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# Geochemistry of biotites from Boroujerd granitoid complex, SSZ, Iran: A crucial factor for illustration petrogenesis and tectonomagmatic environment of host rock?

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Boroujerd Granitoid Complex of the Sanandaj-Sirjan Zone in western Iran mainly consists of three units: granodiorite, quartzdiorite and monzogranite. Biotite, the dominant hydrated ferromagnesian rock forming mineral, from different units of the complex has been analyzed with electron microprobe. The results have been used to elucidate tectonomagmatic and evolution of the complex. The composition of biotite from different units has plotted in the annite – siderophyllite – phlogopite – eastonite quadrilateral (ASPE). Accordingly, the biotites from granodioritic rocks exhibits a fairly wide range of Al values reaching up to $\tilde{3}$.36 per formula unit (apfu), all at Fe/(Fe + Mg) contents slightly varies from $\tilde{0}$.59 to 0.68 whereas biotite samples from the monzogranitic unit define a field with a relatively narrow range of Fe/(Fe + Mg) but total aluminum values changes with a small range of 3.19 to 3.35 apfu. biotite compositions from these units considered to be derived entirely from crustal material, show a remarkable increase in both total Al and Fe, approaching the siderophyllite end member. Biotite from the qaurtzdioritic unit shows approximately a constant range of Fe/ (Fe + Mg) in respect with a large variety of moderate Al content in the ASPE quadrilateral. Hence the most evident differences in biotites from distinct units of Boroujerd granitoids also the petrogenesis interpretations are based on ASPE quadrilateral diagram of trioctahedral micas. Besides, biotite compositions from metaluminous I-type quartzdioritic unit have slightly lower content of Al2O3 in contrast to two other units, but being moderately enriched in Mg. They plot in the calc-alkaline I-type field in the discrimination diagram of Abdel-Rahman (1994). These compositional features of biotite are consistent with the nature of their host rocks. Contrary to the quartzdirtes, showing subduction related I-type granitoid samples from granodiorites and monzogranites, mentioned ternary diagram failed to indicate correct tectono-magmatic field. Since the great care was taken into account to avoid non-magmatic biotites, this discrepancy in discriminating tectonomagmatic environments of Abdel-Rahman (1994), isn't due to non-magmatic or alerted biotites.
Furthermore log(XF/XOH) versus log(XMg/XFe) plot of Ague and Brimhall (1988) is utilized here in order to shed light on processes which had been countributed in genesis of the host rock e.g. degree of contamination in different units of the Boroujerd complex. log(XMg/ XFe) ranges from -0.452 to 0.074 in the analysed biotites and most of samples from qaurtzdioritic unit in Boroujerd complex fall within I-MC (Moderately contaminated I-type) field whereas two other units, containing biotites with log (XMg/ XFe)< -0.21, classified as I-SCR type. Noteworthy that, quiet a few samples from granodiorites are > -0.21 and fall between I-SCR and I-MC to slightly I-WC type.
In general granites from different units of Boroujerd complex in SSZ are interpreted as having formed within a subduction-related environment. They contain biotites that is compositionally posses moderate Al contents, suggestive of significant contributions from aluminous metasedimentary material or magmas from aluminous supracrustal material, either by assimilation or cotamination, during its petrogenesis. This conclusion is consistent with the available petrological and geochemical data of Ahmadi et al. (2007). We therefore conclude, like Abdel-Rahman (1994) and Shabani et al. (2003) that the composition of biotite can be a useful host rock tectonomagmatic and petrogenesis indicator if coupled with other parameters, such as major- and trace-element data on the whole rocks, isotopic geochemical data, field and other geological constraints.