

# Earth shattered global heat record in '23 and it's flirting with warming limit, European agency says

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The cracked earth of the Sau reservoir is visible north of Barcelona, Spain, March 20, 2023. Earth last year shattered global annual heat records, the European climate agency said Tuesday, Jan. 9, 2024. Credit: AP Photo/Emilio Morenatti, File

Earth last year [shattered global annual heat](#) records, flirted with the world's agreed-upon warming threshold and showed more signs of a feverish planet, the European climate agency said Tuesday.

The European climate agency Copernicus said the year was 1.48 degrees Celsius (2.66 degrees Fahrenheit) above pre-industrial times. That's barely below the 1.5 degrees Celsius limit that the world hoped to stay within in the 2015 Paris climate accord to avoid the most severe effects of warming.

And January 2024 is on track to be so warm that for the first time a 12-month period will exceed the 1.5-degree threshold, Copernicus Deputy Director Samantha Burgess said. Scientists have repeatedly said that Earth would need to average 1.5 degrees of warming over two or three decades to be a technical breach of the threshold.

The 1.5 degree goal "has to be (kept) alive because lives are at risk and choices have to be made," Burgess said. "And these choices don't impact you and I but they impact our children and our grandchildren."

The record heat made life miserable and sometimes deadly in Europe, North America, China and many other places last year. But scientists say [a warming climate is also to blame](#) for [more extreme weather events](#), like the lengthy drought that devastated the Horn of Africa, the torrential downpours that wiped out dams and killed thousands in Libya and the Canada wildfires that fouled the air from North America to Europe.

In a separate Tuesday press event, international climate scientists who calculate global warming's role in extreme weather, the group's leader, Imperial College climate scientist Friederike Otto said "we definitely see in our analysis the strong impact of it being the hottest year."

The World Weather Attribution team only looks at events that affect at

least 1 million people or kill more than 100 people. But Otto said her team was overwhelmed with more than 160 of those in 2023, and could only conduct 14 studies, many of them on killer heat waves. "Basically every heat wave that is occurring today has been made more likely and is hotter because of human-induced climate change," she said.

The United States lurched through [28 weather disasters last year that caused at least \\$1 billion in damage](#), smashing the old record of 22 set in 2020, the National Oceanic and Atmospheric Administration announced Tuesday. The number of these costly disasters, which are adjusted to account for inflation, has soared, averaging only three per year in the 1980s and just under six per year in the 1990s.

The U.S. billion-dollar disasters last year included a drought, four floods, 19 severe storms, 2 hurricanes, a wildfire and a winter storm. They combined to kill 492 people and cause nearly \$93 billion in damage, according to NOAA.

Antarctic sea ice hit record low levels in 2023 and broke eight monthly records for low sea ice, Copernicus reported.

Copernicus calculated that the global average temperature for 2023 was about one-sixth of a degree Celsius (0.3 degrees Fahrenheit) warmer than the old record set in 2016. While that seems a small amount in global record-keeping, it's an exceptionally large margin for the new record, Burgess said. Earth's average temperature for 2023 was 14.98 degrees Celsius (58.96 degrees Fahrenheit), Copernicus calculated.

"It was record-breaking for seven months. We had the warmest June, July, August, September, October, November, December," Burgess said. "It wasn't just a season or a month that was exceptional. It was exceptional for over half the year."

There are several factors that made 2023 the warmest year on record, but by far the biggest factor was the ever-increasing amount of greenhouse gases in the atmosphere that trap heat, Burgess said. Those gases come from the burning of coal, oil and natural gas.

Other factors including the natural El Niño—a temporary warming of the central Pacific that alters weather worldwide—other natural oscillations in the Arctic, southern and Indian oceans, increased solar activity and the 2022 eruption of an undersea volcano that sent water vapor into the atmosphere, Burgess said.

Malte Meinshausen, a University of Melbourne climate scientist, said about 1.3 degrees Celsius of the warming comes from greenhouse gases, with another 0.1 degrees Celsius from El Niño and the rest being smaller causes.

Copernicus records only go back to 1940 and are based on a combination of observations and forecast models. Other groups, including the United States' National Oceanic and Atmospheric Administration and NASA, the United Kingdom's Meteorological Office and Berkeley Earth go back to the mid-1800s and will announce their calculations for 2023 on Friday, with expectations of record-breaking marks.

The Japanese Meteorological Agency, which uses similar techniques as Copernicus and goes back to 1948, late last month estimated that it was the warmest year at 1.47 degrees Celsius (2.64 degrees Fahrenheit) above pre-industrial levels. The University of Alabama Huntsville global dataset, which uses satellite measurements rather than ground data and dates to 1979, last week also found it the hottest year on record, but not by as much.

Though actual observations only date back less than two centuries,



several scientists say evidence from tree rings and ice cores suggest this is the warmest the Earth has been in more than 100,000 years.

"It basically means that our cities, our roads, our monuments, our farms, in practice all human activities never had to cope with the climate this warm," Copernicus Director Carlo Buontempo said at a Tuesday press conference. "There were simply no cities, no books, agriculture or domesticated animals on this planet the last time the temperature was so high."

For the first time, Copernicus recorded a day where the world averaged at least 2 degrees Celsius (3.6 degrees Fahrenheit) more than pre-industrial times. It happened twice and narrowly missed a third day around Christmas, Burgess said.

And for the first time, every day of the year was at least one degree Celsius (1.8 degrees Fahrenheit) warmer than pre-industrial times. For nearly half the year—173 days—the world was 1.5 degrees warmer than the mid-1800s.

Meinshausen, the Australian climate scientist, said it's natural for the public to wonder whether the 1.5-degree target is lost. He said it's important for people to keep trying to rein in warming.

"We are not abolishing a speed limit, because somebody exceeded the speed limit," he said. "We double our efforts to step on the brakes."

But Buontempo said it's only going to get hotter: "Following the current trajectory in a few years time the record-breaking year of 2023 will probably be remembered as a cold year."

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