

# CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS SUMMARY FOR POLICYMAKERS

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## 1. INTRODUCTION

I first became interested in the possible consequences of the enhanced greenhouse effect when I was teaching English in the Teachers' University in Kunming in 1991. I became an enthusiast and gave several lectures on the subject to Chinese students.

When I returned to New Zealand, the drafts of the first IPCC Report were being circulated and I was asked to make comments. Over time I became an independent "expert reviewer". Since then I have provided comments on both drafts of all four major scientific Reports (1990, 1995, 2001, and, now, 2007) plus the subsidiary reports of 1992 and 1994, amounting to many hundreds of pages.

My disillusionment began very early. The first Report was an attempt to promote the value of computer models. Climate data on the supposed warming were largely confined to the end of the Report, presumably to conceal the lack of confirmation of the models. They still claimed that the "size of this warming" was "broadly consistent" with the models.

Possibly after my comment, all subsequent IPCC Science Reports have placed the climate data at the beginning.

The first draft of the IPCC "Climate Change 1995" Report had a Chapter headed "Validation of Climate Models". I commented that this word was inappropriate as no model had ever been "validated", and there seemed to be no attempt to do so. They agreed, and not only changed the word in the title to "evaluation", but they did so no less than fifty times throughout the next draft and ever since.

"Validation", as understood by computer engineers, involves an elaborate testing procedure on real data, beyond mere simulation of past datasets, but including successful prediction of future behaviour to an acceptable level of accuracy. Without this process no computer model should ever be acceptable for future prediction. The absence of any form of validation still applies today to all computer models of the climate. The IPCC do not use the word "prediction" in any of its publications, only "projections". It is the politicians and the activists who convert these, wrongly, into "predictions".

Without a validation process there cannot be any scientific or practical measure of accuracy. There is therefore no justified claim for the reliability of any of the "projections".

Instead of tackling this problem they have sought the “opinions” (or “guesses”) of panels of “experts” all of whom usually have a financial stake in the outcome. They apply levels of “likelihood” which are given spurious numerical values. The opinions of those financed by oil or coal companies are accused of bias. Are those financed or employed by governments who promote the notion of greenhouse warming impartial?

## **2. THE 2007 SUMMARY FOR POLICYMAKERS**

This (IPCC 2007) is really a Summary BY Policymakers, since it has been agreed line-by-line by Government representatives. It has broken with the procedure followed previously, as it was issued before the main Working Group 1 (WGI) Report.

A full study of the complete 2007 Report must await its release. These comments are therefore confined to the aspects of the “2007 Summary for Policymakers Report” which I find the most distasteful. They come under the headings of unreliable data, inadequate statistical treatment and gross exaggeration of model capacity. The first two need to be treated together.

## **3. CLIMATE DATA**

The 2007 Summary begins by discussing the concentrations of the minor greenhouse gases in the atmosphere. As with almost all of their data, the figures are the results of averages from unrepresentative samples. The worst of these are the concentrations derived from ice cores which are averages from a somewhat indefinite number of years that it takes for the deposited snow to consolidate, from a number of sample locations so pathetically small that they cannot represent a global average.

More recent measurements are not much better. The more than 90,000 measurements of carbon dioxide in the atmosphere by chemical methods since 1812 are routinely ignored (Beck 2007) and measurements since 1958 are mere averages of samples taken mainly over ocean sites. There is hardly any information about carbon dioxide over land surfaces, the places where it is supposed to matter. Measurements over land are difficult because of “noise” which proves that the gases are not “well-mixed”. Even the ocean averages are shown to vary with seasons and geography.

The relationship between these gases and such climate effects as temperature are non linear. With carbon dioxide the accepted mathematical relationship is logarithmic. This means that calculations based on linear averages are bound to be wrong, because fluctuations below the average are more important than fluctuations above the average. Until these fluctuations are known, and extended to land surfaces the calculations of “radiative forcing” for greenhouse gases are suspect and less certain than is claimed.

The mean atmospheric methane concentration has shown a declining “rate of growth” ever since measurements began in 1984 (Dlugocencky 2006). Although this is admitted, they do not mention that the growth rate is at present fluctuating above, and mainly below, zero, which means it is heading downwards at an increasing rate. All the “emissions scenarios” assume immediate future increases in methane concentration in contrast to facts. The recent discovery that methane is emitted by plants (Keppler et al. 2006) destroys the idea that they can compensate for carbon emissions.

