

Global warming has been halted: is global warming by the greenhouse gases significant?

Opinion

There have been many violent weather-related phenomena in these days, which are suspected, implied or reported to be related to temperature rise caused by the greenhouse gases. This concern is originated in the claim by the International Climate Change Panel (IPCC)¹ in 2007, "Summary for Policymakers", p.8, in which the IPCC stated that the warming during the last half of the last century, particularly between 1975 and 2000, was "very likely" to be due to the greenhouse gases.

Since CO₂ has still been increasing rapidly, it is natural to be concerned with its future consequences. In supporting the IPCC's statement, a large number of computer simulation studies predict a high temperature rise in the future. In fact, a set of 32 computer models with 102 runs predicted a range of temperature rise as large as 0.3°C to 1.0°C between 2000 and 2020, the average being about 1°C.²

However, contrary to the IPCC claim and later predictions by a very large number of computer simulation studies, global warming has been *halted* from about 2000, in spite of the fact that the amount of CO₂ in the atmosphere is still rapidly increasing. In fact, the temperature rise from 2000 to 2018 is only about 0.1°C by both ground-based and satellite observations,²⁻⁴ instead of the predicted temperature of about 1°C, 10 times higher than the observations. Obviously, the prediction considerably overestimated warming. This prediction error is originated in the above-mentioned IPCC claim. Why could such a prediction error happen?

Temperature change consists of both natural change and man-made change. Thus, in predicting future temperature rise, it is absolutely essential to identify and subtract natural change from observed change. Without subtracting natural change, it is not possible to identify and quantify warming by the greenhouse gases for computer simulations, because as shown below, natural change has a large contribution on temperature change.

There are two prominent natural changes in climatology. One is the recovery from the Little Ice Age (LIA), which had lasted from about 1200 to 1800–1850. During the LIA, the temperature was known to be about 1°C lower than the present. Thus, the recovery from the LIA means a temperature *rise*; the rate of temperature increase was about 0.5°C/100 years or warming of about 0.1°C between 1975 and 2000.⁵ The other change is a semi-periodic change called the Pacific Decadal Oscillation (PDO); it has an amplitude of roughly 0.2°C and the period of about 40 years.⁶ The PDO peaked in about 2000, so that warming caused by PDO between 1975 and 2000 is about 0.5°C.

Thus, the combined rise caused by the two natural changes between 1975 and 2000 is about 0.6°C (= 0.1°C + 0.5°C). Since this rise of 0.6°C is close to the observed temperature rise (0.6°C) during the corresponding period, it is likely, within the accuracy of the observation and analysis, that warming by the greenhouse gases is expected to be rather small. Actually, a similar temperature rise occurred between 1910 and 1940, so that the rise between 1975 and 2000 is not unusual (mostly due to the PDO).

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Thus, the reason for the overstated claim by the IPCC and the overestimated computer simulation studies is that they did not seriously considered *natural change*, which should be subtracted from the observed temperature rise before quantifying the actual warming effect by the greenhouse gases.

In as late as 2009, Kerr⁷ mentioned about the halting of global warming in his article in *Science*, titled "What happened to Global Warming? Scientists say just wait a bit." This seems to indicate that contacted scientists by him (expected be experts in climatology) would not have recognized the actually occurring halt of the temperature rise at that time by believing that the temperature rise between 1975 and 2000 would continue and also trusting the prediction by computer simulations. Now, we have waited too long to realize the overestimate. In this regard, it may be noted also that Kenney⁸, Editor-in-Chief of *Science*, stated: "Now that the scientific consensus is clear" in his article titled "Climate: Game Over". We should not forget that unlike perhaps in politics, consensus does not determine right or wrong in science.

There is some confusion on the terminology in this subject. 'Global warming' is certainly included in 'climate change'. Thus, any doubting or questioning on global warming by the greenhouse gases is considered to be denial of climate change itself. *Natural change is always in progress*. The natural change emphasized in this article is obviously climate change, which are more serious than man-made change. We should not forget the Great Ice Age (BIA); the so-called the " interglacial periods" after each BIA in the past lasted for only about 10,000 years; the present interglacial period has lasted about 10,000 years.⁹

In science, the accuracy of prediction can be examined by later observations. This was why the scientists contacted by Kerr said "wait a bit", who must have assumed resurgence of the warming. Thus, it must be said that the prediction based on the present simulation studies of warming seems to fail.

