

## GEOCHEMICAL CHARACTERISTICS OF METAMORPHOSED PRECAMBRIAN MAFIC ROCKS OF SHILLONG PLATEAU, NORTH-EAST INDIA: IMPLICATION FOR ARC-RELATED MAGMATISM

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### Abstract

Proterozoic mafic rocks of Shillong Plateau have been geochemically studied. These rocks have suffered low-grade metamorphism (under greenschist facies) and are dominantly made up of tremolite, actinolite, relict pyroxene, plagioclase, quartz along with minor chlorite, epidote, sericite, and opaque minerals. SiO<sub>2</sub> concentration is variably low ranging from 47.36 wt.% to 50.50 wt.%. Fe<sub>2</sub>O<sub>3</sub> (total) concentration is high in the studied rocks with an average of 14.54 wt.% while MgO averages 7.76 wt%. The total alkalis (Na<sub>2</sub>O + K<sub>2</sub>O) in the studied samples, is low with an average of 2.92 wt%. Low loss on ignition values (0.37-1.16 wt%), suggest no alteration effects in the studied samples. The studied samples are compositionally sub-alkaline tholeiitic basalt. Magnesium number [Mg# = (MgO\*100)/(MgO + FeO)] of the studied rocks range between 41 to 53, suggesting an evolved magmatic character. The primitive mantle normalized multi-elemental diagram shows fractionated trends with inter-elemental variations. Large Ion Lithophile Elements (LILE) like Sr shows a positive anomaly while the High Field Strength Elements (HFSE) like Nb, Ti, and Zr depict negative anomalies. In chondrite normalized REE diagram, the pattern is gently sloping from left to right [(La/Lu)<sub>N</sub> = 2.87 – 3.63] with less differentiated HREE [(Gd/Yb)<sub>N</sub> = 1.36 – 1.60]. Trace elements ratios such as La/Nb > 2 and Nb/La < 1 when coupled with REE and the multi-elemental patterns indicate volcanic arc-related magmatism. Tectonic discrimination diagrams of immobile elements [Ti vs. Zr, Hf/3-Th-Nb/16, and Nb/La vs. (La/Sm)<sub>N</sub>] corroborate a volcanic arc setting for magma emplacement. The ratio-ratio plots (Rb/Y vs. Nb/Y, Nb/La vs. Ba/Rb, and Ba/Th vs. Th/Nb) are indicative of LILE enrichment of the source mantle by subducting slab derived fluid.

*Keywords:* Shillong Plateau, Precambrian, Metadolerite, Geochemistry, Subduction