

## I. Background Information

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**Area of Expertise:** Computer forecasting and control theory

## II. Comments

**All of my comments apply to the chapter entitled "Global Climate Change." I found it pointless to comment on later chapters, as they all build on the foundation, and propagate the errors, of this chapter.**

**Chapter GCC, page 16, point 1:** This comment is both about this first point as well as the entire report. Never have I seen a document purporting to be scientific that has been so shallow and poorly structured. Numerous times I have attempted to find sources for certain statements like this first one, and found no footnoting or sourcing.

When there have been footnoted sources, often the source is not available because it has not yet been published. It is incredibly disingenuous to set a comment period deadline before much of the material in the report can be checked.

Finally, and most importantly, if this document is meant to be a political attack piece by a particular interest group, it is well-constructed. However, if it is meant to be a balanced view of the state of the science and the threats faced, it is the most abysmal, one-side document I have ever seen. Not once in this entire chapter was there a hint of doubt or uncertainty. Topics for which scientists have but the flimsiest of understandings, for example feedback effects, are treated with the certainty of Newtonian mechanics. Any bit of conflicting evidence -- whether it be the fact that oceans were rising before the industrial era, or that tropospheric temperatures are not higher than surface temperatures as predicted, or that large parts of Antarctica are gaining ice -- are blissfully omitted.

My point is not that the report should agree with my position, but that it should mention where scientists are getting measurement results that don't fully match the conclusions and still need to be explained. Here are a few examples of what an honest report would mention:

- On the exact same day in 2007 when Arctic sea ice was hitting a 30-year low, Antarctic sea ice was hitting a 30-year high.
- Over the last 4 years, the Argo network has actually measured a decrease in ocean heat content
- Over the last 10 years, satellites have measured a flat to declining surface temperature trend
- Troposphere temperatures over the Tropics are not higher than surface temperatures as global warming theory would predict

The report needs to address these issues, and not treat the data as if it is lining up 100% around the report's hypothesis. None of these have to be "daggers" that kill the report's hypothesis, but they need explanation. For example, the difference in Arctic and Antarctic sea ice behavior might be due to greater sea area in the Southern Hemisphere that time-delays the warming signal. By omitting any of these issues, your report is just dodging them.

**Chapter GCC, page 16, point 1:** Since the IPCC Fourth Assessment used similar language, there has been substantial confusion over the word "most." By "most", do the author's mean "greater than 50%?" This report should be more specific. If it cannot be more specific, then it needs to give an assessment of its certainty and the range of likely values for past man-made global warming. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 16, point 3:** The term "heat wave" is a nebulous term without scientific definition. Without a definition, it cannot possibly be measured. This is a mere assertion, not a statement based on any facts. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 16, point 4:** Sea levels have been rising steadily for hundreds of years, long before mankind's fossil fuel combustion. To have meaning, sea level rise would have to accelerate over this natural historical trend line, and it has not. Over the last four years, sea levels have actually fallen slightly. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 16, point 6:** This is a scientifically meaningless statement. What matters is if the trends are accelerating, not how the trends compare to past projections. The statement as-is is merely a comment on past forecasting ability, not real physical processes. Warren Meyer, Climate-Skeptic.com

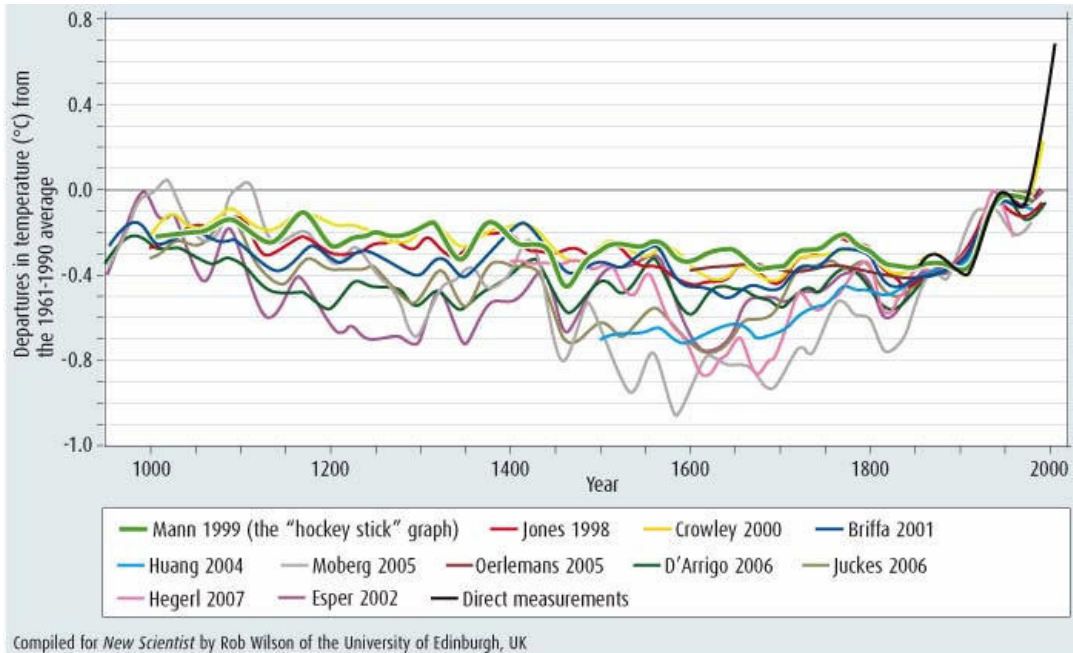
**Chapter GCC, page 16, point 7:** This statement is partially incorrect. Yes, there is a "fingerprint" of stratospheric temperatures falling while surface

temperatures are rising, but there is a second expected fingerprint that the troposphere should heat more than the surface, particularly in the tropics. In fact, we see no such thing. The troposphere, if anything, appears to be warming the same or less than the surface, and the troposphere in the tropics has not warmed at all over the last 30 years. Your report even says as much on page 22, stating “These measurements show warming of the troposphere (the layer of the atmosphere just above the surface), consistent with the surface warming.” But theory and models predict that they should not be consistent. The only sure-fire fingerprint for man-made global warming that scientists have given us is not appearing. Warren Meyer, Climate-Skeptic.com

