Geochemistry and Petrogenesis of the Host Granites and Mafic Enclaves in the Granitic Terrain of the Hyderabad Region, India: Implications for the Proterozoic Crustal Evolution

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The granitic terrain of the Hyderabad region represents one of the major granite forming events of the south Indian shield. The terrain is composed of varied granite types ranging from tonalite, trondhjemite, granodiorite to adamellite compositions and carry mafic enclaves of various sizes. Studying the mutual petrogenetic relationships of the enclaves and the host granites will help in understanding of the granite emplacement mechanisms vis a vis the source characteristics of the granite magma, apart from throwing light on the crustal evolution processes of the Proterozoic period (to which the granite event belongs)). An attempt has been made to mineralogically and geochemically characterize the mafic enclaves and the various granite types of the terrain and understand the mutual relationships if any of the mafic enclaves and host granites.

Under the microscope the granites consist essentially of quartz, k-feldspar, hornblende and biotite with occasional plagioclase and a few opaques. On the other hand the mafic enclaves are mostly fine- to medium grained, consisting of amphibole, occasional opx and hornblende with micro- granular texture.

The host granite samples encompass the field of "granite", occasionally tending towards " adamellite" and "granodiorite" fields and have been emplaced in a "volcanic arc granite" (VAG) tectonic environment.

The granites are characterized by high silica contents with moderate levels of alkalis indicating their origin as I-type granites by anatectic processes. The granites have got fractionated LREE (Avg.La_N/Sm_N= 5.68), with moderate HREE fractionation (Avg. Gd_N/Yb_N= 4.42) with mostly negative Eu anomalies (Avg Eu/Eu^{*}=0.69).

The enclaves for the most part are of amphibolite nature (Fig.4), with low- to moderate levels of silica and alkalies with enriched contents of ferromagnesian trace elements such as Cr and Ni etc. The mafic enclaves have moderate LREE fractionation (Avg La_N/Sm_N =4.82) and HREE fractionation (Avg. Gd_N/Yb_N =4.95) with Negative Eu anomalies (Avg. Eu/Eu^{*} =0.62).

The mafic enclaves of amphibolite character may possibly be remnants of older crust brought up by the ascending granitic magma. In the process of assimilation of

the pre-existing mafic crust, the magma might have been modified in composition to varying degrees depending on the extent of digestion of the mafic crustal material trapped in the ascending granitic magma, before emplacement of the granite, which might have resulted in the observed variations in both the host granites as well as the mafic enclaves. It is imperative that the early formed continental crust was of mafic nature, which with time has evolved into one of granitic nature with evolution.

Key words: Hyderabad granitic terrian; host Granite; mafic enclaves, geochemistry; petrogenesis