

## Climate Change: Is the Science Settled?

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### Introduction

As the US prepares for an upcoming Presidential election, the major political parties have formally embraced opposing perspectives on the question of climate change. The Democratic Party has adopted the position that has been outlined by the Intergovernmental Panel on Climate Change (IPCC). In short, the IPCC declares that the burning of carbon-based fuels has added carbon dioxide to the atmosphere in unprecedented amounts, resulting in an enhanced “greenhouse” effect with an attendant rise in atmospheric temperatures [1]. This will have a wide range of deleterious effects, to include loss of species diversity, rising sea levels, reduced biological productivity, displacement of indigenous cultures, disruption of hydrological cycles and reduced capacity of our agricultural systems. The scientists shaping these arguments are referred to as “warmists” (or “alarmists”). Their thinking is articulated in a number of journals, which include *The Journal of Climate*, *Climatic Change*, *Earth Interactions*, *Nature: Climatic Change and Science*, along with an extensive network of websites, such as *Real Climate*, *Hot Whopper*, *DeSmog Blog* and *Skeptical Science*.

To ameliorate the dire consequences the alarmists point to, the Democratic Party calls for immediate action in their platform [2]:

“Climate change is an urgent threat and a defining challenge of our time. Fifteen of the 16 hottest years on record have occurred this century...The best science tells us that without ambitious, immediate action across our economy to cut carbon pollution and other greenhouse gases, all of these impacts will be far worse in the future. We cannot leave our children a planet that has been profoundly damaged.”

The “action plan” to stem the impending crisis includes a number of draconian measures, some of which will radically alter the way we produce, consume, and distribute energy across the economy. These measures range from carbon taxes, to cap and trade schemes, subsidies for “clean” energy, bans on offshore drilling and a moratorium on hydraulic fracturing (i.e., “fracking”).

The climate “skeptics”, on the other hand, argue that the thinking on fossil fuels and their impacts is flawed, along with the mathematical models that shape the alarmist paradigm. They cite scores of studies where elaborate modeling attempts fail to accurately “hind cast” and/or forecast global or regional temperatures with acceptable degrees of accuracy. A central theme to the criticism of these models is that global temperatures have raised little in the past 18 years, yet the models continue to predict steady increases in the global temperature profile. They also cite data deficiencies that range from urban contamination of surface data over land to irregularities in the collection and interpretation of sea-surface temperatures. Skeptics go on to say that warming cycles are naturally occurring, and that we should direct our actions towards adapting to future warming, regardless of its cause.

While united in their criticisms of alarmist thinking, the skeptics can be divided into two distinct camps: the “Luke Warmists” and the “Dragon Slayers.” Both groups agree that natural variability is the primary driver of climate change, but they differ in their acceptance of the greenhouse theory of global warming. The “Dragon Slayers” argue that the greenhouse concept is thermodynamically invalid and that no amount of CO<sub>2</sub> can cause temperatures to rise. The “Luke Warmists” argue that the greenhouse

properties of anthropogenically derived CO<sub>2</sub> are but a minor contributor to the earth’s total heat budget. Furthermore, they contend that additional loadings of CO<sub>2</sub> will have little or no additional impact.

With regard to natural variability, the skeptics point to a number of drivers: solar variability, geothermal forcing, oceanic and atmospheric oscillators, and changes in cloud cover are the most important. All of these drivers have operated in the past, and are having an impact at present. Needless to say, they will also continue to operate in the future. These arguments are summarized at length in *Climate Change Reconsidered II, Physical Science* [3] and through a number of popular websites such as *CO<sub>2</sub> Science*, *Climate Depot*, *Climate Etc.* *Watts Up With That* and *Principia Scientific*.

In the political arena, the Republican Party is decidedly committed to the skeptical position on climate change. Their platform reads [4]:

“Information concerning a changing climate, especially projections into the long-range future, must be based on dispassionate analysis of hard data...The United Nations’ Intergovernmental Panel on Climate Change is a political mechanism, not an unbiased scientific institution. Its unreliability is reflected in its intolerance toward scientists and others who dissent from its orthodoxy.”

The question then becomes: whose vision is correct, and which path should we take on this all-important issue? Alarmists are quick to cite a number of studies that establish an overwhelming consensus among climate scientists (97%) and point to this as definitive proof that they are on the right side of the argument. However, the “97% consensus” that global warming is anthropogenically driven is somewhat suspect. A quick perusal of a recent American Meteorological Society survey concludes that only 67% of professional atmospheric scientists subscribe to the theory that humans are mostly or entirely responsible for the recent warming [5]. Additionally, the “97%” figure contains a large number of studies that address the issue: “assuming that we will experience warming in the future, how will it affect fisheries/farms/urban areas/monsoons/sea level/forests/biodiversity/extinction rates/severe storms/energy usage” etc.? This amounts to compounded Groupthink, a dangerous conflation that should be approached cautiously.

This type of thinking is not unique to the climate sciences. The gruesome practice of bloodletting was popular in ancient Egypt and was not abandoned until Pasteur’s time. Medical researchers, Kerridge and Lowe [6] state “that bloodletting survived for so long is not an intellectual anomaly—it resulted from the dynamic interaction of

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social, economic and intellectual pressures, a process that continues to determine medical practice.” In my opinion, this dynamic is still found in most areas of scientific research, climate science included.

It appears that the most prudent course is to assume that the science on climate change is not “settled” and that, in light of numerous uncertainties, much work remains to be done. In particular, each of the ideas proposed by the skeptics must be fully assessed through careful, exhaustive research, and then either embraced or debunked on the weight of the empirical evidence. I think the ideas of Alfred Wegner, the trailblazer of modern tectonic theory, should guide our actions on this all-important problem [7]. To quote: “Scientists still do not appear to understand sufficiently that all earth sciences must contribute evidence toward unveiling the state of our planet...It is only by combing the information furnished by **all the earth sciences** that we can hope to determine ‘truth’ here...Further, we have to be prepared always for the possibility that each new discovery, no matter what science furnishes it, may modify the conclusions we draw.”

Wise advice, indeed.

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