

COMPUTER CLIMATE MODELS

Computer climate models are the heart of the problem of global warming predictions.

By Dr. Timothy Ball

Abstract

Entire global energy and climate policies are based on the Reports of the Intergovernmental Panel on Climate Change (IPCC). Their conclusions are based on climate models that don't and cannot work. This article explains how the situation developed and why the models are failures.

Introduction

What do the IPCC reports actually say about global warming? What is the basis for their position? All predictions of global warming are based on computer climate models. The major models in question are the ones used by the Intergovernmental Panel on Climate Change (IPCC) to produce their Reports. The most recent, the Fourth Assessment Report (AR4) uses and averages output from 18 computer models. These Reports are the source for policy on climate change used by world governments. The Reports are released in two parts. The first release and the one used for policy by governments was the Summary for Policymakers (SPM) released in April 2007. The Technical Report ("The Physical Science Basis") produced by Working Group I was released in November 2007. It is essential to read because it contains more, but not all, of the severe limitations in climate research including the data, the mechanisms and the computer models.

Definition of climate change

The definition of climate change is the first serious limitation on the IPCC work and models. They use the definition set out by the United Nations Environment Program in article 1 of the United Nations Framework Convention on Climate Change (UNFCCC). Climate Change was defined as "*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 considerable time periods". Human impact is the primary purpose of the research. However, you cannot determine the human portion unless you know the amount and cause of natural climate change. As Professor Roy Spencer said in his testimony before the US Senate EPW Committee, "And given that virtually no research into possible natural explanations for global warming has been performed, it is time for scientific objectivity and integrity to be restored to the field of global warming research."

IPCC models are sole the source of predictions about future climates except they don't call them predictions. They become predictions through the media and in the public mind. IPCC reports have advised about their definition from the start. The First Assessment Report (Climate Change 1992) "*Scenarios are not predictions of the future and should not be used as such.*" While the Special Report on Emissions Scenarios says; "*Scenarios are images of the future or alternative futures. They are neither predictions nor forecasts.*" Climate-Change 2001 continues the warnings; "*The possibility that any single in emissions path will occur as described in this scenario is highly uncertain.*" In the same Report they say, "*No judgment is offered in this report as to the preference for any of the scenarios and they are not assigned probabilities of recurrence, neither must they be interpreted as policy recommendations.*" This is reference to the range of scenarios they produce using different future possible economic conditions.

Climate Change 2001 substitutes the word projection for prediction. Projection is defined as follows; "*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 socio-economic and technological developments that may or may not be realised and are therefore subject to substantial uncertainty*".

There is an inherent contradiction between these statements and the production of a Summary for Policymakers, which is the document used as the basis for policy by governments worldwide. The Summary for Policymakers (SPM) released by the IPCC in April

2007 says, *“Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.”* They define “very likely” as greater than a 90% probability. (Table 4 “Likelihood Scale”) Here are Professor Roy Spencer’s comments about probabilities in this context. *“Any statements of probability are meaningless and misleading. I think the IPCC made a big mistake. They’re pandering to the public not understanding probabilities. When they say 90 percent they make it sound like they’ve come up with some kind of objective, independent, quantitative way of estimating probabilities related to this stuff. It isn’t. All it is is a statement of faith.”*

