Geophysical Research Abstracts
Vol. 20, EGU2018-9386, 2018
EGU General Assembly 2018

The Northwestern Barents Sea: crustal structure from the recent seismic profiles?

Alexey Shulgin (1), Jan Inge Faleide (1), Rolf Mjelde (2), Ritske Huismans (2), and Iselin Aarseth (2)

(1) University of Oslo (CEED), Center for Earth Evolution and Dynamics (CEED), Norway, (2) Department of Earth Science, University of Bergen, Norway

The basement structure below the Paleozoic sedimentary basins is still not fully understood in the Western Barents Sea region. It has been proposed that the early Devonian Caledonian orogeny has formed structural framework over which major basins have developed lately. Unfortunately, the offshore location, orientation and the extent of the deformation front, associated with the Calodonian Orogeny is still constrained only locally and with limited resolution. The tectonic interpretation of the crustal complexes in the Barents Sea is heavily dependent on the spatial extent and orientation of the Caledonian Deformation Front (CDF) or any other major suture zones. In 2014 an active marine seismic experiment was conducted in the Western Barents Sea. One of the goals of the experiment is to discriminate between two existing models for orientations of the CDF: north-south from the potential fields data, and southwest-northeast from seismic data. We also aim to constrain the location of the CDF offshore northern Norway.

We present the joint interpretation of collocated newly collected wide-angle seismic data (Ocean Bottom Seismometers) and reprocessing of the reflection seismic dataset (Multi-channel seismics) collected in the mid 1980's, using modern computational techniques. The crustal seismic modeling is performed by travel-time tomography modeling, independently for P and S waves, providing the Vp/Vs distribution in the crust along the profiles. The Vp/Vs ratio shows the changes in the crustal composition, which are poorly resolved in standalone models of P or S velocities. Furthermore, good spatial correlation of boundaries within the crust with changing Vp/Vs ratio with the distribution of local seismicity, suggests robustness of the obtained models.

We further build a 3D crustal model of all available wide-angle seismic profiles (including the most recent ones) in the Western Barents Sea, in order to reevaluate our understanding of the tectonic evolution of the Barents Sea.