

Lateral ramp and wrench structures in the terrane boundary thrust of the Eastern Ghats Mobile Belt, Eastern India.

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Abstract: The tectonic of juxtaposition of various terranes is well documented in the deformational structures of the terrane boundary. The boundary between the Eastern Ghats Mobile Belt (EGMB) and the Bastar craton in eastern India has been studied in detail to understand the Mesoproterozoic tectonics that resulted in the creation of East Gondwanaland. The Eastern Ghats Mobile Belt comprising granulite facies rocks is juxtaposed against the low grade granitic craton with a curved terrane boundary. The boundary, around Lakhna, is marked by a prominent ductile shear zones that is inclined towards the mobile belt. The mylonites in the shear zone are quartzofeldspathic, being marked by strong SE dipping mylonitic foliation and moderate to steep down dip stretching lineations. It shows the presence of porphyroclast system and asymmetric folds. Microscopic study of the mylonites reveals the presence of S[^]C fabric, asymmetric winged porphyroclasts and intragranular fault which unequivocally point to a top to NW vergence of the shear zone, implying thrusting of the mobile belt over the craton. The strain is calculated by using the S[^]C angle based on simple shear deformation and a throw of 4.0 Km has been estimated.

However, to the south of Boran, for a short distance, the shear zone assumes an E-W trend and if the shear zone is traced eastward into the mobile belt (south of Khariar), the granulites show change in strike from NE-SW to E-W and are marked by two sets of foliation, one related to folding (NE-SW trending) and other related to shearing (E-W trending). On the E-W trending foliation, the subhorizontal stretching lineations are developed indicating E-W strike slip shearing. This segment has been interpreted as a lateral ramp on the basis of exposure of deeper level rocks in the south relative to the north. The exposure of basic charnockite zone to the south of Khariar which is very narrow or nearly absent in the central part is attributed to this lateral ramp structure. To further south, west of Dharamgarh, the terrane boundary becomes NNW-SSE, though the mylonites restate its NNE-SSW strike. Hence the mylonitic foliation remains oblique to the trend of the shear zone. Further, the foliations are shallow implying low inclination of the shear zone. The shear zone, in this part, shows all evidences of thrust slip character indicating overthrusting of Eastern Ghats. Tracing the shear zone to the north of Lakhna, the zone swings eastward around Gandhamardan Hill and it displays strike slip shearing. The stretching lineation gradually varies from thrust slip to strike slip as one moves away from NNE-SSW segment. This part has been explained as a wrench on the terrane boundary shear zone.

On the basis of terrane boundary thrust in conjunction with distinct thrust sheets within Eastern Ghats, the area has been compared with a fold thrust belt. On account of the late kinematics nature of the thrusting (1500 Ma) to folding and granulite metamorphism (1600 Ma), the area has been compared with Caledonide type of fold thrust belt. Hence it is concluded that thrust tectonic played a major role in evolution Gondwanaland during Mesoproterozoic time. The terrane boundary structure and fold thrust belt nature of the belt help in building stronger correlation with East Antarctica.