

Scientists explain why the record-shattering 2023 heat has them on edge. Warming may be worsening

January 12 2024, by Seth Borenstein



The Rev. Ai Hironaka, resident minister of the Lahaina Hongwanji Mission, walks through the grounds of his temple and residence destroyed by wildfire, Dec. 7, 2023, in Lahaina, Hawaii. The latest calculations from several science agencies Friday, Jan. 12, 2024, all say that global average temperatures for 2023 shattered existing heat records. Credit: AP Photo/Lindsey Wasson, File

The latest calculations from several science agencies showing Earth obliterated global heat records last year may seem scary. But scientists worry that what's behind those numbers could be even worse.

The Associated Press asked more than three dozen scientists in interviews and emails what the smashed records mean. Most said they fear acceleration of climate change that is already right at the edge of the 1.5 degrees Celsius (2.7 Fahrenheit) increase since pre-industrial times that nations had hoped to stay within.

"The heat over the last calendar year was a dramatic message from Mother Nature," said University of Arizona climate scientist Katharine Jacobs. Scientists say [warming](#) air and water is making deadly and costly [heat waves](#), floods, [droughts](#), storms and wildfires more intense and more likely.

This last year was a doozy.

Average global temperatures broke the previous record by a little more than a quarter of a degree (0.15 degrees Celsius), a big margin, according to calculations Friday from two top American science agencies, the British meteorological service and a private group founded by a climate skeptic.

Several of the scientists who made the calculations said the climate behaved in strange ways in 2023. They wonder whether [human-caused climate change](#) and a natural El Niño were augmented by a freak blip or whether "there's something more systematic afoot," as NASA climate scientist Gavin Schmidt put it—including a much-debated acceleration of warming.

A partial answer may not come until late spring or early summer. That's when a strong El Niño—the cyclical warming of Pacific Ocean waters

that affects global weather patterns—is expected to fade away. If [ocean temperatures](#), including [deep waters](#), keep setting records well into the summer, like in 2023, that would be an ominous clue, they say.

Nearly every scientist who responded to AP's questions blamed [greenhouse gases](#) from the burning of fossil fuels as the overwhelmingly largest reason the world hit temperatures that human civilization has not likely seen before. El Niño, which is bordering on "very strong," is the second-biggest factor, with other conditions far behind, they said.

The trouble with 2023, NASA's Schmidt said, is "it was a very strange year ... The more you dig into it, the less clear it seems."



A man cycles through a mister to cool off from the heat in Montreal, Sept. 6, 2023. The latest calculations from several science agencies Friday, Jan. 12, 2024, all say that global average temperatures for 2023 shattered existing heat records.

Credit: Christinne Muschi/The Canadian Press via AP

One part of that is the timing for when 2023's big burst of heat began, according to Schmidt and Samantha Burgess, deputy director of Europe's Copernicus Climate Service, which earlier this week put warming at [1.48 degrees Celsius above pre-industrial times](#).

Temperatures are typically highest above normal in late winter and spring, they said. But 2023's highest heat kicked in around June and [lingered](#) at record levels for months.

Deep ocean heat, a big player in global temperatures, behaved in a similar way, Burgess said.

Former NASA climate scientist James Hansen, often considered the godfather of global warming science, theorized last year that warming was accelerating. While many of the scientists contacted by AP said they suspect it is happening, others were adamant that evidence so far supports only a steady and long-predicted increase.

"There is some evidence that the rate of warming over the past decade or so is slightly faster than the decade or so previous—which meets the mathematical definition of acceleration," said UCLA climate scientist Daniel Swain. "However, this too is largely in line with predictions" that warming would accelerate at a certain point, especially when particle pollution in the air decreases.

The [U.S. National Oceanic and Atmospheric Administration](#) calculated that Earth in 2023 had an average temperature of 59.12 degrees (15.08 degrees Celsius). That's 0.27 degrees (0.15 degrees Celsius) warmer than the previous record set in 2016 and 2.43 degrees (1.35 degrees Celsius)

warmer than pre-industrial temperatures.

"It's almost as if we popped ourselves off the staircase (of normal global warming temperature increases) onto a slightly warmer regime," said Russ Vose, global monitoring chief for NOAA's National Centers for Environmental Information. He said he sees acceleration of warming.

[NASA](#) and the [United Kingdom Meteorological Office](#) had the warming since the mid-19th century a bit higher at 2.5 degrees (1.39 degrees Celsius) and 2.63 degrees (1.46 degrees Celsius) respectively. Records go back to 1850.

The World Meteorological Organization, combining the measurements announced Friday with Japanese and European calculations released earlier this month, pegged 2023 at 1.45 degrees Celsius (2.61 degrees Fahrenheit) warmer than pre-industrial temperatures.



People cool off on a beach in Barcelona, Spain, Aug. 9, 2023. The latest calculations from several science agencies Friday, Jan. 12, 2024, all say that global average temperatures for 2023 shattered existing heat records. Credit: AP Photo/Emilio Morenatti

Many of the climate scientists saw little hope of stopping warming at the 1.5-degree goal called for in the 2015 Paris agreement that sought to avert the worst consequences of climate change.

"I do not consider it realistic that we can limit warming (averaged over several years) to 1.5C," wrote Woodwell Climate Research Center scientist Jennifer Francis in an email. "It is technically possible but politically impossible."

"The slow pace of climate action and the continued disinformation that catalyzes it has never been about lack of science or even lack of solutions: it has always been, and remains, about lack of political will," said Katharine Hayhoe, chief scientist at The Nature Conservancy.

Both NASA and NOAA said the last 10 years, from 2014 to 2023, have been the 10 hottest years they've measured. It's the third time in the last eight years that a global heat record was set. Randall Cerveny, an Arizona State University scientist who helps coordinate record-keeping for the WMO, said the big worry isn't that a record was broken last year, but that they keep getting broken so frequently.

"It's the rapidity of the continual change that is, to me, most alarming," Cerveny said.

Cornell University climate scientist Natalie Mahowald said, "This is just a taste of what we can expect in the future, especially if we continue to fail to cut carbon dioxide fast enough."

That's why so many scientists contacted by The Associated Press are anxious.

"I've been worried since the early 1990s," said Brown University [climate](#) scientist Kim Cobb. "I am more worried than ever. My worry increases with every year that global emissions move in the wrong direction."

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Citation: Scientists explain why the record-shattering 2023 heat has them on edge. Warming may be worsening (2024, January 12) retrieved 27 April 2024 from <https://phys.org/news/2024-01-scientists-shattering-edge-worsening.html>

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