



Zagros orogeny and the nature of derivative granitoids in central segment of Sanandaj-Sirjan zone, Iran

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Sandndaj-Sirjan zone (SSZ) is a subzone of the Zagros Orogenic belt (ZOB) of Iran. ZOB resulted from the Arabian–Iranian microplate continental collision following the subduction of the Neotethys oceanic crust underneath Iran (e.g. Agard et al. 2011). SSZ mostly consists of a basement made of low- to high-grade metasedimentary rocks intruded by felsic to mafic bodies showing geochemical arc affinity (e.g. Ahmadi Khalaji et al. 2007).

Central segment of the SSZ characterized by intrusion of Alvand, Boroujerd, Aligoodarz and Dehno granitoid complexes all of which have comparable whole rock geochemical properties. They show continuous trends on harker variation diagrams and have similar chondrite-normalized multi element patterns. Fractional crystallization is their main evolving process. Fractionation of biotite, amphibole, feldspar and Fe-Ti oxides have important effect on magma evolution and generation of different magma types. All the granitoid bodies have geochemical properties similar to I-type granitoids of normal continental arcs. However Alvand granite has the most peculiar composition. In comparison with other granitoids, it is enriched in Cs, Cr, Rb, K₂O and Th but depleted in Ca. All of these features indicate the role of sedimentary rocks in the petrogenesis of Alvand granite.

Sr and Nd isotopic composition of the Alvand (⁸⁷Sr/⁸⁶Sr=0.707-0.719; εNd=-1.0 to -4.5; Shahbazi et al. 2010), Boroujerd (⁸⁷Sr/⁸⁶Sr=0.7062–0.7074; εNd=-3.02 to -3.62; Ahmadi Khalaji et al. 2007) and Aligoodarz (⁸⁷Sr/⁸⁶Sr=0.7074-0.7110; εNd=-3.56 to -5.50; this study) granitoids provides more evidence on the nature of these rocks. Alvand granitoids have the widest range of isotopic composition probably due to the heterogenous nature of the source rocks especially the assimilated sedimentary rocks. So, their isotopic characteristic is comparable with S-type granitoids. Isotopic composition of the Boroujerd granitoids is similar to the I-types. Isotopic composition of the Aligoodarz mafic samples is similar to those from Boroujerd and is comparable with I-type granitoids. However, they are similar to S-types as SiO₂ content of the samples increase. These observations suggest that assimilation of surrounding sedimentary rocks has occurred during magma evolution. So, assimilation and fractional crystallization are the main evolving processes of the granitoids in the central segment of the SSZ. The degree of assimilation is not the same for the granitoids of different areas. Boroujerd granitoids show the least degree of assimilation. Alvand granitoid show the widest range of assimilation. For the Aligoodarz granitoids, it increases as the magma evolves by fractional crystallization.

References



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