



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

CORRECTING CLIMATE SCIENCE CONTRARIANS

The Scientific Consensus on Human-Caused Climate Change Remains Strong
The causes and impacts of climate change are apparent worldwide and have been recognized by nearly every major national and world scientific body, including the National Academy of Sciences, the American Meteorological Society, the American Geophysical Union and the unprecedented collaboration of thousands of expert scientists in the Nobel-Prize winning Intergovernmental Panel on Climate Change.

The IPCC's Fourth Assessment Report (2007) represents an unprecedented collaboration of **more than 2,500 scientific expert reviewers, more than 800 contributing authors, and more than 450 lead authors from more than 130 countries**. All work cited in the IPCC reports was previously published in the peer-reviewed scholarly literature. One component of the IPCC report alone on the physical science basis of climate change was authored by 620 people with another 600-plus expert reviewers. A full list of these authors with affiliations can be seen at:

http://en.wikipedia.org/wiki/List_of_authors_from_Climate_Change_2007:_The_Physical_Science_Basis

The United States Global Climate Research Project, a collaboration of 13 federal agencies, also shares this view. Their 2009 report states, **“Global warming is unequivocal and primarily human-induced. Global temperature has increased over the past 50 years. This observed increase is due primarily to human-induced emissions of heat-trapping gases.”**

By comparison, contrarian sources are almost never found in the scientific literature. Often, they are only found on ideologically-driven web sites that exist far outside the bounds of effective scientific review and fact-checking. For instance, the Center for Inquiry, a non-partisan think-tank dedicated to the integrity of science and evidence-based reasoning in public policy, has [pointed out](#) (pdf) that a much-publicized list of climate contrarians actually includes few scientists and even fewer with expertise in climate science. Astoundingly, some of the scientists included on this list did not previously grant their permission and have now [publicly denounced](#) the list and its supposed conclusions.

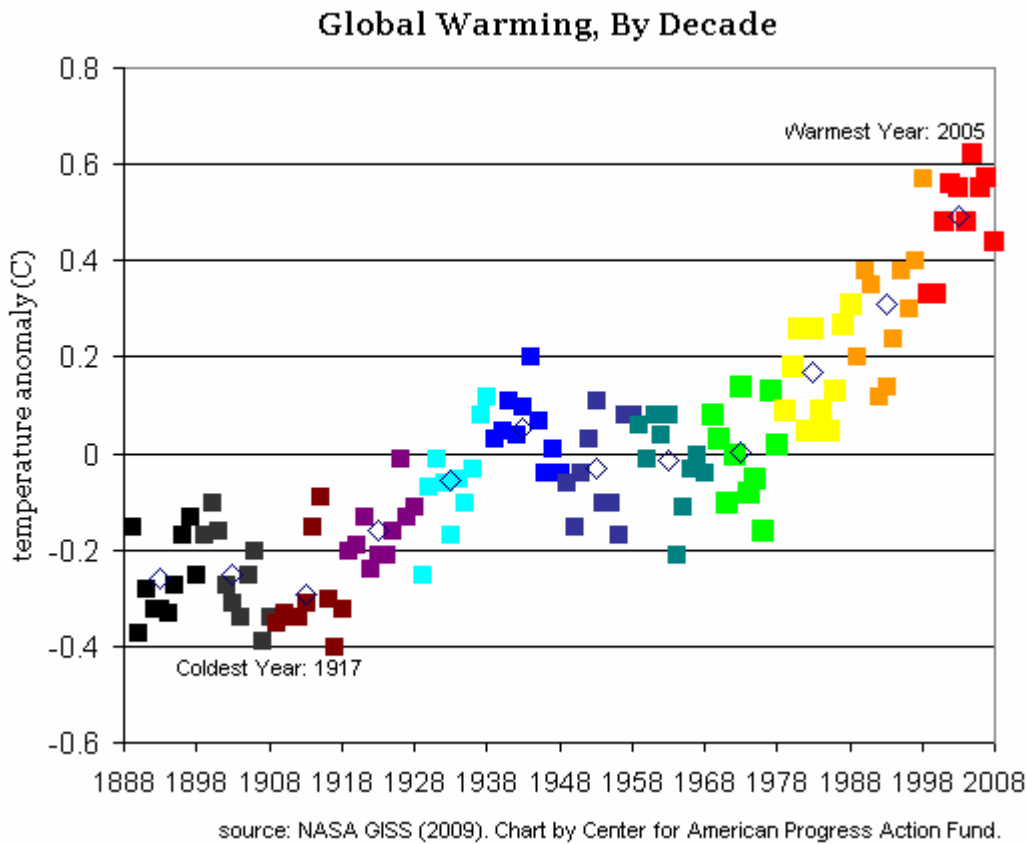
The Earth is Warming and Global Temperatures Continue to Rise

While natural cycles push temperatures up and down, global warming raises the baseline on which those cycles operate. Put another way, global warming makes both cool years and hot years warmer. That's why **the eight warmest years in the instrumental record have all occurred since 1998**, and the 14 warmest years in the record have all occurred since 1990. Global mean temperatures to the end of 2007 were well above the average of the last century.

Comparing temperatures of the last decade to the 1901-2000 mean demonstrates that **global annual temperatures were above this average for each of the past eight years:**

YEAR	Degrees C above average
2001	0.7562
2002	0.8604
2003	0.7778
2004	0.7291
2005	0.9797
2006	0.8399
2007	1.0159
2008	0.8042

A graph of global temperatures over time demonstrates this clear upward trend, even as natural cycles continue their slight variations.



Contrarians focus on short-term temperature trends in the Earth's natural up and down cycles to mask the obvious increase in temperatures over the long-term.

NCDC/NOAA - surface temperature anomalies from observations:
<http://www.ncdc.noaa.gov/oa/climate/research/2009/perspectives.html>

The Annual Global Land Temperature Anomalies (degrees C):
ftp://ftp.ncdc.noaa.gov/pub/data/anomalies/annual.land.90S.90N.df_1901-2000mean.dat

The Latest Science Indicates that the Effects of Climate Change are More Extreme than Scientists Had Predicted

When contrarians fail to overturn basic climate science, they instead attack the science regarding the consequences of climate change. But the truth is that the latest science indicates that climate change is happening more quickly and will have more severe consequences than scientists have projected previously.

The extensively peer-reviewed Fourth IPCC Assessment Report found that **global average temperatures have already risen 1.4 ° F degrees since pre-industrial times, and are expected to increase another 2° F – 11.5° F by the end of the century**, depending on how much more heat-trapping emissions go into the atmosphere. These increasing temperatures are causing ice to melt all over the world, raising sea levels and threatening human and wildlife populations. All of these impacts are occurring faster than previously anticipated.

Since the latest report of the IPCC working groups in 2007, scientists have found:

- Sea level rise is occurring 50 percent faster than projected.
- Arctic sea ice is melting ten times faster than projected, decreasing ice mass at a rate of 7 to 9 percent per decade.
- Quickly acidifying oceans are able to absorb much less carbon dioxide, the chief heat-trapping gas from industrial activity, forcing 12.5 percent more carbon dioxide to remain in the atmosphere for every ton emitted.

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