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Those who have knowledge, don't predict. Those who predict, don't have knowledge" – Lao Tzu, 6th Century BC Chinese Poet

Global Warming – Is it Really a Threat?

Address to Australia Club, 22 July 2008

By Des Moore

This is a complex subject involving issues that extend into religion, philosophy and economics as well as science. In the limited time available I can only touch on aspects of each.

As an economist my expertise is necessarily limited but I have had extensive experience in analysing radical proposals for government action to change society and the world. I mention just one that started me on the path of scepticism and the need for caution about such proposals. That was a brief period as chief adviser to Jim Cairns, who sought to solve the inflation problem by printing more money but whose time was mostly taken up with mooching with Morosi! Recall however that Dr Cairns was taken seriously and he lost by only one vote his challenge to Whitlam for Labor party leadership and Prime Ministership.

During my 28 years in Treasury, and since, I came to the view that politicians and bureaucrats have a natural instinct to expand their roles by intervening in the operation of the economy and society generally. Many justify this because they believe it will improve the public good. But many have their own interests in mind too, even if only subliminally. We citizens should beware of problem-solving proposals by governments.

This is particularly relevant to the global warming issue because the alleged problem of continually rising temperatures is perceived as a matter for governments. There is, it is said, a "market failure", meaning that individual businesses or persons are judged as lacking the necessary incentive or the resources to remedy the perceived problem by acting on their own behalf.

This picture is reinforced by the explosion of dire warnings from supposed experts if rising temperatures are allowed to continue, first from Al Gore's film "An Inconvenient Truth", then from the Stern Review of the Economics of Climate Change, followed by four major reports from the Intergovernmental Panel on Climate Change, endorsement by the Royal Society of London and now in Australia from the CSIRO and economist Ross Garnaut. Moreover, all major political parties in developed countries have accepted the need for action to reduce emissions of greenhouse gases. The Rudd Government's green

paper of July 2008 asserts “the IPCC makes an unequivocal case to begin to address climate change.” It confirms that a policy of reducing CO2 emissions will commence in 2010 with the eventual aim of a 60% reduction by 2050 but a likelihood that the European model of a 20% reduction by 2020 will be adopted. The adoption of such a policy regardless of what other countries seems unbelievably naïve as an early start by Australia will not influence the start of an emission reduction program by major emitters without one. Also worrisome is the failure to undertake any independent public examination of the IPCC case involving independent scientists: the IPCC advice is simply accepted as gospel despite the widespread scientifically-based critiques.

Contrary to claims of a scientific consensus that human activity is the principal temperature driver, there are now many published reports and papers strongly disputing the IPCC analysis, including several by eminent Australian scientists. My conclusion is that the case for major government intervention to “keep us cool” has not been made and that, even if further increases in average temperature were to occur, the response should be left principally to the private sector to handle. In the printed version of this address I list some of the dissenting analyses but the list is by no means comprehensive.

The dissenters range from over 15 individuals scientists interviewed in the Great Global Warming Swindle film to a group of 400 endorsing a minority US Senate Environment report, to a report by a small expert group formed by US Professor Fred Singer to constitute a Nongovernmental Panel on Climate Change (NIPCC), to a group of 103 highly qualified persons who wrote to the UN Secretary-General last December, to more than 1100 who signed the Manhattan Declaration at a climate conference in New York this March, and finally to no less than 31,000 US scientists who have signed a petition declaring “there is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate".

We now have, therefore, many qualified individuals or groups who strongly reject IPCC theories and who can justifiably challenge claims IPPC science is right because it is supported by 2,500 scientists. That number is not only much less than the dissenters but it refers only to scientists who either submitted papers or whose papers were referenced by the IPCC, some of whom have subsequently disassociated themselves from IPCC conclusions. The Secretariat of the IPCC has in fact denied that the 2,500 endorsed the reports and has refused to divulge their names to a senior Canadian journalist seeking interviews. In reality, IPCC reports have been compiled by a very small group of government-appointed scientists, with only 51 contributing to the IPCC’s 2007 Summary for Policy Makers.

Note also that the IPCC conclusion is not unequivocal: its assertion is limited to “**most** of the observed increase in global average temperatures since the mid-20th century” and to the conclusion that this “is ***very likely*** due to the observed increase in anthropogenic greenhouse gas concentrations”. I will come back to this shortly but, once account is also taken of the extensive dissent, any notion that this justifies major precautionary actions is

undermined because such dissent shows the enormous uncertainty about the costs and benefits of such action. As a recent Productivity Commission Staff paper points out, the multitude of definitions of the precautionary principle leaves open what it means for decision-making. This explains why, after exhaustive examination in 2006, the UK House of Commons Science and Technology Committee concluded that "the term 'precautionary principle' should not be used … and [should]cease to be included in policy guidance", adding that it has been "devalued and [is] of little practical help, particularly in public debate".

But in any event advocates of major government action destroy their own case. For example, while Professor Garnaut's draft report estimates that GDP in 2100 would be only 4.8% lower if no action was taken, it also estimates that GDP would then be seven times what it is today. Nobody could seriously believe that the much richer people living in 2100 would be unable to cope with such a miniscule small loss of income or unable to take counter-action to cope with the higher temperatures if they did occur. This must surely mean that no case exists for proceeding with emission reduction programs that would involve major structural changes to the economy and a huge increase in government controls and intervention.