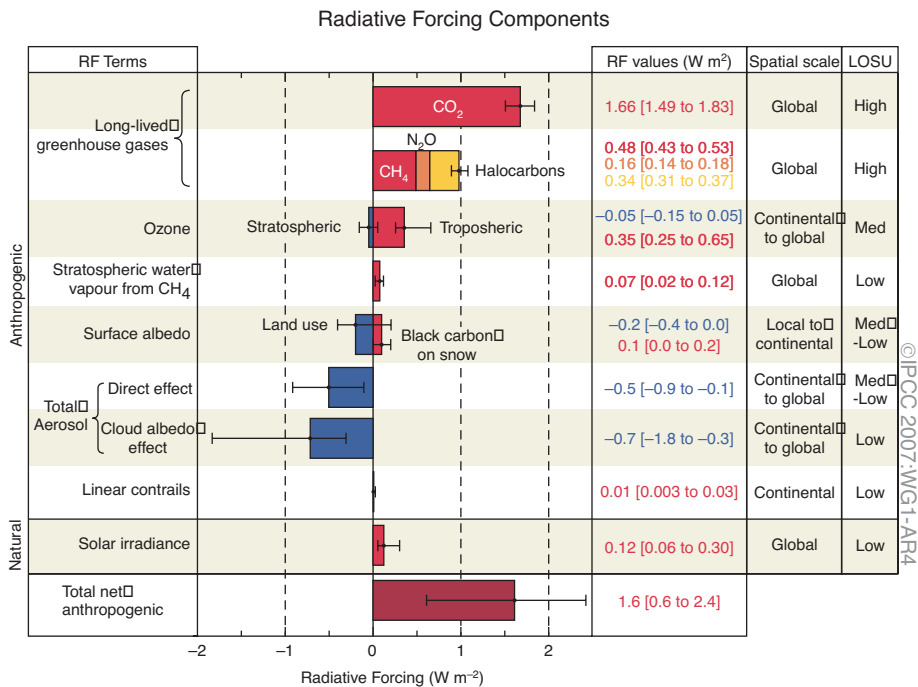


Figure 1: Radiative forcing components according to the IPCC. “LOSU” means “Level of Scientific Understanding”.

This Summary admits that many figures for carbon dioxide emissions are poorly known. They do not explain that the relationship between emissions and atmospheric concentrations is unclear, so reductions in emissions may not necessarily lead to reduced concentrations. The two quantities are often confused.

#### 4. RADIATIVE FORCING

The essential claim of the greenhouse theory is that increases in greenhouse gases are responsible for a change in the radiant energy experienced by the earth, called “radiative forcing”. The most important feature of this 2007 IPCC Summary is therefore the estimates of the elements of radiative forcing which are considered to have arisen since the beginnings of industrialization in 1750 (Figure 1). A Figure similar to this has appeared in all the IPCC WGI Reports, but this one has some novel features.

It may surprise some people that there are so many components of radiative forcing, besides carbon dioxide. Some have negative effects which could be greater than the positive effects of the greenhouse gases themselves.

The reliability of the estimates is a serious problem. The previous diagram, in “Climate Change 2001” (Houghton et al. 2001, Figure 6.6 page 392) supplied “error bars” as an indication of reliability, but rather destroyed their value by saying in the caption to the diagram that they possessed “no statistical significance”. This time there is a claim of statistical significance for them, with 90% confidence levels instead of

the usual 95%, to make them look better. These are rather undermined by the additional qualification, at one side of the diagram, that they are further subject to various “Levels of Scientific Understanding”. The figures for the main gases are, admittedly, “High Level”, but there is no indication what this may mean. The components with “Low Levels of Scientific Understanding” could obviously swamp the others.

They have left out the most important contributors to radiative forcing, which are water vapour and clouds. The excuse given is that they are “feedbacks” which implies that both these quantities are functions of global temperature, a postulate which has no scientific or experimental basis. It is illogical to include two sets of cloud effects and not the most important.

“Climate Change 2001” (Houghton et al 2001, Figure 6.6, page 392), in the caption included a warning that the various components should not be added together to produce a net radiative forcing because they were not uniformly applied in time or space. This time they have disregarded this warning. They give a net figure of 1.6 Watts per square meter with a 90% confidence of 0.6 to 2.4. If you carry out the same forbidden procedure on the previous figures you get 2.07 W/sqm but without any “range”.

If you take note of these points together with the low “Levels of Scientific Understanding” of so many of the components, you have to conclude that the globe may not be warming at all.

## 5. TEMPERATURE TRENDS

The central claim of the IPCC is that the increases in greenhouse gases cause “global warming”. The IPCC’s “Climate Change 2001” (Houghton et al 2001) printed the version of mean annual surface temperature anomalies by the Climate Research Unit of the University of East Anglia seven times (directly) and eleven times (indirectly with others). This “2007 Summary for Policymakers” depends on it once more, and is behind the conclusion (page 10):

**“Most of the observed increase in globally averaged temperatures since the mid-20<sup>th</sup> century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations”**

The level of “warming” involved is 0.7°C since 1850 and 0.5°C since the mid-20<sup>th</sup> century, and only “most” of the last; perhaps 0.3°C. or 0.4°C, all of which took place between 1976 and 1998, only 21 years of the 56. Between 1950 and 1976 there was a slight cooling, and since 1998, for eight years, there has been no increase at all, both in stark contrast to the model “projections”. These amounts are not very great and would usually be regarded as negligible.

