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Outlining the Moho depth beneath Estonia using receiver functions and gravimetrics

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Abstract:

Moho depth beneath Estonia has been estimated using teleseismic P-wave receiver function analysis. The study incorporates data from several Estonian and a few nearby regional broadband seismic stations to improve spatial resolution of crustal structure. Previous estimates of crustal thickness in the region have relied primarily on gravimetric, magnetic, and sparse deep seismic sounding (DSS) data, often resulting in inconsistent interpretations and limited resolution. This work offers an independent seismic perspective on the Moho depth under Estonia.

The Moho depths show an average of 51–52 km in central and northern Estonia, where the crust appears relatively uniform. In contrast, southeastern Estonia exhibits strong lateral variation. Moho depth increases by about 16 km along an 80 km transect. It changes from the thinnest crust in Estonia – 47 km at Vasula (VSU) – to the thickest, 63 km at Piusa (PISE).

These results align with regional gravity anomaly maps and past seismic studies, while offering improved spatial detail. Although data coverage remains uneven, particularly in the southern part of the country, the analysis highlights the value of receiver functions in resolving subtle crustal features in stable continental settings. The findings support future efforts to integrate seismic approaches into a more comprehensive geophysical model of lithosphere in Estonia.