Geophysical Research Abstracts
Vol. 14, EGU2012-8566, 2012
EGU General Assembly 2012

Compilation of Moho boundary map for northern Fennoscandian shield

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POLENET/LAPNET project is a passive seismic array experiment in north-western Fennoscandian Shield. It is centered in northern Finland with some stations also in Sweden, Norway and Russia. The experiment was a part of International Polar Year (IPY) 2007-2009. One of the main targets of the project is to obtain a seismic model of the upper mantle using tomographic inversion of teleseismic travel times. To correct teleseismic travel times for crustal effect we present a new Moho map of POLENET/LAPNET study area located between 64˚ – 70˚ N and 18˚ – 34˚ E. The new Moho map is based on published models of previous 2-D controlled source seismic experiments and previous and new receiver function inversion results. There are four major seismic profiles crossing our research area. In addition there are some shorter profiles, but also quite large areas with no previous controlled source seismic information at all. These regions of data gaps were filled by a new analysis of receiver functions obtained from POLENET/LAPNET data. CRUST3D program was used for compiling these different types of 1-D and 2-D data to a 3-D crustal model. The program is designed to take advantage of the different methodological strengths and to compile a 3-D crustal model that fits all available data within its appropriate individual and methodological uncertainty limits. The original data leading to the published models were carefully analyzed to ascertain only information is used from locations where Moho reflectors/refractors were actually observed. The Moho interface is obtained by application of the principle of simplicity: the aim is to find a smoothest Moho interface that satisfies all reflector data within their a priori estimated error bars. On our Moho map we can see three main units in Moho, which suggests presence of three major crustal terrains. In south-western part of our study area the Moho is quite flat and shallow with average Moho depth of 44 km, which suggests that the crust there was formed in Achaean. In northern part of our study area the Moho is also quite flat and the average Moho depth is about 47 km, suggesting that the crust there has been reworked in Proterozoic. Two deepest Moho depressions were found in the north-eastern and south-eastern parts of study area, where it is reaching the depths of almost 60 km. The latter Moho depression appears to be limitation of the thin crust of the Karelian Craton not only from the West, but also from the East and is spatially coincident with the cluster of mineral deposits.