

Scientists Reach 100% Consensus on Anthropogenic Global Warming

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Bulletin of Science, Technology & Society
2017, Vol. 37(4) 183–184
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DOI: 10.1177/0270467619886266
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Abstract

The consensus among research scientists on anthropogenic global warming has grown to 100%, based on a review of 11,602 peer-reviewed articles on “climate change” and “global warming” published in the first 7 months of 2019.

Keywords

global warming, climate change, anthropogenic global warming, consensus, climate

We can date the beginning of consensus-building on anthropogenic global warming (AGW) to Manabe and Wetherald (1967). Their pioneering computer modeling showed that doubling atmospheric CO₂ would raise global temperature by about 2°C, lower than the present best estimate but not by much. Their finding convinced the late Wallace Broecker that what he named “global warming” was “a thing to worry about” (Broecker, 1975; Weart, 2009).

As computer modeling steadily improved and global temperatures began their erratic but inexorable climb in the 1970s, a consensus grew first among climate scientists and then more broadly that AGW was true and indeed worrisome. Governments became concerned about the damaging potential of AGW, as reflected in the objective of the first United Nations Framework Convention on Climate Change, held in Rio in June 1992: “To achieve . . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (United Nations, 1992, p. 4).

Because the use of fossil fuels has become so embedded in the world economy, it was clear that “stabilizing” greenhouse gases might require large-scale government intervention and regulation, anathema to some, including some scientists. This recognition gave rise to the repeated claim of global warming denialists: “There’s no consensus.”

Consider as examples two statements 20 years apart from Richard Lindzen of MIT. In 1992, he published an article titled, “Global Warming: The Origin and Nature of the Alleged Scientific Consensus” (Lindzen, 1992). It appeared in *Regulation*, a non-peer-reviewed periodical from the Cato Institute, a libertarian “think-tank.” The article began, “Many aspects of the catastrophic scenario have already been largely discounted by the scientific community [and] fears of massive sea level increases have been steadily reduced by orders of magnitude” (p. 87). In 2012, Lindzen and 15 coauthors published a letter to the *Wall Street Journal* titled, “No Need

to Panic about Global Warming” (Lindzen, 2012). It opened with this paragraph:

A candidate for public office in any contemporary democracy may have to consider what, if anything, to do about “global warming.” Candidates should understand that the oft-repeated claim that nearly all scientists demand that something dramatic be done to stop global warming is not true. In fact, a large and growing number of distinguished scientists and engineers do not agree that drastic actions on global warming are needed.

The signatories included not only Lindzen but also a former astronaut and senator, the co-founder of the *Journal of Forecasting*, the President of the World Federation of Scientists, and a member of both the National Academy of Engineering and the National Academy of Sciences. This impressive list seemed to show not only that there was no consensus on AGW, but that distinguished scientists thought it might well be false. However, Lindzen was the only one of the 16 who had done climate research.

Scholars responded to the controversy by surveying the opinion of scientists. The results of eight such studies conducted between 2009 and 2015 showed a consensus on AGW ranging from 83.5% to 97% (Cook et al., 2016). But given the ingrained caution of scientists and their reluctance to affirm findings outside their own field, opinion surveys are likely to underestimate the consensus. Moreover, as shown by the controversy over continental drift, even a near-unanimous consensus among scientists can turn out to be wrong. If we look back at the early decades of continental drift, however, we find that

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there was little peer-reviewed evidence for or against the theory. As a result, early articles on continental drift contained much more opinion than evidence. Thus, we could say that although scientists turned out to be wrong about continental drift, the peer-reviewed literature was not wrong, only thin and inconclusive. This affirms that the most reliable way to gauge a consensus among scientists is to turn to the peer-reviewed literature and the evidence therein. This method also has the advantage of directly showing how likely a theory is to be true.

In an article titled “The Scientific Consensus on Climate Change,” Naomi Oreskes was the first to use the literature in this way (Oreskes, 2004). As a scholar of the history of science, she recognized that in spite of the widespread agreement on AGW from scientific associations, national academies, and the IPCC (Intergovernmental Panel on Climate Change), their reports “might downplay legitimate dissenting opinions” from individual scientists. Oreskes tested that hypothesis by reading the abstracts of the 928 articles published between 1993 and 2003 that answered to the keyword phrase, “global climate change.” She found, “Remarkably, none of the papers disagreed with the consensus position” (Oreskes, 2004, p. 1686).

Cook et al. (2013) reviewed 11,944 peer-reviewed articles from 1991 to 2011, using the search terms “global climate change” and “global warming.” They required that to be counted as part of the consensus, an article had to “endorse” AGW by “explicitly stat[ing] that humans are the primary cause of recent global warming” (p. 3). This led them to reject 7,930 articles, after which they calculated a consensus of 97.1%. Had they used rejections of AGW, as Oreskes did, Cook et al. (2013) would have reported a consensus of 99.8%, compared to her 100% (see Cook et al., 2016). Powell (2016) reported that, using rejection as the criterion, literature surveys to date showed an average consensus of 99.94%.

In this study, I used the Web of Science core database to search for peer-reviewed articles on “climate change” or “global warming” published from January 1, 2019, through early August (see Research Data, available online as Supplemental Material). I found 11,602 articles, more than 10 times the number in Oreskes’s database. To read even the abstracts would be a daunting and time-consuming task subject to fatigue and error. Instead, I read the titles, and when it appeared that an article might question AGW, I read the abstract and in some cases the article itself. I found only a handful of articles whose titles left open the possibility that its authors might reject AGW, and on closer inspection none did. One example is, “Has Global Warming Already Arrived?” by Varotsos and Efstathiou (2019). They reported that the temperature of the troposphere as measured indirectly from satellites did not match that predicted by AGW theory. They noted that “the climate system is complicated and complex with the existing uncertainties in the climate predictions” (p. 36) and did not use the discrepancy as a basis to reject AGW.

Oreskes’s largely unheeded warning from 15 years ago tolls sadly true today: “There is a scientific consensus on the reality of anthropogenic climate change. Climate scientists have repeatedly tried to make this clear. It is time for the rest of us to listen” (Oreskes, 2004, p. 1686).

Denialists have long run out of excuses for inaction and humanity has almost run out of time.


Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Supplemental Material

Supplemental material for this article is available online.

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Author Biography

James Powell has a PhD from MIT in Geochemistry and is the former college president, museum director, and 12-year member of the US National Science Board appointed first by President Reagan and then by the President G. H. W. Bush. He is the author of several books. *Asteroid 1987 SH7* is named after him.