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Whole rock geochemistry and Sr-Nd isotopes of mafic to intermediate subvolcanics bodies of Kashmar, evidence for subduction of Sabzevar back arc basin beneath Lut block

A.R. Almasi[*1], R. Arjmandzadeh[2], J. Francisco Santos[3], M. H. Karimpour[4]

1- Department of Geology, Faculty of Sciences, Lorestan University,Khorram Abad
2- Department of Geology, Payame Noor University (PNU), Iran
3- Department of Geology, University of Aveiro, Austria
4- Department of Geology, Faculty of Sciences, Ferdowsi University of Mashhad

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Abstract: On the basis of field studies, mafic-intermediate bodies of Kashmar are subdivided into the old series (often stocks of gabbro, diorite, quartz diorite/monzodiorite) and the new series (quartz monzodiorite swarm dykes). In terms of crosscutting relationships, old series has the age between oldest volcanic units (57 Ma) and Eocene granitoids (40 Ma), but the swarm dykes are attributed to the post Eocene (Oligocene?) in age. Mafic-intermediate bodies with the high-K calc-alkaline to shoshonitic, metaluminous to low peraluminous, LILE/HFSE and LREE enrichment [$(La/Yb)_N$=5.3-6.8] and depletion of HREE characteristics are reminiscent of the arcs in subduction zone. These features accompany with negative anomalies of Eu indicating magma generating at the depth of plagioclase stability and contaminiation of magma to continental crust, which remains during the melting of the garnet rock. Linear trend of the major oxides and trace elements in Harker diagrams indicate in importance of fractional crystallization of magma evolution. Average of initial isotope ratios of $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ (in age 50 Ma) for the old series samples are between 0.7054 /0.7062 and 51262-0.51264 respectively, and the εNdi has a range of 1.08 to 1.42. Average of initial isotope ratios of $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ (in age 30 Ma) for swarm dykes are 0.7056 and 512623 respectively, and the εNdi amount is .059. εNdi positive values and low ISr of all rocks with their T_{DM} (0.6-0.8) implying that they form from partial melting of lithospheric mantle source, which modified to earlier subduction processes melts. Based on the Th/Ta versus Nb/Ta and Nb/Y versus Zr/Y charts, both subduction and rift forming processes were involved in the formation of Kashmar rocks. This feature is compatible with subduction of Sabzevar oceanic crust to the Lut block.

Keywords: *Subvolcanic bodies; geochemistry; Sr-Nd isotopes; back arc; Kashmar.*

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[*]Corresponding auther, Tel: 09169674572, Fax: 06633202673, Email: alireza.almasi@gmail.com