Crustal Configuration Beneath the Palghat Gap (South India) and Mantle-Crust Connections

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The orogenic mountains with charnockite and khondalite along the ancient sutures represent exposures of the lower continental crust through continental collision and deep erosion (Fountain and Salisbury, 1981). The Southern Granulite Terrane (SGT) of peninsular India is one such old orogen and is of global significance because of its role in the reconstruction models of east Gondwana supercontinent. Recent investigations show that the juxtaposition of SGT and the Dharwar craton represents a progressive tectonic sequence from Pacific-type orogeny which finally gave rise to a Himalayan-type orogeny (Santosh et al., 2009). The exhumed lower crustal rocks of the SGT occupying the plateaus and peaks of Nilgiri, Biligirirangan-Shevaroy, Anaimalai and Palani-Cardamom hills are the manifestation of continued continental convergence and deep erosion. Palghat gap, located near the centre of the granulite terrane, is the most conspicuous linear low-level landform stretching from the west to the east coast that divides the plateaus and peaks of the SGT. Whether the Palghat gap is just an incision across the Western Ghat hill ranges or a tectonic feature affected by the various stages of the orogeny cycle is of seminal importance. With rock records covering a long span of Earth history (2.5 Ga to 550 Ma) and bounded by Palghat-Cauvery shear system (Chetty, 1996) the Palghat gap holds vital clues for evaluating the Archaean-Proterozoic (or Precambrian) orogeny of the SGT (Naganjaneyulu and Santosh, 2010; Yellappa et al., 2010).

Seismically constrained and geologically comprehensible 2D crustal density model along the Kuppam-Palani geotransect shows a high-density (2.90 g/cm³) shallow body lying at a depth of about 10 km and an ~5 km upwarped Moho beneath the Palghat Gap region. The aim of this presentation is to provide gravity derived, 3-D crustal structure of the region that maintains the state of isostatic equilibrium and to deduce its possible mantle connection that shaped it.

Key words: Southern Granulite Terrain, Palghat Gap, Bouguer gravity anomaly.

References

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