



The initial 3-D crustal model of POLENET/LAPNET research area, northern Fennoscandian shield

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POLENET/LAPNET project is a passive seismic array experiment in northern Finland with some stations also in northern Sweden, Norway and Russia. The experiment was a part of International Polar Year (IPY) 2007-2009. The data acquisition period of POLENET/LAPNET experiment was May, 2007 – September, 2009. One of the main targets of the experiment is to obtain a seismic model of the upper mantle using tomographic inversion of teleseismic travel times. In order to correct teleseismic travel times for crustal effect a seismic crustal 3-D model of the POLENET/LAPNET research area is needed. The aim of this work was to compile a 3-D crustal model of northern Fennoscandian shield centred in northern Finland and extending to surrounding areas in Sweden, Norway, and Russia.

The initial information on crustal structure was obtained mainly from 2-D seismic velocity models along previous controlled-source seismic experiments. There are four main seismic profiles in our research area: wide-angle reflection and refraction profile FENNOLORA in Sweden, wide-angle reflection and refraction profile POLAR and near-vertical reflection profile FIRE4 in Finland, and wide-angle reflection and refraction profile Kostomuksha-Pechenga in Russia. All of these profiles are approximately north-south directed. POLAR and FIRE4 profiles are almost co-located. In addition to main previous profiles there are some earlier one shot-point profiles, but there are also quite large areas with no previous information at all.

From these profiles can be concluded that the crust of northern Fennoscandia has generally three layers: the upper crust with P-wave velocities 5.8 – 6.3 km/s, the middle crust with P-wave velocities 6.3 – 6.6 km/s, the and lower crust with P-wave velocities 6.6 – 6.9 km/s. Also the high velocity lower crust, with P-wave velocities larger than 7.0 km/s can be seen in some of the models. The moho depth varies between 38 km and 52 km. Also the depth of crustal boundaries have significant differences in different parts of research area. Because of variations on layer depths and relatively sparse data, we concluded that previous results do not contain enough information to compile 3-D crustal model of whole research area. To fill the gaps between active seismic profiles receiver function analysis of new passive seismic data from POLENET/LAPNET project.