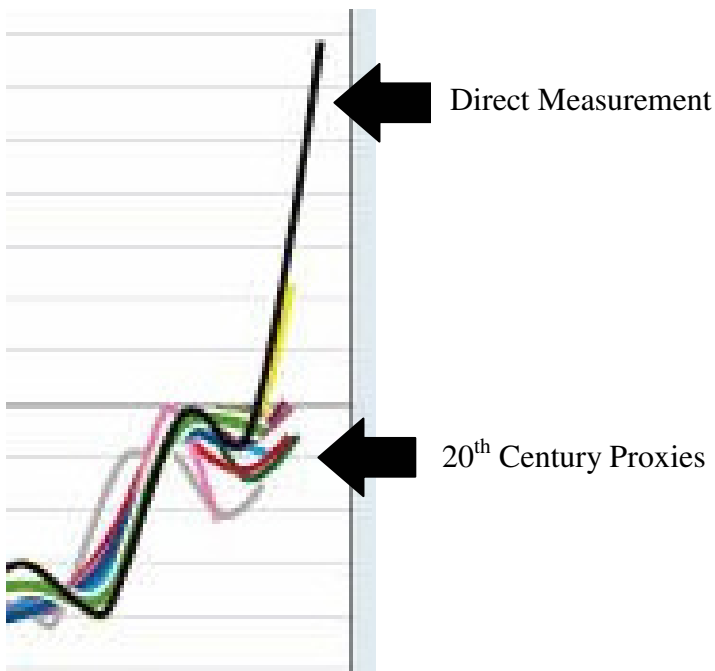
**Chapter GCC, page 17, chart caption:** The last paragraph of the chart caption is not supported by the chart. First, it mentions the long history of temperature, but there is no temperature data in the chart. Second, the x-axis scale is about 150,000 years to the inch. That means that 50 years would be 1/3000 of an inch on this chart, or about 1/10 of the width of a printing pixel. A chart scaled as such can't possibly tell us anything what to expect over a 50-year span. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 19, chart, mid-page:** The temperature analysis included in this chart has been shown in many sources to be deeply flawed. However, I will focus on just one issue: The inflection in the slope of the temperature line from flat to upward sloping c. 1900 occurs at the exact same location where two entirely different data sources are spliced. Tree rings are used to the left, with instrumental temperature readings to the right. The fact that the inflection point occurs exactly at the splice between two unrelated data sets should greatly reduce our confidence in the analysis, particularly since tree ring data in the 20<sup>th</sup> century has failed to show the same upward inflection. A more likely conclusion than the one reached here is that tree ring data understates temperature variability in the past, just as it is understating temperature variability in the present. A pithier statement would be that trees don't make very good thermometers, as their growth is regulated by far more than just temperature

This divergence problem can be seen clearly in the Fourth IPCC Assessment, despite attempts to hide it. Here is a the chart on historical temperature reconstructions from that report:



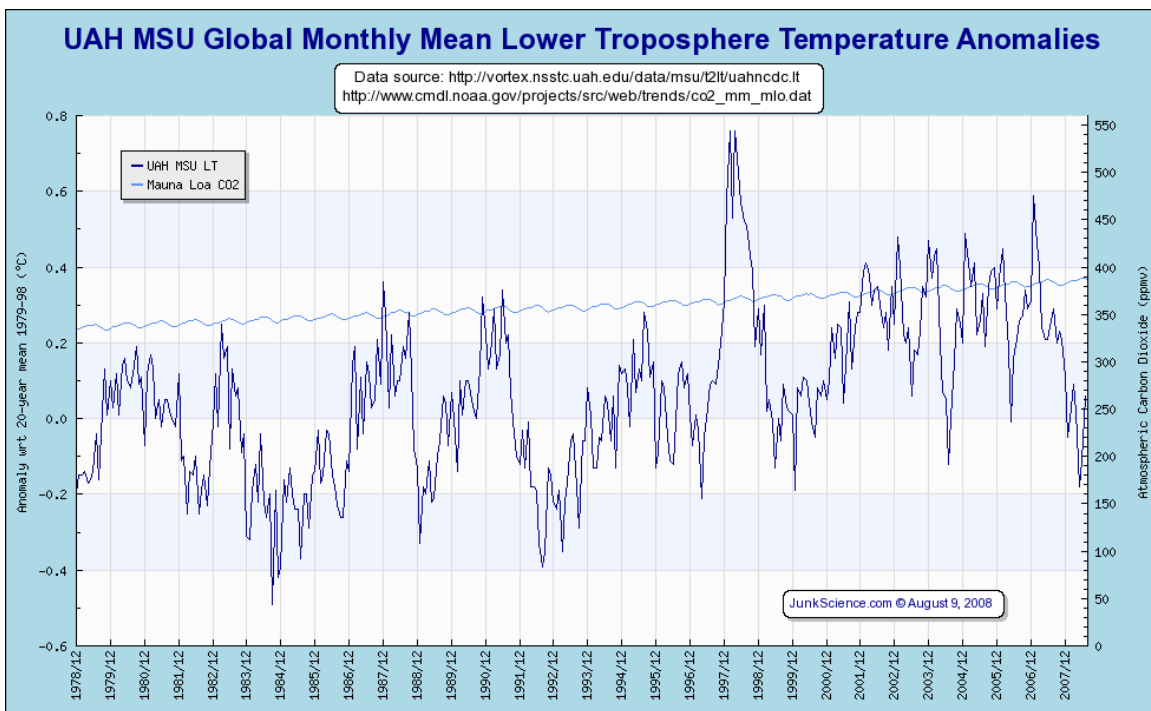
And here is a closeup of the 20<sup>th</sup> century



One can clearly see that the trees show the 20<sup>th</sup> century to be unremarkable.  
 Warren Meyer, [Climate-Skeptic.com](http://Climate-Skeptic.com)

**Chapter GCC, page 21, second chart:** Even taking into account smoothing, the temperature record in this chart does not appear consistent with the 20<sup>th</sup> century temperature chart on page 19 (page 19 appears to have more 20<sup>th</sup> century warming than page 21) This is consistent with my observation that this report appears cut and pasted from multiple sources without any kind of consistency check or reconciliation. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 22, first sentence:** The warming trend has actually decelerated over the last decade. Since about 1998, there has been no global warming at all. Below is the UAH satellite data for the globe. Satellite data is demonstrably better than ground based thermometers, since they are not subject to urban and other location biases and they have more complete coverage.

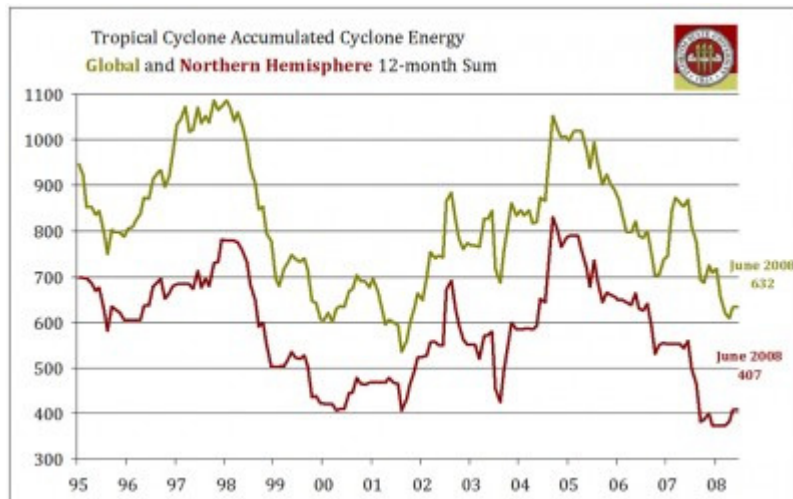


I would have described this as deceleration. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 23, first line:** I know of no scientifically meaningful definition of "heat wave." Without such a definition, measurement is impossible, and discussion of trends merely speculative. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 23, line 4-5:** Hurricane strength based on counts or landfalls is inherently faulty data because it is so subject to observer biases., particularly when the data go back to the early 20<sup>th</sup> century when hurricanes that never made landfall might never even be recorded. A better metric is

accumulated cyclonic energy. By this metric, neither hurricanes nor cyclones appear to be getting more numerous or powerful.



