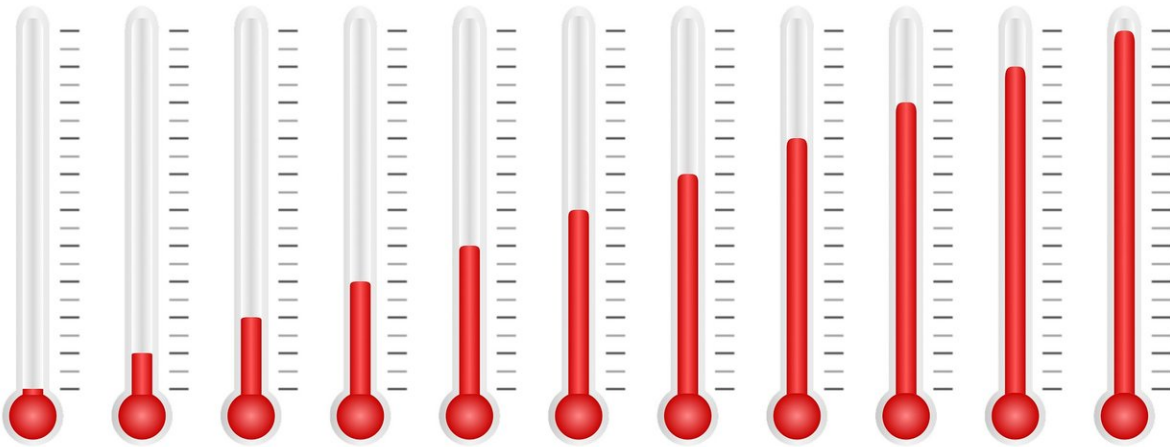


July was the planet's hottest month on record—so far

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A sizzling month marked by record heat waves, major wildfires, melting sea ice and a burgeoning El Niño will go down in the books as the hottest July on record—at least until next year, federal officials said Monday.

The planet and its oceans roasted last month as global average temperatures soared 2.02 degrees above average, making July 2023 not only the hottest July ever, but very likely Earth's warmest month in at least 174 years of record keeping.

"Climatologically, July is the warmest month of the year," the National

Oceanic and Atmospheric Administration said in a monthly report released Monday. "As the warmest July on record, July 2023, at least nominally, was the warmest month on record for the globe."

Temperature data through July make it virtually certain that 2023 will rank among the five warmest years on record, with a nearly 50% probability that it will be the single warmest year on record, the agency said.

The announcement came as little surprise to millions of Americans who suffered through extreme heat conditions firsthand.

The stubborn presence of a high-pressure heat dome over the American Southwest pushed temperatures in Phoenix to 110 degrees or hotter for a record 31 days straight. More than 40 deaths were recorded in the county with hundreds more under investigation, and scores of people were hospitalized for heat-related illnesses and pavement burns.

In Greece, Italy, Canada and Algeria, raging wildfires ignited amid broiling temperatures, spewing noxious smoke and sending residents and tourists fleeing for safety. Death Valley soared to 128 degrees, while areas in northwest China climbed as high as 126.

A multitude of factors converged to drive the sweltering conditions, said Karin Gleason, chief of the monitoring section at NOAA's National Centers for Environmental Information.

The onset of El Niño, a [climate pattern](#) in the tropical Pacific, warmed areas around the equatorial Pacific, pushing land and [ocean temperatures](#) to new extremes. Surface temperatures simmered 0.36 degrees warmer than the previous July record, set in 2021.

The month "was the warmest on record for land, warmest on record for

oceans, and when you combine the two, it was the warmest on record for the combined land and ocean anomaly values," Gleason said. "So it set a record in all three categories."

Asia, Africa and South America each had their warmest July on record, she said, and "to see three larger continents having their warmest July on record is certainly something to take seriously."

Oceans also suffered from the heat, with July marking the fourth consecutive month of record-high global ocean [surface temperatures](#).

At 1.78 degrees above normal, the month saw the highest monthly sea surface [temperature](#) anomaly of any month in NOAA's climate record. Ocean temperatures off the coast of Florida rose to an unprecedented 101 degrees—roughly the temperature of a hot tub.

However, Gleason noted that El Niño is not solely to blame.

The pattern arrived after a rare three consecutive years of its counterpart, La Niña, which is known to have a cooling effect in some regions that may have been masking an ongoing warming trend, she said.

"Because we were in that prolonged La Niña period, there was this sense that the Earth wasn't warming, when in reality, the rest of the ocean basins besides the eastern equatorial Pacific were warm, and were gradually warming," Gleason said. "But now with those waters warming, it just shines a light on how warm the other ocean basins really have been."

That larger warming trend is almost entirely attributable to human-caused climate change, said Daniel Swain, a climate scientist at UCLA.

"If you have to summarize it in two words, it's [global warming](#)—that is

by far the dominant effect," Swain said. He noted that El Niño hasn't even fully developed yet, and that the global temperature increases associated with it are typically strongest toward the middle and end of the event.

"El Niño does help explain, potentially, the margin by which this July is the warmest on record, but it doesn't explain why we got to the point where we were breaking these temperature records all the time in the first place," he said. "Maybe greater than 80%—maybe even greater than 90%—of the reason is just the accumulation of greenhouse gases in the atmosphere."

Swain said there may also be some tertiary factors contributing to the record warmth, including the Hunga-Tonga volcano eruption of 2022, which shot record-breaking amounts of heat-trapping water vapor into the stratosphere.

A major change in shipping regulations also could have played a small role, he said.

The regulations, ordered by the International Maritime Organization in 2020, reduced the upper limit of sulfur in fuels in an effort to achieve cleaner air in ports and coastal areas. But the change may have had an unintended consequence, as the aerosols were helping to reflect some sunlight away from Earth.

Swain said the extremely warm waters are in some ways more remarkable than the warmer land temperatures because it takes even more energy to heat the ocean. "Think of how much energy it takes to boil a pot of water," he said.

Such anomalously high ocean temperatures can have cascading consequences, such as massive coral reef bleaching events occurring in

the Caribbean and Gulf of Mexico, which the NOAA says may lead to significant mortality.

"There is real concern among a lot of scientists who study these reefs that this may be it—this summer may be the regional or localized extinction event for a lot of coral reefs in those regions, because it's just been so unbelievably hot," Swain said.

The warmer temperatures also contributed to melting sea ice, with July setting a record for the lowest global July sea ice extent on record—about 470,000 square miles less than the previous low from July 2019.

It was the third consecutive month of [record](#)-low sea ice in the Antarctic, running about a million square miles below the 1991 through 2020 average, the NOAA said—"roughly the size of Argentina."

Though the conditions may seem untenable, officials say global heating is only expected to get worse.

"Despite July being exceptionally warm now, we expect this to continue, by and large, throughout the rest of the year," Gleason said. "We don't necessarily see any immediate relief in sight, as long as the forecast holds throughout the winter months."

Indeed, officials at the NOAA's Climate Prediction Center have placed the odds of El Niño persisting through the winter at 95%, meaning that 2024 could start off even warmer.

"I think everyone in the climate community is anticipating the winter months to be very warm months," Gleason said. "And 2024 could actually exceed 2023 before all is said and done."

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