Geophysical Research Abstracts
Vol. 12, EGU2010-9479, 2010
EGU General Assembly 2010

Scholte-wave Inversion for shallow 2D shear-wave velocity models at different locations in North- and Baltic sea using a hybrid particle swarm optimization scheme

Dennis Wilken and Wolfgang Rabbel
Geosciences/ Kiel University, Geophysics, Kiel, Germany (dwilken@geophysik.uni-kiel.de)

In the years 2006 to 2008 we performed Airgun profiles to excite Scholte-waves at different locations in the North and Baltic sea. Scholte-wave energy was recorded using a specially developed Ocean-Bottom-Seismometer. The system is able to sample signals up to 11kHz and can thus be localised at seafloor with an accuracy of a few meters using traveltimes of high frequent seismic signals that are excited in the watercolumn.
Scholte-wave recordings are added to common-receiver-gathers which are then inverted for shear-wave velocity structure by fitting modelled phase-slowness frequency dispersion spectra to spectra of the wavefield. By extracting local wavefields from the profile-gathers, multiple 1D Inversions of these fields at different offset-points lead to a 2D shear-wave velocity model of the profile.
A new spectral misfit calculation was developed, working without the requirement of identification of the Scholte-wave dispersed modes in the spectra. For minimization of the misfit we implemented a new hybrid method using a combination of particle swarm optimization and a local downhill-simplex resulting in a resolution of global misfit minimum of about 7%. The method was used for shear-wave velocity inversion at four different locations in North and Baltic sea. Resulting models show very good coherence along each Profile and especially a very good correlation to high resolution reflection seismic sections of the same profiles.