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Insights on the tectonic styles across Estonia using satellite potential fields derived from WGM-2012 gravity data and EMAG2 magnetic data.

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The nature of the Estonian crust was studied using global topography, magnetic data, and gravity data to estimate its tectonic regime. The Estonian Precambrian crystalline basement, composed of Paleo- to MesoProterozoic metamorphic and igneous rocks, is covered by a Paleozoic sedimentary rock deposit 100–780 m thick. To visualize crustal sources of the Estonian basement, we employed spectrum analysis of magnetic and gravity data, as well as two-dimensional (2D) forward modeling of gravity data. The gravimetric data was also evaluated to identify the depth of the Moho and Conrad discontinuities in Estonia. The magnetic data has also been evaluated to calculate the Curie point depth, which was then utilized to predict heat flow values inside the research zone. The subsurface of Estonia is divided into six petrological-structural zones: Tallinn, Alutaguse, Johvi, West-Estonian, Tapa and South-Estonian. To assess the structural variations of the crust at these locations, profiles of topographic, gravity, magnetic and heat flow data were constructed in each of the petrological-structural zones. The spectrum analysis and 2D gravity forward models yielded residual and regional gravity anomaly maps that show a significant amplitude potential maximum across the precambrian Rapakivi granitoid plutons and the Paldiski-Pskov tectonic zone. The Curie point depth reveals values ranging from 7 to 26 km, whereas the Moho depth suggests values ranging from 48 to 72 km and the Conrad depth values ranging from 14 to 20 km.