Petrological and Structural Characters of Khammam Granitoids in the Areas Adjacent to Eastern Ghats Mobile Belt and Dharwar Craton: Implications for Crustal Growth

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In peninsular India, granulite facies rocks of Eastern Ghats Mobile Belt lie in contact with the Archaean craton of Dharwar and Bastar. Assessment of the contact zone is important to decipher the nature of ancient tectonic activity and for knowing the nature of supercontinents in the geologic past. The present study focuses on the margin of one such terrane in the Indian shield, the Dharwar craton, and documents the detailed geological investigations carried out in the contact zone between the craton and the Eastern Ghats Mobile Belt (EGMB) that lies to the east of this craton. The study integrates structural, petrographic, geochemical and metamorphic data to understand the nature of the Dharwar craton- EGMB contact in detail.

The granitoid (Khammam granitoids) in the study area forms an important magmatic lithotype that contains the dominant mineral assemblage viz. quartz , plagioclase, microcline, biotite and hornblende ; both the feldspars form phenocrysts that are now deformed into augens. The penetrative foliation in the granitoid is in the form of a gneissic layering, with biotite replacing hornblende. On the basis of several compositional parameters, the Khammam granitoids show characteristics of both I- and S-type granites. However, quantitative trace element modelling suggests that partial melting of the metabasic rocks in the study area, followed by fractional crystallization of an assemblage consisting of quartz, plagioclase, K-feldspar and biotite, with minor amounts of zircon and apatite/monazite, cannot reproduce the observed concentrations of key trace element concentrations in the Khammam granitoids. It has been suggested that partial melting of a mixture comprising metabasic rocks and small proportion (~2%) of granetiferous quartzo feldspathic gneiss was responsible to generate melt parental to Khammam granitoids.