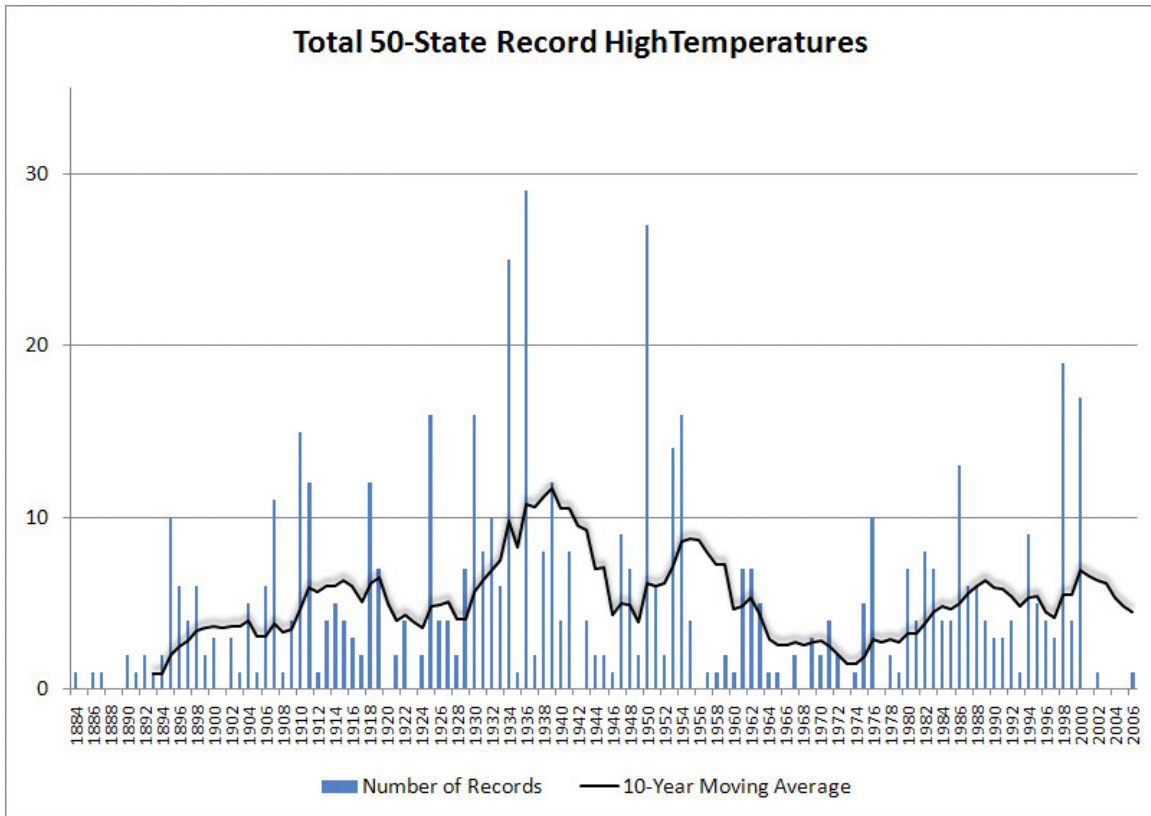
This is via the Australian National Climate Center, which also said:

*Concern about the enhanced greenhouse effect affecting TC frequency and intensity has grown over recent decades. Recently, trends in global TC activity for the period 1970 to 2004 have been examined by Webster et al. [2005]. They concluded that no global trend has yet emerged in the total number of tropical storms and hurricanes."... For the 1981/82 to 2005/06 TC seasons, there are no apparent trends in the total numbers and cyclone days of TCs, nor in numbers and cyclone days of severe TCs with minimum central pressure of 970 hPa or lower.*

Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 23, top graph:** This chart is meaningless. One isolated spot in the whole world had an abnormally hot summer for one year. So what? What possible conclusion can one draw from this? Some year has to be the highest. After all, on average, a city should be hitting a new 100-year high every three months.

Here is a chart with far more meaning. It is a graph of what year each state of the US hit its monthly all-time high temperature for each of the 12 months (so, for 50 states and 12 monthly highs each there are 600 data points).



If your hypothesis were correct, and man-made global warming were driving more heat waves and all-time highs, then a disproportionate number of high temperature records should have been set in the last 2 decades, but one can see this is not the case. Warren Meyer, Climate-Skeptic.com

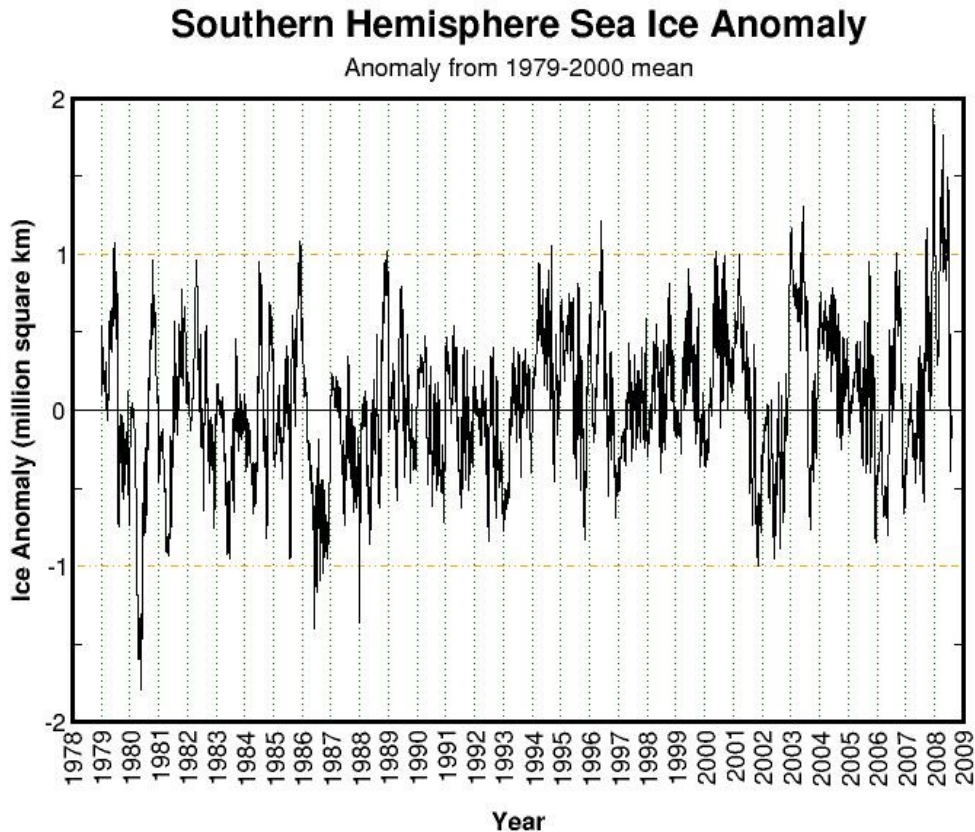
Further, recent high temperature records in urban locations are much more likely to be due to growing urban heat bias effects than man-made global warming. While this paper posits that man-made global warming may have added a half degree Celsius to global temperatures, urban biases can add 6-10C to urban temperature records.

