

# Consensus distorts the climate picture

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IN February 2007, publication of the Intergovernmental Panel on Climate Change's Fourth Assessment Report (AR4) was received with international acclaim.

The vaunted IPCC process -- multitudes of experts from more than 100 countries examining thousands of refereed journal publications, with hundreds of expert reviewers, across a period of four years -- elevated the authority of the IPCC report to near biblical heights. Journalists jumped on board and even the oil and energy companies neared capitulation.

The veneration culminated with the Nobel Peace Prize, which the IPCC was awarded jointly with former US vice-president Al Gore. At the time, I joined the consensus in supporting this document as authoritative; I was convinced by the rigours of the process. Although I didn't agree with some statements in the document and had nagging concerns about the treatment of uncertainty, I bought into the meme of: "Don't trust what one scientist says; trust the consensus-building process of the IPCC experts."

Six-and-a-half years later, nominally a week before the release of the IPCC Fifth Assessment Report (AR5), substantial criticisms are being made of leaked versions of the report as well as of the IPCC process. IPCC insiders are bemoaning their loss of scientific and political influence. What happened to precipitate this change?

The IPCC was seriously tarnished by the unauthorised release of emails from the University of East Anglia in November 2009 that became known as the Climategate affair. These emails revealed the "sausage-making" involved in the IPCC's consensus-building process, including denial of data access to individuals who wanted to audit its data processing and scientific results, interference in the peer-review process to minimise the influence of sceptical criticisms and manipulation of the media.

Climategate was soon followed by the identification of an egregious error involving the melting of Himalayan glaciers. These revelations were made much worse by the response of the IPCC to these issues. Then came concerns about the behaviour of the IPCC's chairman Rajendra Pachauri and investigations of the infiltration of green advocacy groups into the IPCC. All of this was occurring against a background of explicit advocacy and activism by IPCC leaders related to carbon dioxide mitigation policies.

Although the scientists and institutions involved in Climategate were cleared of charges of scientific misconduct, the scientists and the IPCC did not seem to understand the cumulative impact of these events on the loss of trust in climate scientists and the IPCC process.

The IPCC's consensus-building process relies heavily on expert judgment; if the public and the policymakers no longer trust these particular experts, then we can expect a very different dynamic to be in play with regards to the reception of the AR5 relative to the release of the AR4 in 2007.

THERE is another, more vexing dilemma facing the IPCC, however. Since the publication of the AR4, nature has thrown the IPCC a curveball: there has been no significant increase in global average surface temperature for the past 15-plus years. This has been referred to as a pause or hiatus in global warming.

Almost all climate scientists agree on the physics of the infrared emission of the CO<sub>2</sub> molecule and understand that if all other things remain equal, more CO<sub>2</sub> in the atmosphere will have a warming

effect on the planet. Further, almost all agree that the planet has warmed across the past century and that humans have had some impact on the climate.

But understanding the causes of recent climate change and predicting future change is far from a straightforward endeavour.

The heart of the debate surrounding the IPCC's AR5 is summarised by the graphic on this page that compares climate model projections of global average surface temperature anomalies against observations.

This diagram is Figure 1.4 from the first chapter of an AR5 draft. FAR denotes the First Assessment Report (1990), SAR the second (1995) and TAR the third (2001), which was followed by the AR4 (2007). It is seen that climate models have significantly over-predicted the warming effect of CO<sub>2</sub> since 1990, a period during which CO<sub>2</sub> concentrations increased from 335 parts per million to more than 400ppm.

The most recent climate model simulations used in the AR5 indicate that the warming stagnation since 1998 is no longer consistent with model projections even at the 2 per cent confidence level. Based on early drafts of the AR5, the IPCC seemed prepared to dismiss the pause as irrelevant noise associated with natural variability. Apparently the IPCC has been under pressure from reviewers and its policymaker constituency to address the pause specifically.

Here is the relevant text from the leaked final draft of the AR5 summary for policymakers: "Models do not generally reproduce the observed reduction in surface warming trend over the last 10-15 years.

"The observed reduction in warming trend over the period 1998-2012 as compared to the period 1951-2012 is due in roughly equal measure to a cooling contribution from internal variability and a reduced trend in radiative forcing (medium confidence).

"The reduced trend in radiative forcing is primarily due to volcanic eruptions and the downward phase of the current solar cycle. However, there is low confidence in quantifying the role of changes in radiative forcing in causing this reduced warming trend. There is medium confidence that this difference between models and observations is to a substantial degree caused by unpredictable climate variability, with possible contributions from inadequacies in the solar, volcanic and aerosol forcings used by the models and, in some models, from too strong a response to increasing greenhouse-gas forcing."

