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New Zealand Association of Scientists discussion paper

Climate change
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1. Introduction

Last month David Lillis published an article¹ with the above title with a view to initiating a discussion on the topic of "Climate Change" in New Zealand Science Review.

The bulk of the article amounts to a political manifesto which gives details of what changes should be made in all of our lives as a result of his belief that "Human-induced climate change is a reality"

2. Overwhelming Evidence

He begins by dealing, in a rather perfunctory fashion, with what he regards as objections to this belief, admitting that "most or all of the standard objections have been answered to a large extent", but then asserts that despite this lack of complete certainty "The evidence (of human-induced warming) is overwhelming" and that "it is now widely accepted that the earth is indeed warming at a significant rate"

In order to support this statement, he then quotes an "estimate" by Mears and Wentz that the earth is warming at a rate of 1.9°C per century, and that Christy, using the same data "estimates" a rise of "about" 1.2°C per century. This already represents a large discrepancy between interpreters of the same data, and one wonders at the accuracy of these "estimates. To test the value of these statements let us examine the actual data upon which they are based.²

Figure 1. Annual Average Global temperature anomalies in the lower troposphere from the. from NASA Microwave Sounder Units (University of Huntsville, Alabama) 2.

The data, which are derived from NASA satellites using Microwave Sounder Units (MSU), are able to monitor the temperature of the whole earth in the lower troposphere something which cannot be done on the surface

Microwave Sounder Units measure the microwave spectrum of oxygen, a sensitive measure of temperature.

The record only exists since the beginning of the satellite programme, from 1979, so it is rather arrogant to derive a linear temperature increase over this relatively small period and conclude that it applies for the entire century. Also there seems to be no realization that an irregular sequence such as this can have several very different "linear" changes depending on the choice of starting point and finishing point.

The obvious irregularity of this record can hardly be held to be compatible with a theory which expects global temperatures to rise in a steady fashion. It could even be held to prove that the theory must be wrong.

The above record can be divided into a number of different "trends". From 1979 to 1997 there was clearly no significant change in global temperature at all in the lower troposphere. There was, similarly, no significant temperature increase from 2000 to 2006. There has therefore been no "global warming" for the past 5 years. This means that for these two periods of eighteen years and five years, when greenhouse gas emissions were increasing all the time, there was no evidence in the lower troposphere, where the greenhouse effect is supposed to be most evident, of any detectable temperature increase. This is surely "overwhelming evidence" that the greenhouse theory must be wrong.

Many of the features of this record can be convincingly related to natural climate features that took place during the period.

There were two major volcanic eruptions, El Chichon on 3 April 1982, and Pinatubo, 14 June 1991, both of which must be held responsible for the recorded lowered temperatures of those years.

Most of the peak temperatures in this record. are associated with El Niño ocean oscillation of that year. The most prominent one was in 1998 which provides a completely distorting picture to the whole record, being largely responsible for the size of the "trend", but clearly not evidence of the effects of greenhouse gases,

There were also prominent El Niño events in 1980, 1982-3 (superimposed on the effects of the El Chichon eruption), 1987, 1991 (again on top of the Pinatubo eruption), 2002-2003, 2004-2005 and 2006, all of which caused increased temperature peaks.

Without the influences of the volcanic eruptions and the El Niño events there would be precious little "trend" left to be attributed to greenhouse warming. This period (1979-2006) had the maximum rate of emissions of greenhouse gases recorded. If there was little or no evidence of greenhouse warming here, there could hardly have been any effects in any of the previous years.

It is also obvious that if the El Chichon volcano and the 1998 El Niño swapped places, there would be a downwards "trend" and David Lillis might be proposing a policy to mitigate the coming ice age..

It has to be admitted that the temperature record since 2001 has been consistently higher than the overall average value since 1979. This must be at least partly due to the several extended El Niño events over the period, but it does seem to require more than this to explain it. What it cannot be due to is the greenhouse effect, since that would predict a steady increase over the period. Global temperatures have actually been stable for five years, although they seem to have declined markedly in New Zealand.,

So much for the only example David Lillis was able to provide of the "overwhelming evidence" that human emissions of greenhouse gases are warming the climate.