**Chapter GCC, page 23, line 6<sup>th</sup> from the bottom:** The fact that change is occurring faster than modeled or predicted is meaningless as a measure of a physical phenomenon. This is only a measure of the quality of past forecasting, not of the physical process. If a physical process is accelerating or going beyond historical norms, then that evidence should be used instead. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 24, line 12:** The theory that surface melt water is lubricating and accelerating Greenland ice movement is outdated and has mostly been repudiated (Joughin and Das, 2008). Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 24, last line before table:** This report demonstrates itself to be incredibly ones-sided. While ice has clearly melted in the Arctic, there are many indicators of ice mass increases in the Antarctic. Antarctic Sea ice extent reached a 30-year high in 2007, and most of Antarctica has been gaining ice mass over the last decades, offset somewhat by rising temperatures and loss of ice around the Antarctic Peninsula.

(chart via the University of Illinois Polar Research Group)

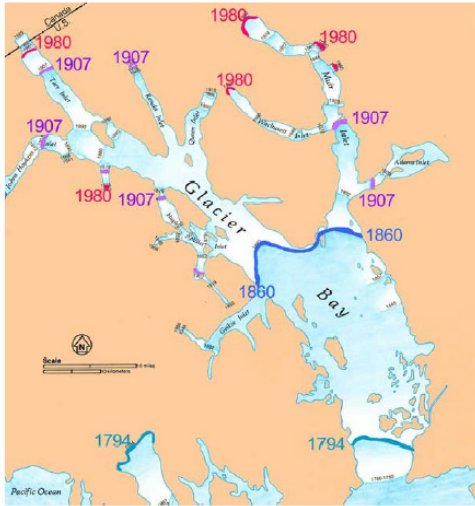


Discussing only a few isolated studies of ice loss without taking in the broader context which tends to point to overall ice gains in Antarctica is disingenuous and shows this report to be lopsided and biased. Even the IPCC admitted that climate models predicted ice gains in Antarctica even in strong warming scenarios due to heavier precipitation . Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 25, top chart:** This is terrible chartsmanship. The reader has no idea if this decrease is a lot or a little, without any context as to the base value. Converting the Y-axis scale to percent decrease from absolute numbers would help. Warren Meyer, Climate-Skeptic.com



**Chapter GCC, page 25, top chart:** Most of the world's glaciers were observed to have begun retreating in the 19<sup>th</sup> century, before any possible anthropogenic warming. Below is an example from Alaska Geographic magazine for Glacier Bay, Alaska



The year lines correspond to the observed extent of the glacier observed in that year. As one can see, the recession began on or before 1794 and was mostly complete by 1907. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 26, top chart:** It should be made clear that the blue line is, like the red line, a simulation from climate models and not an actual empirical measurement. Warren Meyer, Climate-Skeptic.com

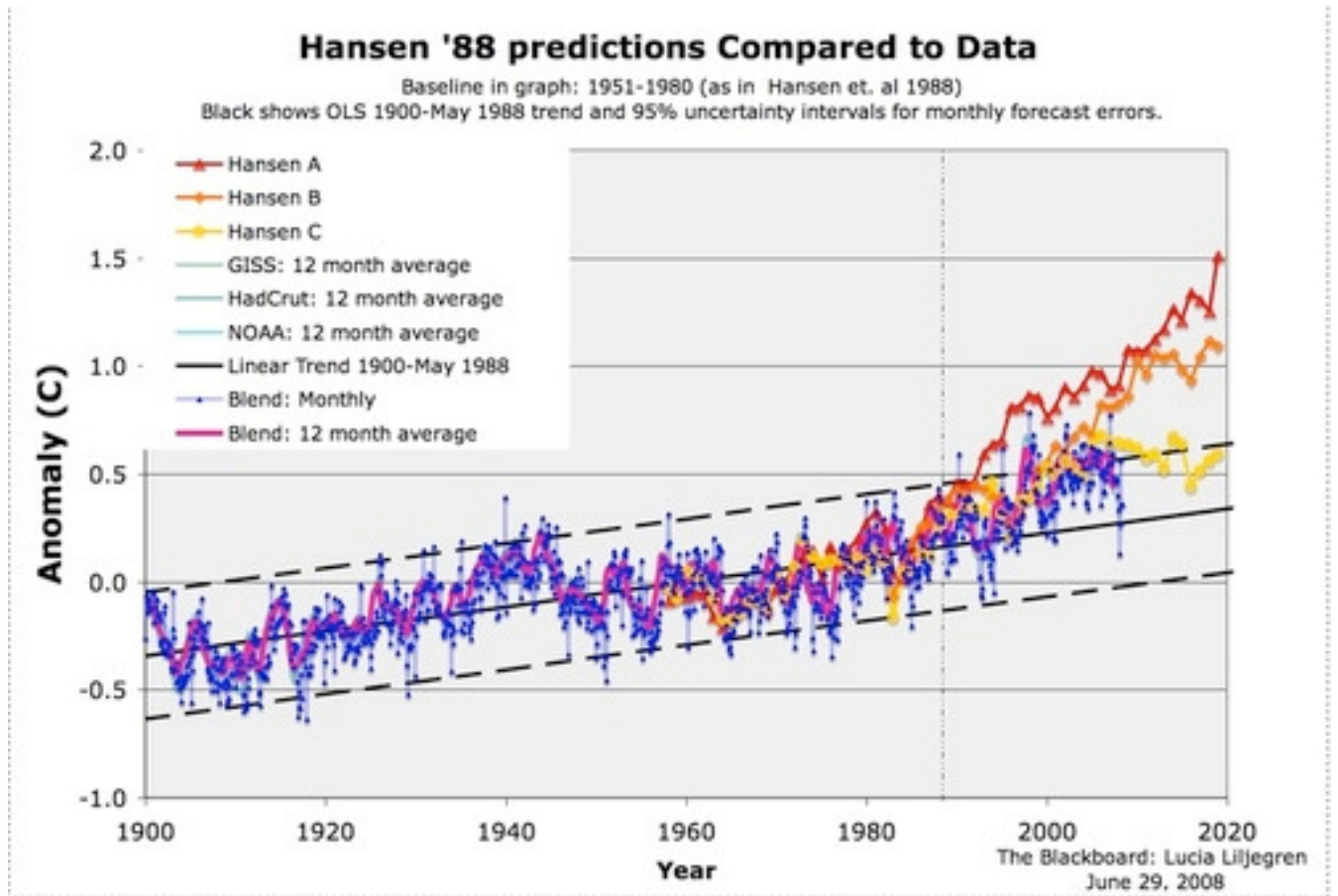
**Chapter GCC, page 26, top chart:** My comments focus on the two lines that use climate models to “backcast” history. I don't have the data to do any statistical tests, but just by eye, the red model output line does an amazing job at predicting history. I have done a lot of modeling and forecasting in my life. However, I have never, ever backcast any model and gotten results this good. I mean it is absolutely amazing. Odd as it may seem, the precision with which the backcasts match history casts substantial doubt on the backcasting process.

One's confidence in the climate models based on their near-perfect back-casting should be tempered by the fact that when the models first were run backwards, they were terrible at predicting history. Only a sustained effort to tweak and adjust and plug them has resulted in this tight fit.