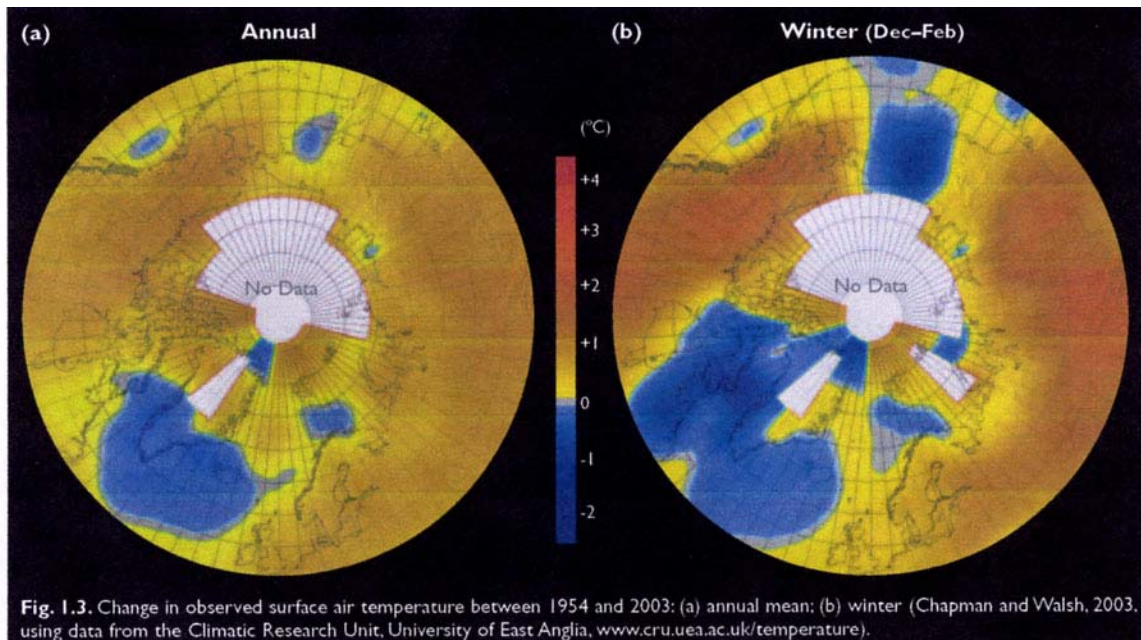
The Models

This and similar statements are based on the unproven hypothesis that human produced CO₂ is causing warming and or climate change. The evidence is based solely on the output of the 18 computer climate models selected by the IPCC. There are a multitude of problems with the computer models including the fact that every time they are run they produce different results. The final result is an average of all these runs. The IPCC then take the average results of the 18 models and average them for the results in their Reports.

Tim Palmer, a leading climate modeler at the European Centre for Medium - Range Weather Forecasts said *“I don’t want to undermine the IPCC, but the forecasts, especially for regional climate change, are immensely uncertain.”* This comment is partly explained by the scale of the General Circulation Models (GCM). The models are mathematical constructs that divide the world into rectangles. Size of the rectangles is critical to the abilities of the models as the IPCC AR4 acknowledges. *“Computational constraints restrict the resolution that is possible in the discretized equations, and some representation of the large-scale impacts of unresolved processes is required (the parametrization problem).”* (AR4 Chapter 8. p.596.)

The IPCC uses surface weather data, which means there is inadequate data for most of the world to create an accurate model. The amount of data is limited in space and time. An illustration of the problem is identified by the IPCC comment of the problems of modeling Arctic climates.