Let me now consider some specific aspects of this global warming scare, starting with some history and philosophy.

A Little History and Philosophy

I want first to recall the long history of doom and gloom predictions about the likely course of human activity. Way back in 1798, for example, Thomas Malthus postulated in his "Essay on the Principle of Population" an "inevitable" tendency for population to outrun available subsistence. Jumping ahead 170 odd years, four scientists from the Club of Rome got much publicity in 1972 when they argued in "The Limits to Growth" that a developing shortage of resources required population to be "stabilized" and in his 1971 "The Population Bomb" biologist Professor Ehrlich predicted early serious shortages of food unless population growth was reduced to zero. A similar theme was advanced in "A Blueprint for Survival" signed in 1972 by 21 eminent scientists and described as a "major contribution to the current debate" in a letter to The Times signed by another 150 scientists, including nine more fellows of the Royal Society and 20 more university science professors.

Recent increases in world prices of oil and some basic foods might appear to provide some support for such theses. However, the food price increases appear mostly to be due to bad government policies, such as bio-fuel subsidisation for environmental reasons and price controls that deter production, while the ratio of oil reserves to production has not fallen and is higher than it was in the early 1980s.

So why is it that gloomy and totally erroneous predictions emerge from time to time? This is not easy to answer but some view the current global warming scare as part of a new age of Apocalypticism. The long history of apocalyptic statements and writings foretelling death or disasters, even the end of the world, in certain circumstances may

derive from the religious notion that there is a day of final judgment. When things go bad humans have an inbuilt tendency to include in their thinking what might be the worst possible outcome, reflected in the verse that poet John O'Brien put in his 1921 poem

"If we don't get three inches … to break this drought, we'll all be rooned … before the year is out, said Hanrahan".

Today we look to scientists rather than poets or preachers to make predictions and to propose what might be done to prevent roon. But although that should provide a more rational approach, all too often scientists themselves downgrade the potential for technological and other scientific advances to overcome or at least alleviate perceived and actual problems faced by mankind.

When I did my own research at the Royal College of Defence Studies in London in the early 1970s on the predicted running out of resources thesis, I was astonished to discover that the scientist doom and gloom analysts had made only limited allowance for new technological developments, let alone for new discoveries to supplement existing resources. A popular theme at the time was that the exhaustion of oil supplies would itself soon cause a major reduction in economic growth. But such propositions took insufficient account of the likelihood that the natural operations of markets, particularly through the price mechanism, would lead either to new discoveries or to the development of alternative fuel sources to replace oil.

The recent warnings of dire consequences from further temperature increases have emerged from a science of climatology that is only a new one dealing with extremely complicated relationships. Based on my own observations, and examining those of well-qualified analysts with whom I have discussed the matter, it is difficult to avoid the conclusion that there has been a gross overstatement by some scientists of the seriousness of threats. Those who are dissenters do not completely rule out the possibility of damaging changes but they do not put them in the IPCC category of being "very likely" and many are much more fearful of the effects of cooling than warming.

Let me turn now to discuss some specifics, first to temperatures.

Temperatures

The temperature data used by the IPCC, put together by centres that proselytise global warming, show an increase in average global surface temperatures of 0.74C over the 100 years to 2005. However, the accuracy of this data is uncertain particularly whether it takes sufficient account of urban heating effects. One analyst, whose exposure of major errors in the hockey stick analysis forced the IPCC to abandon its use, concluded in an article published in December last year that "the IPCC's global surface-temperature data is exaggerated, with a **large** warming bias. Claims about the amount of surface warming since 1980, and its attribution to anthropogenic greenhouse-gas emissions, should be reassessed using uncontaminated data. And governments that rely on the IPCC for advice should begin asking why it was allowed to suppress earlier evidence of this problem".

Long local records of temperatures for some specific places showing little or no warming also raise a question as to the accuracy of global surface temperature measurements and the method used for calculating the global average.

Differences also exist in measurements of recent upper air temperature changes. The IPCC report claims that "new analyses of balloon/satellite lower and mid-tropospheric" temperatures show warming rates that are generally consistent with surface temperatures for the 1979–2005 period. However, the IPCC does not explain why over that period lower tropospheric temperatures measured by satellite increased in the Northern Hemisphere but not in the Southern (see graph). Nor has it explained why analysis of all relevant measurements (from radiosonde weather balloons, satellites and ground thermometers) show no increase in rate of temperature with height in the troposphere in tropical latitudes. Yet computer models based on greenhouse theory says that such a tropical "hot spot" should exist in the upper troposphere.

The data used by the IPCC also show two lengthy periods, from 1940–75 and 1880-1910, of declining temperatures even though CO2 emissions were increasing (see graph of global temperatures since 1850). Since 1998 another shorter but significant period has developed showing no increase in the global average temperature (see graph of temperatures since 1975) and a recent article in a science journal has suggested that over the next decade "natural" climate variations will "temporarily offset the projected anthropogenic warming: surface temperatures in Europe and North America may even cool a little during this period". **Natural** variations are anathema to IPCC views, of course.

