



## MAJOR AND TRACE ELEMENTS IN PLAGIOCLASE AND AMPHIBOLE FROM THE LAVRAS PLUTON, RS: EVIDENCES OF MAGMA-CHAMBER DYNAMIC

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Processes of magma differentiation are discussed for the Lavras granitic pluton (603-596 Ma) based on new mineralogical data. The granitic pluton, in the West of the Sul-riograndense Shield, displays a reverse compositional zonation and two structural domains: a central laccolith surrounded by annular intrusions. Magnesian granites occur in the laccolith constructed by intrusion of the core Bt-granodiorite (BG) into a precursory sill now formed by the middle types, Amp-Bt monzogranite (ABM) varying up to syenogranite (ABS). Ferroan, slightly alkaline types constitute annular intrusions including the Bt-Amp syenogranite (BAS) and the alkali-feldspar granite (Afsg). Contacts between granites are mostly gradational, and all but the core types display localized mafic microgranular enclaves. Regular chemical variations in bulk compositions point to processes of fractional crystallization for the border granites, whereas the inner ones show no clear evolutionary trends in a short SiO<sub>2</sub> interval (70-72 wt. %). EMPA and LA-Q-ICPMS analyses for major and trace elements in amphibole and plagioclase from 6 samples representative of granites were obtained on laboratories at IGEO/UFRGS and IG/USP, respectively. From the inner to the border types, plagioclase varies from oligoclase/andesine through albite showing a regular decrease of Sr, Ba and Mg. Compositional trends of amphibole, from Hst-Hbl to a solid solution between Fe-Hbl and Fe-Wnt, are defined by increasing alkalinity index ( $AI = NK/A$ ) and contents of Nb, Li, Zn, HREE, Zr and Pb, and decreasing *mg#* (Mg-number), Sr, Eu and Ba. Trace elements show more regular variations against *mg#* and AI in the core and border types respectively, whereas a major dispersion in the middle ones is suggestive of open-system processes. Hst-Hbl, in BG, show the lowest content and the least fractionated REE pattern, and the highest V, Eu, Sr and Ba. In ABM-ABS, these amphiboles have the most fractionated REE patterns, the highest REE and Y, Si-Al-Sc contents like those from the BG, and Ba-Ga-Mn-V-Zr-Hf-Rb-Li as those from the BAS resulting in some divergent trends (Ba-Sr, Y-Nb). In the Afsg, Fe-Hbl/Wnt are enriched in Nb, Ta, Li, Zn, Zr and Hf. Plagioclase with high Sr, Ba and Eu occur mainly in the porphyritic facies of BG, and it has maximum and highly varied contents of LREE, Rb and Li in the middle types, pointing to some effect of residual liquid in a magma-mush. It occurs as tabular or blocky grains showing normal (ABM-ABS) or oscillatory-normal zoning (BG) with moderate amplitude of An ( $\leq 5-7$  mol %), and as larger grains displaying a clear rim around a patchy-zoned nucleus. More varied zoning with irregular and corroded nuclei, truncated zones and synneusis, as well as partially dissolved cumulates of Pl indicate dynamic magma processes in BG. Relatively abundant resorbed and patchy zoned plagioclases, and rapakivi Afs corroborate the middle types as hybrid rocks formed through recycling of a magma-mush by inputs of diversely fractionated magmas. New data confirm the major role played by magma fractionation in the border granites and suggest distinct differentiation processes for the inner ones. Repeated events of recycling of a feldspar-dominated magma-mush by successively more alkaline liquids are here strongly corroborated. Compositions of Pl and Amp allow to propose that the precursory sill of the middle types, which was repeatedly recycled, are linked to the northern monzonites (Tapera monzonite).