The choice of “since the mid-20<sup>th</sup> century” eliminates alternative measurements of globally averaged temperatures such as the NASA satellites (since 1979), and radiosondes, (since 1960) presumably because they do not confirm the above conclusion.

The surface record makes use of temperature measurements at meteorological weather stations, and those from ships. It is based on a biased sample covering only a small proportion of the earth’s surface, and, on the land, mostly close to cities. It is impossible in principle to obtain a reliable average from such a sample, or a measure of its reliability.

The two US surface temperature experts (GISS and GHCN) refuse to use the ocean measurements because they have impossible problems of quality control and continuity.

Since the ocean is 71% of the earth's surface, omitting them makes the sampling even less representative.

The basic initial data used in the compilation of the surface record are mean daily temperatures. The vast majority of weather stations derive the daily mean temperature from an average of the daily maximum and minimum temperatures. We are faced at once with a quantity which could not possibly be regarded as a reliable average. The most elementary textbook on statistics begins by explaining how an average should be calculated. You hopefully have a large number of measurements, you plot these as a distribution curve, you hope it is symmetrical and if it roughly resembles the so-called Gaussian, or "bell" curve you can use the simple mathematics that this implies to calculate the mean and a measure of accuracy. The procedure is on every "scientific" calculator and computer spreadsheet.

What you must not do is calculate the average from the maximum and minimum values. The error involved in this calculation may be sampled from figures supplied by: [http://www.niwasience.co.nz/edu/resources/climate/minairtemp/data\\_minairtemp\\_excel.xls/view\\_file](http://www.niwasience.co.nz/edu/resources/climate/minairtemp/data_minairtemp_excel.xls/view_file)

This website supplies two Excel spreadsheets giving hourly temperature measurements from 24 New Zealand weather stations, one in summer and one in winter.

For the summer figures, the mean difference between the max/min reading and the average of 24 hourly readings is +0.5°C, with a range of +2.6 to -0.4°C.

For the winter figures, the mean difference between the max/min reading and the average of 24 hourly readings is +0.9°C, with range of +1.9°C to -0.9°C. The data on this particular website have been withdrawn, but four of the sites are available from NIWA (2007). Only ten hourly readings are given this time, and the bias from using a maximum/minimum average for these sites as compared with a mean hourly average ranges from +1.4°C to -0.2°C

The annual global surface temperature anomaly record is compiled from the mean daily temperatures by averaging monthly or annual averages from several weather stations in a defined area and subtracting this from the average figure for a reference period. Each process would involve additional uncertainties beyond those in the basic figure.

The above figures show that there could be a very large positive or negative bias from using maximum/minimum averages and there are huge differences in this bias between individual stations even with only two samples, so the closure or moving of stations would have large effects. When you consider that the number of available stations was only 200 in 1850, grew to 6000 in 1980, and then fell to 2500 today, it is obvious that an alleged rise of only 0.7°C over 156 years, or 0.4°C over 56 years is simply swamped with uncertainty.

There are a very few long-term reliable individual surface records where the bias may be less variable, and therefore might give a reliable guide to the local surface temperature trend. Almost all of such records show little or no evidence of a warming trend for the past 100 years or so (Gray 2000, Daly 2007). For Christchurch, New Zealand the maximum temperature since 1910 was in 1917 (GISS 2007).

The only reliable global temperature record, then, is from the Microwave Sounder Units (MSU) on NASA satellites (Christy 2007) (Figure 2). It is genuinely global and its accuracy has been confirmed by the intense scrutiny of teams of opponents. This

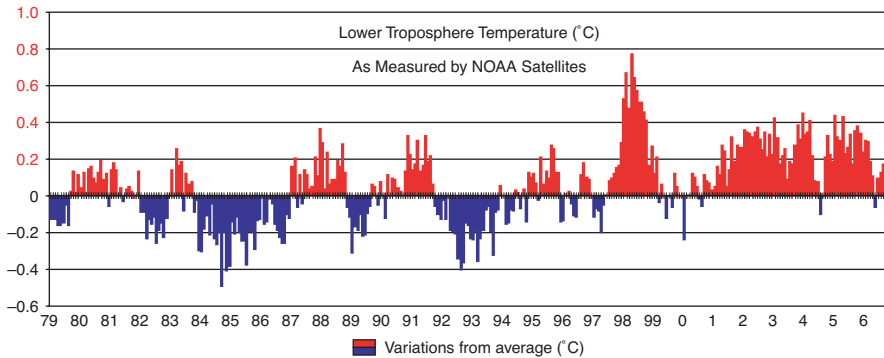


Figure 2: Monthly globally averaged temperature anomalies in the lower atmosphere as measured by NASA satellites (MSU).

