



This is the print version of the [Skeptical Science](http://sks.to/midcentury) article '[It cooled mid-century](http://sks.to/midcentury)', which can be found at <http://sks.to/midcentury>.

Why did climate cool in the mid-20th Century?

What The Science Says:

Mid-century cooling involved aerosols and is irrelevant for recent global warming.

Climate Myth: It cooled mid-century

"It was the post war industrialization that caused the rapid rise in global CO₂ emissions, but by 1945 when this began, the Earth was already in a cooling phase that continued until 1975. With 32 years of rapidly increasing global temperatures and only a minor increase in global CO₂ emissions, followed by 33 years of slowly cooling global temperatures with rapid increases in global CO₂ emissions, it was deceitful for the IPCC to make any claim that CO₂ emissions were primarily responsible for observed 20th century global warming." ([Norm Kalmanovitch](#))

Although temperatures increased overall during the 20th century, three distinct periods can be observed. Global warming occurred both at the beginning and at the end of the 20th century, but a cooling trend is seen from about 1940 to 1975. As a result, changes in 20th century trends offer a good framework through which to understand climate change and the role of numerous factors in determining the climate at any one time.

Early and late 20th century warming has been explained primarily by increasing solar activity and increasing CO₂ concentrations, respectively, with other factors contributing in both periods. So what caused the cooling period that interrupted the overall trend in the middle of the century? The answer seems to lie in solar dimming, a cooling phenomenon caused by airborne pollutants.

The main culprit is likely to have been an increase in sulphate aerosols, which reflect incoming solar energy back into space and lead to cooling. This increase was the result of two sets of events.

1. Industrial activities picked up following the Second World War. This, in the absence of pollution control measures, led to a rise in aerosols in the lower atmosphere (the troposphere).
2. A number of volcanic eruptions released large amounts of aerosols in the upper atmosphere (the stratosphere).

Combined, these events led to aerosols overwhelming the warming trend at a time when solar activity showed little variation, leading to the observed cooling. Furthermore, it is possible to draw similar conclusions by looking at the daily temperature cycle. Because sunlight affects the maximum day-time temperature, aerosols should have a noticeable cooling impact on it. Minimum night-time temperatures, on the other hand, are more affected by greenhouse gases and therefore should not be affected by aerosols. Were these differences observed? The answer is yes: maximum day-time temperatures fell during this period but minimum night-time temperatures carried on rising.

The introduction of pollution control measures reduced the emission of sulphate aerosols. Gradually the cumulative effect of increasing greenhouse gases started to dominate in the 1970s and warming resumed.

As a final point, it should be noted that in 1945, the way in which sea temperatures were measured changed, leading to a substantial drop in apparent temperatures. Once the data

are corrected, it is expected that the cooling trend in the middle of the century will be less pronounced.

Basic rebuttal written by Anne-Marie Blackburn

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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