3. The IPCC

The Framework Convention on Climate Change of 9 May 1992,³ in force from 21 March 1994 defined "climate change" in its Article 1, as follows:

"Climate Change" is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods"³

This was not just a definition; it was a decision. The nations (including our own) who endorsed the convention, and accepted the obligations it has imposed have also accepted that there is no possible argument with the proposition that human-induced greenhouse gases are warming the climate.. They have accepted that the evidence for "climate change": as so defined is so overwhelming that they must take the steps so exhaustively described by David Lillis to implement the Convention. Our government and almost all of the other political parties in New Zealand accept that the existence of "climate change". so defined calls for action to control and reduce carbon dioxide and other greenhouse gas emissions.

Although it was generally agreed that further evidence was unnecessary, the Intergovernmental Panel on Climate Change (IPCC) was established jointly between the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) in 1988 to accumulate additional evidence for "Climate Change". The scientists involved in this exercise felt that it appeared that they were not even allowed to investigate possible natural effects on the climate, and they attempted, unsuccessfully, to alter the FCCC definition to include "natural variability" in their investigations. When it was made clear that such investigations would only be made if they were shown to play only a minor role on the effects on the climate of human greenhouse gas emissions, they were permitted to do so.

The determination to suppress any scientific contributions which tended to challenge the "Climate Change" mantra was made clear in the first IPCC Report (1990) in their introduction to a list of reviewers, as follows⁴:

"The persons named below all contributed in the peer review of the IPCC Working Group I Report. While every effort was made by the lead authors to incorporate their comments, in some cases these formed a minority opinion which could not be reconciled with the larger consensus. Therefore there may be persons below who still have points of disagreement with areas of the Report"

After that you would hardly be surprising that most scientists who disagree with the Report's conclusions have been reluctant to waste their time and effort to say so.

The whole exercise is an openly political one, as it is carefully controlled by Government representatives from the Convention signatories. Lead authors for the Reports are chosen by the Governments and a "Summary for Policymakers" approved line-by-line by the Government representatives has to be at the beginning of all reports. The authors of this summary are "drafting authors" who are carrying out decisions made by the governments.

In these circumstances, it is very difficult for scientists to have a genuine debate on the issues involved, as the impression is given that all such issues have been settled long ago and there is no place for further argument. David Lillis regards this discussion as merely an opportunity to dismiss "objections" He does not even consider that it is necessary to give reasons why "climate change" is believed.

The IPCC has published four major reports and several minor ones. The fourth report is in three volumes, dealing with Science (WGI), Impacts (WGII) and Mitigation (WGIII). The WGI (Science) Reports, considered here, are all very difficult to follow for a non-scientist, and even for a non-specialist scientist, as they are full of acronyms and specialist terms. As a result, the Summary for Policymakers" tends to be the only document considered, and even that requires a level of scientific knowledge which the general public is increasingly being prevented from acquiring by the dumbing down of science in our education system..

The drafts of each report are routinely circulated for comment to interested parties, and nowadays almost anybody can comment, as it is so easy to distribute the Reports electronically.

I have been an "Expert Reviewer" right from the start. I believe that I submitted more comments than any other individual. Up to recently these comments have been secret, and I never expected that they could ever see the light of day. However, as a result of a request under the US Official Information Act, the comments on all three drafts of the 2007 IPCC Science Report (from the IPCC Working Group I) are now available on the web⁵. From the 556 commentators I made the greatest number from any individual, 1,878 in all, 16% of the total. Of course, most of them were "rejected".

I have published critical reports on all of the IPCC Reports⁶⁻²¹, including one book¹⁷ including the most recent paper which was originally rejected by New Zealand Science Review ²⁰.

4. Atmospheric Carbon Dioxide Concentration.

According to the IPCC²², the "Radiative Forcing" ΔF , in watts per square meter, of additional carbon dioxide in the atmosphere, can be calculated from the formula

$$\Delta F = 5.35 \ln C/Co$$

Where C is the concentration of carbon dioxide in parts per million by volume, and Co is the reference concentration. ln is the logarithm to the base e.

This formula means that the overall effect of carbon dioxide in the atmosphere depends very strongly on its variability. Variability below the average is far more important than variability above the average.

