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A-type and I-type granitoids and mylonitic granites of Hassan Salaran area of SE Saqqez, Kurdistan, Iran

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The Hassan Salarn area is located 20km to southeast of Saqqez city in Kurdistan Province, western Iran. In this area there are two distinct granitic rock suites consisting A-type and I-type granites and also mylonitic granites. These A-type and I-type granites have various petrological and geochemical characteristics. They also have different origins and petrogenesis. A-type granitoids comprise alkali feldspar granite, syenogranite and quartz alkali feldspar syenite, whereas I-type granitoids are composed of monzogranite, granodiorite and tonalite. Geochemically, A-type granitoids are peralkaline and acmite-normative but I-type granitoids are subalkaline (calc-alkaline), metaluminous and diopside-normative. A-type granitoids are also ferroan alkali and ferroan alkali-calcic whereas I-type granitoids are magnesian and calcic. A-type granitoids resemble to within plate granites and post-orogenic granites whereas I-type granitoids resemble to volcanic arc granites. A-type granitoids contain higher concentrations of alkalies, Zr, Rb, Nb, Y, Th, Ce, high FeO/MgO ratios and lower concentrations of Mg, Ca and Sr, resembling post-orogenic A-type granites. It is possible that heat from a mantle-derived magma which intruded into the lower crust, and/or rapid crustal extension have been essential generation of approriate melts producing A-type granitoids. Thus we can conclude that A-type granitoids were generated from a mixed mantle-crust source. Negative Nb anomalies and low contents of Ti and P probably indicate a subduction-related origin for protolith of I-type granitoids. Negative Nb anomalies and enrichment in Ce relative to its adjacent elements can be related to involvement of continental crust in magmatic processes. I-type granitoids are also enriched in Rb, Ba, K, Th, Ce and depleted in Nb, Zr and Y, indicating that they have had interacted with crust. I-type granitoids may result from contamination of mantle-derived magmas by continental crust during a subduction event.
The mylonitic granites are elongated masses with a NE-SW trend and their contacts with the A-type and I-type granitoids are fault contact. Hand specimens have a layered appearance with green bands made from chlorite and epidote and grey to white bands with quartz and feldspar. These rocks contain plagioclase, quartz and orthoclase under the microscope. Also fine-grained minerals such as quartz, sericite, epidote, chlorite and opaque minerals make the groundmass wrapping the porphyroclasts. Pressure shadows around porphyroclasts of plagioclase and quartz and crystallization of fine-grained quartz and sericite in these places along with intense alteration of plagioclase to epidote and sericite, existence of quartz with different sizes, andaluse extinction in quartz crystals, and elongation of chlorites, resulted from dynamic recrystallisation of biotites all indicate effect of stresses on the rocks. Considering the similar mineralogical composition of the mylonitic rocks with I-type granitoid, it could be concluded that the granodioritic magma, after intrusion and solidification, is changed to mylonite in a shear zone due to tectonical forces.