

# **Ages and tectonic setting of alkaline-peralkaline granitoids of Paraná and Santa Catarina States, southern Brazil**

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In the Precambrian area of Paraná and Santa Catarina States three major tectonic domains were recognized (Basei *et al.*<sup>1</sup>): Luis Alves, Curitiba and Paranaguá (Figure 1). The last is composed mainly by Neoproterozoic calc-alkaline granitoids while the other two are predominantly constituted by Paleoproterozoic gneisses (Siga Jr *et al.*<sup>2</sup>), where several granitoid bodies were individualized by geological mapping projects developed during the sixties by the Geological Commission of Paraná. These intrusive granitoids were grouped by Kaul<sup>3</sup> in the Serra do Mar Suite.

The Serra do Mar granitoids show a diversity of dimensions from small stocks to large batholiths, whose denomination have been attributed from the toponymy of the region where they occur: Agudos do Sul, Corupá, Serra Alta, Morro Redondo, Serra da Igreja, Graciosa, Anhangava, Marumby, Piraí and Dona Francisca (Figure 1).

There is a predominance of alkaline-peralkaline granites, which range from quartz-syenite to syenite. These rocks are normally isotropic, leucocratic, coarse grained with gray, gray-pinkish to pink colors. The textures are predominantly hipidiomorphic granular. The minerals present are: quartz, microcline, often perthitic to meso-perthitic plagioclase (albite-oligoclase), biotite, (Na-Ca) amphibole, and subordinately, Na-Ca clinopyroxene and fayalite. The main accessory minerals are: titanite, zircon, apatite, opaques minerals and, sometimes fluorite.

The mafic minerals suggest evolutive trends which include metaluminous to frankly peralkaline granitoids. In this evolution, fayalites (Corupá and Morro Redondo) and clinopyroxene (aequerine/augite) are sometimes bordered by calcic-sodic amphiboles. The massifs of Agudos and Marumby, although alkaline shown by occurrence of perthitic alkaline feldspar and sodic plagioclase, differ from the others by the absence of amphibole or sodic pyroxene. In the QAP diagram the analyzed samples are predominantly granodioritic (Agudos do Sul) and alkali-feldspar granite to alkali-feldspar-quartz-syenitic (Anhangava, Graciosa, Morro Redondo and Corupá).

The available geochronological data composed by Rb-Sr (whole rock isochron), U-Pb (zircon), Sm-Nd (TDM) and K-Ar (minerals) are summarized in the Table 1.

MASSIFS METHODS	Agudos do Sul	Anhangava	Corupá	Graciosa	Morro Redondo	Marumby/ Serra da Igreja
Rb-Sr	570 ± 22	600 ± 20	550 ± 26	584 ± 12	~580	
(IR)	(0.70735)	(0.71930)	(0.70703)	(0.70796)	(~0.710)	
U-Pb	594 ± 26		580 ± 6	594 ± 64	589 ± 37	
Sm-Nd (TDM)	2,085	1,852	1,942		1,978	
K-Ar	580-540	550 ± 17	535-525	585-520	565 ± 20	590-500

Table 1 - Geochronological data (Ages in Ma).

The K-Ar ages of amphiboles and biotites range between 595 to 495 Ma, where the 585-540 Ma interval can be chosen as the main cooling period for these bodies. The U-Pb (zircon) and Rb-Sr (isochron) ages for the Agudos do Sul, Corupá, Graciosa, Anhangava and Morro Redondo massifs, fall in a Neoproterozoic 600-570 Ma interval, which could represent the main period of granitoid intrusion. Similar ages have been obtained in the acid volcanic rocks of the Guaratubinha and Campo Alegre volcanosedimentary basins.

2100-1850 Ma (Paleoproterozoic) model Sm-Nd ages (TDM), represent the period of the mantle-crust differentiation that generated the crustal precursors of these granitoids. Based on these model ages it is possible to suggest that, despite the fact that these granitoids cross-cut the Luis Alves and Curitiba gneisses they were not derived from them since the gneisses generally have much higher model ages. They probably derived from a lithospheric mantle differentiated and incorporated into crust around 2.0 Ga. The  $\epsilon_{Nd}$  (600 Ma) range between -7 to -13, in good agreement with the interpretation of a long period of crustal residence for the protoliths of these rocks suggested by the model ND ages.

