

GEOCHEMISTRY OF SHEETED DIKES IN THE NAIN OPHIOLITE (CENTRAL IRAN)

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ABSTRACT

The Nain ophiolite is a highly dismembered ophiolite complex cropping out at the north of the Nain town to the west of central Iran. The igneous rocks of this complex consist of both mantle and crustal suites and include serpentized peridotites, peridotites, harzburgites associated with dunite and lherzolite, pegmatitic and isotropic gabbros, plagiogranites, sheeted dikes and pillow lavas. Several pyroxenite, wehrlite and rodingite dikes are present in the ultrabasic rocks. The sheeted dikes include subalkaline basalts, basaltic andesites and andesites. Their magma was of sub-alkaline (low potassium tholeiite) type and they are chemically similar to island arc tholeiitic basalts. The N-MORB-normalized incompatible elements for the sheeted dike samples indicate depletion in most of the high field strength elements (HFSE). The concentrations of the large ion lithophile elements (LILE) in these rocks are all greater than those in the N-MORB. Significant chemical characteristics of these rocks are the positive anomaly for Th and negative anomaly of Nb that are considered to represent a subduction zone component. The chondrite-normalized rare earth element (REE) patterns of these rocks show HREE enrichment and LREE depletion [$(La_N/Sm_N)_{ave} = 0.63$]. Their geochemistry also shows that the primary melt derived from high degrees of partial melting of a mantle source previously depleted with respect to the source of mid-ocean ridge basalts, and were subsequently enriched by aqueous fluids driven off subducted oceanic lithosphere in an arc-basin setting. We conclude that the Nain ophiolite is a supra-subduction zone type ophiolite.