Ocean Bottom Seismic Survey in the Knipovich Ridge area

W. Czuba[1], R. Mjelde[2], Y. Murai[3], T. Janik[1]

[1] Institute of Geophysics, Polish Academy of Sciences, Warszawa, Poland; [2] Department of Earth Science, University of Bergen; [3] Institute of Seismology and Volcanology, Hokkaido University

The structure of the oceanic crust generated by the ultraslow-spreading Knipovich Ridge still remains relatively uninvestigated compared to the other North Atlantic spreading ridges further south. The complexity of the Knipovich Ridge, with its oblique ultraslow-spreading and segmentation, makes this end-member of Spreading Ridge Systems an important and challenging ridge to investigate. The aim of this work is to better understand the lithospheric structure beneath the rare ultraslow-spreading ridges, using as example the Knipovich Ridge along its spreading direction. Ultraslow spreading ridges are characterized by a low melt supply. At spreading rates below 20 mm/y, conductive cooling effectively reduces the mantle temperature and results in less melt produced at larger depths. Ultraslow spreading ridges, namely the Arctic ridge system with the Gakkel Ridge, Lena Trough and Knipovich Ridge and the Southwest Indian Ridge (SWIR), therefore greatly differ in their morphology from faster spreading ridges. The Ocean Bottom Seismometer (OBS) data along a refraction/reflection profile (~280 km) crossing the Knipovich Ridge off the western Barents Sea was acquired by use of RV G.O. Sars on July 24 - August 6, 2019. Additionally, gravity, echo-sounder and single-channel streamer data were acquired. The project partners are University of Bergen, Institute of Geophysics, Polish Academy of Sciences, and Hokkaido University. The acoustic energy was emitted every 200 m by an array of air-guns with total volume of 80 l. To receive and record the seismic waves at the seafloor, ocean bottom seismometers were deployed at 12 positions with about 15-km spacing in 2 deployments. All the stations were recovered and correctly recorded data. Clear seismic energy from airgun shots were obtained up to 50 km from the OBSs. The profile provides information on the seismic crustal structure of the Knipovich Ridge and oceanic and continental crust in the transition zone. With this survey we have to some extent overlapped the previously made profile by Hermann & Jokat (2013). Together, they constitute one joined transect crossing the Knipovich Ridge from the American to the European plate.

Hermann, T. and Jokat, W., 2013. Crustal structures of the Boreas Basin and the Knipovich Ridge, North Atlantic. Geophys. J. Int., 193, 1399–1414, doi: 10.1093/gji/ggt048

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