



# The hottest month ever recorded

July 2023 broke all records globally and was accompanied by heatwaves and wildfires

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On 27 July 2023, a joint statement was released by Copernicus and the World Meteorological Organization (WMO) accompanied by Figure 1. Copernicus is the Earth observation component of the European Union's space programme and provides freely accessible data (including non-space data) related to our planet and its environment. The statement declared that July 2023 was extremely likely to be the hottest month ever recorded, following on from the hottest June ever recorded. This was confirmed in early September when all the data for summer 2023 were analysed.

The lines on Figure 1 are colour shaded by decade and show how daily surface air temperatures have risen steadily since the middle part of the last century from the cool blues of the 1940s to the reds of the 2020s. Summer 2023 saw deadly heatwaves and wildfires in many parts of the northern hemisphere alongside record ocean temperatures. Climate scientists agree that these heatwaves were boosted by global warming. Summer warming was also boosted from early May by the onset of El Niño as warm water moved across the equatorial Pacific from east to west. Average global sea surface temperatures sat well above previously observed values for most of July.

Dr Carlo Buontempo is the director of the Copernicus Climate Change Service.

He stated: 'Record-breaking temperatures are part of the trend of drastic increases in global temperatures. Anthropogenic emissions are ultimately the main driver of these rising temperatures.'

The Finnish secretary-general of the WMO, Professor Petteri Taalas, said: 'The extreme weather which has affected many millions of people in July is unfortunately

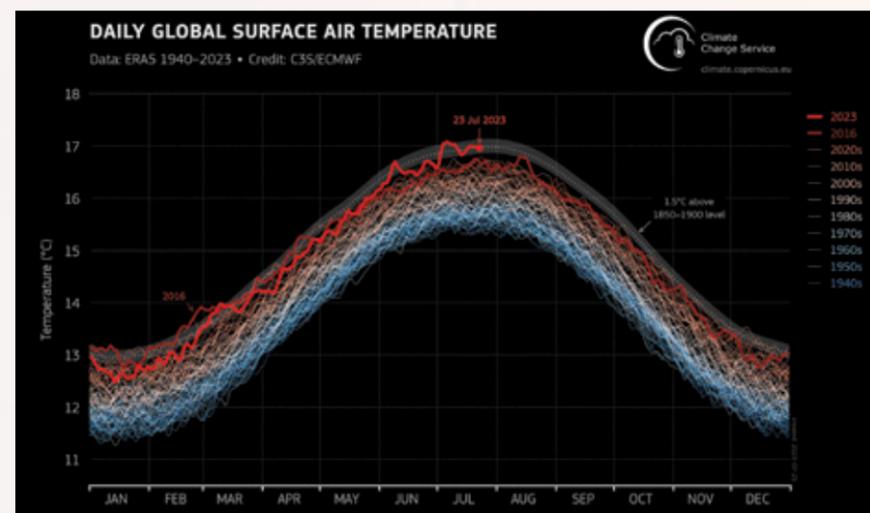
the harsh reality of climate change and a foretaste of the future. The need to reduce greenhouse gas emissions is more urgent than ever before. Climate action is not a luxury but a must.' You can read the full statement here: [www.tinyurl.com/yaav9h27](http://www.tinyurl.com/yaav9h27).

*Scientific American's* Earth and Environment editor Andrea Thompson reported on the statement: 'Because July

is climatologically the hottest month of the year for the Earth as a whole, that makes July 2023 the hottest month since records have been kept and likely the hottest in 120,000 years, based on evidence of past temperatures found in ancient sediments and layers of ice, as well as on other palaeoclimate records.' See [www.tinyurl.com/j957y8zj](http://www.tinyurl.com/j957y8zj).

In early September 2023 Copernicus confirmed August 2023 as the warmest August on record and warmer than all other months except July 2023. Figure 2

shows the 30 warmest months since 1940. Note the big jump to August and July 2023. Even June 2023 ranks eighth on this list. The Copernicus Climate Bulletin reported the northern hemisphere summer (June–July–August) 2023 as the warmest on record globally by a worryingly large margin. The average temperature of 16.77°C was 0.66°C above the long-term average. You can read the statement here: [www.tinyurl.com/mrv5hxbk](http://www.tinyurl.com/mrv5hxbk). Keep an eye on the Copernicus Climate Bulletins to see what summer 2024 brings.



Source: Data from ECMWF Copernicus Climate Change Service's ERA5 dataset

**Figure 1** Global daily surface air temperature (°C) from 1 January 1940 to 23 July 2023, plotted as time series for each year and shaded by colour for each decade. 2023 and 2016 are shown with thick lines shaded in bright red and dark red, respectively. The dotted line and grey envelope of uncertainty represent the 1.5°C threshold temperature above pre-industrial levels (1850–1900) set out in the Paris Agreement in 2015



Source: ECMWF Copernicus Climate Change Service

**Figure 2** The 30 warmest months in the period 1940–2023 ranked from lowest to highest for global-mean surface air temperature

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