Frantic efforts are made to try and preserve the myth that carbon dioxide is "well-mixed" in the atmosphere, so as to conceal the fact of its variability. The restrictive conditions of measurement in order to do this are described by Manning et al²³ as follows:..

"At Baring Head maritime well mixed air masses come from the Southerly direction, and a baseline event is normally defined as one in which the local wind direction is from the South and the standard deviation of minute-by-minute CO₂ concentrations is <<0.1 ppmv for 6 or more hours."

Despite the admitted fact that there is a global "variability" of carbon dioxide concentration for the year 2006 between 366 and 390ppmv, even for the restrictive conditions of measurement over the ocean. ²⁴. The IPCC persists in calculating "radiative forcing" from the "average" to give an upwards bias to the figure.

Measurements over land surfaces, which are of concern to inhabitants of cities, are never revealed, neither are the ocean measurements outside the restrictive conditions laid down by Manning et al.

Beck²⁵ has recently shown that there were over 90,000 chemical measurements of atmospheric carbon dioxide concentration made between 1812 and 1958.. All were publishes in peer reviewed journals, and some were by Nobel prize-winners. The actual papers can be read on Beck's

supplementary website²⁶.

The very existence of these measurements has been routinely suppressed by the IPCC. Chapter 1 of the recent "Climate Change 2007" purports to be a "Historical Review of Climate Change Science"²⁷ but there is no mention of the very large literature on atmospheric carbon dioxide concentration before 1958.

An examination of these papers shows that carbon dioxide is only very rarely "well-mixed" in the atmosphere. In most places the concentration changes with time of day and wind direction. The actual concentration can vary from figures much greater than the amount currently claimed to values well below it. The only possible reason why this information is being concealed from us is that they wish to use the apparent "average" to calculate radiative forcing" instead of an integrated sum of the logarithm of concentration at different levels, in order to provide an upwardly exaggerated figure.

The results of atmospheric carbon dioxide concentration obtained from ice cores, relating to past eras must also be similarly disputed. They are based on a mere handful of sites, and the results themselves are subject to a large number of errors and doubtful assumptions, which are described in detail by Jawarowski²⁸. The figures now quoted also lack information on variability and accuracy. Information about concentration variability in the early papers has apparently disappeared from the later papers

5. Atmospheric Methane Concentration

Measurements of atmospheric methane concentration have been made by NOAA and others since 1984²⁹, using the restricted procedures also applied to carbon dioxide in an attempt to claim that this gas, too, is "well-mixed" in the atmosphere. These measurements have shown a steadily falling "rate of growth", that although the actual concentration has appeared constant since 1998, it should eventually fall at an increasing rate.

This behaviour is regarded as unbelievable to the extent that all the IPCC SRES (Special Report on Emissions Scenarios") scenarios assume that methane has increased since the year 1990 at an increasing rate. Since these scenarios cannot even predict the past¹⁷ their reliability for future prediction seems doubtful. The reasons for the actual behaviour are also regarded as obscure, probably because the chief (and least accurately known) methane emitter is wetlands, and it would be embarrassing to admit that wetlands are being drained, or that draining wetlands is beneficial to the climate.

"Radiative forcing" of atmospheric methane is also dependent on a logarithmic function of the concentration²⁹ so this calculation also should not be made on an "average", but on the logarithmic function applied to measured variability. Actually, the variability of even the "background" is quite great (1630-1900ppbv for 2006³⁰) and figures over land are expected to be much more variable.

The discovery that methane is evolved from plants³³, apparently a surprise, shows how little is known about the concentration or distribution of this gas. The claim, though, is still controversial³⁰

6. Radiative Forcing

The crucial claim supporting the influence of increased greenhouse gases is the calculation supplied by the IPCC³³ which gives the estimates of the various components of radiative forcing the extra radiation, measured in watts per square meter at the tropopause.

These estimates are given in Figure 2.