Considering the close geographical proximity and the same formation ages (600  $\pm$  20 Ma) obtained on these granitoids and in the acid-volcanic rocks presented in the Guaratubinha and Campo Alegre volcanosedimentary basins it is suggested that both magmatisms could be included in the same magmatic episode occurred around 590 Ma reflecting an important extensional period that had affected the eastern portion of the Paraná and Santa Catarina States at the end of the Brasiliano Cycle.

#### References

1. Basei et al. - 1992- *Rev. Bras. Geoc.*, **22**(2): 216-221
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3. Kaul, P.F.T. & CORDANI, U.G. (1994). In: *CONGRESSO BRASILEIRO DE GEOLOGIA*, 38, Camboriú, SBG, v.2, p.371-372.

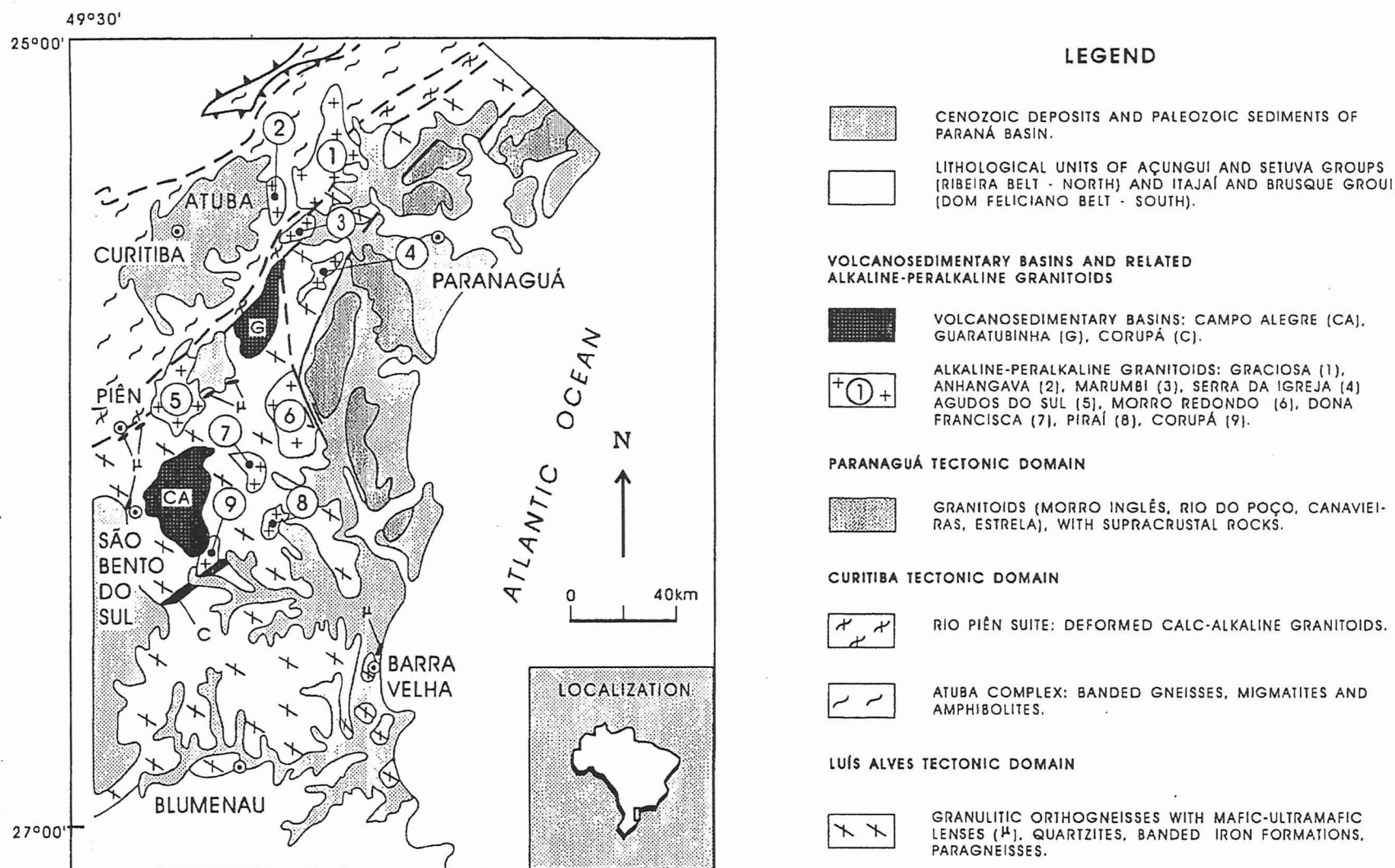


Figure 1- Southeast Paraná and northeast Santa Catarina tectonic domains.