Responses by global warmers to this latest cooling period point out that temperatures are still higher than pre-1975 and claim an "underlying" warming trend remains. But that does not explain, of course, why temperatures have stopped rising in circumstances where CO2 emissions have been increasing strongly.

Historical experience also contradicts the IPCC claim that global temperatures in the last 50 years are ***likely*** to have been the highest in at least the last 1300 years. For Australia, it also contradicts the green paper's assertion that "the 12 hottest years in history have all been the last 13 years". Well-known features of history suggest temperatures in periods in the past have almost certainly been higher than recently without having adverse effects on societies.

Examples from the Medieval Warm Period (roughly, 800-1,100 AD) reveal the growth of crops and the grazing of cattle in Greenland in circumstances where there must have been much less ice than today. But, conveniently, after its 1990 report the IPCC stopped showing a graph of possible temperatures in the MWP. The warm climate then helps explain the increased economic, cultural and warlike activity at the time, as it did in the earlier Greco-Roman warm period (from 600 BC to 200 AD) when Hannibal took his army, including elephants, through the Alps in winter and grapes were planted and wine produced in northern England during the Romans occupation. IPCC and some other scientists appear to have "forgotten" history and the marked historical changes in climate,

which included cold periods that resulted in lives of misery for most and declines in populations.

Historical analysis of ice cores also suggest that, contrary to Al Gore's thesis, over the past half-a-million years temperatures increased on average 800 years **before** carbon concentrations increased, making it impossible for major climate cycling to be caused by CO2 variation.

It is difficult to avoid the conclusion that the IPCC analysis of what has happened to global temperatures in both the distant and recent pasts raises serious questions and does not form a satisfactory basis for assessing what might happen to future temperature trends. But do the same queries arise in relation to the large ice formations of Greenland, Antarctic and the Arctic?

Greenland, Antarctic and Arctic Ice Sheets

If an extended period of increasing temperatures were to occur, large ice sheets and glaciers would obviously melt. Melting in the Arctic, some of which has occurred recently but at a time when global temperatures fell by 0.5 of a degree, would be advantageous as it opens the North-West passage to transport (as it has done temporarily in the past) and, because it is mostly sea ice, there is no addition to sea levels. Other meltings would however lead to rising sea levels and enhanced flooding of low-lying areas, and this is one the principal dangers of inaction that is emphasised by global warming believers.

But if the IPCC claim is correct that the global sea level increased between 1961 and 2003 by about 7 centimetres (about 2.5 feet), that appears to have caused few problems. Its projection for 2100 is less - about 18-59 centimetres or only about 2 feet, of which only a miniscule amount is attributed to Greenland melting. However, the extent of the actual and potential sea level rise is widely disputed even by "experts" who accept the general warming thesis. Other analyses suggest the Greenland and Antarctic ice sheets have probably been relatively stable. The best "scare" the green paper can produce is stated as "increasing concern about the stability of the Greenland and West Antarctic ice sheets". But the sea ice area in the Southern Hemisphere is now about one million square kilometres higher than the 1979-2000 average. As to glaciers, the recent Indian government climate change action plan, which was endorsed by IPCC chairman Pachauri despite its denial of the human caused warming thesis, states that melting in glaciers is not consistent across the Himalayan chain and it is too early to "establish long-term trends or their causation, in respect of which there are several hypotheses".

In short, it is difficult to see serious problems emerging from melting glaciers or from possible increased sea levels that demand any action additional to what the Dutch have done over time.

Other Alleged Warming Problems

Many other responses can be made at a scientific level to alleged global warming scares. The Hanrahan perception that increased temperatures accompany rooness droughts is not borne out as Australian droughts have occurred when global temperatures were lower than now and wetter years have occurred when such temperatures were rising (the green paper's acknowledgement that the north-east of Australia has become wetter since the 1950s implies no "global" influence). Moreover, the projections of rainfall derived from computer models have been shown to significantly underestimate the extent to which rainfall increases with temperature; polar bears are not dying off because of melting ice problems but have been increasing; higher temperatures would not increase malaria in former cooler areas as those areas have already experienced high incidences of malaria; warmer temperatures would not lead to an increased incidence of hurricanes and storms but possibly the opposite.

In summary, even if the IPCC analysis of temperatures were accepted, almost all the scares "supposed" already to be occurring have either no substantive scientific backing or are highly disputed by eminent scientists. The same conclusion arises when we turn to the science itself.

The Science of Emission Concentrations

The additions to CO2 concentrations in the atmosphere are the basis of the IPCC conclusions that temperatures will continue to increase unless there is a halt to CO2 emission increases. Put very simply, such concentrations radiate back to earth the heat reflected from the earth and, hence (the story goes), the greater the concentrations the greater the temperatures. The problem is that all the IPCC reports also acknowledge that it is widely accepted amongst scientists that the warming effects from emissions of CO2 diminish progressively as atmospheric concentration levels of CO2 increase (see graph on Radiation Forcing increments with CO2 concentration).

Using this analysis it can be calculated that, even if CO2 concentrations doubled between now and 2100, temperatures would increase by no more than 0.5 of a degree. Amongst others, Professor Richard Lindzen of MIT has also drawn attention to this point and has even suggested the amount of carbon dioxide in the atmosphere may already have reached a level at which it is ceasing to have any significant warming effect.

