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Modeling of Scholte wave transmission through the corrugated interface

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Scholte wave with frequency usually below 25 Hz, i.e. dispersive interface waves travelling at the fluid-solid interface, bear information on the shear-wave velocity of the uppermost layers of the seafloor. They are useful to study the stability of the inclined margin sediments, to estimate velocity models for correcting site effects beneath seismic stations, or to analyse the properties of mushy layers on the seafloor.

Although the wave propagation along plane layered structures is well understood, the effect of seafloor topography and small scale heterogenities is not well understood so far.

This work describe modeling results of the Scholte wave transmission along regularly and randomly corrugated fluid-solid interface.

The simulations are compared to ones from a reference model consisting of several layers with a minimum thickness of 30 m and shear wave velocities ranging from 600m/s. A single explosive source at the seafloor excites at frequencies between 10Hz and 20 Hz; the synthetic time traces last 5 seconds and have a sampling rate of 1000 Hz.

The corrugated interface

The wavelength of the Scholte waves are comparable to the horizontal spatial wavelength of the corrugated seafloor but is much greater than the vertical amplitudes of the spatial interface variation.

The characteristics of Scholte waveform indicate consistently as follows: The attenuated main pulse arrives first and a strong ringing is observed in the coda of the waveform.

The wave velocity and the main pulse of Scholte wave depend little on the number of peaks in the regularly corrugated interface.

The randomly corrugated interface does not cause a big change in comparison to the regularly corrugated interface.

Results are also well-compared with experiment and a secondary modeling program.