Geophysical Research Abstracts
Vol. 19, EGU2017-12649, 2017
EGU General Assembly 2017

Acoustic gravity microseismic pressure signal at shallow stations

Charles Peureux (1), Fabrice Ardhuin (1), and Jean-Yves Royer (2)

(1) Laboratoire d'Océanographie Physique et Spatiale, Université de Bretagne Occidentale, Brest, France (cpeureux@ifremer.fr), (2) Laboratoire Domaines Océaniques, Université de Bretagne Occidentale, Brest, France

It has been known for decades that the background permanent seismic noise, the so-called microseimic signal, is generated by the nonlinear interaction of oppositely travelling ocean surface waves [Longuet-Higgins 1951]. It can especially be used to infer the time variability of short ocean waves statistics [Peureux and Ardhuin 2016]. However, better quantitative estimates of the latter are made difficult due to a poor knowledge of the Earth's crust characteristics, whose coupling with acoustic modes can affect large uncertainties to the frequency response at the bottom of the ocean.

The pressure field at depths less than an acoustic wave length to the surface is made of evanescent acoustic-gravity modes [Cox and Jacobs 1989]. For this reason, they are less affected by the ocean bottom composition. This near field is recorded and analyzed in the frequency range 0.1 to 0.5 Hz approximately, at two locations : at a shallow site in the North-East Atlantic continental shelf and a deep water site in the Southern Indian ocean, at the ocean bottom and 100 m below sea-surface and in the upper part of the water column respectively. Evanescent and propagating Rayleigh modes are compared against theoretical predictions. Comparisons against surface waves hindcast based on WAVEWATCH(R) III modelling framework help assessing its performances and can be used to help future model improvements.

References

Longuet-Higgins, M. S., A Theory of the Origin of Microseisms, Philos. Trans. Royal Soc. A, The Royal Society, 1950, 243, 1-3.

Peureux, C. and Ardhuin, F., Ocean bottom pressure records from the Cascadia array and short surface gravity waves, J. Geophys. Res. Oceans, 2016, 121, 2862-2873.

Cox, C. S. & Jacobs, D. C., Cartesian diver observations of double frequency pressure fluctuations in the upper levels of the ocean, Geophys. Res. Lett., 1989, 16, 807-810.