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Structural framework across the Bastar craton - the Eastern Ghats Granulite Belt interface: Implications for making of eastern Gondwana

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The transformation of palaeo-continents involve breakup, dispersal and reassembly of cratonic blocks by collisional suturing that develop a network of orogenic (mobile) belts around the periphery of the stable cratons. During the collision, partial melting of the different crustal blocks produces migmatites at the craton-mobile belt interface. Thus, migmatites at the craton-mobile belt contact can provide valuable information regarding the pressure-temperature conditions of the melting of lower crust during supercontinent building processes. In this contribution, we document the structural framework across the Bastar craton- Eastern Ghats Granulite Belt (EGGB) interface that developed during the accretion of EGGB over Bastar craton.

Near Bhawanipatna, Orissa, Eastern India, the granulites of the mobile belt are juxtaposed against the granitic rocks of the Bastar craton. Away from the contact domain, the cratonic granite is non-migmatitic and blasto-porphyritic in nature that gradually transforms to migmatitic variety towards the contact domain. In the non-migmatitic variety, the E-W trending stromatic leucozomes and biotite-hornblende rich fabric (S1) wraps around recrystallized K-feldspar augens. In the migmatitic variety towards the contact domain, NNE-SSW trending diatexite leucozomes (S2) are prominent and the intensity of melting and tightness of folding increases towards the contact domain. Structural measurements indicate that the S1 fabric is folded with the development of NNE-SSW axial plane with easterly plunging fold axis (50 -> 050N).

To correlate the geological history of EGGB in the context of supercontinent reconstruction, the existence of a cratonic block consisting of India – Madagascar – Sri Lanka – Enderby Land–Kalahari (“IMSLEK”) from 3000 Ma upto 750 Ma has been invoked by several authors. The apparent continuity of the Grenvillian metamorphic orogen along the East Antarctica-Australia-India margin has been taken as conclusive evidence for the existence of a single landmass since the time of Grenvillian orogeny (1000 Ma) and it is suggested that the same configuration was preserved up to the formation of East Gondwana. The EGGB orogenic belt is considered as intercontinental high grade domain with no evidence for the closing of Mesoproterozoic oceans and the younger Pan-African metamorphic events are the results of intercontinental reactivation of old crustal weakness during the Gondwana assembly in the late Neoproterozoic-Paleozoic. However, recent palaeomagnetic data from India and Australia indicate that India was at much higher palaeolatitude compared to the Australia-Antarctica block, and the accretion of Eastern Ghats Granulite Belt over Bastar craton should have occurred during the Pan-African orogeny. The presence of NNW-SSW trending melt bands and the increase in the intensity of melting and tightness of folding near the contact indicate that Eastern Ghats Granulite belt collided with the Bastar craton during the Paleozoic.