So why has the IPCC failed to take this into account in framing its conclusions that major action is urgently needed in response to global warming? Given that the recognition of the analysis is tucked well away in the body of IPCC reports, the clear implication is that those conclusions are politically not scientifically motivated. It is astonishing that this aspect of the science has not been publicly examined and reported on *before* governments accepted that policy action is needed to reduce emissions.

There is also very considerable doubt about the accuracy of the modelling used by the IPCC used to project temperature increases. These models incorporate the *positive* feedbacks from water vapour that **increase** the radiation effects back to earth from increased CO2 concentrations (and hence cause some initial rise in temperatures). However, the models fail to take adequate account of the temperature **reducing** effects

from the *negative* feedback coming from the strong increase in surface evaporation that also occurs as surface temperatures rise. Surface evaporation involves a temperature offsetting process but, as the IPCC models understate the net reducing effects, the modelled outcome of larger CO2 concentrations is a much larger increase in surface temperature than actually occurs.

If the CO2 concentration model does not explain increased temperatures, what does? The short answer is that nobody can provide a definitive answer. However, a number of leading scientists do present a convincing case that changes in the sun's activity levels, including particularly variations in sunspot activity, are closely co-related with variations in temperature, that the sun seems to have been much more active in recent years, but that this activity is now ending and cooler periods are likely to develop.

These analyses of the role of the sun arguably provide more defensible explanations of temperature changes than the IPCC ones put together by government-appointed scientists who say they are "90 per cent certain" that human activity has been the main cause of temperature increases.

CONCLUSION

By contrast with the draft Garnaut report and the green paper, Australia's professionally respected Productivity Commission has pointed out that "uncertainty continues to pervade the science and geopolitics and, notwithstanding the Stern Report, the economics". It adds that "independent action by Australia to substantially reduce GHG emissions, in itself, would deliver barley discernible climate benefits, but could be nationally very costly". It also describes the Stern report "as much an exercise in advocacy as it is an economic analysis of climate change".

Even if increases in temperature were to continue at about the same rate as in the past century, the normal operations of market economies should be able to handle most problems that might emerge. Moreover, the next generation will be much richer and have a much greater capacity to provide the resources needed to deal with such problems. The scare-mongering reports have seriously underestimated the capacity of humans to both innovate and adapt to change as they have done over the past century in company with the relatively small increase in temperature that has occurred.

If any substantive qualification were to be made to the alleged consensus, this would clearly require a different policy response. For example, if it came to be accepted that any further temperature increase from increased CO2 emissions is likely to be small and relatively gradual, such an increase would be capable of being handled mainly by adaptation by the private sector. The wide differences in average temperatures that already exist between different parts of the world show the extent to which humans can readily adapt themselves to different climates: Singaporeans live with an average temperature of about 27 degrees while Helsinki residents experience an average below 10.

The case for extensive government intervention is importantly dependent on the end-of-civilisation type argument that some scientists have previously predicted wrongly. Unfortunately, the political basis underlying the claims by the IPCC and its supporters are likely to prevent even the public inquiry needed into the scientific analysis that would include representation of those scientists disputing the IPCC views.

ATTACHMENT – Critiques by Major Groups or Individuals

US Senate Environment and Public Works Committee Report (Minority), 20 December, 2007, endorsed by over 400 prominent scientists (many being current or former participants in the IPCC), including Australian Professor Ian Plimer, and voicing "significant objections to major aspects of the so-called "consensus" on man-made global warming";

Oregon Institute of Science and Medicine, Petition Project, started in 1998 after the signing of the Kyoto Treaty by many countries. The Petition, which is now signed by over 31,000 scientists in the US (and continues to attract signatories), was endorsed originally by the former head of the US National Academy of Science, Dr Fred Seitz. The Petition declares "there is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate";

Science and Environmental Policy Project by S.Fred Singer, research professor at George Mason University and professor emeritus of environmental sciences at the University of Virginia. With Dennis Avery (a senior fellow of the Hudson Institute) he has co-authored a book "Unstoppable Global Warming Every 1,500 years" (2007) dedicated to "those thousands of highly qualified research scientists who have documented physical evidence of the1500-year climate cycle from over the entire globe" and to three scientists who led the discovery of the cycle for which they received the Tyler Prize, described as the "environmental Nobel". Singer is an active critic of the human-caused thesis and publishes a weekly newsletter;

Letter dated 10 January 2007 to the Canadian Prime Minister, Stephen Harper, signed by 61 prominent international scientists (including Australian Mr William Kininmonth) and calling on the Prime Minister to hold public consultation-sessions to "examine the scientific foundations of the federal government's climate-change plans";

Fraser Institute (Canada) Independent Summary for Policy Makers (of the) IPCC Fourth Assessment report, February 2007, signed by 10 expert scientists/economists, including Australian Mr William Kininmonth, and concluding "there is no compelling evidence that dangerous or unprecedented changes are underway";

The Lavoisier Society Group – Submission to Garnaut Climate Change Review, January 2008, by President Peter Walsh (former Finance Minister in the Hawke Labor Government); The Lavoisier Society Groups' submission to the Garnaut Review, January 2008; Nine Facts about Climate Change by Secretary Ray Evans, February 2008. The Society's web site contains many scientific papers critical of the IPCC thesis;

Book by Czech President, Vaclav Klaus on "Blue Planet in Green Shackles What is Endangered: Climate or Freedom?", 2007. Published by the Competitive Enterprise Institute in Washington DC.

