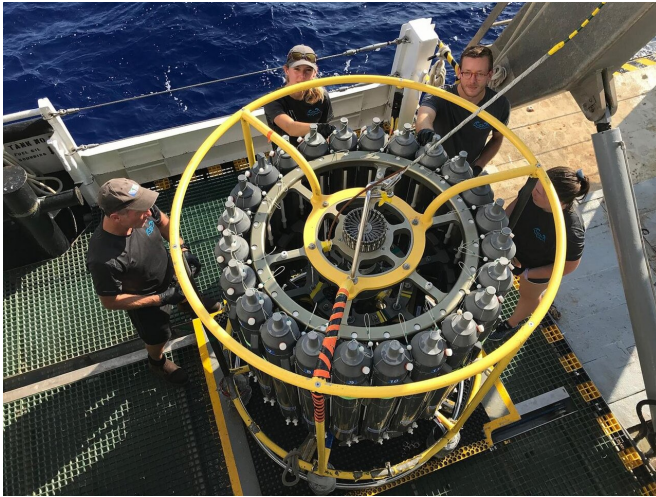


# Long-term data show a recent acceleration in chemical and physical changes in the ocean

16 October 2020



From L to R: Rod Johnson (BATS Co-PI), Emily Davey (Research Technician), Dom Smith (Research Technician) and Claire Medley (Research Technician) sample the CTD for dissolved O<sub>2</sub> and CO<sub>2</sub> aboard the R/V Atlantic Explorer during a routine Bermuda Atlantic Time-series Study (BATS) cruise. Credit: Ella Cedarhold, Bermuda Institute of Ocean Sciences

New research published in *Nature Communications Earth & Environment* uses data from two sustained open-ocean hydrographic stations in the North Atlantic Ocean near Bermuda to demonstrate recent changes in ocean physics and chemistry since the 1980s. The study shows decadal variability and recent acceleration of surface warming, salinification, deoxygenation, and changes in carbon dioxide (CO<sub>2</sub>)-carbonate chemistry that drives ocean acidification.

The study utilized datasets from Hydrostation 'S' and the Bermuda Atlantic Time-series Study (BATS) projects at the Bermuda Institute of Ocean Sciences (BIOS). Both are led by Professor

Nicholas Bates, BIOS senior scientist and the projects' principal investigator (PI), and Rod Johnson, BIOS assistant scientist and the projects' co-PI. Together, these time-series represent the two longest continuous records of data from the global open [ocean](#).

"The four decades of data from BATS and Hydrostation 'S' show that the ocean is not changing uniformly over time and that the ocean carbon sink is not stable over recent time with variability from decade to decade," Bates said.

Of the two sites, Hydrostation 'S' is the oldest, located approximately 15 miles (25 km) southeast of Bermuda and consisting of repeat biweekly hydrographic observations of temperature, salinity, and dissolved oxygen conducted through the water column since 1954. The Bermuda Atlantic Time-series Study (BATS) site is located approximately 50 miles (80 km) southeast of Bermuda. It consists of monthly sampling of the physics, chemistry, and biology of the entire water column since 1988. The study's datasets represent more than 1381 cruises to Hydrostation 'S' from 1954 to 2020 and more than 450 cruises to BATS from 1988 to the end of 2019.



From L to R: Ella Cedarhold (Marine Technician), Claire Medley (Research Technician), Emily Davey (Research Technician), and Lydia Sgouros (Marine Technician) deploy an in-situ pump off the stern of the R/V Atlantic Explorer for proteomics sampling during a recent Bermuda Atlantic Time-series Study (BATS) cruise. Credit: Bermuda Institute of Ocean Sciences

Results showed that, over the last 40 years, [surface temperatures](#) in the Sargasso Sea have increased by  $0.85 \pm 0.12^{\circ}\text{C}$ , with the summer surface temperatures rising at a higher rate than winter. Additionally, the winter (

APA citation: Long-term data show a recent acceleration in chemical and physical changes in the ocean (2020, October 16) retrieved 19 October 2020 from <https://phys.org/news/2020-10-long-term-chemical-physical-ocean.html>

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