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SURFACE WAVE TOMOGRAPHY OF THE EUROPEAN ARCTIC

Christian Weidle (1), Anatoli Levshin (2), Johannes Schweitzer (3), Nils Maercklin (3), Nikolai Shapiro (2), Michael H. Ritzwoller (2)

(1) University of Oslo, Norway, (2) University of Colorado at Boulder, USA, (3) NORSAR, Kjeller, Norway

Existing global and regional tomographic models have limited resolution in the European Arctic due to the small number of seismic stations, relatively low regional seismicity, and poor knowledge of the crustal structure. During the last decades, new seismic stations were permanently or temporarily installed in and around this region. However, many of the data from these stations are not easily accessible via the international data centers but only by direct request to various data operators.

Recently, a new crustal model of the Barents Sea and surrounding areas had been derived in a joint project between the University of Oslo, NORSAR and the USGS (Bungum et al. (2005), EOS 86(16), 160-161). This model with its detailed information on crustal thickness and sedimentary basins in the area helps to constrain the tomographic inversion of the upper mantle velocity structure based on surface wave data.

To improve the surface wave data set in the region, we extensively searched for broadband data from stations in the area from the beginning of the 1970s until 2005 and were able to retrieve surface wave observations from the data archives at NORSAR, University of Bergen, University of Helsinki, the Kola Science Center in Apatity, and the Geological Service of Denmark in addition to data from the data centers of IRIS and GEOFON.

Rayleigh and Love wave group velocity measurements from 10 sec to 150 sec period obtained on these seismograms were combined with the existing data set provided by the University of Colorado (e.g., Levshin et al. (2001), PEPI 123, 185-204). Using these data, we constructed a new 3-D shear velocity model of the crust and upper

mantle beneath the European Arctic which provides higher resolution and accuracy than previous models.

The new model reveals substantial variations in shear wave speeds in the upper mantle across the region. Of particular note are clarified images of the mantle expression of the continent-ocean transition in the Norwegian Sea and a deep high wave speed lithospheric root beneath the Eastern Barents Sea.

Currently, the data set is being extended southwards to cover mainland Scandinavia and leading to a 3-D model of the crust and upper mantle for Norway and adjacent areas.