, who have a sense of objectivity and intellectual honesty, have condemned the hockey stick graph as deeply flawed and simply bad science. It is an artifact of poor mathematics (Muller, 2004).

A consensus of informed scientific opinion, namely 60 distinguished scientists, have written to the Canadian Prime Minister, indicating that observational evidence does not support today's computer climate models, so there is little reason to trust model predictions for the future (Phillips, 2006). Mann's methodology for reconstructing past temperature by combining incompatible proxy data is fraught with danger (Pearce, 2006). More

than 17,000 professional scientists have signed statements which state that they disagree with the IPCC policy on climate change.

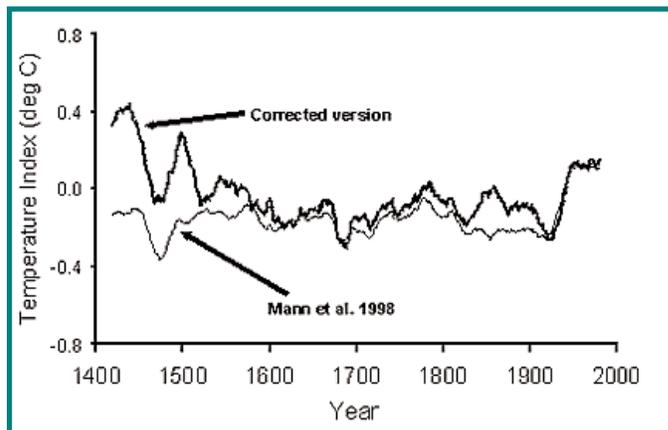


Figure 1 Temperature vs. time graphs (a) Mann et al. (1998) (b) corrected version (After Carter, 2003)

The public conditioning on climate change has involved spreading the belief that announcements of the IPCC are the consensus opinion of the vast majority of knowledgeable climate scientists. The belief is simply not true (Paltridge in Carter, 2004). Governments must be advised that the economic projections used in the Intergovernmental Panel on Climate Change (IPCC) emissions scenarios are technically unsound (Castles in Carter, 2004).

2 ATMOSPHERIC GREENHOUSE GAS EMISSIONS

Without the natural greenhouse effect the average global temperature would be minus 18 C, which can be contrasted with the average of 15 C that has prevailed for the development and nurture of life and civilization (Carter, 2005). Carbon dioxide is a lesser greenhouse gas, and it is **estimated** that it is responsible for ~26% (8 C) of the total greenhouse effect of 33 C; of the 26% an **estimated** upper limit of about 25% (~2 C) can be attributed to CO₂ from human activity. Water vapor, at about 60% to 70% and is therefore by far the most important factor of atmospheric greenhouse warming (Carter pers. comm., 2006)

Hieb (2003) has also **estimated** that water vapor makes up about 95% of the greenhouse effect and states that CO₂ is a minor component of the greenhouse gas, responsible for about 3.6% of the total greenhouse effect. Of this 3.6%, only 0.12% can be attributed to anthropogenic activity; this translates into a 0.036 C rise in temperature.

These data provide an indication of the range of values for water vapor, greenhouse gas and temperature rise, from human activity. The actual value will lie somewhere in the range. The data range indicates that the CO₂ being generated by human activity can be considered to be a very small amount compared to the natural greenhouse effect.

It is interesting to note that the published figures by the IPCC in 2005 on CO₂ emissions, estimate that anthropological activity is responsible for 7 Bt of CO₂ (or 4.5%) out of a total of 157 Bt released annually. A typical breakdown of total CO₂ emissions is as follows: (1) oceans 57%; (2) decaying vegetation 19%; (3) plant and animal respiration 19%.

Currently there is about 370ppm of CO₂ in the atmosphere. Prior to the industrial Revolution there was about 280ppm (Flannery, 2006). Past interpretation of CO₂ levels in the atmosphere indicates that they have been much higher in the geological past, namely in excess of 1000ppm (Haworth et al., 2005) with no obvious adverse effects.

