Origin of basaltic rocks of Nagaland-Manipur Hill Ophiolite (NMHO) complex in North-Eastern India: Inferences from mantle melting models.

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Basaltic samples from Nagaland-Manipur Hill Ophiolite (NHMO) complex in north-eastern India comprise predominantly of plagioclase with small amounts of pyroxene and exhibit porphyritic texture. In whole rock Zr/Ti vs. Nb/Y discrimination diagram, these rocks are classified as basalt (TiO$_2$ < 2 wt.%) and alkali basalt (TiO$_2$ < 2 wt.%). Based on whole rock and clinopyroxene composition, basalt and alkali basalt show tectonic affinities to MORB and WPB, respectively. In N-MORB normalized trace element plot, basalt display near-horizontal trend at rock/N-MORB = ~1 and show positive anomalies at Pb, Th and Sr, whereas alkali basalt display increasing enrichment from left to right with marked negative anomalies at Ti and Sr. In chondrite normalized REE plot, basalt display near-parallel horizontal pattern similar to average N-MORB, whereas alkali basalt show parallel but increasing enrichment pattern from HREE to LREE similar to average OIB. Incompatible trace element ratios Sm/Yb, La/Sm, TiO$_2$/Yb and Nb/Yb suggest N-MORB- and OIB-type parental magma for basalt and alkali basalt, respectively.

Dynamic melting inversion model for alkali basalt suggests melting of OIB-like spinel lherzolite composition (S1) at $F = \sim 5\%$, with S1 being more enriched in MREE, LREE, Nb and Zr as compared to DMM. Non-modal batch melting model for basalt suggests melting of N-MORB-like spinel lherzolite composition (S2) at $F = \sim 5 - 10\%$, with S2 being very similar to DMM. Constraints from trace elements indicate that basalt with N-MORB signatures is believed to be part of an ophiolite suit, whereas the alkali basalt with OIB signatures is likely due to some localized plume activity.