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INTRAPLATE ALKALINE MONZOGABBROS-MONZODIORITES MIXED WITH A-TYPE SYENO/MONZOGRANITES AND PRODUCTION OF EXPRESSIVE HYBRID ROCKS WITH MIXING TEXTURES IN NEOPROTEROZOIC LATE TO POST-OROGENIC AND ANOROGENIC SETTINGS: AN EXAMPLE FROM PALERMO AND RIO NEGRO STOCKS, SOUTHERN BRAZIL

Harara OMM[1], Cury LF[1], Basei MAS[2], Siga Jr O[2], Vlach SRF[2], Campos Neto MC[2] - [1]Department of Geology, Federal University of Paraná, [2]Institute of Geosciences, University of São Paulo

Palermo (PG), Rio Negro (RNG) are components of the expressive Neoproterozoic Serra do Mar granite stocks or Graciosa Granitic Province emplaced in extensional late to post orogenic and anorogenic settings, along the central and northern portion of the Archean -Paleoproterozoic Luis Alves Terrane (LAT). The mineralogical, petrographic and lithochemical investigations carried out by many researchers on these granite stocks revealed that they present A-type (alkaline and aluminous) and A/PA-type (slightly alkaline to peralkaline) granite characteristics. The presence of monzogabbros-monzodiorites mixed with granites and expressive occurrence of mafic and felsic hybrid rocks produced by magma mixing were mapped mainly in PG and RNG. The U-Pb zircon ages suggest the period between 595 and 580 Ma for the formation of the all Serra do Mar granitic stocks.

The PG is mainly constituted by biotite and amphibole-bearing monzo-syenogranites, biotite and amphibole-bearing quartz-monzonites/quartz-syenites and biotite and amphibole-rich monzogabbros/monzodiorites with surrounding felsic and mafic hybrid rocks. The RNG is constituted by monzo/syenogranites at the margin of the stock and by expressive occurrence of monzogabbros/monzodiorites mixed with surrounding mafic and felsic hybrid rocks in the center. The monzogabbros form by mixing with the adjacent monzo-syenogranites mainly in the RNG, a large variety and chaotically distributed mafic and felsic hybrid rocks with typical mixing textures: quartz-ocelli with or without interstitial perthite mantled by biotite, amphibole and pyroxene; chaotic acicular apatite and rounded and elliptical mafic concentrations containing biotite, amphibole and pyroxene.

The monzo/syenogranites of PG and RNG and quartz monzonites/quartz syenites of PG present xenomorphic textures that suggest initial crystallization of quartz and feldspars and late and interstitial crystallization of biotite, amphibole, zircon, titanite apatite, allanite and fluorite. Miarolitic cavities with fluorite and granophyric intergrowths between quartz and feldspar are common textures that suggest synchronic crystallization of quartz and feldspar in low pressure conditions. These characteristics are typical of worldwide A-type granites. The monzogabrros present interstitial texture characterized by disordered and synchronic crystallization of pyroxene and plagioclase and late interstitial crystallization of biotite and amphibole.

The monzo/syenogranites of PG and RNG are alkaline and aluminous and the quartz-monzonites/quartz-syenites of the PG are slightly peralkaline and all rocks present trace element contents that are typical of A-type within plate granite signatures. The monzogabbros of PG and RNG are alkaline and present trace element content that are typical of within plate signatures such as Within Plate Basalts (WPB), Flood Continental Basalts (FCB) and CRF (Continental Rift Basalts).

The U-Pb zircon dating yielded ages of 593±12 Ma and 593±6 Ma for the crystallization of monzo/syenogranites and age of 584±7 Ma for the monzogabbros. The (T_{DM}) ages of the monzogabbros are Paleoproterozoic with less negative $\hat{I}Nd^{(T)}$ than the monzo-syenogranites of both granitic stocks. All geological data available suggest underplating, intraplating and crustal contamination of enriched mantle derived monzogabbros and generation of A-type monzo-syenogranites by heating and partial melting of lower crustal sources and bimodal magma mixing in late- to post collisional and anorogenic extensional settings.