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Curie depth point, effective elastic thickness, and 3-D crustal structure of Eastern Indian shield based on the interpretation of satellite gravity (GOCE) and aeromagnetic data.

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Eastern Indian shield comprises rocks that well persevered the Archean to the Proterozoic history of the earth. However, the lithospheric evolution of the region is poorly understood due to the scanty of seismological observations. In the presented study, an integrated approach is adopted to analyze the satellite gravity (GOCE), aeromagnetic, and topography data complemented with seismological constraints to understand the thermal evolution of the region. Wavelet based Bouguer-topography coherence method was used to compute spatial variations of effective elastic thickness (Te) in the region. We noticed high Te values of 27-31 km over EGMB and low to moderate Te values of 22-30 km over SC and CGGC. Results of 3-D forward gravity modeling of Complete Bouguer anomalies show that the Moho boundary lies at a depth of 35-38 km below the Eastern Ghats Mobile Belt (EGMB) and 38-40 km below Singhbhum Craton (SC), and it increases gradually towards the Chotanagpur granite gneiss complex (CGGC) to a depth of 40-44 km. Curie depth point (CDP) values obtained based on the spectral analysis of aeromagnetic data range from 25-30 km beneath the EGMB, 23-26 km over SC, and 30-36 km beneath the CGGC. Further comparison of CDP values with Moho depths (35-44 km) from 3-D forward gravity modeling and available deep seismic sounding/receiver function data in this region indicate that CDP values are shallower than the Moho. Unlike other cratonic regions, the shallowest CDP and low Te values observed over the Eastern Indian Shield suggests thermal reworking of the cratonic lithosphere in this region.