



First Results of a Large MERMAID Deployment into the Pacific Ocean

Joel D. Simon (1), Frederik J. Simons (1), and Guust Nolet (2)

(1) Department of Geosciences, Princeton University, Princeton, United States (jdsimon@princeton.edu), (2) Géoazur, Université Nice Sophia Antipolis, Valbonne, France

Between late June and early September of 2018, eighteen of the newest-generation, commercially-available MERMAID floats were deployed into the Southern Pacific Ocean. We present, for the first time, a report on the quality and quantity of the first half-year of data, and offer a broad overview of MERMAID data in general: how it looks and its utility. As of November, 2018, MERMAIDs had sent to shore nearly 500 seismograms from the Southern Pacific Ocean, about 90% of which have been matched to the global catalog. The remaining unmatched data represent small earthquakes deep in the ocean that otherwise go undetected by the global seismic network. MERMAID is an acronym for Mobile Earthquake Recorder in Marine Areas by Independent Divers. It is an autonomous, freely-drifting oceanic float that records the acoustic wavefield at mid-column depths. The float itself is an adjustable buoyancy glass sphere that includes a GPS receiver, two-way Iridium communication for data transfer in near real time to and from the float, and a hydrophone. A standard dive cycle goes something like this: upon surfacing MERMAID sends its current location and any data it recorded during its last dive, downloads instructions for the next dive, descends to a specified depth (generally between 1500 and 2000 m), and activates its hydrophone to passively record the acoustic wavefield. The data is passed in real-time through an onboard detection algorithm that triggers an immediate surfacing if a signal is deemed to have a high likelihood of being generated by an earthquake. Signals with lower likelihoods of being generated by an earthquake are written to an onboard buffer and sent during the next surfacing, either when a higher-likelihood signal is recorded, or a predetermined maximum dive duration has been reached, whichever comes first. In this way MERMAID delivers seismograms in near real time from the oceans, often within hours after large events.