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The Earth's Hum on Land and at the Ocean Bottom: a comparison between Modeled and Recorded Data

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The Earth's Hum is defined as continuous oscillations of the earth, generally observed at periods greater than 30 seconds. This very weak signal of only nanometers in displacement is difficult to observe on raw data. In order to observe the hum at the Ocean Bottom, we first need to remove stronger signals caused by currents « tilt » and ocean wave pressure forcing « compliance ». We propose data processing techniques for Ocean Bottom Seismometer that enable to obtain signal level in the hum period band similar to that of land stations. We present observations of the hum on broadband INSU ocean bottom seismometers deployed in the Indian Ocean in 2012/13, as part of the RHUM-RUM experiment.

The Hum is probably generated by long period, low amplitude ocean infragravity waves interacting with the continental shelf. A first attempt to model these sources was proposed by Ardhuin et al., 2015. We test this model by comparing synthetic seismic data generated from these sources at several locations on both land and at the ocean bottom. We discuss the fit of the model and data focusing on parameters such as seasonal variations; distant and local sources and continental slope topography.

Investigating the hum will help in understanding the generation mechanism and finds applications in noise tomography and monitoring the sea state.