AOGS 2005

Anomalous thermal structure of the lithosphere beneath Singhbhum Craton, Indian Shield

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Continued plume induced tectonothermal reactivation/rifting, since at least mid-Proterozoic, has made Indian continental lithosphere unique which are well reflected into geological and geophysical signatures. Underlying lithosphere beneath some of the geotectonic segments have now become extremely warm, degenerated, deformed and relatively non-rigid. Singhbhum craton, situated on the eastern part of the Indian shield, is one such region. It is surrounded on all sides by mobile belts; in the north by Narmada-Son mega lineament, in the south by Mahanadi graben and in the east by mid-Proterozoic mobile belt.

To study the detailed lithospheric thermal structure and evolutionary history of this craton, we have made an attempt to combine heat flow and other related geological and geophysical data. Our study reveals that this craton is associated with an abnormally thin lithosphere of about 65 km only, compared to an average of ~ 105 km for Indian cratonic region and 250 to 300 km in other global shields. Temperature at the Moho depth of ~ 36 km is found to be about 700°C. Moho heat flow is also found to be very high at 45 mW/m^2, which is almost twice than that found elsewhere in similar terrains, thereby making it one of the warmest lithosphere anywhere in the world. We feel that more than two-thirds of surface heat flow observed over this region comes from below the Moho. This craton appears to be highly rejuvenated and undergoing neotectonic uplifting. To get an insight into the dynamic history of this craton, a detailed multiparametric study is being undertaken.