



This is the print version of the [Skeptical Science](#) article '[No warming in 16 years](#)', which can be found at <http://sks.to/16years>.

Human activity continues to warm the planet over the past 16 years

What The Science Says:

Once natural influences, in particular the impact of El Niño and La Niña, are removed from the recent temperature record, there is no evidence of a significant change in the human contribution to climate change.

Climate Myth: No warming in 16 years

"...there has been no increase in the global average surface temperature for the past 16 years"
([Judith Curry](#) and [David Rose](#))

Update 26/05/2013: The '16 years' video, originally linked from this article, is not representative of the scientific consensus. In fact the short term trends are rather more complicated. The problem is explained in more detail in [this article](#).

Humans have continued to contribute to the greenhouse warming of the planet over the past 16 years. The myth arises from two misconceptions. Firstly, it ignores the fact that short term temperature trends are strongly influenced by a variety of natural factors and observational limitations which must be analyzed to isolate the human contribution. Secondly it focuses on one small part of the climate system (the atmosphere) while ignoring the largest part (the oceans). We will address each of these errors in turn.

What factors influence the 16 year trend?

Climate scientists have traditionally looked at climate over long periods - 30 years or more. However the media obsession with short term trends has focussed attention on the past 15-16 years. Short term trends are much more complex because they can be affected by many factors which cancel out over longer periods. In a [recent interview](#) James Hansen noted "If you look over a 30-40 year period the expected warming is two-tenths of a degree per decade, but that doesn't mean each decade is going to warm two-tenths of a degree: there is too much natural variability".

The list of factors which can affect short term temperature trends is extensive, and some of them can rival the global warming signal in magnitude over short periods. The following table identifies a range of influences on the recent temperature trend:

| Influence | Effect | Notes |
|------------------------------|---------|---|
| Human GHG emissions | Warming | |
| Human sulphate emissions | Cooling | Recent emissions from China |
| Coverage bias | Cooling | HadCRUT4 and NOAA only |
| Sea surface temperature bias | Cooling | GISTEMP and NOAA only |
| The El Niño oscillation | Cooling | The recent run of La Niñas |
| Volcanic eruptions | Warming | Recovery from Pinatubo eruption |
| Solar cycle | Cooling | Recent solar minimum |
| Longer term oscillations | Unknown | AMO and PDO |

Change in ocean heat uptake

Cooling [Balmaseda et al \(2013\)](#), [Guemas et al \(2013\)](#)

Most of the short term influences, with the exception of greenhouse gas emissions and probably volcanoes (but see [Neely et al 2013](#)), have had a cooling influence. As a result it is unsurprising that we have seen a reduced rate of warming over the past 16 years. The fact that there has been any warming at all is strongly supportive of the warming effect of greenhouse gas emissions.

The fundamental mechanism of global warming is a change in the top-of-atmosphere energy balance, and as a result the energy content of the climate system provides a more direct measure of global warming which avoids many of these problems, although the observational record is shorter and less complete (e.g. [Church et al 2011](#)).

The rest of the climate system

Focusing on surface air temperatures also misses more than 90% of the overall warming of the planet (Figure 2).

Where is global warming going?

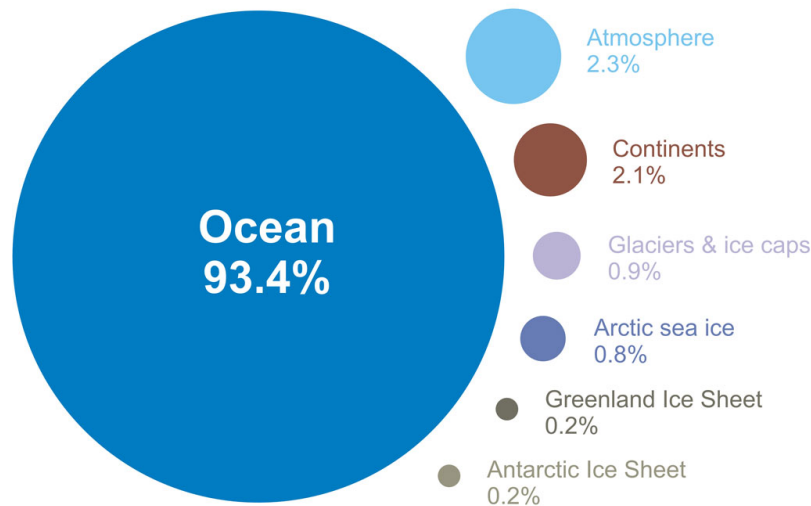


Figure 2: Components of global warming for the period 1993 to 2003 calculated from [IPCC AR4 5.2.2.3](#).

[Nuccitelli et al. \(2012\)](#) considered the warming of the oceans (both shallow and deep), land, atmosphere, and ice, and showed that global warming has not slowed in recent years (Figure 3).

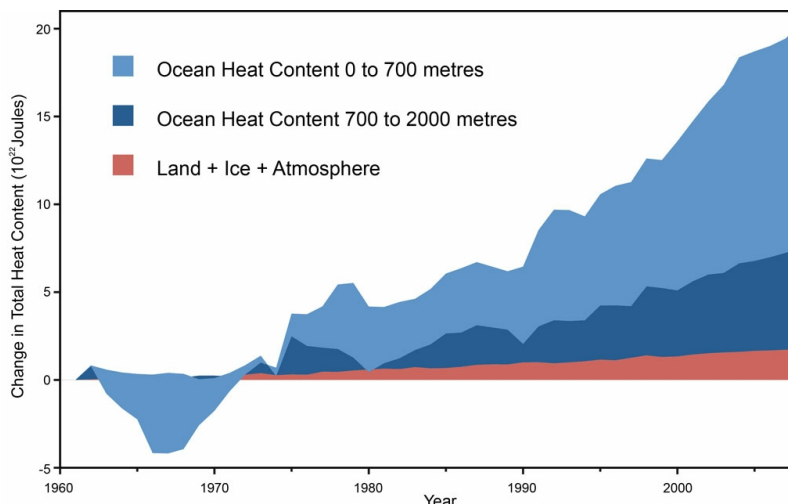


Figure 3: Land, atmosphere, and ice heating (red), 0-700 meter OHC increase (light blue), 700-2,000 meter

OHC increase (dark blue). From [Nuccitelli et al. \(2012\)](#).

References

- Foster and Rahmstorf (2011), *Global temperature evolution 1979–2010* [doi:10.1088/1748-9326/6/4/044022](https://doi.org/10.1088/1748-9326/6/4/044022)
- Nuccitelli et al. (2012) *Comment on Ocean heat content and Earth's radiation imbalance. II. Relation to climate shifts* [doi:10.1016/j.physleta.2012.10.010](https://doi.org/10.1016/j.physleta.2012.10.010)

Credits: [Calculations](#) and video: Kevin C. Voiceover: Daniel Bailey. Advice: The SkS team.

Intermediate rebuttal written by Kevin C

Update July 2015:

Here is a related lecture-video from [Denial101x - Making Sense of Climate Science Denial](#)

[see video at [this link](#).]



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