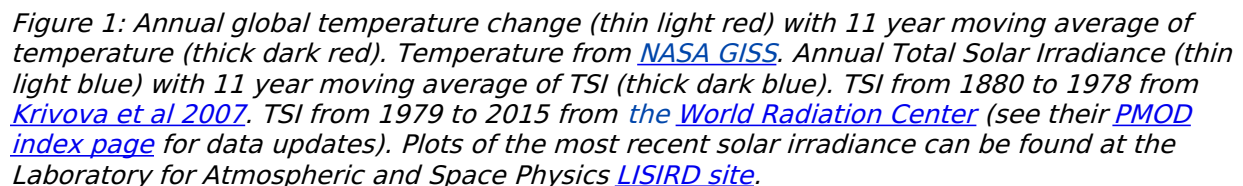


## Sun & climate: moving in opposite directions

The sun's energy has decreased since the 1980s but the Earth keeps warming faster than before.

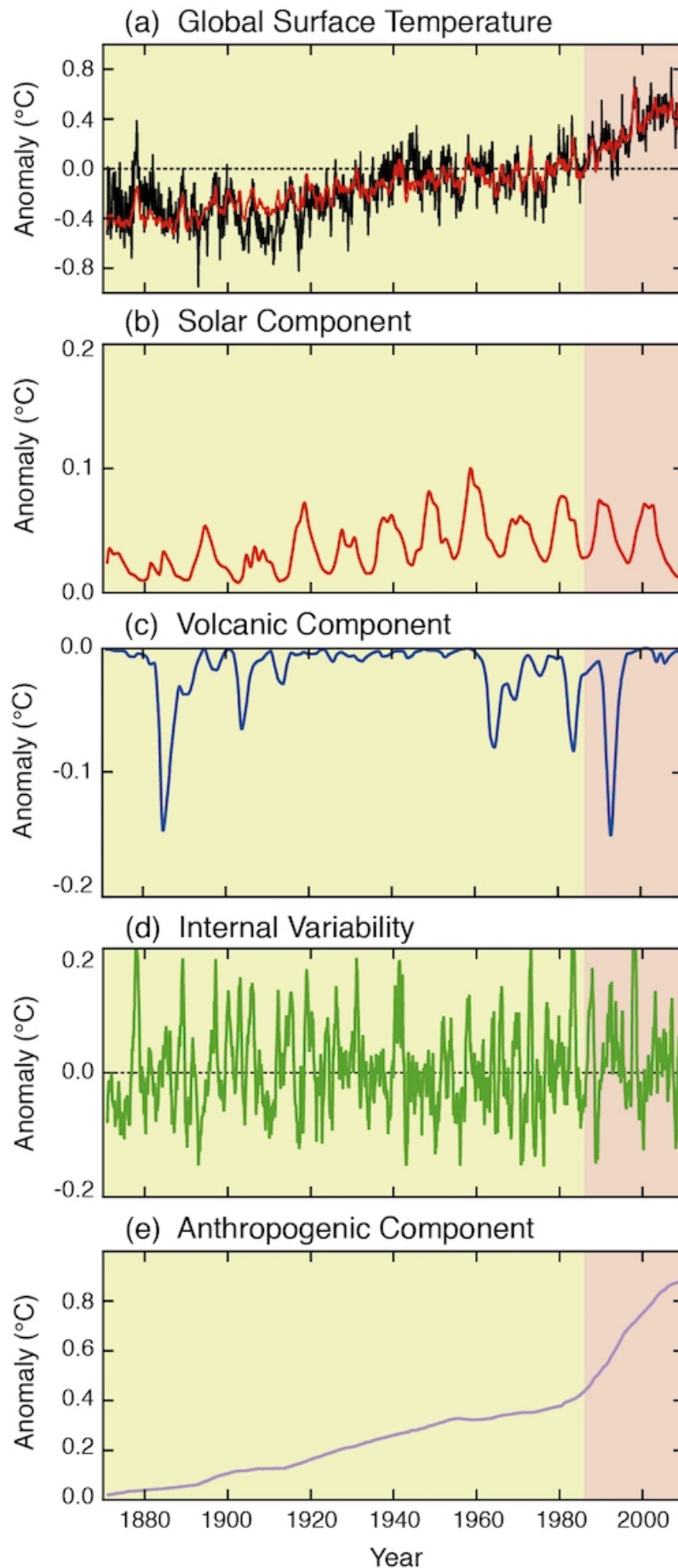
"Over the past few hundred years, there has been a steady increase in the numbers of sunspots, at the time when the Earth has been getting warmer. The data suggests solar activity is influencing the global climate causing the world to get warmer." ([BBC](#))

Figure 1 shows the trend in global temperature compared to changes in the amount of solar energy that hits the Earth. The sun's energy fluctuates on a cycle that's about 11 years long. The energy changes by about 0.1% on each cycle. If the Earth's temperature was controlled mainly by the sun, then it should have cooled between 2000 and 2008.



The solar fluctuations since 1870 have contributed a maximum of 0.1 °C to temperature changes. In recent times the biggest solar fluctuation happened around 1960. But the fastest global warming started in 1980.

Figure 2 shows how much different factors have contributed recent warming. It compares the contributions from the sun, volcanoes, El Niño and greenhouse gases. The sun adds 0.02 to 0.1 °C. Volcanoes cool the Earth by 0.1-0.2 °C. Natural variability (like El Niño) heats or cools by about 0.1-0.2 °C. Greenhouse gases have heated the climate by over 0.8 °C.



*Figure 2 Global surface temperature anomalies from 1870 to 2010, and the natural (solar, volcanic, and internal) and anthropogenic factors that influence them. (a) Global surface temperature record (1870–2010) relative to the average global surface temperature for 1961–1990 (black line). A model of global surface temperature change (a: red line) produced using the sum of the impacts on temperature of natural (b, c, d) and anthropogenic factors (e). (b) Estimated temperature response to solar forcing. (c) Estimated temperature response to volcanic eruptions. (d) Estimated temperature variability due to internal variability, here related to the El Niño-Southern Oscillation. (e) Estimated temperature response to anthropogenic forcing, consisting of a warming component from greenhouse gases, and a cooling component from most aerosols. (IPCC AR5, Chap 5)*

Some people try to blame the sun for the current rise in temperatures by [cherry picking](#) the data. They only show data from periods when sun and climate data track together. They draw a false conclusion by ignoring the last few decades when the data shows the opposite result.

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### Basic rebuttal written by Larry M, updated by Sarah

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#### Update July 2015:

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

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

This rebuttal was updated by Kyle Pressler in 2021 to replace broken links. The updates are a result of [our call for help](#) published in May 2021.



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