

## The IPCC confidence in human-caused global warming is based on solid scientific research

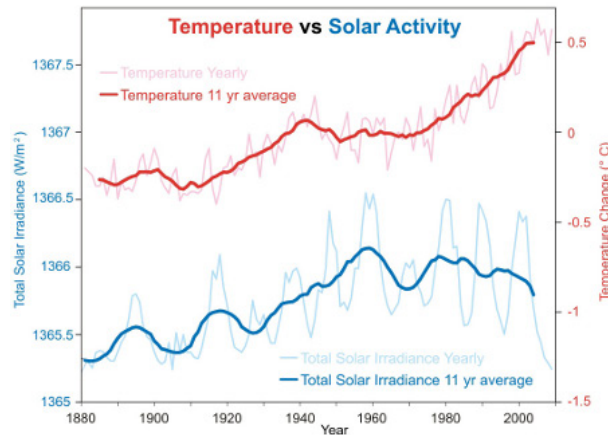
### What's causing global warming: human greenhouse gas emissions.

"The best estimate of the human-induced contribution to warming is similar to the observed warming over this period ... The observed warming since 1951 can be attributed to the different natural and anthropogenic drivers and their contributions can now be quantified. Greenhouse gases contributed a global mean surface warming likely to be in the range of 0.5°C to 1.3 °C over the period 1951–2010, with the contributions from other anthropogenic forcings, including the cooling effect of aerosols, likely to be in the range of -0.6°C to 0.1°C."

### What's not causing global warming: natural external factors like solar activity, and natural internal factors like ocean cycles.

"The contribution from natural forcings is likely to be in the range of -0.1°C to 0.1°C, and from internal variability is likely to be in the range of -0.1°C to 0.1°C."

We've observed about 0.6°C average global surface warming over the past 60 years. During that time, the IPCC best estimate is that greenhouse gases have caused about 0.9°C warming, which was partially offset by about 0.3°C cooling from human aerosol emissions. During that time, natural external factors had no net influence on global temperatures. For example, solar activity has been flat since 1950.



Annual global temperature change (thin light red) with 11 year moving average of temperature (thick dark red). Temperature from NASA GISS. Annual Total Solar Irradiance (TSI; thin light blue) with 11 year moving average of TSI (thick dark blue). TSI from 1880 to 1978 from Krivova et al (2007). TSI from 1979 to 2009 from PMOD

## [Human vs. Natural Contributions to Global Warming](#)

### [Sun & climate: moving in opposite directions](#)