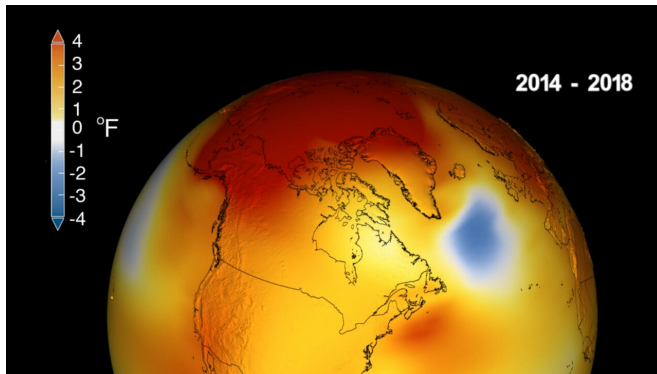


2018 fourth warmest year in continued warming trend, according to NASA, NOAA

6 February 2019



Earth's long-term warming trend can be seen in this visualization of NASA's global temperature record, which shows how the planet's temperatures are changing over time, compared to a baseline average from 1951 to 1980. The record is shown as a running five-year average. Credit: NASA's Scientific Visualization Studio/Kathryn Mersmann

Earth's global surface temperatures in 2018 were the fourth warmest since 1880, according to independent analyses by NASA and the National Oceanic and Atmospheric Administration (NOAA).

Global temperatures in 2018 were 1.5 degrees Fahrenheit (0.83 degrees Celsius) warmer than the 1951 to 1980 mean, according to scientists at NASA's Goddard Institute for Space Studies (GISS) in New York. Globally, 2018's temperatures rank behind those of 2016, 2017 and 2015. The past five years are, collectively, the warmest years in the modern record.

"2018 is yet again an extremely warm year on top of a long-term global warming trend," said GISS Director Gavin Schmidt.

Since the 1880s, the average global surface [temperature](#) has risen about 2 degrees Fahrenheit (1 degree Celsius). This warming has been driven

in large part by increased emissions into the atmosphere of carbon dioxide and other greenhouse gases caused by human activities, according to Schmidt.

Weather dynamics often affect regional temperatures, so not every region on Earth experienced similar amounts of warming. NOAA found the 2018 annual mean temperature for the contiguous 48 United States was the 14th warmest on record.

Warming trends are strongest in the Arctic region, where 2018 saw the continued loss of sea ice. In addition, mass loss from the Greenland and Antarctic ice sheets continued to contribute to sea level rise. Increasing temperatures can also contribute to longer fire seasons and some [extreme weather events](#), according to Schmidt.

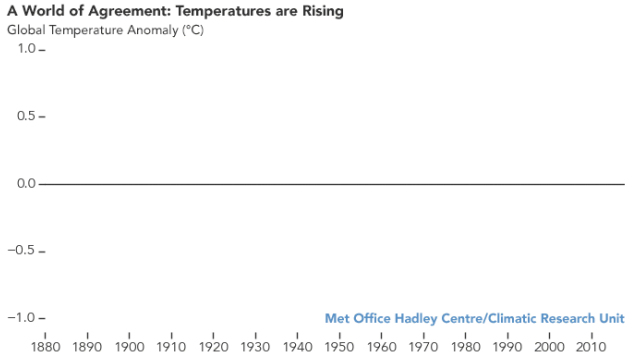
"The impacts of long-term global warming are already being felt—in coastal flooding, [heat waves](#), intense precipitation and ecosystem change," said Schmidt.

NASA's temperature analyses incorporate surface temperature measurements from 6,300 [weather stations](#), ship- and buoy-based observations of sea surface temperatures, and temperature measurements from Antarctic research stations.

These raw measurements are analyzed using an algorithm that considers the varied spacing of temperature stations around the globe and urban heat island effects that could skew the conclusions. These calculations produce the global average temperature deviations from the baseline period of 1951 to 1980.

Because weather station locations and measurement practices change over time, the interpretation of specific year-to-year global mean temperature differences has some uncertainties. Taking this into account, NASA estimates that

2018's global mean change is accurate to within 0.1 degree Fahrenheit, with a 95 percent certainty level.



This line plot shows yearly temperature anomalies from 1880 to 2018, with respect to the 1951-1980 mean, as recorded by NASA, NOAA, the Japan Meteorological Agency, the Berkeley Earth research group, and the Met Office Hadley Centre (UK). Though there are minor variations from year to year, all five temperature records show peaks and valleys in sync with each other. All show rapid warming in the past few decades, and all show the past decade has been the warmest. Credit: NASA's Earth Observatory

NOAA scientists used much of the same raw temperature data, but with a different baseline period and different interpolation into the Earth's polar and other data poor regions. NOAA's analysis found 2018 [global temperatures](#) were 1.42 degrees Fahrenheit (0.79 degrees Celsius) above the 20th century average.

NASA's full 2018 surface temperature data set—and the complete methodology used to make the temperature calculation—are available at: <https://data.giss.nasa.gov/gistemp>

Provided by NASA's Goddard Space Flight Center
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