Geochemical and petrological constraints on the origin of the A-type Itu granitic batholith, Brazil

GIOVANNA DE SOUZA PEREIRA[1] AND VALDECIR DE ASSIS JANASI[1]

[1]Instituto de Geociências, Universidade de São Paulo, São Paulo, Brazil, 05508-080, giovanna.pereira@usp.br, vajanasi@usp.br

The post-orogenic Itu Batholith (580-560 Ma) in SE Brazil comprises four main plutons that result from the successive emplacement and interaction between several magmatic pulses of dominantly granitic composition at shallow crustal levels. The plutons share several key features (e.g., A-type geochemical signature), but each has its own structural pattern and distinctive geochemical and isotopic identity, in spite of wide faciological variation.

The ~560 Ma Cabreúva Pluton, the most voluminous unit, has a simple zoning pattern with predominant coarse-grained hololeucocratic syenogranite varying to a medium-grained facies towards the border. This is perturbed at the center of the pluton by an association of porphyritic granite and melagranite that is interpreted as a product of replenishment by a pulse of more mafic magma. The Salto Pluton, of similar age, is mainly composed of coarse-grained hornblende-biotite rapakivi granite, with a cupula unit of leucogranite showing miarolitic cavities, both strongly affected by hydrothermal alteration. Replenishment by new pulses of felsic magma intruding granite mushes resulted in a body of porphyry granite and abundant felsic microgranular enclaves. The ~580 Ma Indaiatuba Granite corresponds to remnants of an early intrusion of coarse-grained rapakivi granite with both felsic and mafic microgranular enclaves. It is locally intruded by hololeucocratic varieties of the as yet undated Itupeva Pluton. The latter is the most complex of the four units, comprising several textural varieties from equigranular granodiorite to porphyritic to inequigranular biotite monzo and syenogranite, and hosts small bodies of hybrid mafic rocks and mafic microgranular enclaves, attesting to recurrent replenishment by basic magmas.

Important geochemical contrasts are observed between the dominant granitic rocks from the different plutons, mostly in trace-elements as Sr, Ba, Zr and the ETR, and in the mg#. While the variations in whole-rock mg# can be attributed to differences in redox conditions (e.g., low mg# is typical of ferromagnesian minerals and whole-rock of Cabreúva, as contrasted with Salto and Itupeva), the trace-element and isotope (Nd, Sr and Pb) contrasts reflect differences in sources (interpreted to be dominantly of meta-igneous character) and degree of contribution from basic magmas derived from the enriched mantle.