

Seismic monitoring by an autonomous robotic float equipped with a hydrophone: MERMAID

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Seismic monitoring in the oceans has been limited to rather localized experiments such as ocean bottom seismometers (OBSs) and moored hydrophones. Because about 70% of the Earth is covered by water, advances in seismic monitoring depend on the development of radically new instruments, capable of providing seismic data all over the ocean. Recently a new instrument, named MERMAID (Mobile Earthquake Recording in Marine Areas by Independent Divers), was developed to measure acoustic signals converted from seismic waves at the seafloor. The MERMAID is an autonomous robotic float equipped with a hydrophone and drifts passively at 1,500–2,000 m depth until an earthquake signal is detected. If this is identified as a strong P wave, the MERMAID ascends at speed of 10 cm/s for transmission of the recorded waveform within time window of a hundred seconds before and after the P wave arrival as well as its global positioning system coordinates at the surface. After transmitting the data via satellite links, the MERMAID descends at speed of 5 cm/s to monitor earthquake signals at 1,500–2,000 m depth again. Therefore we are able to obtain seismograms from the ocean in quasi-real time. Under an international project collaborated among Japan, France, United States and China, we planed to deploy more than 40 drifting buoys with hydrophone to image the detail of the South Pacific mantle plume that is one of two huge mantle plumes from the base of the mantle. As part of this project, we deployed drifting floats in the South Pacific during the 1st leg of MR18-06 cruise. We will show the obtained seismograms and discuss their quality.

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