3 MILANKOVITCH CYCLES AND SOLAR RADIATION

The earth and the other planets in the solar system are in a continual dynamic state and are subject to the laws of physics, namely the gravitational interaction between the earth and the other planets. This affects both the rotation and orbit of the Earth around the Sun. Hieb (2002) states that these influences affect the Earth's climate due to the so-called Milankovitch cycles, which cause:

- (1) Changes to the tilt of the Earth's axis and elliptical orbit which occur on a 21,000 yr. cycle (precession of the equinoxes).
- (2) A +/- 1.5° wobble or nutation of the Earth's axis (tilt) which occurs on a 41,000yr cycle. These cycles can be determined and it is amazing that the mid-Pleistocene to Holocene glacial periods, which occur about every 100,000 or 40,000 years, have corresponded to the periodicity of Earth's orbital cycles of eccentricity and tilt, causing significant changes in the of seasonal distribution of solar radiation across the planet (**figure 2**).
- (3) Variations in the shape of the Earth's elliptical orbit around the Sun, which occur as a 100,000 yr. cycle of eccentricity.

Primary variations in radiation energy from the Sun must also be considered. Hieb (2002) indicates that solar cycle variability occurs every 11 yr. and 206 yr. (sunspot activity). Landscheidt (2003) has studied the evidence on past solar radiation and in extrapolating into the future comes to the most interesting conclusion that the next ice-age is likely to be fully developed by 2030. This prediction should cause the alarm bells to ring

Underpinning the global warming and climate change mantra is the imputation that humans live on a non-dynamic planet. Greenhouse propaganda on climate change is ignorance of the history of our dynamic planet hiding behind unscientific political policy (Plimer in Carter, 2004).

4 RELATION BETWEEN TEMPERATURE INCREASE AND CO LEVELS

The premise that anthropogenic CO₂ emissions are mainly responsible for global warming is contradicted by the following:

- (1) The composition of the atmosphere, which as discussed in the previous section 2, shows that the amount of anthropogenic emissions and the associated temperature increase they cause are very small.
- (2) The variations of temperature and atmospheric CO₂ versus time can be determined from ice cores (figure 2). The data indicate that over annual and long term glacial-interglacial periods the temperature variations always precede the parallel changes in CO₂. This has repeatedly occurred over a time span of 65 million years. To emphasize this point, if we apply logic to this phenomenon then; if two events, say A and B always occur sequentially; (i.e. event A always occurs before event B), then clearly event B cannot possibly cause event A. How then can CO₂ emissions be considered the primary cause of temperature increases? The answer is that it cannot.
- (3) Examination of the ancient climate record and especially the last 400 thousand years (Ky.) of glacial-interglacial change, indicate that modern temperatures are neither particularly high, nor are their rates of change significantly rapid. For the last three main Pleistocene interglacial periods which preceded the Holocene, temperatures in the Antarctic were about 5, 4, and almost 6 C respectively, warmer than present.

5 THE FUTILITY OF TRYING TO CHANGE THE CLIMATE

The IPCC (2001) policy is based on unsubstantiated computer scenarios, not predictions. Predictions are considered the most accurate outcome of any probabilistic analysis but can be justifiably regarded with healthy skepticism due to the problem of obtaining accurate and representative critical parameters. However, scenarios are merely non-sub-

stantive generalizations which can be manipulated to achieve any result required. They cannot and should not be accepted as a prediction, let alone as scientific fact.

There is an urgent need for Governments to shake themselves free of the partial advice provided by environmental advocacy groups and government science agencies, all of whom have a strong and often undeclared self-interest in climate change matters (Carter, 2004)

6 PAST CLIMATIC OCCURRENCES

About 56 Ma Arctic temperatures rose to about 23 C and about 49 Ma the Arctic was green with vegetation sustained by fresh surface water (Intg. Ocean Drill. Prog., 2006).

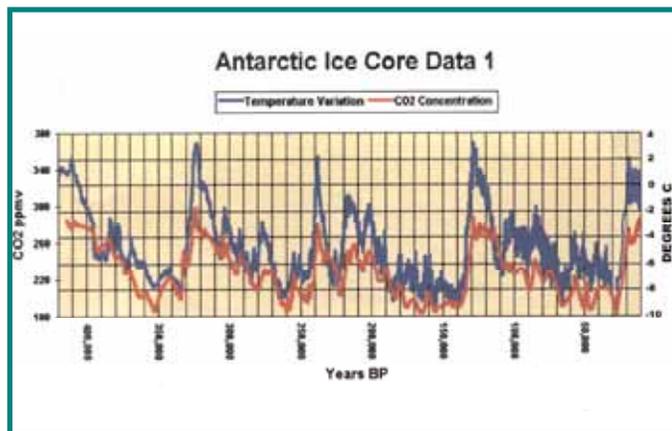


Figure 2 CO and temperature vs. time (From Petit et al., 1999).