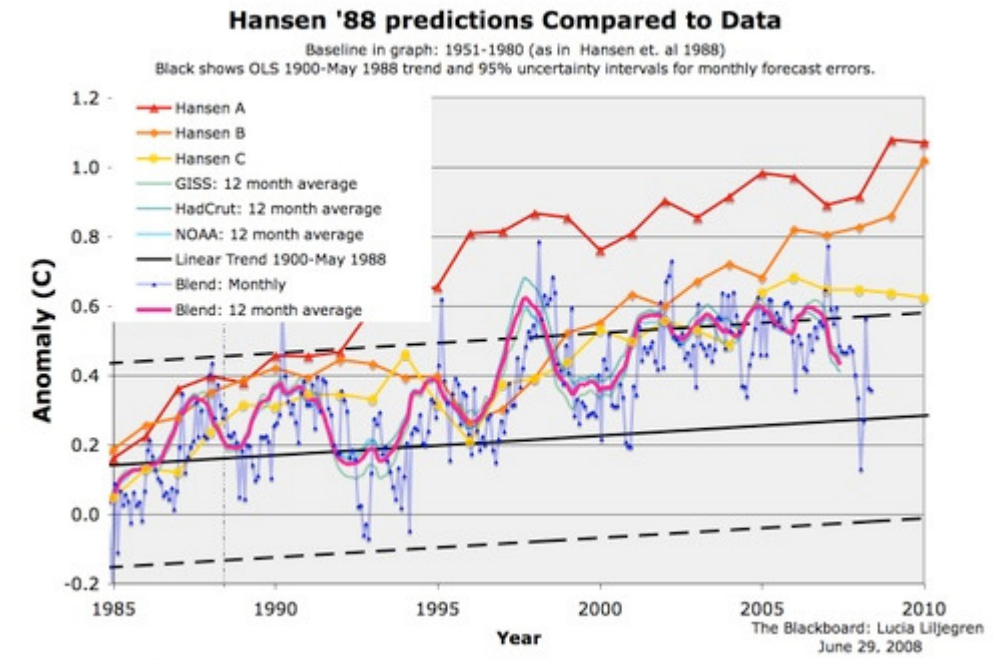
In fact, it is fairly easy to demonstrate that the models are far better at predicting history than they are at predicting the future. Climate models have done a terrible job in predicting the first 10-20 years of the future. One wonders why this report, which make such frequent use of climate models, never once addresses their accuracy and predictive ability. After all, we have climate model forecasts

data all the way back from the late 1980's -- surely 20+ years is enough to get a test of their performance.

Below is the model forecasts James Hansen, who this report cites authoritatively numerous times, used before Congress in 1988 (in yellow, orange, and red), with a comparison to the actual temperature record (in blue).



Here is the detail from the right side:



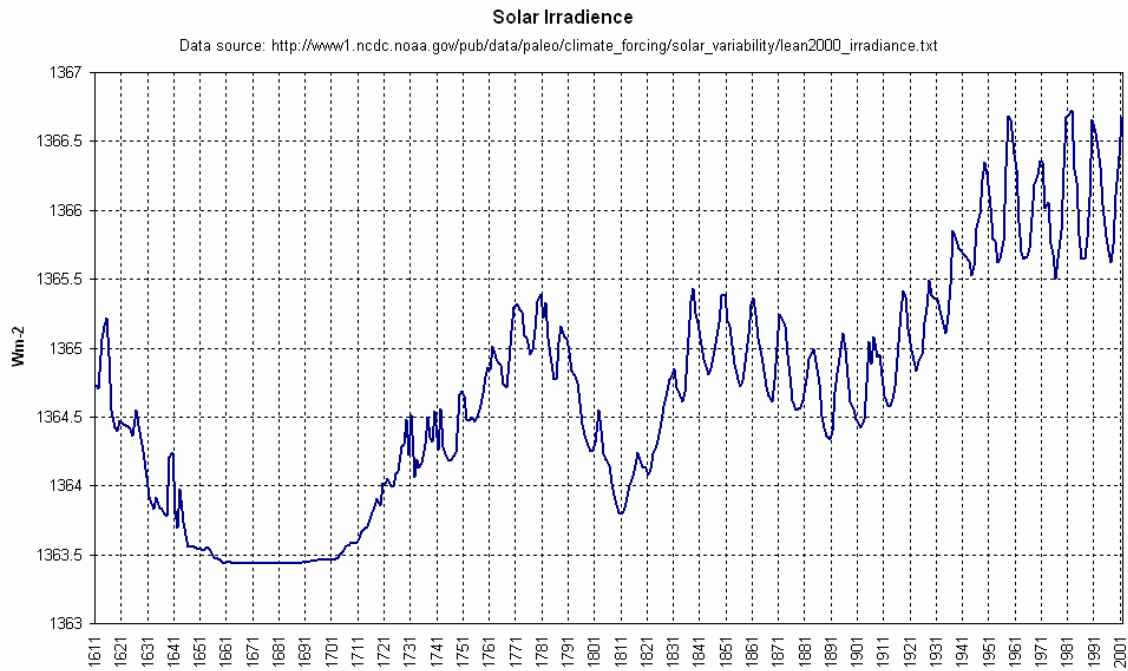
You can see the forecasts began diverging from reality even as early as 1985. By the way, we can't get too encouraged by the yellow line appearing to be fairly close -- the Hansen C case in yellow was similar to the IPCC B1 case which hypothesizes strong international CO2 abatement programs which have not come about. Based on actual CO2 production, the world is tracking, from a CO2 standpoint, between the orange and red lines. However, temperature is nowhere near the predicted values. I would suggest this report directly address the accuracy of past forecasts. Given this poor level of accuracy, the report should address what is different in current models that might give us confidence that they will be more accurate in the future. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 26, top chart:** This comment focuses on the blue line where climate models have back-cast world temperature without man-made forcings. The blue line is supposed to represent the climate absent man. But here is the question I have been asking ever since I first started studying global warming, and no one has been able to answer: *What changed in the Earth's climate in 1955?* Because, as you can see, climate forecasters are telling us the world would have reversed a strong natural warming trend and started cooling substantially in 1955 if it had not been for anthropogenic effects.

This has always been an issue with man-made global warming theory. Climate scientists admit the world warmed from 1800 through 1955, and that most of this warming was natural. But somehow, this natural force driving warming switched off, conveniently in the exact same year when anthropogenic effects supposedly took hold. A skeptical mind might ask why current warming is not just the same natural trend as warming up to 1955, particularly since no one can say with any

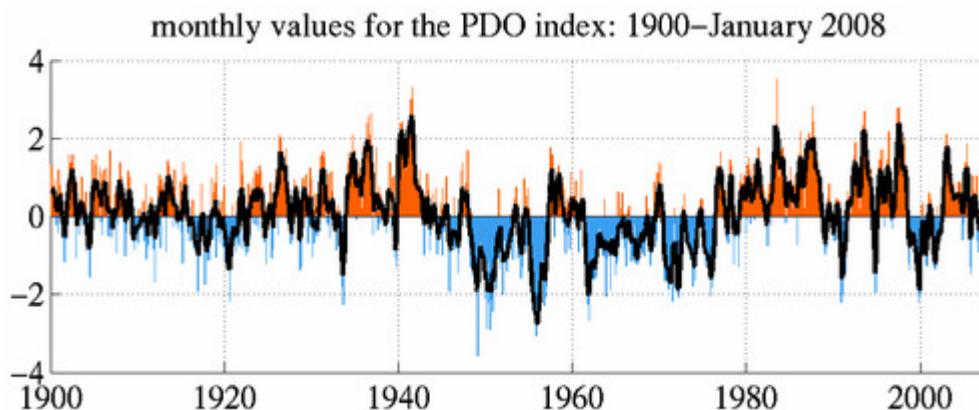
confidence why the world warmed up to 1955 and why this warming switched off and reversed after that.