2007 IPCC Summary tries to claim that its results are “consistent” with the surface record, I have shown (Gray 2006) that this is not so, unless the large errors in the surface record are admitted.

Figure 2 shows that the globally averaged monthly MSU temperature is passing through a warm spell since 2001, similar to, but longer, than those from 1987–89 and 1990–92. A linear regression between 1979 and 2006 shows an upwards slope because of two volcanic eruptions (El Chichon in 1982 and Pinatubo in 1991), which caused cooling in the first part, and a very severe El Niño in 1998. A linear regression from 1979 to 1997 is close to zero. Since considerable emissions of greenhouse gases took place over this period, their effects are thus undetectable in the region where they are supposed to be most prominent.

Figure 2 also shows that global temperatures do not display a steady trend, but are irregular. For example, the recent warming in the Arctic is not unusual, as there was a similar hot period in the 1940s (Chylek et al. 2006)

The uncertainties in global temperature estimates escalate with “proxy” data from the past such as tree ring thicknesses related only to summer temperatures, and influenced by a host of other climatic factors.

The mathematics that derived the so-called “hockey stick” curve in the 2001 IPCC Report have been comprehensively trashed by McIntyre and McKittrick (2003). I understand it has been withdrawn. Despite this embarrassment, this IPCC Summary still claims:

**“New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the 20<sup>th</sup> century is likely to have been the largest of any century during the past 1000 years” and “the warmth of the last half century is unusual in at least the previous 1300 years”.**

This denies the well-authenticated “Medieval warm period” in the 15<sup>th</sup> century which was supported by the first IPCC Report in 1990. (Houghton et al 1990, Figure 7.1 page 202)

The “warmth of the last half century” only began in 1976, so it was only 30 years, on the unreliable surface record.

## **6. MODEL “PROJECTIONS”**

The IPCC 2007 Summary claims many “projections” from models.

The fact that no scientifically established confidence level can be placed on any model “projection” means that the reliability of every claim is unknown and indefinite.

The parameters and equations that comprise the models are so uncertain that it is possible to adjust them to fit some, but not all, past climate sequences. An attempt to simulate the surface temperature record concluded that greenhouse gas effects were necessary to complete it. (Figure SPM-4, page 11) But in order to do this they left out the most important natural contributor to recent warming, the 1998–9 El Niño event, and all consideration for the inherent bias of the record.

The future “emissions scenarios”, form an important part of the IPCC “projections”. The latest of these were devised for the IPCC’s 2001 Report by a sub-committee of Working Group III (“Mitigation”) which was foisted on the scientists in Working Group I of “Climate Change 1995” without consulting them. The scenarios (Nakicenovic 2000) have been vigorously attacked by several senior economists as biased. My publication of 1998 “The IPCC future projections: are they plausible?” (Gray 1998) confirmed this for the earlier scenarios. In my book “The Greenhouse Delusion; A Critique of “Climate Change 2001” (Gray 2001) I showed that even the figures for 2000 in the current series were wrong. So they cannot even predict the past.

The maximum future temperature “projection” for the year 2100 in the 1990 IPCC Report was 4.2°C, and in the IPCC 1995 Report, a range, depending on aerosols, of 3.5°C to 4.5°C. In the first draft of the 2001 report it was 4.0°C, but this was raised to 5.8°C in the second draft and in the final Report by inventing an extra, even more extreme, emissions scenario, A1F1.

This time, 2007, “projected” temperature increases by 2100 are given for each of six scenarios. The most extreme and totally implausible scenario, A1F1, has a “Best Estimate” figure of 4.0°C, with a “range” of 2.4°C to 6.4°C. A figure of 0.6°C with a “range” of 0.3°C to 0.9°C is given IF ONLY the carbon dioxide concentration were to remain constant in the atmosphere.

## **7. CONCLUSION**

As with previous IPCC Reports, the 2007 Report provides us with no evidence that increases in human emissions of greenhouse gases have any harmful effect on the climate. Instead we have a large array of “opinions” of partisan “experts”

The data on greenhouse gas concentrations, the supposed temperature effects, and their statistical treatment do not meet scientific standards of representativity and accuracy.

The claimed “radiative forcing” effects are so uncertain as to be incapable of confirmation.

The only reliable temperature records show no evidence of the climate being influenced by a steady forcing regime.

Climate models have never been validated, have no uncertainties attached to them, and are assessed only by “expert opinion”.

It is surprising that such inadequate evidence has proved convincing to so many people.



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