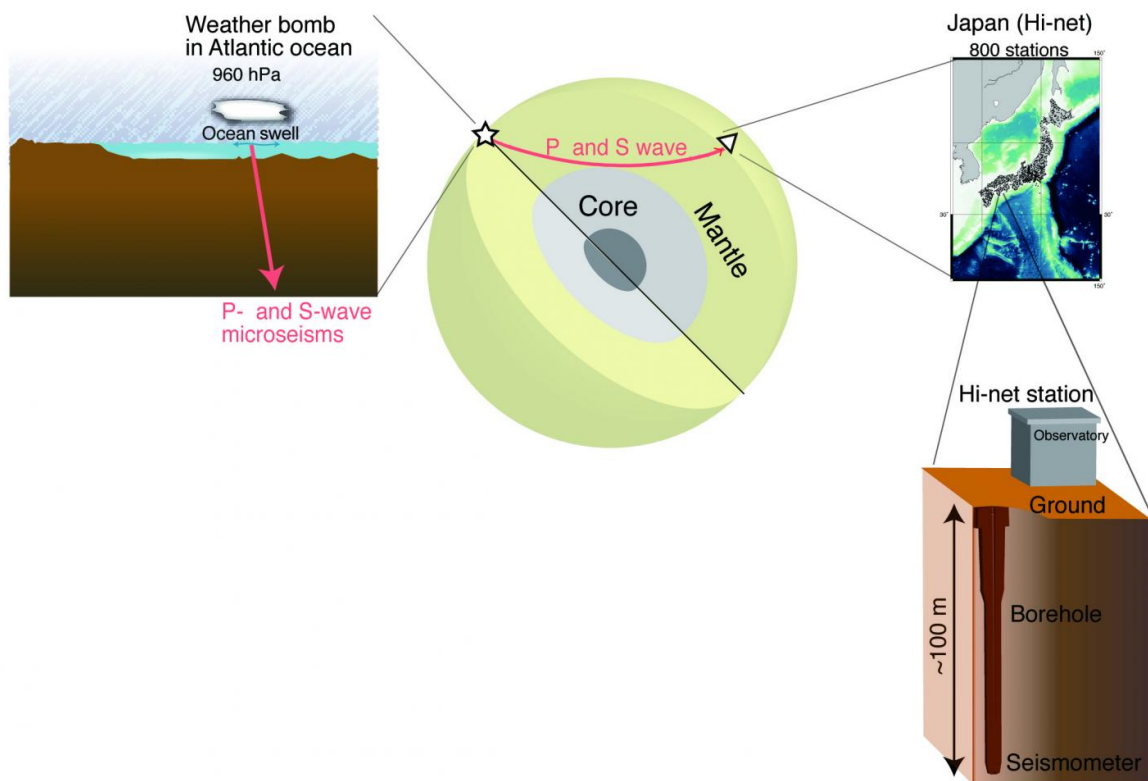


Japan scientists detect rare, deep-Earth tremor

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An Atlantic “weather bomb,” or a severe, fast-developing storm, causes ocean swells that incite faint and deep tremors into the oceanic crust. These subtle waves run through the earth and can be detected in places as far away as Japan, where facilities using a method called “Hi-net” measure the amplitude of the storm’s P and S waves for the first time. Credit: Kiwamu Nishida and Ryota Takagi

Scientists who study earthquakes in Japan said Thursday they have detected a rare deep-Earth tremor for the first time and traced its location to a distant and powerful storm.

The findings, published in the US journal *Science*, could help experts learn more about the Earth's inner structure and improve detection of earthquakes and oceanic storms.

The storm in the North Atlantic was known as a "weather bomb," a small but potent storm that gains punch as pressure quickly mounts.

Groups of [waves](#) sloshed and pounded the ocean floor during the storm, which struck between Greenland and Iceland.

Using seismic equipment on land and on the seafloor that usually detects the Earth's crust crumbling during earthquakes, researchers found something they had not detected before—a tremor known as an S wave microseism.

Microseisms are very faint tremors.

Another kind of tremor, known as P waves, or primary wave microseisms, can be detected during major hurricanes.

P waves are fast-moving, and animals can often sense them just before an earthquake hits.

The elusive S waves, or secondary waves, are slower, and move only through rock, not liquid. Humans feel them during earthquakes.

Using more than 200 stations operated by the National Research Institute for Earth Science and Disaster Prevention in Japan's Chugoku district, researchers Kiwamu Nishida and Ryota Takagi "successfully detected

not only P wave microseisms triggered by a severe and distant North Atlantic [storm](#), known as a weather bomb, but also S wave microseisms, too," said the study.

"The discovery marks the first time scientists have observed... an S wave microseism."

Microseism S waves are so faint that they occur in the 0.05 to 0.5 Hz frequency range.

The study in the journal *Science* details how researchers traced the direction and distance to the waves' origins, and the paths they traveled.

The discovery "gives seismologists a new tool with which to study Earth's deeper structure," said Peter Gerstoft and Peter Bromirski of the University of California, San Diego in an accompanying Perspective article.

Learning more about microseismic S waves may "add to our understanding of the deeper crust and upper mantle structure."

More information: K. Nishida et al. Teleseismic S wave microseisms, *Science* (2016). [DOI: 10.1126/science.aaf7573](https://doi.org/10.1126/science.aaf7573)

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