Two articles written by Professor David Henderson (former head of Economics Division of the OECD) and Mr Ian Castles (former Commonwealth Statistician) in 2003 and published in *Energy & Environment*, exposing errors in the economic and statistical analysis used by the IPCC;

Report by House of Lords Select Committee on Economic Affairs (2005), *The Economics of Climate Change* and evidence presented by Professor David Henderson;

Article in World Economics, Vol 7, No.4, October-December 2006 on *The Stern Review: A Dual Critique,* concluding that the Review is deeply flawed and does not provide a basis for informed and responsible policies. The Critique was originated by Professor David Henderson and authored by him and 14 other prominent scientists and economists, including Australian Professor Bob Carter (a palaeontologist who has published considerable research on climate change and is Adjunct Professor at James Cook university in Townsville), Professor Chris de Freitas (a climate scientist at the University of Auckland), and Richard Lindzen, Professor of Atmospheric Sciences at MIT (see below) and Mr Ian Castles.

National Post newspaper, Canada, has published numerous articles criticising the scientific consensus and outlining the views of individual scientists who dispute the consensus;

Three articles by Mr John Stone, former head Australian Treasury, published in National Observer on "Michael Crichton on "Global Warming"', No. 64, Autumn 2005; ""Global Warming" Scare-mongering", No. 71, Summer 2006/07; ""Global Warming" Scare-Mongering Revisited", No.72, Autumn 2007; and "Kyoto the Fraud: How Australians are being Conned", Address to National Conference of the National Civic Council, 2 February 2008;

Book by Michael Crichton on "State of Fear", published by HarperCollins, New York, 2004;

Articles written by Professors Stephen McIntyre and Ross McKitrick in *Energy & Environment* in 2003 and 2005, and Geophysical Research Letters in 2005, that inter alia exposed errors in the historical temperature reconstruction of the past 2,000 years by the IPCC (the so-called hockey stick presentation, subsequently abandoned by that body);

The Great Global Warming Swindle film, March 2007, portraying the views of many expert scientists criticising the IPCC analysis and including environmentalist Patrick Moore, a founding member of Greenpeace;

Book by Mr William Kininmonth, former head of the Australian Bureau of Meteorology's National Climate Centre, on "Climate Change: A Natural Hazard", 2004;

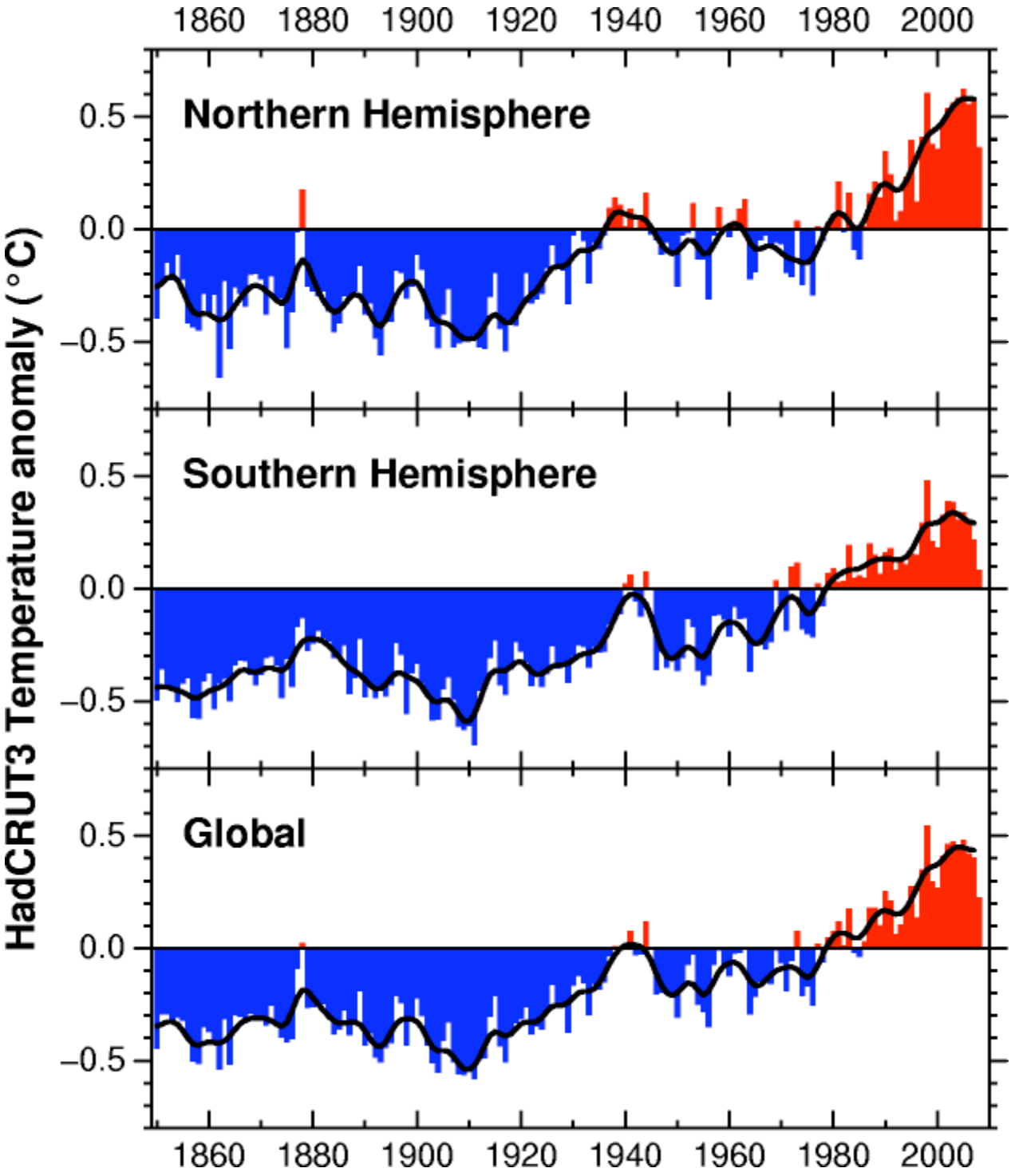
Professor Richard Lindzen, Alfred Sloan Professor of Atmospheric Sciences at the Massachusetts Institute of Technology, publisher of over 200 books and scientific papers, is a major critic of the IPCC's analysis;

