

Petrology of the Precambrian composite mafic dyke swarms of the southern Bastar craton: implications for evolution of the central India sub-continental lithosphere

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Four sets of composite mafic dyke swarms are emplaced in a vast terrain of the Archaean granite gneisses and granites in the southern Bastar craton. A general trend of these dyke swarms is NW-SE. Three petrographic varieties, viz. amphibolites, greenschists, and dolerites/meta-dolerites, are recognized. Minor meta-diorite is also exposed. Geochemically amphibolites and dolerites/meta-dolerites show sub-alkaline tholeiitic nature, whereas, greenschist variety shows sub-alkaline basaltic komatiite in nature. On the basis of distinct geochemical characteristics, three tholeiitic swarms, viz. TD1, TD2 and TD3, have been recognized. Basaltic komatiite variety is recognized as noritic dyke swarm (ND) on the basis of its mineralogy and chemistry. Distinct multi-elements spidergrams, rare-earth element patterns and La^N/Lu^N ratios corroborate four mafic dyke swarms in the region. Geochronological data on these mafic dykes is not available. Geochronological data of enveloped granitoids, field relationships of dykes with the granitoids, and absence of dyke in the Late Proterozoic sedimentary basin of the region suggest Late Archaean age for TD1 and TD2 swarms, Early Proterozoic age for ND swarm and Middle Proterozoic age for TD3 swarm. Tholeiite-norite associations of similar ages and geochemical characteristics are also reported from Scourie (NW Scotland), Wyoming (USA), SW Greenland, Finland, Brazil, and East Antarctica. This observation suggests presence of mantle heterogenities during the Late Archaean-Middle Proterozoic time on a global scale.