

Geochemistry, Petrogenesis and Tectonic Significance of the Proterozoic Mafic Dykes from the Bomdila Area, NE Lesser Himalaya, India



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Abstract The present study documents a new set of comprehensive whole rock geochemical data of metabasic rocks from Lesser Himalayan sequence, western Arunachal Pradesh, NE India. They occur as sills and dykes within Paleoproterozoic Bomdila and Rupa Group of rocks and are metamorphosed to amphibolite grade metamorphism. Hornblende and plagioclase are the dominating minerals with minor constituents of Fe-oxides, quartz, biotite and apatite in these rocks. They are sub-alkaline tholeiitic in nature, having composition of basalt to basaltic andesite. They are enriched in LREE (light rare earth elements) and LILE (large ion lithophile elements) with depleted HFSE (high field strength elements) characteristics. The geochemical signatures e.g., Fe-enrichment, high Ti/Zr ratio (>52) but low Th/Ta ratio (0.23–0.71) and large variation in La/Yb (5.43–10.21), Zr/Y (0.15–15.14), Ti/Y (261–1133) and Zr/Nb (0.15–16.42) ratios indicate that these rocks were probably derived from an enriched lithospheric mantle source due to varying degrees of partial melting and subsequently the melt was modified by fractional crystallization of olivine, pyroxene and plagioclase rather than crustal contamination. Originally these rocks were emplaced in a continental rift tectonic environment and witnessed amphibolite grade metamorphism during Himalayan orogeny. The geochemical characteristics of the studied metabasic rocks are consistent with the Paleoproterozoic mafic rocks reported from other parts of Lesser Himalaya like Chail and Juthogh amphibolites, Garhwal flows and dykes, Mandi-Darla-Rampur volcanics indicating a same magmatic event along the Lesser Himalaya around Paleoproterozoic.

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