



This is the print version of the [Skeptical Science](http://sks.to/past) article '[Climate's changed before](http://sks.to/past)', which can be found at <http://sks.to/past>.

What does past climate change tell us about global warming?

What The Science Says:

Greenhouse gasses, principally CO₂, have controlled most ancient climate changes. This time around humans are the cause, mainly by our CO₂ emissions.

Climate Myth: Climate's changed before

Climate is always changing. We have had ice ages and warmer periods when alligators were found in Spitzbergen. Ice ages have occurred in a hundred thousand year cycle for the last 700 thousand years, and there have been previous periods that appear to have been warmer than the present despite CO₂ levels being lower than they are now. More recently, we have had the medieval warm period and the little ice age. ([Richard Lindzen](#))

Greenhouse gasses – mainly CO₂, but also methane – were involved in most of the climate changes in Earth's past. When they were reduced, the global climate became colder. When they were increased, the global climate became warmer. When CO₂ levels jumped rapidly, the global warming that resulted was highly disruptive and sometimes caused [mass extinctions](#). Humans today are emitting prodigious quantities of CO₂, at a rate faster than even the most destructive climate changes in earth's past.

Abrupt vs slow change.

Life flourished in the [Eocene](#), the [Cretaceous](#) and other times of high CO₂ in the atmosphere because the greenhouse gasses were [in balance with the carbon in the oceans](#) and the weathering of rocks. Life, ocean chemistry, and atmospheric gasses **had millions of years to adjust** to those levels.



Lush life in the Arctic during the Eocene, 50 million years ago ([original art - Stephen C. Quinn, The American Museum of Natural History, N.Y.C](#))

But there have been [several times in Earth's past](#) when Earth's temperature jumped abruptly, in much the same way as they are doing today. Those times were caused by large and [rapid greenhouse gas emissions](#), just like humans are causing today.

Those [abrupt global warming events were almost always highly destructive](#) for life, causing mass extinctions such as at the [end of the Permian, Triassic](#), or even [mid-Cambrian](#) periods. The symptoms from those events (a big, rapid jump in global temperatures, rising sea levels, and [ocean acidification](#)) are all happening today with human-caused climate change.

So yes, the climate has changed before humans, and in most cases scientists know why. In all cases we see the same association between CO₂ levels and global temperatures. And past examples of **rapid** carbon emissions (just like today) were generally highly destructive to life on Earth.

Basic rebuttal written by howardlee

Update July 2015:

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



Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a [college textbook on climate change](#) and the book [Climate Change Denial: Heads in the Sand](#). Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.



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