

# 2023 was hottest year on record, close to 1.5°C

Every day was over a degree above the pre-industrial level, writes the [Climate & Capitalism blog](#).

The European Commission's [Copernicus Climate Change Service \(C3S\)](#) says 2023 was the first year on with all days over 1°C warmer than the pre-industrial period.

Unprecedented global temperatures from June onwards led 2023 to become the warmest year on record – overtaking by a large margin 2016, the previous warmest year. The 2023 Global Climate Highlights report presents a general summary of 2023's most relevant climate extremes and the main drivers behind them.

C3S Director Carlo Buontempo comments:

“The extremes we have observed over the last few months provide a dramatic testimony of how far we now are from the climate in which our civilization developed. This has profound consequences for the Paris Agreement and all human endeavor's. If we want to successfully manage our climate risk portfolio, we need to urgently decarbonize our economy whilst using climate data and knowledge to prepare for the future.”

## Global surface air temperature highlights

- 2023 is confirmed as the warmest calendar year in global temperature data records going back to 1850.
- 2023 had a global average temperature of 14.98°C, 0.17°C higher than the previous highest annual value in 2016.
- 2023 was 0.60°C warmer than the 1991-2020 average and 1.48°C warmer than the 1850-1900 pre-industrial level.
- It is likely that a 12-month period ending in January or February 2024 will exceed 1.5°C above the pre-industrial

level.

- 2023 marks the first time on record that every day within a year has exceeded 1°C above the 1850-1900 pre-industrial level. Close to 50% of days were more than 1.5°C warmer than the 1850-1900 level, and two days in November were, for the first time, more than 2°C warmer.
- Annual average air temperatures were the warmest on record, or close to the warmest, over sizeable parts of all ocean basins and all continents except Australia.
- Each month from June to December in 2023 was warmer than the corresponding month in any previous year.
- July and August 2023 were the warmest two months on record. Boreal summer (June-August) was also the warmest season on record.
- September 2023 was the month with a temperature deviation above the 1991–2020 average larger than any month in the ERA5 dataset.
- December 2023 was the warmest December on record globally, with an average temperature of 13.51°C, 0.85°C above the 1991-2020 average and 1.78°C above the 1850-1900 level for the month. You can access information specific for December 2023 in our monthly bulletin.

## **Ocean surface temperature highlights**

- Global average sea surface temperatures (SSTs) remained persistently and unusually high, reaching record levels for the time of year from April through December.
- 2023 saw a transition to El Niño. In spring 2023, La Niña came to an end and El Niño conditions began to develop, with the WMO declaring the onset of El Niño in early July.
- High SSTs in most ocean basins, and in particular in the North Atlantic, played an important role in the record-breaking global SSTs.
- The unprecedented SSTs were associated with marine

heatwaves around the globe, including in parts of the Mediterranean, Gulf of Mexico and the Caribbean, Indian Ocean and North Pacific, and much of the North Atlantic.

### **European temperature highlights**

- 2023 was the second-warmest year for Europe, at 1.02°C above the 1991-2020 average, 0.17°C cooler than 2020, the warmest year on record.
- Temperatures in Europe were above average for 11 months during 2023 and September was the warmest September on record.
- European winter (December 2022 – February 2023) was the second-warmest winter on record.
- The average temperature for the European summer (June-August) was 19.63°C; at 0.83°C above average, it was the fifth-warmest on record.
- European autumn (September-November) had an average temperature of 10.96°C, which is 1.43°C above average. This made autumn the second-warmest on record, just 0.03°C cooler than autumn 2020.

### **Other remarkable highlights**

- 2023 was remarkable for Antarctic sea ice: it reached record low extents for the corresponding time of the year in 8 months. Both the daily and monthly extents reached all-time minima in February 2023.
- Arctic sea ice extent at its annual peak in March ranked amongst the four lowest for the time of the year in the satellite record. The annual minimum in September was the sixth-lowest.
- The atmospheric concentrations of carbon dioxide and methane continued to increase and reached record levels in 2023, reaching 419 ppm and 1902 ppb respectively. Carbon dioxide concentrations in 2023 were 2.4 ppm higher than in 2022 and methane concentrations increased by 11 ppb.

- A large number of extreme events were recorded across the globe, including heatwaves, floods, droughts and wildfires. Estimated global wildfire carbon emissions in 2023 increased by 30% with respect to 2022 driven largely by persistent wildfires in Canada, greenhouse gas concentrations, El Niño and other natural variations.

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