First observations of teleseismic P-waves with autonomous underwater robots: towards future global network of mobile seismometers

Alexei Sukhovich (1), Guust Nolet (2), Yann Hello (2), Frederik Simons (3), and Sébastien Bonnieux (2)

(1) Laboratoire Domaines Océaniques, Université de Brest, Brest, France, (2) Nice/Sophia Antipolis, Geoazur, Geosciences, Sophia Antipolis, France (nolet@geoazur.unice.fr), (3) Department of Geosciences, Princeton University, Princeton NJ, USA

We report here the first successful observations of underwater acoustic signals generated by teleseismic P-waves recorded by autonomous robots MERMAID (short for Mobile Earthquake Recording in Marine Areas by Independent Divers). During 2011-2012 we have conducted three test campaigns for a total duration of about 8 weeks in the Ligurian Sea which have allowed us to record nine teleseismic events (distance more than 60 degree) of magnitudes higher than 6 and one closer event (distance 23 degree) of magnitude 5.5. Our results indicate that no simple relation exists between the magnitude of the source event and the signal-to-noise ratio (SNR) of the corresponding acoustic signals. Other factors, such as fault orientation and meteorological conditions, play an important role in the detectability of the seismic events.
We also show examples of the events recorded during these test runs and how their frequency characteristics allow them to be recognized automatically by an algorithm based on the wavelet transform. We shall also report on more recent results obtained during the first fully autonomous run (currently ongoing) of the final MERMAID design in the Mediterranean Sea.