Well, lets see if we can figure it out. The sun, despite constant efforts by alarmists to portray it is climactically meaningless, is a pretty powerful force. Did the sun change in 1955?



Well, it does not look like the sun turned off. In fact, it appears that just the opposite was happening -- the sun hit a peak around 1955 and has remained at this elevated level throughout the current supposedly anthropogenic period.

OK, well maybe it was the Pacific Decadal Oscillation? The PDO goes through warm and cold phases, and its shifts can have large effects on temperatures in the Northern Hemisphere.



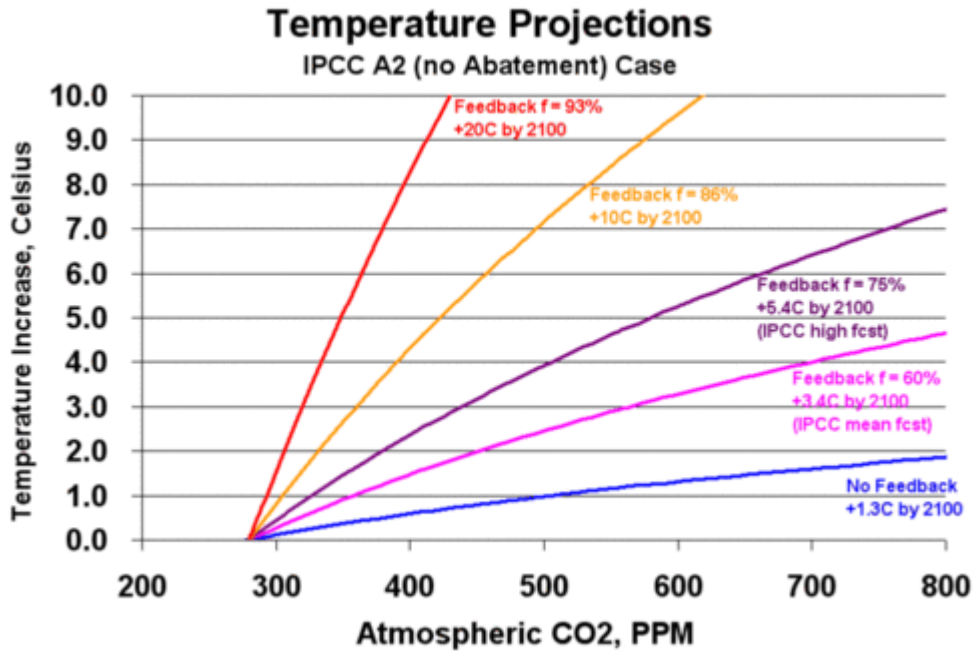
Hmm, doesn't seem to be the PDO. The PDO turned downwards 10 years before 1955. And besides, if the line turned down in 1955 due to the PDO, it should have turned back up in the 1980's as the PDO went to its warm phase again.

So what is it that happened in 1955? The report owes us physical explanations and/or observation evidence that supports the notion that natural forcings drove temperature up in the first half of the 20<sup>th</sup> century and would have driven it down in the latter half absent man. But I can tell you what happened in 1955: Nothing.

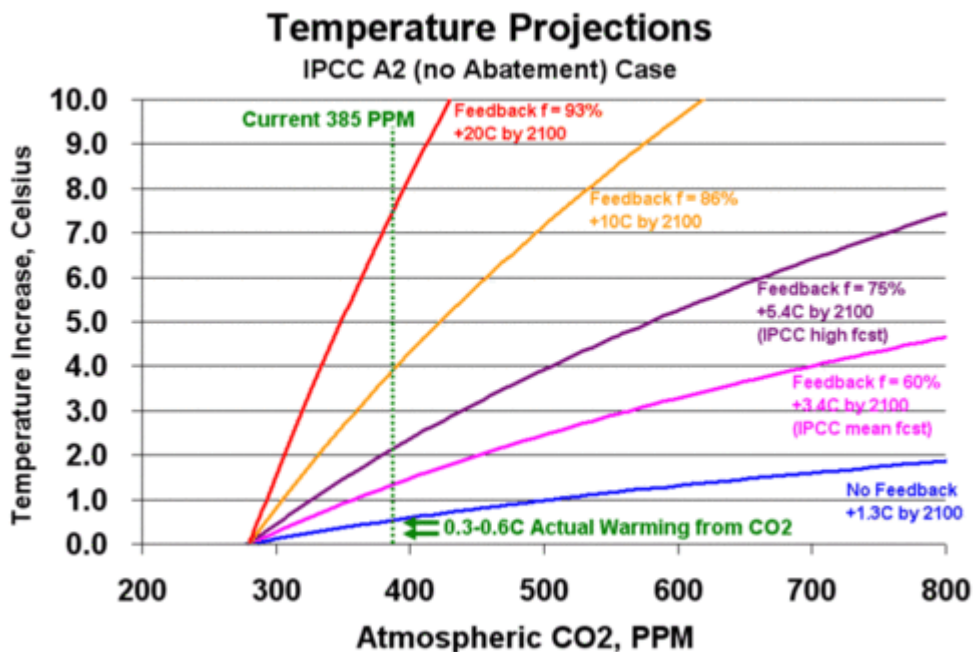
Let me digress for a minute, and explain an ugly modeling and forecasting concept called a "plug". It is not unusual that when one is building a model based on certain inputs (say, a financial model built from interest rates and housing starts or whatever) that the net result, while seemingly logical, does not get to what one thinks the model should be saying. While few will ever admit it, I have been inside the modeling sausage factory for enough years that it is common to add plug figures to force a model to reach an answer one thinks it should be reaching -- this is particularly common after back-casting a model.

I can't prove it, any more than this report can prove the statement that man is responsible for most of the world's warming in the last 50 years. But it is nearly certain that the blue line in the backcasting chart is a plug. As I mentioned earlier, modelers had terrible success at first matching history with their forecasting models. In particular, because their models showed such high sensitivity of temperature to CO<sub>2</sub> (this sensitivity has to be high to get catastrophic forecasts) they greatly over-predicted history.

Here is an example. The graph below shows the relationship between CO<sub>2</sub> and temperature for a number of sensitivity levels (the shape of the curve was based on the IPCC formula and the process for creating this graph was described [here](#)).



The purple lines represent the IPCC forecasts from the fourth assessment, and when converted to Fahrenheit from Celsius approximately match the forecasts on page 28 of this report. The red and orange lines represent more drastic forecasts that have received serious consideration. This graph is itself a simple model, and we can actually backcast with it as well, looking at what these forecasts imply for temperature over the last 100-150 years, when CO2 has increased from 270 ppm to about 385 ppm.



The forecasts all begin at zero at the pre-industrial number of 270ppm. The green dotted line is the approximate concentration of CO2 today. The green 0.3-0.6C arrows show the reasonable range of CO2-induced warming to date. As one can see, the IPCC forecasts, when cast backwards, grossly overstate past warming. For example, the IPCC high case predicts that we should have seen over 2C warming due to CO2 since pre-industrial times, not 0.3 or even 0.6C

Now, the modelers worked on this problem. One big tweak was to assign an improbably high cooling effect to sulfate aerosols. Since a lot of these aerosols were produced in the late 20th century, this reduced their backcasts closer to actuals. (I say improbably, because aerosols are short-lived and cover a very limited area of the globe. If they cover, say, only 10% of the globe, then their cooling effect must be 1C in their area of effect to have even a small 0.1C global average effect).

