Multi-disciplinary, autonomous underwater floats for recording seismic and hydroacoustic signals in the oceans

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Abstract

At Géoazur we have been developing autonomous seismo-acoustic floats ("MERMAID"). Their primary purpose is to record earthquakes waves in the oceans, where seismometer installations on the seafloor would be (too) challenging and costly. In addition, MERMAID can potentially record the entire underwater soundscape. Originally derived from Argo-type profiling floats, MERMAID drift passively at 1000-1500m water depth, carrying a hydrophone and processing algorithms that constantly scan for seismo-acoustic events of interest. When a relevant event is detected, such as a large earthquake, the float rises to the surface to transmit home its recording via Iridium satellite link, then sinks back to resume its work at depth.

Several dozen MERMAID are currently deployed on > 5-year-long missions in the world oceans (https://earthscopeoceans.org). An ongoing focus is to demonstrate a first multi-disciplinary mission in the Mediterranean in 2023, with hydrograms recording not just the seismic but also the marine acoustic frequency range up to several kHz. First targeted applications are the detection and quantification of rain fall, ship noise and marine mammal vocalizations. In coming years, we will extend our capabilities to sea-bottom-landing floats equipped with seismometers and harvesting renewable energy during their missions. I will give an overview of the MERMAID program with a view to possible synergies with EMSO-MARMARA.

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