Carter (2005) states that analysis of sedimentary cores from beneath the deep sea floor and ice cores from Greenland and Antarctic ice caps reveals:

- (1) That 5 million years ago (Ma) the Earth's temperatures were several degrees warmer than at the present.
- (2) A gradual decline in temperature has since occurred. Superimposed on this decline, since 2.5 Ma through the Pliocene/Pleistocene, there have been substantial glacial and interglacial climate fluctuations. These have caused the waxing and waning of ice sheets in the higher latitudes in the northern and southern hemispheres. The general timing of which can be shown to occur at 20ky, later at 41ky, and through the main glaciations mid-Pleistocene, at 100 Ky. (Carter, 2004). These timings are referred to as Milankovitch frequencies which are caused by changes to the Earth's orbital geometry, as described in section 3.

(3) For the last 0.6 million years, glacial and interglacial oscillations have occurred every 100 Ky. For more than 90% of that time the Earth's temperature was up to 6 C cooler than the present. Warm interglacial periods comprised less than 10% of the time and on average lasted only 10 Ky. Civilization and our modern society developed during the most recent warm interglacial period (the Holocene), which has already lasted 10ky. This observation should also start the alarm bells ringing.

(4) Superimposed on these longer climatic cycles are: (1) shorter term cyclic oscillations between 11 yr. sunspots and 1, 2 and 5 Ky. cycles of indeterminate origin; (2) periods of rapid climate changes across almost the full glacial-interglacial range occur over time spans that varied from few years to a few decades. The cause of these is also not known.

In the past 650,000 years the polar ice caps have extended far beyond their present boundaries on at least seven occasions, in so doing they locked up enormous volumes of water in frozen oceans and vast continental ice sheets before retreating to higher latitudes. This caused dramatic variations in sea levels with some falls being up to 130 meters below present levels which were followed by equally dramatic rises in levels up to several metres higher than those of today.

7 ISOTOPES AND CLIMATE CHANGE

Oxygen is one of the most important keys to interpreting past climates (NASA, 2006). All oxygen atoms have 8 protons but the nucleus may contain 8, 9 or 10 neutrons. Oxygen is present in nature as light and heavy isotopes, namely O-16 and O-18, respectively. The ratio of these two isotopes in water varies with the climate. Interpretation of the difference of the ratio of light and heavy isotopes from ice cores or fossils, measured against a universally accepted standard, enables a determination of past climate changes to be obtained (Answers.com, 2006).

8 COMPUTER MODELLING

To enable future climate trends to be assessed, climatologists rely on General Circulation Models (GCMs) that attempt to mathematically describe the Earth's climate (Freidereich and Ramaswamy, 1993). The models vary widely in terms of the input variables and assumptions regarding how the variables interact. Yet some official

reports selectively publish only the worst case scenarios and ignore those findings that show only moderate or low warming in the 21st century (Legates, 2005).

9 CONCLUSIONS

The following conclusions can be drawn regarding the issue of climate change:

- The assumption that prior to the industrial revolution the Earth had a stable climate is incorrect.
- Climate has always changed; and always will change.
- Attempting to stop climate change is an expensive act of complete futility.
- The only sensible action to take regarding climate change is to prepare and to adapt to it as it occurs.
- The premise that CO₂ emissions are the prime cause of global warming is not valid.
- The causality of climate change is overwhelmingly a result of the natural variability of our dynamic Earth.
- There has never been an adequate unbiased independent assessment of the science of global warming and its implications. This leads to the result that most officials in government agencies, who work on climate change policy, are uninformed of the validity of the science and are led to rely on the flawed advice of the IPCC. This is a world wide problem.
- Fossil fuel burning should be reduced and, if feasible, ultimately eliminated; not primarily because of the CO₂ emission issues, but rather because of health and conservation issues. The whole spectrum of renewable and non-polluting energy sources should be considered as alternatives to burning fossil fuel; namely wind, geothermal, solar. For many persons nuclear energy is not a preferred option because of pragmatic and economic reasons, rather than environmental aspects. ■

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Editorial Postscript:

Dr. Jackson was in the process of including acknowledgements when his life was tragically cut short.

He received help, encouragement and advice from many of his fellow associates.

We are aware that Professor Robert M. Carter from James Cook University (Queensland) and Dr. Colin M. Barton, a former work associate and friend gave considerable support and advice. Unfortunately, we do not have personal knowledge of the many other supporters so must apologize for any unavoidable omissions.