Figure 2 Components of Radiative Forcing 1750 to 2005 as assessed by the IPCC³³

It may surprise some that there are so many components of this quantity. The components are all furnished with a spurious indication of accuracy, supposedly 90% confidence limits. As most of them are also non-linear functions of concentration, this calculation from an average for each one of them is unreliable. But they do not include the extra level of inaccuracy embodied in the "Levels of Scientific Understanding" (LOSU) estimates on the right hand side of the diagram. Since there is no evidence of the value of these levels it means that the actual most probable value of each item, and the net radiative forcing since 1750, obtained by integrating all of them, is unknown, and could easily be zero or negative. On top of this, the diagram does not include the most important, and the least known, of the components of radiative forcing, changes in water vapour and in clouds, which are considered to be "feedbacks" to the effects of carbon dioxide, without any theoretical or experimental evidence. .

This diagram, and the crucial claim made by it, that the net radiative forcing since 1750 is positive, is therefore wholly unconvincing. The only hope to show whether changes in radiative forcing could be positive is to seek evidence to show whether there are climate influences which derive from this and from no other cause...

7. Temperature

The principal claim of greenhouse theory is that increases in radiative forcing cause warming of the whole earth, detectable when global temperature averages are derived.

Figure 1, for only 28 years, shows that this claim is wrong, since, as judged by NASA satellite measurements (MSU) in the lower troposphere there was been no "global warming" between 1979 and 1997, or for 2001 to 2006, despite the copious emissions of greenhouse gases that took place over both periods.

The absence of significant "warming" between 2001 and 2006 has been confirmed by all other temperature records (e.g. see Figure 3). The embarrassment caused by the absence of "global warming" has almost led to the abandonment of the term and its replacement with the term "climate change" Attention is thus drawn away from the lack of warming by blaming all other climate events, such as hurricanes, melting ice, droughts, polar bear survival etc. on "climate change" which depends on a warming that is not happening. There is also an argument, used by the scientists involved with Figure 1, that even if it is not warming now, there is a "trend" of warming if you go back far enough. This seems to assume that the greenhouse effect can be intermittent, turning itself on and off, instead of the steady inexorable advance which theory predicts.

The measurements of Figure 1 are not often mentioned since it shows no evidence of greenhouse gas influence in the place where it is supposed to happen, and it is based on a genuine global average, subjected to a constant barrage of attempts to "correct" it to try and show a greenhouse influence.

The preferred temperature records of all the IPCC reports are the mean annual global surface temperature anomaly records, compiled by the three major groups, two in the USA (GISS; The Goddard Institute of Space Studies, and GHCN, The Global Historic Climatology Network, NOAA, NCDC; (National Oceanic and Atmospheric Administration/ National Climate Data Center) and The University of East Anglia Climate Research Unit (CRU) UK. An example from CRU is Figure 3. ³⁴

Figure 3 Global surface temperature anomaly record (Brohan et al 2006)³⁴ with 95% confidence levels added.

Although claiming to provide a "global mean" no actual average temperature is determined to provide it. Many modern weather stations have continuous measurement, but continuity with the past demands that the sole daily record of maximum and minimum temperature must be used

for the entire sequence. The sites used are not a representative sample of the earth's surface and very few would be unaffected by the surrounding buildings and vegetation, or frequent changes of site. The number of stations has been extremely variable and there is no quality control system to control uniformity of measurement or supervision, not even in the USA where there is the greatest chance^{15,17,18,20}.

The entire sequence of Figure 3, since 1850, is irregular and incompatible with a theory which expects a steady change. It is accompanied by spurious statistical "confidence limits" after attempts have been made to correct the many sources of bias and error, but even after that, it turns out that there are "unknown unknowns" which would convert the entire sequence, and its supposed inexorable increase, to universal doubt¹⁵

An attempt has been made to "simulate" the surface record it by adjusting the many uncertain parameters in several models and incorporating the little understood effects of the sun and volcanoes. ³⁵ The most important natural effects on the climate, El Niño ocean oscillations, are omitted, presumably because they would spoil the whole exercise. They also ignore the well-authenticated human influences from urbanisation and change of land usage ¹⁵.

Limited "corrections" of the deficiencies of the surface record, have been made in the USA ³⁶ and in China ³⁷ show no significant evidence of a steady "global warming". The Chinese compilation is shown in Figure 4. It is interesting that this is consistent with the records making up Figure 3, suggesting that others are responsible for the apparent warming.

Figure 4 Temperature anomaly record for China (Zhao et al 2005).
Black curve from Jones (personal communication) the other curves from different Chinese investigators.