Even after these tweaks, the backcasts were still coming out too high. So, to make the forecasts work, they asked themselves, what would global temperatures have to have done without CO2 to make our models work? The answer is that if the world naturally were to have cooled in the latter half of the 20th century, then that cooling could offset over-prediction of temperatures in the models and produce the historic result. So that is what they did. Instead of starting with natural forcings we understand, and then trying to explain the rest (one, but only one, bit of which would be CO2), modelers start with the assumption that CO2 is driving temperatures at high sensitivities, and natural forcings are whatever they need to be to make the backcasts match history.

The report should explain how the blue natural forcings line was generated for the 20<sup>th</sup> century. It also should explain the physical phenomenon that drove the shape of this line, including the climate reversal the models hypothesize circa 1955. Warren Meyer, Climate-Skeptic.com

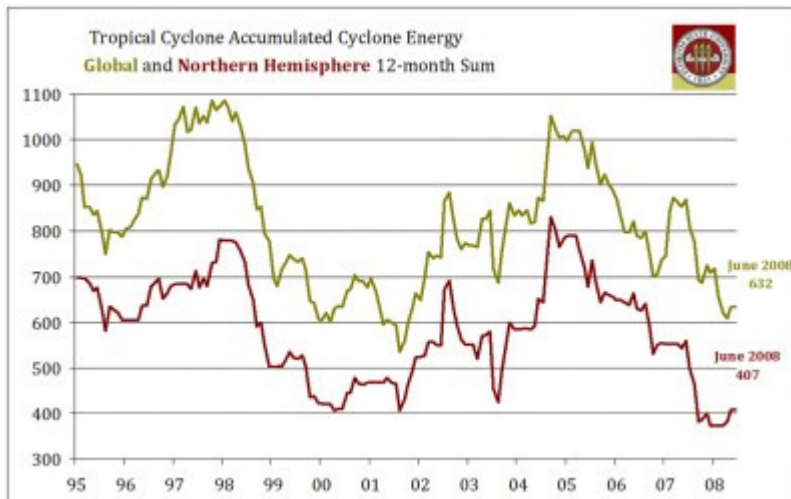
**Chapter GCC, page 26, paragraph:** The report should observe that when climate models were first run against history, they were a terrible match. Only years of tweaking and adding plug figures and twiddling with variables and assumptions have allowed climate scientists to have their models match history. In short, the fact models match history is not a sign the models are robust, it is a sign the models have been tweaked to do so. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 26, second to last sentence:** This is incredibly disingenuous. The report authors must know that an even more important fingerprint of man-made global warming than the troposphere-stratosphere differences is the differences between troposphere and the surface. Every model shows, and theory requires, the troposphere warm more than the surface, particularly in the tropics. This is not occurring. A major fingerprint is missing.

Why can't this report be balanced, and say that one fingerprint exists, while another does not? Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 27, third paragraph:** The Argo network has shown now increase (in fact, a slight decrease) in ocean heat content since it started gathering data in 2003. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 27, third paragraph:** If sea surface temperatures have increased, and such increases cause hurricanes, then why has total cyclonic energy been flat over the last decades?



This is via the Australian National Climate Center, which also said:

*Concern about the enhanced greenhouse effect affecting TC frequency and intensity has grown over recent decades. Recently, trends in global TC activity for the period 1970 to 2004 have been examined by Webster et al. [2005]. They concluded that no global trend has yet emerged in the total number of tropical storms and hurricanes.... For the 1981/82 to 2005/06 TC seasons, there are no apparent trends in the total numbers and cyclone days of TCs, nor in numbers and cyclone days of severe TCs with minimum central pressure of 970 hPa or lower.*

Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 28, top graph:** This report needs to make clear that these forecasts of rapid warming actually depend on more than just greenhouse gas theory. In fact, as the IPCC states, warming from CO<sub>2</sub> alone would be moderate under nearly any scenario. What makes the forecasts potentially catastrophic is the theory that the Earth's climate is dominated by positive feedback, which multiplies the warming from CO<sub>2</sub> by 3-5x or more according to these models

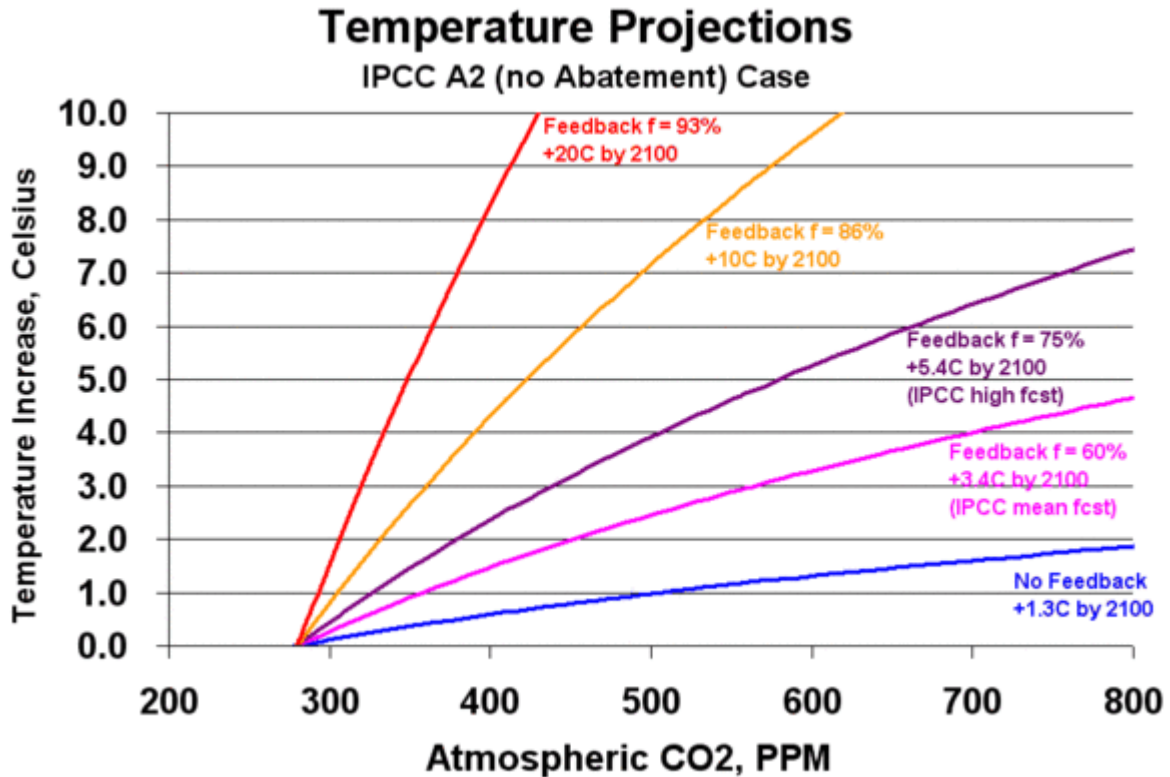


In the charts below, I have used the most drastic CO2 forecast (A2) from the IPCC fourth assessment, and run the numbers for a peak concentration around 800ppm. I have used the IPCC's own formula for the effect of CO2 on temperatures without feedback (Temperature Increase =  $F(C2) - F(C1)$  where  $F(c) = \ln(1 + 1.2c + 0.005c^2 + 0.0000014c^3)$  and  $c$  is the concentration in ppm).

