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Geochemical and Sr-Nd-Ca isotopic study on Nagaland Ophiolites, India plume influence on Neo-Tethyan Oceanic Lithospheric Mantle

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The Nagaland–Manipur Ophiolites, located in the north-eastern margin of India and forming a part of Indo-Myanmar Range, represents the obducted Neo-Tethyan lithospheric mantle with emplacement age estimates ranging from 116-127 Ma ago [1-2]. Petrogenetic studies of these ophiolites samples from either Nagaland or Manipur have suggested diverse origins ranging from supra-subduction zone, back-arc to MOR settings [3-5]. To further evaluate the petrogenesis of these rocks, we analysed geochemical and Nd-Sr-Ca isotopic composition of mafic rocks collected from Nagaland Hill Ophiolite (NHO) using quadrupole ICPMS and TIMS, respectively. The rocks show depleted to dominantly flat REE patterns in chondrite-normalized plots ($La/Sm_{(N)}$ = 0.53 to 0.91), which are higher than average N-MORB ($La/Sm_{(N)}$ = 0.51) [6], and a N-MORB to E-MORB-like composition in a Th-Yb-Nb discrimation diagram**.** The measured $^{87}Sr/^{86}Sr$ (0.704999 - 0.706661) and $^{143}Nd/^{144}Nd$ (0.512370 - 0.512966) also suggests enrichment of the mantle source of these rocks. In Ce/Nb versus Th/Nb and Nb/Y versus Zr/Y discrimination diagrams, the compositions of the NHO mafic rocks overlap with basalts derived by melting of the Kerguelen plume [7]. Initial Nd and Sr isotopic compositions calculated at 117 Ma, also overlap with those of 117 Ma old Kerguelen plume-derived basalts from north-east India [8]. The $\delta^{44/40}Ca_{SRM915a}$ values for the mafic rocks range from 0.78-1.11‰ while the associated ultramafic rocks show higher values (1.09-1.32‰). The $\delta^{44/40}Ca_{SRM915a}$ values show moderate correlations with Mg# and Mg and Fe contents thereby suggesting the influence of magmatic processes on the Ca isotopic compositions of these rocks. The role of seawater alteration on the Ca isotopic composition of the ophiolites needs further evaluation.

[1] Singh et al., 2013 JGSL 174 (170-179); [2] Liu et al., 2016a Geology, 44, 311–314; [3] Kingson et al., 2019 GSL 481(195-210) [4] Ghosh et al., 2018, JAES 160 (67-77), [5] Khogenkumar et al., 2016, JAES, 116 (42-58) [6] Workman et al., 2005 EPSL 231(53-72); [7] Ghatak and Basu, 2013,GCA, 115 (46-72); [8] Ghatak and Basu, 2011, EPSL, 308 (52-64).