Both the USA and Chinese records besides showing no significant long-term warming, show a cyclic temperature fluctuation of about sixty years, with current temperatures close to those observed in the 1940s.

A similar cyclic fluctuation, combined with no significant evidence of an overall warming trend is also to be found in a number of well-maintained, long-term individual climate records ³⁸

Figure 5 gives an example from Christchurch, New Zealand³⁹ where prominent volcanic eruptions and El Niño events can be seen to have influenced the record, and where the maximum temperature since 1908 was in 1917.

8. Sea Level.

Comprehensive data on sea level as measured by tide-gauges is available from PSMSL (Permanent Service for Mean Sea Level)⁴⁰

All the data have to be corrected for tidal variation and most of them are also corrected for isostasy (geological change). The data are often fragmentary and the equipment is often liable to damage from storms. Global positioning has only recently been introduced, to allow for this. To measure the data are not usually corrected for land subsidence caused by growth of cities with weight of buildings, or removal of ground water and minerals, so it is far from certain that the claimed overall rise⁴¹ of 1.7 ± 0.05 mm/year for the 20th Century is genuine, or whether it really happened on the open ocean. Also the change is not linear, and many recent records show no significant rise.

Figure 5 Temperature Record for Christchurch, New Zealand ³⁹

For example, the sea level changes in Auckland and Wellington have been negligible since 1950, and the level at Dunedin has fallen. A claim that Pacific Islands were sinking led to an investigation by Flinders University, Adelaide, which replaced all the tide gauges in 12 Pacific islands to attempt to find out whether it was true. The attempt has now been abandoned as a failure, as none of the 12 islands showed any significant change since 1991. The team tried to save face by claiming that all showed an upwards "trend" because the 1998 hurricane caused a temporary depression in the ocean. Since 1998 all have remained flat, and the main island of contention, Tuvalu, actually rose last year⁴²

Aviso altimetry satellites have found a fairly steady rise of 2.8mm per year since 1993⁴³, but there are recent signs of stabilization. The data are not corrected for post glacier rebound and it is unclear whether they represent a permanent upwards trend,

9. Ocean Heat

This topic seems to be in disarray. The graph, and claims of "Climate Change 2007"⁴⁵ have been amended twice for instrument inaccuracies. The current record appears to be that published by Trenberth⁴⁶ which seems to indicate cyclic temperature behaviour similar to that seen in Figures 4 and 5, where the current peak resembles the one in 1945

10. Hurricanes

"Climate Change 2001" made the following statement⁴⁷

"We are uncertain as to whether there has been any large scale, long-term increase in the Northern Hemisphere cyclone intensity and frequency..... Limited evidence exists for a decrease in cyclone frequency in the Southern Hemisphere since the early 1970s..... Recent analyses of changes in severe weather (tornadoes, thunder days, lightning and hail) in a few selected regions provide no compelling evidence for widespread systematic long-term change"⁴⁷

Christopher Landsea, who was one of the "Contributing Authors" responsible for this statement recently resigned from further participation as he considers that his views are suppressed by the IPCC. He has recently elaborated on these opinions⁴⁸ where he explains that one problem is the difficulty of defining a "hurricane" as there are different definitions over different periods.

"Climate Change 2007"⁴⁹ says

"Tropical cyclones, hurricanes and typhoons exhibit large variability from year to year and limitations in the quality of data compromise evaluations of trends."

All the same, they allocate levels of "likelihood" to increases in cyclones and Trenberth ⁴⁶ claims that "Global Warming Exacerbates Storms" which may be regarded as comforting, since there has been no Global Warming for six years.

11 Forecasting the Future

One of my favourite historical figures is Admiral Robert Fitzroy. He was captain of the "Beagle" during its journey from 1831 to 1836 with his "gentleman companion" Charles Darwin. They visited New Zealand in 1835 and launched the theory of evolution, which Fitzroy subsequently rejected. He was the crucial second Governor of New Zealand; sacked because of his premature concern for the rights of New Zealand Maoris. He was the first Director of the British Meteorological Office where he launched the first Weather Forecasts, storm warnings for ships. He collected information from ships' captains to find the best indicators for storms. He committed suicide at age 59 in 1865, depressed at criticism

that some of his forecasts were wrong.