Lord Nigel Lawson, former UK Chancellor of the Exchequer, “A Cool Look at Global Warming”, the 2007 Trotter Lecture, published by the New Zealand Business Roundtable.

July 2008

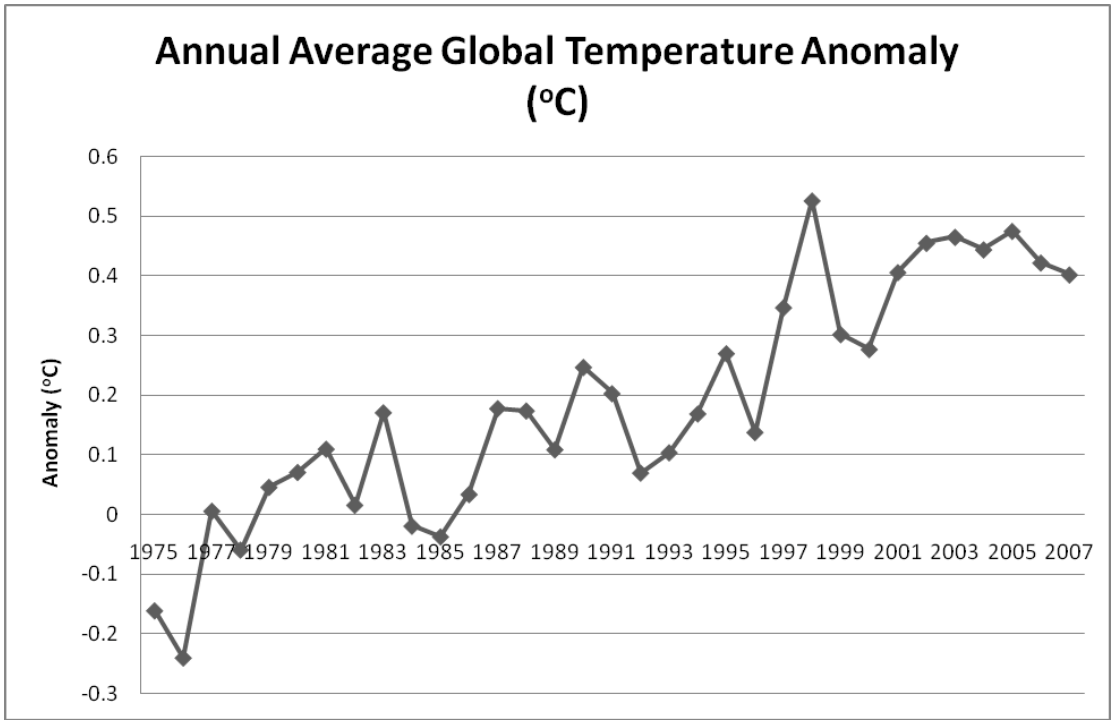
GLOBAL TEMPERATURES AND CO2 CONCENTRATIONS

