

## Seismic monitoring by autonomous floats to image Earth's interior

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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. 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 850–2,000 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 850–2,000 m depth again. Therefore we are able to obtain seismograms from the ocean in quasi-real time.

In 2016 a group of researchers from across the globe formed a consortium, EarthScope-Oceans (ESO; see [www.earthscopeoceans.org](http://www.earthscopeoceans.org)). Their mission is the high-resolution imaging of the whole mantle especially below the oceans where has because of lack of seismic data. In 2018 ESO begin its first large-scale deployment using more than 50 MERMAID instruments to study the mantle beneath the South Pacific Superswell, broad seafloor anomalously elevated and concatenated by several volcanic island (hot spot) chain. Seismological studies have commonly revealed large areas of significantly low seismic velocity in the lower mantle beneath the South Pacific, suggesting the presence of mantle upwelling that are potentially deeply rooted and possibly even fed by the underlying Pacific Large Low Shear Velocity Province. The goal of the South Pacific Plume Imaging with MERMAIDs (SPPIM) experiment is to refine tomographic images of this region. The MERMAIDs will continue to send us P wave records for the next 5 years.

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