In 2010, Akasofu¹⁰ predicted that the halting would occur by the combined effect of the LIA and PDO and thus concluded that warming is less than what most researchers (consensus) have expected; it is not a result of computation, just an extension of both LIA and PDO. Figure 1 shows his conclusion. The contribution by the two natural change on

temperature change from 2000 to 2100 is 0.5°C (LIA) $\pm 0.2^{\circ}\text{C}$ (PDO), or either 0.7°C or 0.3°C in 2100, depending on the phase of the PDO. This figure was constructed in about 2004, and shows the comparison between observation and the prediction in 2008 (red dot).

According to the NOAA (NCEI) report,¹¹ the number of strong and violent tornados (F3+) per year has *decreased* from a 40–50 range to less than a 30 range between 1954 and 2014. The occurrence of hurricane in the Atlantic Ocean between 1900 and 1995 has no particular trend, except some increase in the North Atlantic Ocean. It is difficult to find any statistical trend of drought and floods in this respect, perhaps because it is difficult to define their intensity; there

has been no great drought after the Drought/the Dust Storm which occurred in 1934.¹² Thus, it is even more difficult to relate directly these phenomena to global warming.

The distinction between natural change and man-made change is very important, because our response to them is either adaption or mitigation. Confusing both will be a very costly mistake. It is suggested that an immediate task of research in climate change should be to find ways to distinguish between natural change and man-made change and to subtract natural changes before taking up a major computer simulation study.

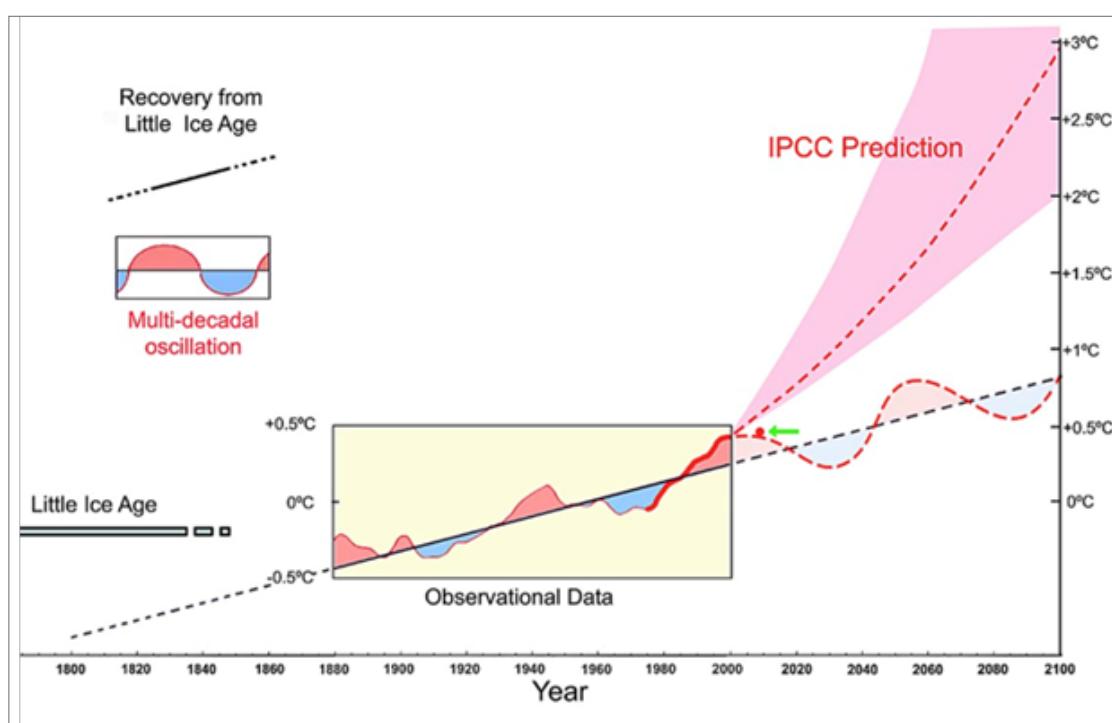


Figure 1 An attempt to construct the global temperature change from 1860 to 2000, which consists of a linear change (LIA) and the superposed semi-periodic change (PDO). The temperature changes after 2000 is assumed to consist of the two components, LIA and PDO. The change in the yellow box is the observed ones. The thick red line is the change, which was claimed to be effect of the greenhouse gases by the IPCC. The pink changes shows various extensions of the thick red line, suggested by computer simulations.^{4,8} On the red dot, see the text.

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Conflict of interest

Author declares that there is no conflict of interest.

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