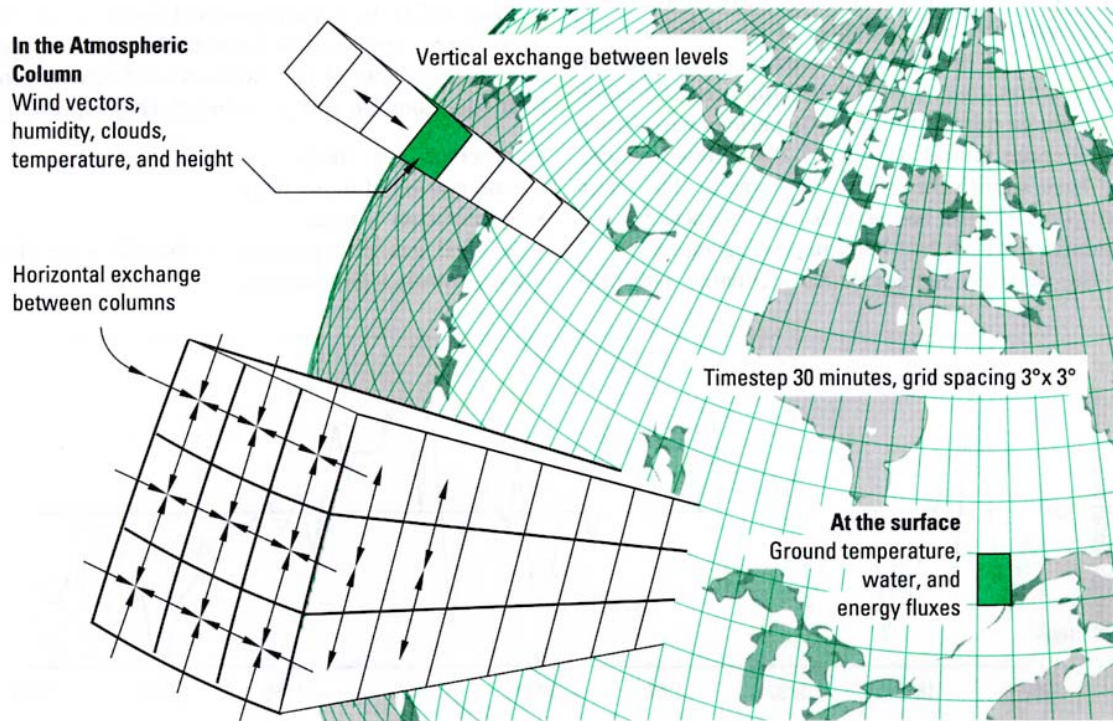
“Despite advances since the TAR, substantial uncertainty remains in the magnitude of cryospheric feedbacks within AOGCMs. This contributes to a spread of modelled climate response, particularly at high latitudes. At the global scale, the surface albedo feedback is positive in all the models, and varies between models much less than cloud feedbacks. Understanding and evaluating sea ice feedbacks is complicated by the strong coupling to polar cloud processes and ocean heat and freshwater transport. Scarcity of observations in polar regions also hampers evaluation.” (AR4.,Chapter 8, p593.) Most of the information for the Arctic came from the Arctic Climate Impact Assessment (ACIA) and a diagram from that report illustrates the problem.



The very large area labeled “No Data” covers most of the Arctic Basin an area of approximately 14,250,000 sq.km (5,500,000 square miles).

In the Southern Hemisphere the IPCC identifies this problem over a vast area of the Earth’s surface. *“Systematic biases have been found in most models’ simulation of the Southern Ocean. Since the Southern Ocean is important for ocean heat uptake, this results in some uncertainty in transient climate response.”* (AR4. Chapter 8. p. 591.)

Limitations of the surface data are more than matched by the paucity of information above the surface. This diagram physically illustrates the structure of the mathematical model. It shows the three dimensional nature of the model and the artificial but necessary box system.



Claims the model are improved because they have increased the number of layers are meaningless because it doesn't alter the lack of data at any level.

The atmosphere and the oceans are fluids and as such are governed by non-linear rather than linear equations. These equations have unpredictability similar to randomness and known as chaos. These problems are well known outside of climate science and were specifically acknowledged in the IPCC Third Assessment Report (TAR), *"In climate research and modeling, we should recognize that we are dealing with a coupled non-linear chaotic system, and therefore that the long-term prediction of future climate states is not possible."* (TAR, p.774.)

Validation is essential for any model before using it for predictions. A

normal procedure is to require proven evidence that they can make future predictions to a satisfactory level of accuracy. The IPCC use the term evaluation instead of validation. They do not evaluate the entire model. They say to do so shows problems but the source is not determined. Instead they evaluate at the component level. This means they don't evaluate the important interactions between the components at any level, which is critical to the effectiveness of duplicating natural processes.

A recent study illustrates the extent of the problem with regard to components.

"The climate models employed in the IPCC's Fourth Assessment are clearly deficient in their ability to correctly simulate soil moisture trends, even when applied to the past and when driven by observed climate forcings. In other words, they fail the most basic type of test imaginable; and in the words of Li et al., this finding suggests that "global climate models should better integrate the biological, chemical, and physical components of the earth system."

