Clinopyroxene composition of volcanics from the Manipur Ophiolite, Northeastern India: implications to geodynamic setting

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The Naga-Manipur Ophiolite (NMO) belt is a Tethyan-type of ophiolite in the Indo-Myanmar Ranges, Northeastern India, emplaced due to the convergence of the Indian plate with the Myanmar plate [1]. The wide variation in clinopyroxene composition of the mafic volcanics from Manipur area of this belt is evident through Electron Probe Micro Analytical studies. Based on the variable content of TiO_2, SiO_2, and Na_2O, the clinopyroxenes are classified as high- and low-Ti clinopyroxenes. High Ti and Al contents with relatively lower silica saturation are observed in the former group and vice-versa in the latter. The ${}^{Ti}D_{Cpx/rock}$ values of 0.36-0.76 in low-Ti clinopyroxenes and 1.98-3.78 in high-Ti clinopyroxenes are comparable with island-arc basaltic andesite (0.3-0.6) and MORB (~1) respectively [2]. This confirms that the clinopyroxene composition of volcanics from the Manipur Ophiolite (MO) is primarily related to the host magma-type and its tectonic setting. Several bivariate diagrams like Ti vs Ca, Na, and (Ca+Na), and (Ti+Cr) vs Ca, and tectonic discrimination diagrams (Si vs Al, Al vs Ti, Ti vs Al^{IV}, and TiO_2-SiO_2/100-Na_2O) confirm MORB (non-orogenic setting) and island-arc boninitic magma affinities (orogenic setting) for the high- and low-Ti clinopyroxenes respectively. The coexistence of both MORB and island-arc boninitic magma-types in the volcanic stratigraphy of MO may reflect either juxtaposition of rocks formed in diverse tectonic settings or, a change in magma composition with time. In the former case, this coexistence may indicate a transformation of tectonic setting from MOR to SSZ whereas, in the latter case, this may indicate a magmatic evolution in subduction zone setting where the early formed volcanics show MORB-type character followed by boninitic volcanism from a mantle wedge source under the influence of subducted slab-derived fluxes [3].

[1] Gansser (1980), *Tectonophysics* 62, 37–52. [2] Beccaluva et al., (1989), *CG* 77, 165-182. [3] Dilek & Furnes (2011), *GSAB* 123, 387-411.