

More evidence that global warming 'pause' never happened

Scott Waldman, *Environment & Energy Publishing*, 1-5-17

There is growing evidence that global warming never took a hiatus in the 2000s.

For many years, climate scientists were puzzled by an apparent plateau in global temperature rise from 1998 to 2012 as ocean temperatures stayed consistent. Climate change deniers seized on the anomaly as evidence that global warming was a hoax.

Then, in 2015, researchers with the National Oceanic and Atmospheric Administration found there was no pause because the method to collect ocean temperatures was flawed. The paper set off a political controversy, with House Science, Space and Technology Chairman Lamar Smith (R-Texas) subpoenaing scientists' emails and claiming they had manipulated temperature data.

Now a new paper in the journal *Science Advances* confirms that the NOAA scientists were correct and there never was a global warming pause.

Instead, researchers found ocean temperatures were warming 0.22 degree Fahrenheit per decade since 2000, which was consistent with the rate of warming dating back to 1970.

The new study proves that NOAA got it right and that it was not "cooking the books," said Zeke Hausfather, a researcher at University of California, Berkeley's Energy and Resources Group and a study author.

Instead, the pause data — culled from a variety of measuring methods on ships — were faulty, he said. Later research improved on older methods by incorporating satellites, Argo floats and buoy measurements. Scientists previously combined data from all those system — discovering what they believed to be the pause. But Hausfather argued that the ship data were actually throwing off the numbers.

"If you suddenly take a bunch of ship data that's a little warmer and throw in a bunch of buoy data that's a little colder because it's sitting in the water and average them together, your overall record is going to be a little cooler," he said. "And so you end up getting a bias in the trend."

The notion that there was a global warming pause has been a favorite citation of climate change deniers seeking to discredit an entire field of research. Politicians who reject mainstream climate science have argued that it is proof that humans are not really warming the planet at an unprecedented pace, even though the vast majority of climate scientists have argued such anthropogenic warming is happening.

Hausfather and colleague Kevin Cowtan of the University of York in the United Kingdom used data collected from satellites and ocean floats to track ocean warming. It found the same level of warming as federal scientists did in 2015, further dispelling the notion of a global warming pause. They focused on data sets more reliable than that collected from ships, he said.

"Ships in general are not great temperature measurement platforms because every ship is different and the characteristics of the ship are getting to affect the measurement they get," he said.

The data that supported the notion of a pause were faulty because of the way they were collected, researchers found. Climate scientists have used data collected over decades to determine long-term trends, but there is significant bias during some periods based on how the water temperature data were collected, skewing the findings, they said.

Water temperature data collection changed in significant ways during the 20th century and comes primarily from the shipping industry measuring ocean conditions, rather than scientific instruments. In the early part of the century, shipping employees collected ocean temperatures by hauling up buckets of water and sticking a thermometer inside. They were largely monitoring the risk of icebergs.

During World War II, the practice of water temperature collection shifted over concerns about Nazi U-boats on the hunt for easy targets, like someone dangling off the side with a rope and bucket, according to Peter Thorne, a climatologist at Maynooth University in Ireland and chairman of the International Surface Temperature Initiative, a climate data collaboration.

Water samples were collected from the engine room, where they were slightly warmed before being sampled. What's more, as the shipping industry evolved and ships had deeper hulls, water was collected from different depths. Eventually, the practice shifted again as buoys, which provide far more reliable measures of temperature, became more common.

In 1990, more than 90 percent of ocean temperature ratings were taken by ships. Now almost the same number comes from buoys, according to researchers.

Thorne said it's important to account for biases in the data, adding that the current research settles the discussion on the pause.

"It certainly puts to bed that we don't understand the temperature behaviors of the past 15 or so years, we had some biases in the observations that we didn't recognize," he said. "We have an answer, we have closure. There is no discrepancy in our understanding."