

Shaik A Rashid and Naqeebul Islam, 2016. Geochemical Characteristics of Proterozoic Mafic Dykes from the Bomdila Group of Rocks, NE Lesser Himalaya, India. *Acta Geologica Sinica* (English Edition), 90(supp. 1): 122.

Geochemical Characteristics of Proterozoic Mafic Dykes from the Bomdila Group of Rocks, NE Lesser Himalaya, India

Shaik A Rashid and Naqeebul Islam

Department of Geology, Aligarh Muslim University, Aligarh -202002, India

The mafic dykes from the Paleoproterozoic Bomdila Group of metasedimentary rocks, Arunachal Pradesh, NE Lesser Himalaya, India have been analyzed for major and trace elements geochemistry essentially to understand their petrogenesis. The mafic rocks are basaltic in composition and show continental tholeiitic nature. The important characters such as low magnesium numbers (mostly < 60) and Sr as well as negative Eu anomalies of the Bomdila mafic rocks suggest that fractional crystallization has played a role in the generation of these rocks. The uniform CaO/Al₂O₃ ratio with increasing FeO^t/MgO further indicates that olivine and plagioclase were the main fractionating phases. The fractionation of olivine and pyroxene from the primitive magmas in the evolution of these mafics is also evident from the diagram FeO^t/(FeO^t+MgO) – Al₂O₃. However, a large variation in incompatible element ratios (e.g., La/Yb, Zr/Y, Ti/Y, Zr/Nb) in the mafic rocks cannot be explained by crystal fractionation alone. These variations probably represent different degree of partial melting from a common source and also reflect the enriched mantle source characteristics.

The mafic samples plotted on (La/Yb)_N vs. (La)_N further support the inference that these rocks evolved by different degrees of partial melting of a mantle source. In general, on this type of plot, a linear relationship will be defined by the samples if they are derived by different degrees of partial

melting of a common source; however, the plots may shift horizontally to higher X-axis values because of crystal fractionation (Feigenson et al., 1983; Rosey et al., 1992; Bradshaw et al., 1993). A broad positive linear pattern is exhibited by the Bomdila mafic rocks in (La/Yb)_N vs. (La)_N diagram, indicating that they were formed by different degrees of melting of a source with similar (La/Yb)_N ratios. Lower degree of melting resulted the samples with higher (La)_N and (La/Yb)_N whereas samples with lower (La)_N and (La/Yb)_N have formed by higher degree of melting.

The strong enrichment of LREE and LIL elements in the Bomdila tholeiites relative to primordial mantle indicate their derivation from an enriched mantle source (Weaver and Tarney, 1983). On Nd-Ce, Zr-Nb bivariate plots, the mafic samples always fall on enriched side in the diagram. The high LREE/HREE and low Nb, P and Ti together with high and variable Fe/Mg ratio of Bomdila mafics indicate that the source was enriched through a hydrous silicate melt phase. Typical continental tholeiitic nature, overall low Mg numbers with chemical features indicating the involvement of fractional crystallization are consistent with the geochemical signatures of other such volcanics from Chail, Juthogh, Vaikrita and Garhwal regions (Ahmad and Bhat, 1987; Bhat and LeFort, 1992) that exist in the NW Lesser Himalaya.

* Corresponding author. E-mail: rashidamu@hotmail.com