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The Integrated Analysis of Upper-Mantle Induced Anomalies Topography in Anatolia

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Anatolia is one of the most intriguing regions in the Alpine–Himalayan orogenic belt with different convergence rates, active tectonics, and seismicity. Surface geology and geophysical observations, such as young volcanism, surface heat flow (in the rage of ∼20-230 mW/m2), Curie-point depths (∼ 6 km-35 km) and gravity data indicate the highly variable lateral and vertical configurations of the crustal and lithospheric structures related to ongoing orogenic processes in the region. Large-scale and regional seismic tomography data image fast seismic anomalies indicating subducted African lithosphere along the Aegean and Cyprian trenches, while slow anomalies dominate beneath Eastern Anatolia and correspond to upwelling mantle in concordance with the geological and geophysical data. Recent geodynamic studies generally infer that the surface topography anomalies may be controlled by dynamic processes induced by upper-mantle flow beneath the investigated region. We present here integrated interpretations of upper-mantle induced surface topography with 3D mantle flow, in addition to Airy-type crustal isostasy and spectral analysis of free-air gravity data. For the mantle flow modeling, we carry out 3D thermo-mechanical experiments with the ASPECT code and use temperature anomalies obtained from P-wave tomography data with prescribed mantle and lithosphere rheology. We interpret our preliminary results in the context of the 3D upper-mantle flow induced present-day dynamic topography in Anatolia.