Temperatures 1850-2007 – Northern & Southern Hemispheres



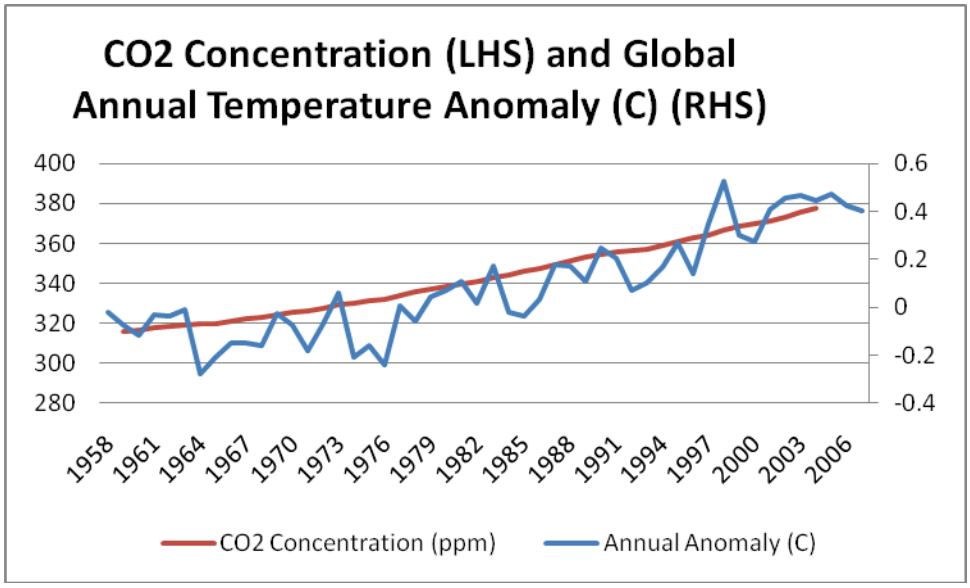
Annual average global near-surface temperature record (combined land and sea); black line is a smoothing filter (UK Hadley Centre based on Jones et al at the University of East Anglia). There are two major periods of warming: from 1910 through 1940 and from 1975 through near 2000. The magnitude of recent warming has been greater in the Northern Hemisphere than in the Southern Hemisphere, possibly reflecting the greater percentage of land area in the Northern Hemisphere but greater ocean

Global Temperature – 1975 -2007



Annual average global temperature anomaly (departures from the 1961-1990 mean) based on published data from the UK Hadley Centre.

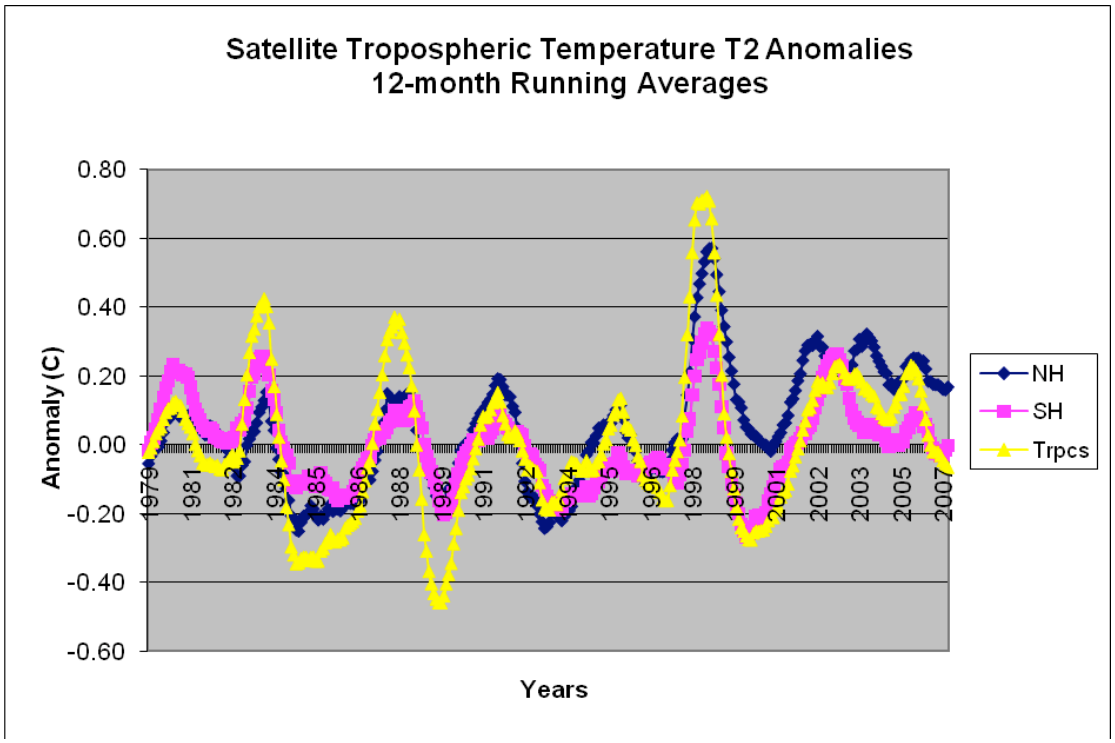
Global Temperature and CO2 Concentration 1958-2006



Annual average global temperature anomaly (departures from the 1961-1990 mean) based on published data from the UK Hadley Centre. Annual average CO2 concentration based on published data from Mauna Loa.

Global temperature remained relatively constant until the middle 1970s and then increased steadily until the late 1990s. Temperature has been nearly constant over the last decade.

