

## **Geochemical characteristics of Fe-Ti-oxide ore bearing ferrodolerite sill of Chhotanagpur granite gneiss complex, eastern India**

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A dolerite sill intrudes the garnetiferous granite gneiss of Chhotanagpur Granite Gneiss Complex of eastern India. It contains laterally persistent, east-west trending discontinuous lenses of well foliated Fe-Ti oxide ore deposits. Dolerite is made up of clinopyroxene, plagioclase, orthopyroxene with subordinate amount of magnetite, ilmenite, spinel. The effect of crustal contamination in dolerite is negligible as indicated by low values (0.09-0.19) of Th/La and low values (0.18-0.34) of Nb/Y ratios. The mg no. of dolerite is also very low (26-35). The linear trend in mg no. variation diagrams (Mg# vs CaO, FeO<sup>t</sup>, MgO, Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, MnO, Ni) suggests fractionation of olivine, clinopyroxene and plagioclase during magmatic evolution. The dolerites are geochemically similar to E-MORB as revealed from like Nb/Yb vs Th/Yb diagram [1]. In the primitive mantle normalized [2] trace element spider diagram peaks are recorded for elements like Ba, W, Pb, Cs and troughs for Cu and Sr. Such enrichment and depletion are considered as geochemical character of mantle source rock. The Chondrite and primitive mantle [2] normalized flat to slightly LREE enriched [(Ce/Yb)<sub>n</sub> = 1.17-2.24] REE pattern of dolerite might suggest its derivation from E-MORB type mantle source. The relatively high value of Lu/Hf ratio (0.1-0.2) indicates magma generation from spinel peridotite layer of the upper mantle. A slightly negative Eu anomaly (Eu/Eu\* = 0.8-0.9) might be the result of plagioclase fractionation. The tholeiitic nature of the dolerite is also clearly visible in AFM diagram. The clinopyroxene in dolerite also shows iron enrichment (mg no. 36-55). The REE pattern of clinopyroxene of dolerite shows LREE enrichment [(Ce/Yb)<sub>n</sub> = 44-103] with respect to clinopyroxene from oceanic island basalt and a LREE depletion [(Ce/Yb)<sub>n</sub> = 0.1-0.6] with respect to clinopyroxene of intraplate basalt. Negative Eu anomaly (Eu/Eu\* = 0.7-0.9) in clinopyroxene hint towards a Eu-depleted mantle source. Occurrence of ferrodolerite in CGGC might suggest an episode of iron enrichment through metasomatism in the mantle source.

[1] Sun & McDougall, 1989, Geological Society, London, Special Publications, 42, ; [2] Pearce, 2008, Lithos, 100(1)