

## PETROGRAPHY AND MINERALOGY OF THE PERALKALINE GRANITES FROM THE MORRO REDONDO COMPLEX (PR-SC), SOUTH BRAZIL, AND SOME CONSTRAINTS FOR THE DEVELOPMENT OF RARE MINERALS

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The Morro Redondo Complex is one of the most expressive occurrence of granites and associated bimodal volcanic rocks from the Graciosa Province, an important Neoproterozoic (ca. 580 Ma), post-collisional, A-type province in south-southeast Brazil. It crops out close to the Paraná-Santa Catarina state limits and covers an area of about 250 km<sup>2</sup>.

The granites were emplaced in Archean rocks from Luis Alves Craton and comprise two main intrusive units with subcircular to irregular outlines: the Papanduva Pluton, in the north, is composed of plagioclase-absent peralkaline granites, while the Quiriri Pluton, in the center-south areas, is made mainly of “subalkaline”, plagioclase-bearing, biotite granites.

The granites from the Papanduva Pluton have high agpaite indexes and are among the most evolved rocks found in the *alkaline petrographic association* within the province. Typical rocks are coarse- to medium grained alkali-feldspar granites with variable amounts of quartz, mesoperthitic alkali feldspar, sodic amphiboles and pyroxene, and accessory minerals, which include several rare agpaite phases. Idiomorphic laths of almost pure albite found in intergrowths with interstitial pyroxene, amphiboles, and accessory minerals in some samples point to its co-precipitation in the late magmatic stage. Late- to post-magmatic tectonic stress leads to the development of slightly oriented to mylonitic rocks with porphyroclasts of amphiboles and/or pyroxene and relatively albite-poor alkali feldspar in a granoblastic matrix with quartz, K-feldspar and albite.

The amphiboles include both arfvedsonite and riebeckite with *mg#* [ $Mg/(Mg+Fe^{2+})$ ] around 0.005 and (Na+K)/Al between 15 and 30. Sodic pyroxene is almost pure aegirine (Eg<sub>90-97</sub>) with  $0.12 < mg\# < 0.20$ . Late- to post-magmatic aegirine appears as interstitial crystals or as mantles over amphibole; in some samples its composition corresponds to a titanian aegirine, with TiO<sub>2</sub> contents up to 7 wt. %. The accessory minerals are zircon, apatite, ilmenite, astrophyllite, chevkinite, narsarsukite, aenigmatite, neptunite, britholite, nacareniobsite, ekanite, (Na-K)-zirconosilicates, and other unidentified phases. The rare minerals are relatively more abundant in the more evolved granites, which contain britholite and (Na-K)-zirconosilicates instead of apatite and zircon, and always present some evidence of deformation.

The inferred magmatic crystallization conditions are close to the FQM buffer. Some samples, with arfvedsonite + aegirine + aenigmatite and no Fe-Ti oxides, point to conditions inside the *non-oxide* field (Nicholls & Carmichael, 1969, *Contrib. Mineral. Petrol.* 20: 268-294). The textural and mineralogical features of the evolved and deformed granites suggest that the deformational event played an important role in the development and circulation of late- to post-magmatic alkali-rich fluids and the crystallization of several among the rare minerals.