Li, H., Robock, A. and Wild, M. 2007. "Evaluation of Intergovernmental Panel on Climate Change Fourth Assessment soil moisture simulations for the second half of the twentieth century." *Journal of Geophysical Research* **112**

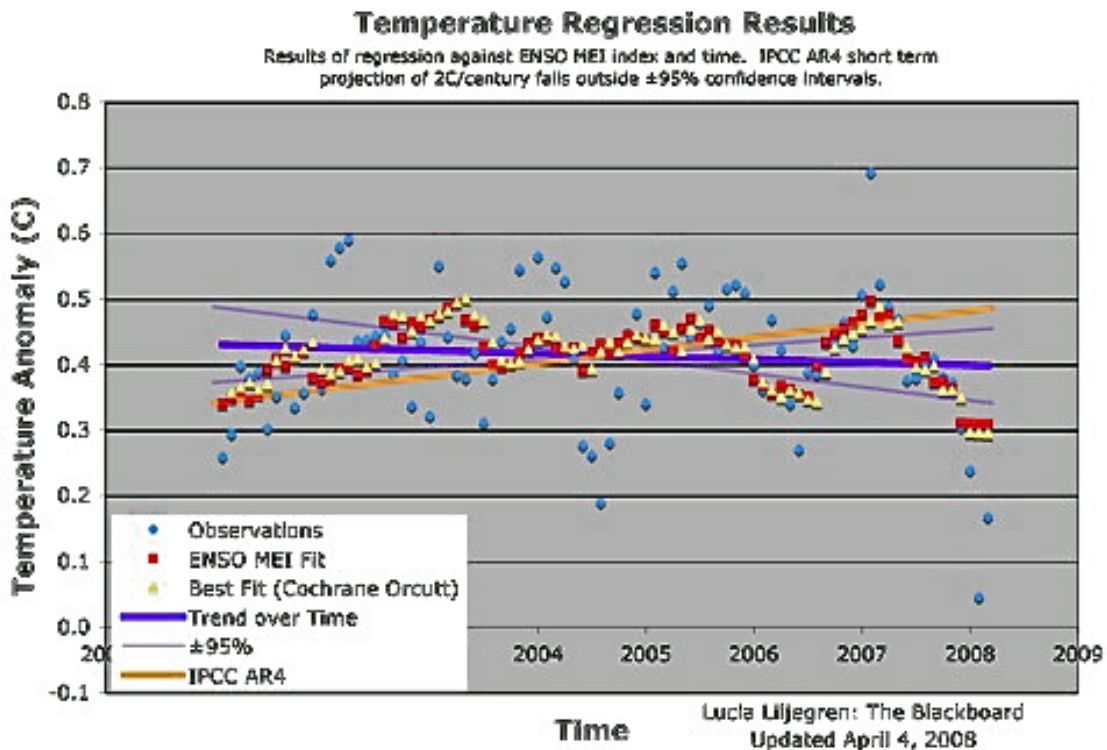
IPCC Report AR4 makes a remarkable statement not repeated in the Summary for Policymakers. It speaks to the lack of valuation, which explains the failure of their projections.

"What does the accuracy of a climate model's simulation of past or contemporary climate say about the accuracy of its projections of climate change? This question is just beginning to be addressed, exploiting the newly available ensembles of models." (AR4, Chapter 8. p.594.)

Predictions?

A simple single word definition of science is the ability to predict. It is rejected by the IPCC yet they present their work as scientific. Media and the public generally believe the IPCC is making predictions and

that is clearly the assumption for government policies. Members of the IPCC do nothing to dissuade the public from that view. All previous projections have been incorrect. The most recent example is the period from 2000 to 2008. This diagram shows temperature data points from various sources and their trend (purple line) compared with the IPCC projections (orange line) for the period.



Beyond the major problems identified above there is the fundamental emphasis on the CO₂ and especially the human portion as the primary cause. A basic assumption of the Anthropogenic Global Warming (AGW) hypothesis is that an increase in atmospheric CO₂ will cause an increase in atmospheric temperature. This is not found in any record of any duration for any time period. In every case, temperature increases before CO₂. Despite this, the models are designed so that an increase in CO₂ causes an increase in temperature.

The IPCC AR 4 Report provides a good argument against the use of IPCC model projections as the basis for any climate policy let alone those currently being pursued.

“Models continue to have significant limitations, such as in their representation of clouds, which lead to uncertainties in the magnitude and timing, as well as regional details, of predicted climate change.”
(AR4, Chapter 8. p.600)

12 / 2008