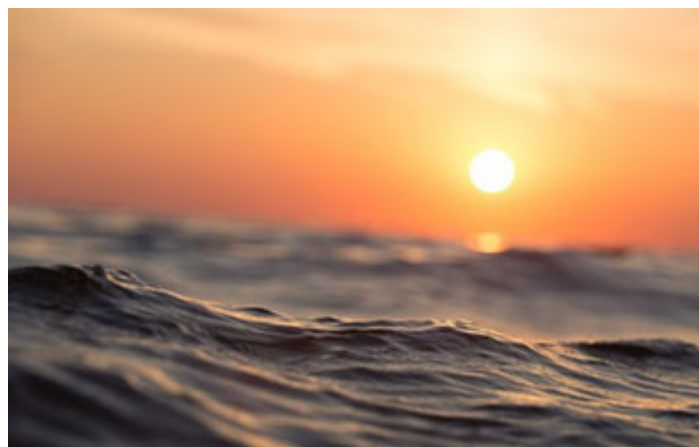




Research News

Correcting historic sea surface temperatures reveals simpler pattern of ocean warming

Clues found in the digitizing of decks of punch cards from the early 20th century



New research corrects decades of sea surface temperature data, solving a long-standing mystery.

[Credit and Larger Version \(/discoveries/disc_images.jsp?cntn_id=298916&org=NSF\)](/discoveries/disc_images.jsp?cntn_id=298916&org=NSF)

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Something odd happened in the oceans in the early 20th century. The North Atlantic and Northeast Pacific appeared to warm twice as much as the global average. Atmospheric and oceanic models have had trouble accounting for these differences in temperature changes.

Now, NSF-funded scientists at [Harvard University \(/cgi-bin/good-bye?https://www.seas.harvard.edu/news/2019/07/bucket-list\)](/cgi-bin/good-bye?https://www.seas.harvard.edu/news/2019/07/bucket-list) and other institutions report new answers in *Nature* (</cgi-bin/good-bye?https://www.nature.com/articles/s41586-019-1349-2>).

The researchers found two key causes of the warming discrepancies. The scientists focused on data from 1908 to 1941, broken down by the data-collecting ship's country of origin, and the “decks,” a term stemming from the fact that marine observations were stored using decks of punch cards.

Before 1932, most records of sea surface temperature from Japanese vessels in the North Pacific came from fishing vessels. These data were originally recorded in whole-degrees Fahrenheit, then converted to Celsius, and finally rounded to tenths-of-a-degree.

However, in the lead-up to World War II, more and more Japanese readings came from naval ships. When the U.S. Air Force digitized the collection, it truncated the data, chopping off the tenths-of-a-degree digits and recording the information in whole-degrees Celsius.

After correcting for the bias introduced by truncation, the warming in the Pacific is much more uniform.

In the late 1920s, German ships began providing a majority of the data in the North Atlantic. Most of these measurements are collected in one deck, which, when compared to other measurements, is significantly warmer. When adjusted, the warming in the North Atlantic becomes more gradual.

"This study shows how complicated it can be to use data 100 years later for a purpose that needs more accuracy," says Mete Uz, a program director in NSF's [Division of Ocean Sciences](https://www.nsf.gov/divisions/division.jsp?division=105) https://www.nsf.gov/awardsearch/showAward?AWD_ID=1558939&HistoricalAwards=false, which funded the research. "It also illustrates the need to do all we can to curate modern records and to document everything that goes into them."

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