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Slab-derived melt involvement in petrogenesis of the high-Nb basalts and magnesian andesites-dacites from NE Iran

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Abstract
Tertiary volcanic rocks in NW Firoozeh region, also known as Meshkan triangular structural unit, represent an episode of Tertiary post-collisional magmatism in NE Iran. The volcanic suite is made of Magnesian andesites to dacites associated with some high-Nb basalts. Despite a rather restricted range of emplacement age, variable from 24.1 to 21.7 Ma obtained on the basis of 40Ar-39Ar dating. Major and trace element data show that Firoozeh volcanic rocks were derived from two distinct parental magmas. The dominant high magnesian magmatic series constitutes a wide spectrum of volcanic rocks from andesite to dacite. The magnesian andesites-dacites are subalkaline and characterized by rather high MgO, Ni, Cr and Sr/Y ratio. High Sr/Y ratio of the magnesian andesites-dacites as well as their Sr-Nd isotopic composition support the notion that the magnesian andesites were originated by interaction of slab derived melts with overlying mantle wedge. Fractional crystallization of an amphibole and plagioclase mineral assemblage is found responsible for evolutionary path form the magnesian andesite to more evolved rocks. In contrast to the sabalkaline magnesian andesites- dacites, the high Nb basalts are sodic alkaline rocks and show silica-undersaturated degree. The high-Nb basalts are enriched in Nb, and a wide range of incompatible trace elements that include LILE, LREE. Almost identical Sr-Nd isotopic composition of the magnesian andesites-dacites and high-Nb basalts imply that the two magmatic series has probably shared a common mantle source. Generation of parental magmas of the two magmatic series are attributed to the asthenospheric upwelling and subsequent partial melting of mantle metasomatized by slab-derived melts.
Key words: slab melt, High-Nb basalt, 40Ar/39Ar, High-Mg andesite