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Upper Mantle of the Central Part of the Russian Platform by Receiver Function Data.

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The study of the upper mantle of the Russian Platform (RP) with seismic methods remains limited due to the lack of broadband seismic stations. Existing velocity models have been obtained by using the P-wave travel-times from seismic events interpreted as explosions recorded at the NORSAR array in 1974-75 years. Another source of information is deep seismic sounding data from long-range profiles (exceeding 3000 km) such as QUARTZ, RUBIN-1 and GLOBUS and peaceful nuclear explosions (PNE) as sources. However, the data with the maximum distances larger than 1500 km have been acquired on the RP and only in the northern part. Being useful, these velocity models have low spatial resolution.

This study analyzes and integrates all the existing RP upper mantle velocity models with the main focus on the central region. We discuss the completeness of the RP area of the LITHO 1.0 model. Based on results of our analysis, we conclude that it is necessary to get up-to-date velocity models of the upper mantle using broadband stations located at the central part of the RP using Vp/Vs ratio data and anisotropy parameters for robust estimation of the mantle boundaries.

By applying the joint inversion of receiver-function (RF) data, travel-time residuals and dispersion curves of surface waves we get new models reaching 300 km depth at the locations of broadband seismic stations at the central part of the RP. We used IRIS stations OBN, ARU along with MHV and mobile array NOV. For each station we attempt to determine thickness of the lithosphere and to locate LVL, LAB, Lehman and Hales boundaries as well as the discontinuities in the transition zones at the depth of 410 and 660 km. Also we investigate the necessity of using short-period and broadband RF separately for more robust estimation of the velocity model of the upper mantle.

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