

Modeling of geophysical data from the area west of Bjørnøya - Report summer 2011

by [Audun Libak](#) — last modified 2011-06-27 10:09

History

Action	Performed by	Date and Time	Comment
Submit Report	Audun Libak	2011-06-27 10:09	No comments.

This report describes the work done by the Vista student Audun Libak during the period January 2010 - July 2011. During this period the student has submitted one paper to Tectonophysics and two more papers are soon ready for submission. We expect to submit the PhD dissertation in August 2011.

Scholar at UiB: Audun Libak
Project leader at UiB: Rolf Mjelde
Division head: Lasse Amundsen
Project number: 6253
Project duration: 01.08.2008-31.07.2011

Objectives

As a part of the International Polar Year (IPY) project: 'The dynamic continental margin between the mid-Atlantic ridge system and the Bear Island Region' two OBS (ocean-bottom seismometer) profiles were acquired west of Bjørnøya in August 2008. The overall goal of the project is to map the structure of the crust and upper mantle between Bjørnøya and the mid-Atlantic ridge system. This includes mapping sedimentary thicknesses and finding Moho depth. Both of the profiles cross the continent-ocean boundary and one of the main goals with the Vista project is to map this boundary in the area. Central parts of profile 1 is located in the Vestbakken volcanic province, an area where the deeper crustal structure is poorly known because of the seismic masking by high impedance volcanic rocks at shallow crustal levels. It is expected that modeling of the data along profile 1 will increase the knowledge about the geology below these volcanic rocks. The resulting velocity models along both profiles will be important information for the study of the frequently occurring earthquakes in the area between the Knipovich Ridge and Bjørnøya.

Activities 01.01.2011-01.07.2011:

Modeling

Most of the modeling is now finished and the results will result in four research papers. A list of the planned papers are listed in the end of this report.

The first paper (Czuba et al. 2011) is already published. This paper describes the preliminary results from modeling of OBS data and land station data on Bjørnøya for the southern profile crossing Vestbakken Volcanic Province.

The second paper (Libak et al. 2011a) will be submitted in the end of July. This paper will also treat modeling of the southern profile, but this time with the integration of NPD

multichannel seismic lines and other types of data (gravity, magnetics, well data). Integration of these data improves the resulting velocity model.

The third paper (Libak et al. 2011b) was submitted to Tectonophysics in January 2011. This paper discuss modeling and results from the northern profile crossing the oceanic crust generated by the Knipovich Ridge and ends at Bjørnøya. The paper was reviewed and a moderate review was suggested by the editor. It will be resubmitted in the end of July.

The last paper (Moghaddam et al. 2011) will be submitted to Journal of Geophysical Research in July/August 2011. This paper test the validity of seismic reciprocity when modeling OBS data with a staggered grid finite-difference scheme and an explosive seismic source. The results show that the reciprocal waveforms are similar to the true waveforms if the explosive source is implemented correctly in the finite-difference algorithm.

Courses and presentations

Libak presented a poster at the final IPY conference in Tromsø in April 2011. The poster summarized the results from the modeling of the two OBS profiles.

Status

We expect to submit the PhD dissertation in August 2011. We also expect to submit all papers to international peer reviewed journals before the submission of the dissertation. A defense in October-November 2011 seems likely.

Publications (published and in prep/in review)

Czuba, W., Grad, M., Mjelde, R., Guterch, A., Libak, A., Krüger, F., Murai, Y., Schweitzer, J. and the IPY Project Group, 2011. Continent-ocean-transition across a trans-tensional margin segment: off Bear Island, Barents Sea. *Geophysical Journal International*, 184, 541-554.

Libak, A., Mjelde, R., Keers, H., Faleide, J.I. and Murai, Y, 2011a, An integrated geophysical study of Vestbakken Volcanic Province, western Barents Sea, in prep for *Marine Geophysical Researches*.

Libak, A., Eide, C.H., Mjelde, R., Keers, H. and Flüh, E., 2011b, From pull-apart basins to ultraslow spreading: Results from the western Barents Sea margin, in review *Tectonophysics*.

Moghaddam, P.P., Libak, A., Keers, H. and Mjelde, R., 2011, Synthetic Seismograms for Ocean Bottom Seismometer Experiment: An Application of Reciprocity, in prep for *Journal of Geophysical Research*.