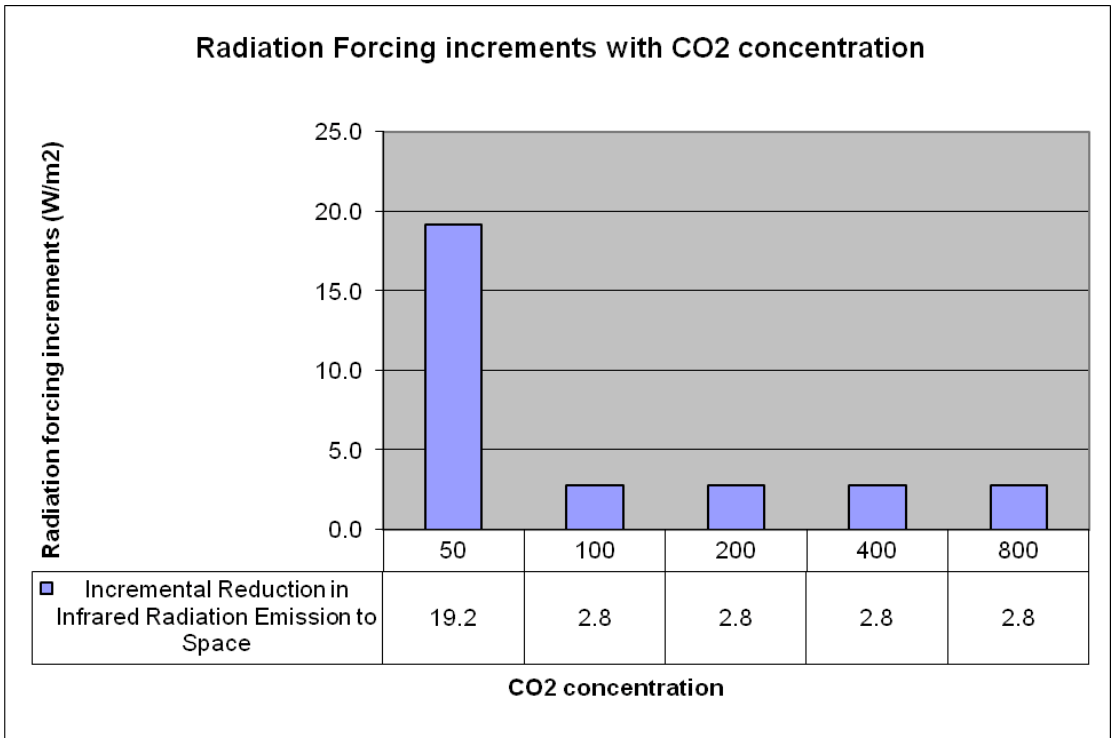
Although the graph appears to show a good correlation between changes in CO2 concentration levels and temperature, that is the outcome of the scales used in the graph. The temperature rise was confined to the years 1976-1998, or about 40 percent of the period. Over the period there is only a small temperature rise despite the claimed continuous forcing from increased CO2 concentration levels.



Satellite derived Lower Troposphere Temperature Anomalies (departures from the 1979-1995 mean) for the northern hemisphere (NH), southern hemisphere (SH) and the tropics (Trpcs) based on published data from the University of Alabama, Huntsville (Spencer and Christy). The temperature trend in the lower troposphere is significantly less than that of the surface.

There is a very strong correlation between the tropical troposphere temperature anomaly and El Nino and La Nina events in the Pacific Ocean. El Nino events (warm sea surface temperatures) coincide with warm tropospheric temperature anomalies. The reverse is the case for La Nina events. This tropical forcing is reflected in troposphere temperature anomalies of both the Northern and Southern Hemispheres.

Why are there disparities between surface and satellite temperature measurements over the middle and higher latitudes (where there are the large land masses of Europe, Asia and North America) - but hardly any in regard to the tropics? One reason is that surface temperatures are influenced (increased) by urban heat island effects from those land masses. Although climatologists are not in agreement as to the processes that have given rise to the surface temperature pattern, one thing is clear - it is not the 'fingerprint' of anthropogenic global warming. The models suggest atmospheric warming should result in equal warming of the two hemispheres.



The bottom section of the graph shows the reduction in radiation emission to *space* as CO2 concentration levels double while the y axis shows the corresponding radiation forcing increases to the *earth's* surface. (The reduction in emission to space - IPCC's definition of radiation forcing - occurs because the radiation emission emanates from a higher and colder layer. The increase in the back IR at the surface occurs because the emission emanates from a lower colder layer of the atmosphere).

The implications of increased levels of CO2 concentration on *surface* temperatures may be summarised as follows:

While this results in radiation back to earth, the amount of that radiation diminishes progressively as levels of CO2 concentration increase. The main 'radiation forcing' of carbon dioxide is by the initial small concentration, with the first 50 ppm of concentration dominating the forcing *(Calculated using MODTANS for cloudless skies and US Standard Atmosphere)*

While the *initial* effect of that radiation is to increase surface temperatures (by increasing the accumulation of energy at the surface), this effect is partially offset by increased radiation from the surface *and* by the increased evaporation of latent energy from the surface (which is the dominant factor in damping any tendency for surface temperature to rise);

The net effect is only a small increase in surface temperatures.

We can evaluate the rate of increase of surface energy loss by infrared emission (the Stefan-Boltzmann Law) and evaporation (Claussius-Clapeyron Relationship). These are 5.4 and 6.0 W/m2 per degree C temperature rise respectively, or a combined 11.4 W/m2 energy loss for each degree C surface temperature rise. The radiation forcing from a doubling of carbon dioxide concentration can only sustain a surface temperature rise of about 0.3C.