The IPCC acknowledges the pause and admits climate models do not reproduce the pause. I infer from these statements that the IPCC has failed to convincingly explain the pause in terms of external radiative forcing from greenhouse gases, aerosols, solar or volcanic forcing; this leaves natural internal variability as the predominant candidate to explain the pause.

Natural internal variability is associated with chaotic interactions between the atmosphere and ocean. The most familiar mode of natural internal variability is El Nino/La Nina. On longer multi-decadal time scales, there is a network of atmospheric and oceanic circulation regimes, including the Atlantic Multidecadal Oscillation and the Pacific Decadal Oscillation.

The IPCC refers to this as "unpredictable climate variability" in its statement above.

My chain of reasoning leads me to conclude that the IPCC's estimates of the sensitivity of climate to greenhouse gas forcing are too high, raising serious questions about the confidence we can place in the IPCC's attribution of warming in the last quarter of the 20th century primarily to greenhouse gases, and also its projections of future warming. If the IPCC attributes the pause to natural internal variability, then this prompts the question as to what extent the warming between 1975 and 2000 can also be explained by natural internal variability.

Nevertheless, the IPCC concludes in the final AR5 draft of the summary for policymakers: "There is very high confidence that climate models reproduce the observed large-scale patterns and multi-decadal trends in surface temperature, especially since the mid-20th century.

"It is extremely likely that human influence on climate caused more than half of the observed increase in global average surface temperature from 1951-2010.

"Continued emissions of greenhouse gases would cause further warming. Emissions at or above current rates would induce changes in all components in the climate system, some of which would very likely be unprecedented in hundreds to thousands of years."

WHY is my reasoning about the implications of the pause, in terms of attribution of the late 20th-century warming and implications for future warming, so different from the conclusions drawn by the IPCC? The disagreement arises from different assessments of the value and importance of particular classes of evidence as well as disagreement about the appropriate logical framework for linking and assessing the evidence. My reasoning is weighted heavily in favour of observational evidence and understanding of natural internal variability of the climate system, whereas the IPCC's reasoning is weighted heavily in favour of climate model simulations and external forcing of climate change.

I do not expect my interpretation and analysis to be given credence above the IPCC consensus. Rather, I am arguing that the complexity of the problem, acknowledged uncertainties and suspected areas of ignorance indicate several different plausible interpretations of the evidence. Hence ascribing a high confidence level to either of these interpretations is not justified by the available evidence and our present understanding.

How to reason about uncertainties in the complex climate system and its computer simulations is neither simple nor obvious. Biases can abound when reasoning and making judgments about such a complex system, through excessive reliance on a particular piece of evidence, the presence of cognitive biases in heuristics, failure to account for indeterminacy and ignorance, and logical fallacies and errors including circular reasoning.

The politicisation of climate science is another source of bias, including explicit policy advocacy by some IPCC scientists. Further, the consensus-building process can be a source of bias. A strongly held prior belief can skew the total evidence that is available subsequently in a direction that is favourable to itself. The consensus-building process has been found to act generally in the direction of understating the uncertainty associated with a given outcome. Group decisions can be dominated by a single confident member.

Once the IPCC's consensus claim was made, scientists involved in the IPCC process had reasons to consider the possible effect of their subsequent statements on their ability to defend the consensus claim, and the impact of their statements on policymaking.

The climate community has worked for more than 20 years to establish a scientific consensus on anthropogenic climate change. The IPCC consensus-building process played a useful role in the early synthesis of the scientific knowledge. However, the ongoing scientific consensus-seeking process has had the unintended consequence of oversimplifying the problem and its solution and hyper-politicising both, introducing biases into the science and related decision-making processes.

SCIENTISTS do not need to be consensual to be authoritative. Authority rests in the credibility of the arguments, which must include explicit reflection on uncertainties, ambiguities and areas of ignorance, and more openness for dissent. The role of scientists should not be to develop political will to act by hiding or simplifying the uncertainties, explicitly or implicitly, behind a negotiated consensus. I have recommended that the scientific consensus-seeking process be abandoned in favour of a more traditional review that presents arguments for and against, discusses the uncertainties, and

speculates on the known and unknown unknowns. I think such a process would support scientific progress far better and be more useful for policymakers.

The growing implications of the messy wickedness of the climate-change problem are becoming increasingly apparent, highlighting the inadequacies of the "consensus to power" approach for decision-making on such complex issues.

Let's abandon the scientific consensus-seeking approach in favour of open debate and discussion of a broad range of policy options that stimulate local and regional solutions to the multifaceted and interrelated issues surrounding climate change.

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