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ocean thermometry using CTBTO hydrophone data

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As the major buffer of Earth's energy imbalance, the ocean plays a key role in regulating global climate and temperature changes. However, accurate estimation of global ocean temperature change remains a challenging sampling problem. To complement existing point measurements, we have developed a novel and low-cost method of using travel time changes of acoustic waves from repeating natural earthquakes to infer basin-scale average ocean temperature changes. In this study, we implement this method using the CTBTO hydrophones H08 near Diego Garcia in the central Indian ocean and H01 near Cape Leeuwin off the southwest coast of Australia. We use the ISC cataloged earthquakes as templates to conduct template matching and obtain a more complete set of repeating earthquakes in 2005–2016 around the Nias Island off Sumatra. Adding these new detected earthquakes and using high-quality hydrophone data enable us to infer the large-scale ocean temperature changes with a high temporal resolution. For both H08 and H01, we detect not only seasonal signals generally consistent with that in previous oceanographic datasets of ECCO and Argo, but also more interesting features missing in ECCO and Argo. These results suggest that the global hydrophone network offers new opportunities for monitoring ocean warming.

Promotional text

We developed a novel and low-cost method of using acoustic waves recored by CTBTO hydrophones from repeating natural earthquakes to infer basin-scale average ocean temperature changes.

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