



Climate scientists drive stake through heart of skeptics' argument

New research shows that the recent rise in global temperatures is unlike anything seen on Earth during the past 2,000 years.

by Jaclyn Jeffrey-Wilensky | NBC NEWS 7/25/19

Global warming skeptics sometimes say rising temperatures are just another naturally occurring shift in Earth's climate, like the Medieval Warm Period of the years 800 to 1200 or the Little Ice Age, a period of cooling that spanned from roughly 1300 to 1850.

But a pair of studies published Wednesday provides stark evidence that the rise in global temperatures over the past 150 years has been far more rapid and widespread than any warming period in the past 2,000 years — a finding that undercuts claims that today's global warming isn't necessarily the result of human activity.

"The familiar maxim that the climate is always changing is certainly true," Scott St. George, a physical geographer at the University of Minnesota in Minneapolis, said in a written commentary about the studies. "But even when we push our perspective to the earliest days of the Roman Empire, we cannot discern any event that is remotely equivalent — either in degree or extent — to the warming over the last few decades."



Since the beginning of the 20th century, the global average temperature on Earth has risen by about 2 degrees Fahrenheit. A consensus of climate scientists pins the increase primarily on the burning of fossil fuels, which spews carbon dioxide and other heat-trapping greenhouse gases into the air. In the absence of concerted efforts to reduce greenhouse gas emissions, the United Nations says, the global average temperature could rise an additional 5.4 to 9 degrees Fahrenheit by 2100.

One of the studies, published in the journal Nature, shows that the Little Ice Age and other natural fluctuations affected only limited regions of the planet at a time, making modern warming the first and only planetwide warm period in the past two millennia. The other study, published in Nature Geoscience, shows that the rate of modern warming has far outpaced changes that occurred before the rise of the industrial era.

For the research, a team led by Raphael Neukom, a postdoctoral researcher at the University of Bern's Institute of Geography in Switzerland, analyzed 2,000 years' worth of climate data. In the absence of direct temperature information — thermometer measurements were scarce before the middle of the 19th century — the scientists looked at data on old trees' growth rings, layers of glacier ice and the remnants of corals, whose layers have different chemical compositions depending on the temperature of seawater.

The Nature study mapped the temperature fluctuations across the planet, finding, for example, that the Little Ice Age didn't affect the whole world at once. Temperatures bottomed out in the Pacific Ocean around 1500, the scientists found; Europe and North America didn't fully chill out for another two centuries.

The same pattern was observed for the higher temperatures seen during the Medieval Warm Period. The researchers found that less than half of the planet felt the heat at once.

The research indicates that during the current period of warming, more than 98 percent of the

Earth's surface has experienced record high temperatures. The finding shows just how dramatically today's global rise in temperatures differs from previous periods of temperature change, the scientists said.

"What we show is that these periods aren't globally coherent as previously thought," said Nathan Steiger, a climate scientist at Columbia University in New York City and a co-author of the Nature study. The current period of warming "stands in stark contrast" to today's warming, he added, calling it "a globally coherent warm period that is very different from what we see in the past."

For the Nature Geoscience study, the researchers charted global temperature averages over time, and then compared the data to a set of climate simulations to figure out what might have driven the changes. Neukom and his colleagues found that the fastest warming in the last two millennia occurred during the second half of the 20th century.

The researchers also found that the main cause of temperature fluctuations changed over time. Prior to 1850, fluctuations were mainly linked to volcanic eruptions, which cooled the planet by spewing sun-blocking ash into the stratosphere; after 1850, greenhouse gas emissions took the wheel.

"It's exciting to see studies like this that combine rigorous statistics with huge databases to make clear conclusions about past climate change," said Gabriela Serrato Marks, a graduate student in paleoclimatology at the Massachusetts Institute of Technology in Cambridge, Massachusetts, who wasn't involved in the new research.

Serrato Marks said the records the researchers used could be incomplete, adding that subsequent research could benefit from more robust data. "Future studies will be strengthened even more with data from the Southern Hemisphere and more high-resolution data," she said.



Jennifer Hertzberg, a paleoclimatologist at Old Dominion University in Norfolk, Virginia, who wasn't involved in the research, called the study "very important" and praised its use of multiple statistical methods to reconstruct temperature change over time. She urged the public to take the results to heart. "The global temperatures that we're seeing now are higher than they have been in the last 2,000 years," she said. "What we're seeing now is uncharted territory. It's time for everybody to wake up and make changes now."