

On the southward extension of the eastern Ghats mobile belt beyond Ongole, Andhra Pradesh, India: Evidence from magnetotelluric data

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SUMMARY

There have been several contrasting geological and geophysical observations about the southward extension of eastern Ghats mobile belt (EGMB) beyond Ongole, Andhra Pradesh, India. To address this enigmatic problem, we have carried out broad-band magnetotelluric (MT) investigations along two profiles, laid out one near the Ongole region (profile AA' of 35 km length) and the other near the Nellore region (profile BB' of 52 km length). The latter is located at a distance of about 125 km south of the former. 2D inversion of MT data in the period range of 0.001 s-10 s, of both the profiles revealed a very thin top conductive layer of about 1–10 Ω -m with an average thickness of about 500 m, representing the alluvium. This layer is underlain by very high resistive subsurface with resistivity of about 10^7 Ω -m extending up to about 30 km and probably further deep. Since the major rock types in the study area are Khondalites, Calcgranulites, Charnockites and Granitic gneisses of Archaean age, having large overlapping resistivities, MT data could not explicitly discern the nature of the multi-layered crust beneath the EGMB. As a result, the subsurface beneath both the regions shows up as a very thick single layer of very high resistivity. The high-grade rocks of the Ongole domain and supracrustals of Nellore Schist Belt (NSB), which lie south of Ongole domain, have undergone synchronous tectonic activity at ca.1.6 By. This is evident by the Kanigiri and Kandra ophiolites within NSB that signify the Proterozoic subduction of the EGMB. This geological evidence together with the similar nature of the high resistive subsurface observed at Ongole and Nellore regions confirm the southward extension of the EGMB beyond Ongole.

Keywords: Eastern Ghats Mobile belt, Ongole, Magnetotellurics and Electrical resistivity imaging