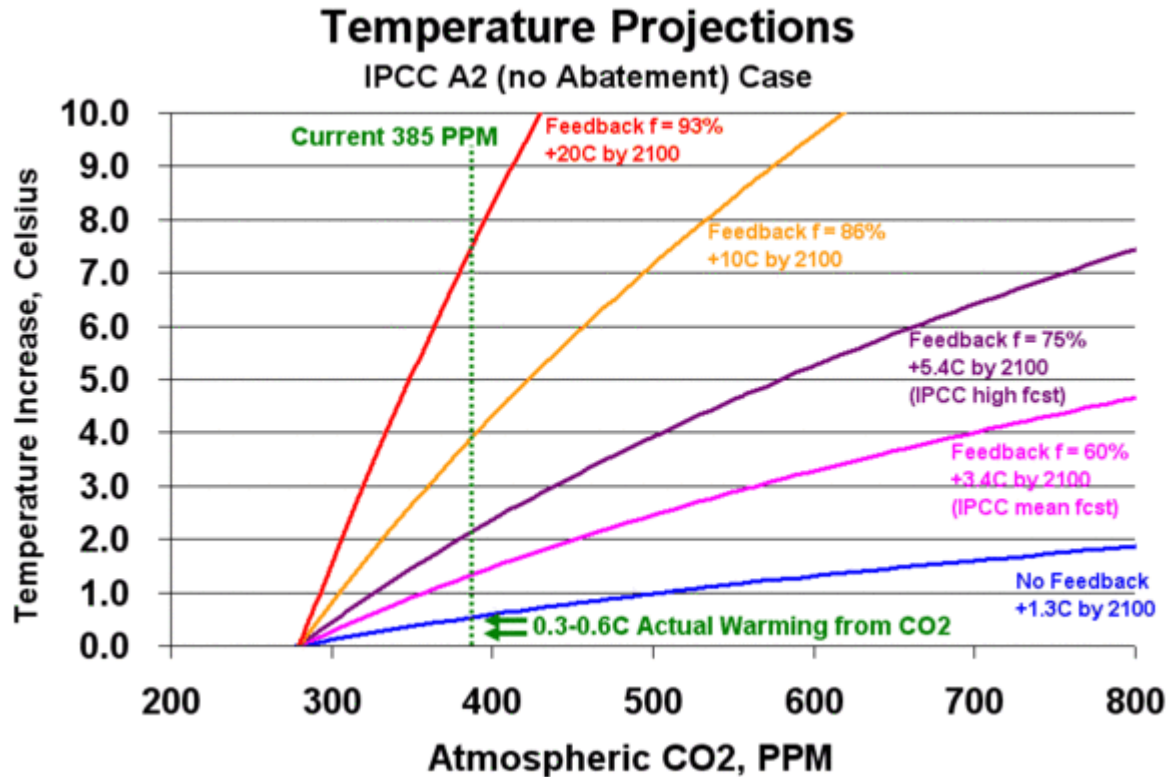
The other formula we need is the feedback formula. Feedback multiplies the temperature increase from CO2 alone by a factor  $F$ , such that  $F = 1/(1-f)$ , where  $f$  is the percentage of the original forcing that shows up as first order feedback gain (or damping if negative).

The graph below shows various cases of temperature increase vs. CO2 concentration, based on different assumptions about the physics of the climate system. All are indexed to equal zero at the pre-industrial CO2 concentration of about 280ppm.

So, the blue line below is the temperature increase vs. CO2 concentration without feedback, using the IPCC formula mentioned above. The pink is the same formula but with 60% positive feedback ( $1/[1-.6] = a 2.5$  multiplier), and is approximately equal to the IPCC mean for case A2. The purple line is with 75% positive feedback, and corresponds to the IPCC high-side temperature increase for case A2. The orange and red lines represent higher positive feedbacks, and correspond to the 10C 5% case and 20C 1% case in Weitzman's article. Some of this is simplified, but in all important respects it is by-the-book based on IPCC assumptions.



OK, so what does this tell us? Well, we can do something interesting with this chart. We have actually moved part-way to the right on this chart, as CO<sub>2</sub> today is now at 385ppm, up from the pre-industrial 280ppm. As you can see, I have drawn this on the chart below. We have also seen some temperature increase from CO<sub>2</sub>, though no one really knows what the increase due to CO<sub>2</sub> has been vs. the increase due to the sun or other factors. But the number really can't be much higher than 0.6C, which is about the total warming we have recorded in the last century, and may more likely be closer to 0.3C. I have drawn these two values on the chart below as well.



Again, there is some uncertainty in a key number (e.g. the amount of historic warming due to CO<sub>2</sub>) but you can see that it really doesn't matter. For any conceivable range of past temperature increases due to the CO<sub>2</sub> increase from 280-385 ppm, the numbers are no where near, not even within an order of magnitude, of what one would expect to have seen if the assumptions behind the other lines were correct. For example, if we were really heading to a 5.4C increase at 800ppm, we would have expected temperatures to have risen in the last 100 years by about 2.2C, which NO ONE thinks is even remotely the case. And if there is zero chance historic warming from man-made CO<sub>2</sub> is anywhere near 2.2C, then there is zero chance future warming will hit 5.4C, much less 10C or 20C.

In fact, experience to date seems to imply that warming has been under even the no feedback case. This should not surprise anyone in the physical sciences. A warming line on this chart below the no feedback line would imply negative feedback or damping in the climate system. And, in fact, most long term stable physical systems are dominated by such negative feedback and not by positive feedback. In fact, it is hard to find many natural processes except for perhaps nuclear fission that are driven by positive feedbacks as high as one must assume to get the 10 and 20C warming cases. In short, these cases are absurd, and we should be looking closely at whether even the IPCC mean case is overstated as well.

Given the last section of this paper on rapid climate change, I would assume the report argues that these curves are not continuous, that there is some point out there where the feedback fraction goes above 100%, and thus the gain goes infinite, and the temperature runs away suddenly. The best example is fissionable material being relatively inert until it reaches critical mass, when a runaway nuclear fission reaction occurs.

This is a totally unreasonable assumption. The earth, on any number of occasions, has been hotter and/or had higher CO<sub>2</sub> concentrations, and there is no evidence of this tipping point effect ever having occurred. In fact, this report contradicts itself by arguing on page 19 that temperatures absent mankind have been incredibly stable for thousands of years, despite numerous forcings like volcanoes and the Maunder Minimum. Systems this stable cannot reasonably be dominated by high positive feedbacks, much less tipping points and runaway processes.

I have simplified away lag effects and masking effects, like aerosol cooling. Lag effects of 10-15 years barely change this analysis at all. And aerosol cooling, given its limited area of effect (cooling aerosols are short-lived and so are geographically limited in area downwind of industrial areas) is unlikely to be masking more than a tenth or two of warming, if any. Warren Meyer, Climate-Skeptic.com

**Chapter GCC, page 28, bottom graph:** The chart caption does not match the chart. The chart states that values from 1900-2000 are computer simulations. In the caption, these are called "observed" values. It is disingenuous to call a computer simulated reconstruction an "observation." Warren Meyer, Climate-Skeptic.com