Geochemistry and petrogenesis of Hassan Salaran granitoid complex in SE Saqqez, western Iran

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The Hassan Salarn granitoid complex is located 20km to southeast of Saqqez city in Kurdistan Province, western Iran. It is composed of two distinct granitic rock suites that have various petological and geochemical characteristics. They also have different origins and petrogenesis. G_1 granitoids comprise alkali feldspar granite, syenogranite and quartz alkali feldspar syenite, whereas G_2 granitoids are composed of monzogranite, granodiorite and tonalite. Geochemically, G_1 granitoids are peralkaline, A-type and acmite-normative but G_2 granitoids are subalkaline (calc-alkaline), metaluminous, I-type and diopside-normative. G_1 granitoids are also ferroan alkali and ferroan alkali-calcic whereas G_2 granitoids are magnesian and calcic.

According to tectonic discrimination diagrams [1], G_1 granitoids plot in the field of the within plate granites whereas G_2 granitoids plot in the field of volcanic arc granites. Considering the method for classification of granites setting [2], G_1 granitoids plot in the post-orogenic field but G_2 granitoids plot in the field of mantle fractionated rocks. G_1 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 G_1 granitoids. Thus we can conclude that G_1 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 G_2 granitoids. Negative Nb anomalies and enrichment in Ce relative to its adjacent elements can be related to involvement of continental crust in magmatic processes. G_2 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. G_2 granitoids may result from contamination of mantle-derived magmas by continental crust during an subduction event.

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Comparing MSW landfill sites of Ottawa (capital of Canada) and Mashhad (the 2nd biggest city of Iran)

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Waste disposal is an important issue in almost all cities and landfilling of municipal solid waste (MSW) is the most widely used disposal method in all over the world. In big cities like Mashhad (cultural capital of Iran) and Ottawa (capital of Canada), in spite of waste composting and recycling, considerable amount of MSW is disposed in landfill sites. In this study, the Mashhad municipal landfill (ML) and Ottawa municipal landfill (OL) sites which are owned and operated by the Cities of Mashhad (Iran) and Ottawa (Canada), respectively, have been investigated. The ML and OL sites were compared by looking at 1) site characterization of ML and OL; 2) waste composition and the geochemical composition of leachate in both ML and OL sites; and 3) the environmental impacts of both sites.

Landfilling in OL and ML sites began in 1960s and 1975, respectively. Both sites accept residential, industrial, commercial/institutional, and construction/demolition MSW material. However, ML is receiving about 584000 tons MSW annually (with dial average of 1600 tons), which is much more than that of OL landfill (355070 tons annually). At Ottawa landfill site, both the shallow and deep aquifers have been impacted by the landfill leachate infiltrating from the unlined portions of the landfill site. The presence of methane, DIC and the enriched d13C-DIC values at some monitoring wells, in comparison with pristine groundwater, provide evidence for leachate impact on groundwater at OL site [1, 2]. The detailed description of sampling procedures, analytical techniques, leachate composition, and leachate impact on the environment is given by Mohammadzadeh and Clark [3]. The ML site, with an elevation of 1080 a.s.l., is located on an igneous bedrock covered with alluvial deposit. Since the covered soil is not that much thick and there is fractured network in granitoeid bedrock, it is suspected that ML leachate have had an impact on groundwater resources.

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