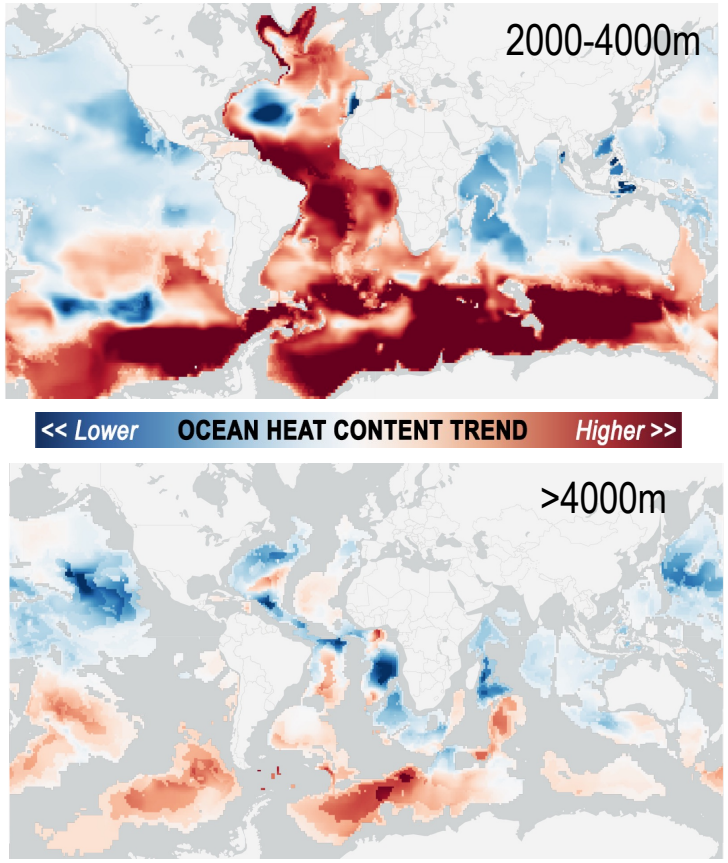
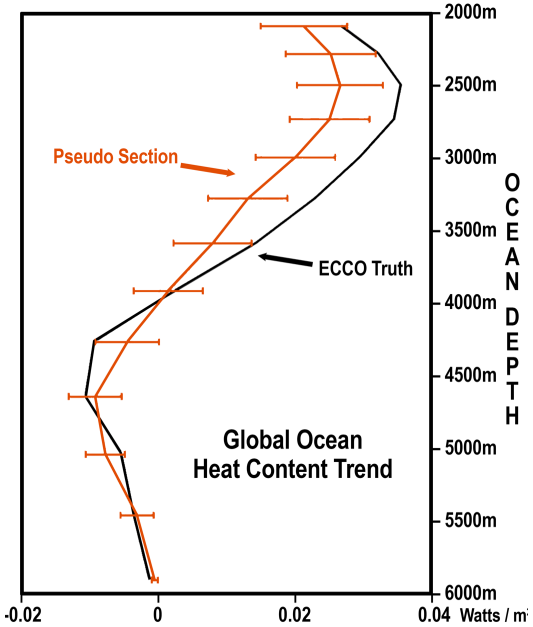
Diving Deep into Ocean Heat

- Our experiment assessed possible biases of deep and abyssal ***ocean heat content (OHC)*** changes due to under-sampling
- We compared temperature OHC trends calculated from observational-style sampling to **trends calculated using ECCO**
- We find that ECCO results for the study period show **strong warming in the Southern and Atlantic Oceans** and, contrary to some other studies, **cooling in the Indian and Pacific Oceans**

The globally averaged OHC trends from ECCO show warming in the deep ocean and cooling in the abyssal ocean. **The global OHC trend profile shown is predominantly shaped by the Atlantic and Southern Oceans** (shown at right)**.** Despite representing only about one-third of the global ocean volume below 2000 m, these two ocean basins have an outsized influence in determining the overall OHC trend in the deep and abyssal oceans.

Under-sampling does not explain the differences between ECCO and observations in the deep and abyssal OHC changes. We find that the largest uncertainties mainly occur in regions where the deep ocean is dominated by newly formed deep-water masses or where hydrographic sections are extremely sparse, such as the Northwest Atlantic Ocean and the Southern Ocean.





LEFT: ECCO OHC trends in deep (upper map) and abyssal (lower map) layers.
ABOVE: Global averaged ECCO "pseudo section" and "truth" OHC trend 1992-2015.

Our findings provide a valuable reference for understanding deep and abyssal ocean changes as well as for designing and implementing future global ocean observational systems.

Zhang, Y., et al. (2025) Assessing Deep and Abyssal Ocean Heat Content Changes With a Dynamically Consistent Ocean State Estimate, J. Geophys. Res. Oceans, 130, doi: e2024JC020925

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