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Dynamic topography of the East European Craton: Mantle downwelling in the interior with mantle upwellings at the margins?

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This study examines the relative roles of the crust, the subcrustal lithosphere, and the dynamic support of the sublithospheric mantle in maintaining surface topography of the East European Craton. A set of maps shows that while most of the craton lacks surface topography, the topogra-phy of its basement exceeds 20 km, the amplitude of topography undulations at the crustal base reaches almost 30 km, variations in the thickness of the consolidated crust exceed 50 km, and the amplitude of topography variaňtions at the lithosphere-asthenosphere boundary exceeds 200 km. Geophysical data on the lithospheric structure and mantle temperatures are used to calculate the isostatic contributions of the crust and the subcrustal lithosphere to the surface topography of the East European Craton. The residual topography is calculated as a difference between the surface topography and the isostatic contributions of the crust and the subcrustal lithosphere. A part of the residual topography can be due to unaccounted density variations in the lithosphere, while the other part may be of a sublithospheric, dynamic, origin. The results indicate that the residual (or dynamic) topography is strongly age-dependent. Positive dynamic topography, which ex-ceeds 2 km in the Norwegian Caledonides and in the Urals, clearly links their on-going uplift with deep mantle processes. Negative residual topography (-1-2 km) beneath the interior Ar-chean Paleoproterozoic parts of the craton indicates either smaller density deficit (ca. 0.9%) in their subcrustal lithosphere than predicted by global xenolith data or the presence of a strong downwelling in the mantle. The latter can effectively divert heat from the mantle, facilitating a long-term survival of the Archean Paleoproterozoic lithosphere. (Global and Planetary Change, 2007, v. 58, 411-434).