

Petrology and U-Pb Zircon Dating of Marfion Intrusive Complex, West of Kashan

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Received: 2012 February 25

Accepted: 2012 September 11

Abstract

The Marfion Granitoid Complex is a part of Cenozoic plutonism, which located in the central part of the Urumieh–Dokhtar Magmatic Belt. This complex consists of four main intrusives, including the Mozvash micro-dioritic to micro-monzodioritic intrusive, which scattered as separate outcrops through the western part of the area, the Marfioun spherical tonalitic intrusive which is the most widespread pluton throughout the area, the Poudalg N-S elongated tonalitic intrusive, and the Ghalhar quartz-dioritic intrusive. The mafic microgranular enclaves with geochemical properties similar to their host granitoid are abundant in the Marfion and also in some parts of Poudalg and Ghalhar intrusives. According to geochemical data, the Marfion granitoid complex is metaluminous, I-type and show the low to medium potassium calc-alkaline affinity. Using U-Pb zircon dating method, the obtained magma crystallization ages are about 50 Ma for the Mozvash intrusive and 18 Ma for the Marfion, Poudalg and Ghalhar intrusives. The geochemical evidences suggest that the Eocene Mozvash microdioritic magma is the result of the lower crust's partial melting and its mixture with the mantle's melts in an active continental margin. The Miocene intrusives were derived from partial melting of a common lower crustal mafic source caused by the mantle melts in a post-collisional setting. The Mozvash micro-diorite intrusive shows less fractionated REE pattern than the Miocene intrusives. The geochemical evidences suggest a same petrogenetic model for tonalite and quartz-diorite magmas. The Marfion, Ghalhar and poudalg intrusives and their enclaves show relatively high Al₂O₃ and Na₂O/K₂O ratio and LREEs, which suggest partial melting of metabasaltic rocks. The geochemical investigations indicate that the quartz-diorites and tonalites are derived from the process of amphibole dehydration melting reacted in the lower crust.

Keywords: Marfion Granitoid, I-type, Partial melting, Post collision, Urumieh–Dokhtar magmatic belt.

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