Today, weather forecasts have become an essential part of all our lives and they are vital to farmers, airlines, sailors and explorers. The basic technique of trying to find patterns in climate data has not changed, but the sophistication of the technological support apparatus has escalated. All the same, reliable forecasts do not extend much further than a week or so, and longer term forecasts can be unreliable.

Computer models are now routinely used for weather forecasting, but computer models based on the theory that climate is influenced by greenhouse gas emissions are so unsuccessful, as shown in the above discussion, that they have not yet made their way into weather forecasting practice. Despite this failure, many enthusiasts for the theory persist in using the untested greenhouse theory for future forecasts, but always for periods so far ahead, that checks on their accuracy cannot be made by persons living today.

Climate Change 2007 makes it perfectly clear that computer models employing the greenhouse gas theory are not suitable for future prediction. The word "prediction" is never applied to a computer model. Instead, the output from a model is called a "projection", which is defined as follows in the Glossary.⁴⁹

"Projection (Generic)

A projection is a potential future evolution of a quantity or set of quantities, often computed with the help of a model. Projections are distinguished from predictions in order to emphasise that projections involve assumptions concerning e.g. future socioeconomic and technological developments that may or may not be realised and are therefore subject to substantial uncertainty"

This has recently been reiterated by Trenberth⁵⁰ as follows

"In fact there are no predictions by IPCC at all. And there never have been. The IPCC instead proffers 'what if' projections of future climate that correspond to certain emissions scenarios. There are a number of assumptions that go into these emissions scenarios. They are intended to cover a range of possible self consistent 'story lines' that then provide decision makers with information about which paths might be more desirable. But they do not consider many things like the recovery of the ozone layer, for instance, or observed trends in forcing agents. There is no estimate, even probabilistically, as to the likelihood of any emissions scenario and no best guess".

Despite the claim that the emissions are "intended to cover a range of possible future events", they fail miserably to do so when compared with future events even a few years' ahead ¹⁴. The latest scenarios are not even capable of predicting the past, let alone the future ⁵¹

Besides the unreliable scenarios, the climate models are based on a range of parameters and non-linear equations which are imperfectly known, and could easily be adjusted to "project" climate cooling as easily as warming.

Despite the admitted gross uncertainties of the computer model "projections" the IPCC assigns to them levels of "likelihood" based purely on the opinion of the models' creators, which are then given totally spurious "probability" figures.

No climate model has ever successfully predicted any future climate event, even as successfully as that made by weather forecasters.

The most hypocritical statement in Climate Change 2007 is from "Frequently Asked Question No 1.250

"Climate is generally defined as average weather, and as such, climate change and weather are intertwined. Observations can show that there have been changes in weather and it is the statistics of changes in weather over time that identify climate change.. While weather and climate are closely related, there are important differences. A common confusion between weather and climate arises when scientists are asked how they can predict climate 50 years from now when they cannot predict the weather a few weeks ahead from now.. The chaotic nature of the weather makes it unpredictable beyond a few days. Projecting changes in climate (i.e. long-term average weather) due to change in atmospheric composition or other factors is a very different and much more manageable issue. As an analogy, while it is impossible to predict the age at which any particular man will die, we can say with high confidence that the average age of death for men in industrialised countries is about 75. Another common confusion of these issues is thinking that a cold winter or a cooling spot in the globe is evidence against global warming. There are always extremes of hot and cold, although their frequency and intensity changes as climate changes. But when weather is averaged over space and time, the fact that the globe is warming emerges from the data."

When "scientists are asked how they can predict climate" the correct answer, as we have just heard, is that they cannot "predict" climate, , they can only "project" it.

"Weather" is apparently subject to "chaos", whereas "climate" is miraculously free from it.

The actual difference between weather forecasts and climate "projections" is that weather forecasts can always be checked whether they are correct. Climate "projections" or even "predictions" can never be checked whether they are correct because they are always made so far ahead that the practitioners can be guaranteed a well-paid career and a comfortable retirement before anybody could wake up to the fact that the emperor has no clothes.

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This website is dedicated to the memory of Professor August H. (Augie) Auer jr, a co-founder of the Coalition.