EGU21-9201
https://doi.org/10.5194/egusphere-egu21-9201
EGU General Assembly 2021

Lithosphere velocity structure of the Khibiny and Lovozero plutons (Eastern part of the Baltic shield) from receiver functions

Andrey Goev[1,2]
[1]Sadovsky Institute of Geospheres Dynamics Russian Academy of Sciences, Moscow, Russian Federation (andr.goev@gmail.com)
[2]Geological Institute – subdivision of the Federal Research Centre, Kola Science Centre of the Russian Academy of Sciences, Apatity, Russia

The Kola region of the Russian Arctic is located in the northeast of the Baltic Shield and is widely known for its unique geology in regards to the presence of massive Paleozoic intrusions. Multidisciplinary researches have been carried out to provide a comprehensive reconstruction of Khibiny and Lovozero plutons' formation and their structure models The main source of geochronological data comes from isotope analysis of the arrays' rocks. The amount of research focuses on the deep structure beneath the Khibiny pluton is scarce. To investigate velocity structure of the investigated region we used receiver function technique. Essence of the method is to analyze P-S (PRF) and S-P (SRF) converted waves form seismic boundaries along with their multiples. For the given research we used seismograms of the teleseismic events recorded by the Apatity (APA) and Lovozero (LVZ) broadband seismic stations since 2000. We selected 220 and 232 individual PRF;147 and 122 individual SRF for LVZ and APA station respectively. As both LVZ and APA are located relatively close to each other, we combined all 452 PRF to get a robust estimation of delay times of P410s and P660s phases. Our estimations of P410s and P660s phases are 43.6 and 67.6 sec respectively. Delay time between these phases is 24 sec that is close to "standard" according to the IASP91 model. The individual times of each phase are slightly less than predicted by IASP91 (by 0.4 sec) and could indicate an increase of velocities in the upper mantle, but it is not unusual for cratonic regions. Joint inversion of PRF and SRF was used to restore velocity sections for the depth up to 300 km. All models have shown a gradient increase in velocities in the earth's crust and sharp crust-mantle boundary at depth of 40 ± 1 km with a velocity jump from 3.9 to 4.4 km/s. The most prominent feature of the upper mantle structure is the presence of the low-velocity zone at a depth from 90 to 140 km. One of the possible explanation of this discontinuity could be the presence of deep fluids and the high porosity of this zone. This study was partially supported by the RFBR grant 18-05-70082 and the SRW theme No. AAAA-A19-119022090015-6.