

THE INHANDJARA TOPAZ-BEARING LEUCOGRANITE: AN EXAMPLE OF MAGMATIC DIFFERENTIATION IN THE ITU RAPAKIVI PROVINCE

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ABSTRACT: The Inhandjara Granite, located north of Itupeva city (São Paulo state, SE Brazil), is a small and differentiated igneous stock that constitutes the northeastern border of the Itu Batholith, an A-type rapakivi body, composed by four main Ediacaran intrusions (Indaiatuba, Salto, Itupeva and Cabreúva). The granite outcrops as hololeucocratic rocks, with distinguished radiometric contents (more enriched in Th and U than the surrounding units), and low magnetic susceptibility. It occurs at higher altitudes, separated from the other granites by a belt of basement gneisses and with different geomorphology. It is made of two internal facies: porphyritic biotite monzogranite, with potassium feldspar megacrysts in a medium to coarse-grained matrix, that locally transits towards seriate inequigranular specimens; and medium to fine-grained equigranular alkali feldspar granite, which is also the most evolved facies, consisting of subhedral albite (28-32%), anhedral quartz (30-35%), potassium feldspar (30-33%) and Li-bearing siderophyllite (2-5%), with fluorite, topaz, zircon, ilmenite and columbite-tantalite as accessory magmatic phases. The stock is metaluminous, with alkali-calcic to alkalic character, and from the ferroan series. It fits in the A2 subtype, with reduced nature and is classified as from the ilmenite-series. The most evolved facies presents high contents of SiO₂ (~76%), Al₂O₃ (~13%) and Na₂O (4.5-5%), with low values of TiO₂ (<0.03%), Fe₂O₃^T (~0.85%), MgO (<0.02%), CaO (~0.5%) and P₂O₅ (<0.01%). Considering the trace elements, it is enriched in F (0.3-0.4%), Cs (~15 ppm) Rb (650-780 ppm), Nb (60-75 ppm), Ta (7-9 ppm), Y (110-125 ppm), Th (35-45 ppm) and U (8-15 ppm), while it is poor in Sr (4-10 ppm), Zr (80-100 ppm) and Ba (2-25 ppm). For the rare-earth elements, when compared to other facies, the equigranular granite shows slight enrichment in the heavy elements, with REE_{total} content around 150 ppm and (La/Yb)_N ratio of 0.6. It displays an almost flat pattern in chondrite-normalized plots, with strong negative Eu anomaly (Eu/Eu* = 0.03), one of the largest for the Itu Batholith. The stock also shows evidences of intensive metasomatism inside the granite and specially in the country rocks, occurring surrounded by thick greisen bodies made of quartz, Li-bearing muscovite and topaz, with local formation of hübnerite (Mn-rich wolframite) and cassiterite in veins in the country gneiss, and sulfides (sphalerite, galena, pyrite and chalcopyrite) in veins inside the granite. Therefore, the Inhandjara leucogranite presents mineralogical, textural and chemical evidences of strong magmatic differentiation, resulting from the crystallization of a late magma, enriched in volatile phases and incompatible elements. Those characteristics place the stock in the most evolved spectrum inside the Itu Province, relating the intrusion with the rare-metal (Nb-Ta-W-Sn) mineralization processes.

KEYWORDS: A-TYPE, RARE-METAL GRANITE, PETROGENESIS.