

SYN-TECTONIC GRANITE EMPLACEMENT IN AN EARLY NEOPROTEROZOIC CRUST (ESPERANÇA PLUTON, NE BRAZIL): RESULTS FROM AMS AND ISOTOPIC (U-Pb, Sm-Nd) DATA

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Anisotropy of magnetic susceptibility (AMS) and isotopic data (U-Pb, Sm-Nd) were combined to study the emplacement and tectonic setting of the Esperança pluton in the Borborema Province (NE Brazil). It is included in the high-K metaluminous calc-alkaline plutons (Guimarães et al., 1998) that usually occur emplaced near the major shear zones that run cross the province. The Esperança pluton is intrusive into Early Neoproterozoic rocks of the Alto Pajeú "terrane" that, approaching the Atlantic coast, occurs between Paleoproterozoic gneisses (Brito Neves et al., 2001). The limit of these chronologically different rock sequences is marked by regional-scale lineaments, such as the Patos shear zone that juxtaposes the Alto Pajeú belt against the São José de Campestre gneisses and migmatites to the north.

The Esperança pluton is formed by sheet-like granitoids that, along with its host rocks, dip moderately (~40°) to the SE. These tilted sheets allow the internal architecture of the pluton to be observed. It consists, from the top to the bottom, of coarse porphyritic granite, leucogranite, equigranular syenogranite and tonalite. Biotite and hornblende are the main mafic minerals. The AMS was determined in 136 sites distributed within the central and western part of the pluton. Sampling was avoided to the northeast due to deep alteration of the regional rocks. The granitic sheets normally have susceptibility lower than 0.35×10^{-3} SI, indicating that Fe-silicates control the AMS. The orientation of the magnetic fabric is very uniform in the upper sheets. In the coarse porphyritic granite and leucogranite the foliation dips moderately while the lineation strikes NE-SW parallel to the pluton elongation. In the lower sheets the foliation dips uniformly to the south. The lineation of the syenogranite and tonalite forms an anticlockwise trajectory, rotating progressively from SSE to E as it approaches the dextral Campina Grande shear zone. The fabric pattern of the lower sheets is consistent with a transtensional tectonic setting, which probably made room for pluton emplacement.

Wall rocks beneath the pluton floor near Pocinhos consist of variably migmatized orthogneisses. $T_{(DM)}$ model ages of the gneissic paleosomes range between 2.1 and 2.4 Ga with ϵNd ($t=0$) values around -22 (Table 1). Similar isotopic data are found in the Paleoproterozoic São José de Campestre block situated at north of the Patos shear zone (Dantas et al., 1998). The gneisses above the pluton roof gave U-Pb zircon ages between 925

and 940 Ma (Brito Neves et al., 2001). The corresponding $T_{(DM)}$ model ages range between 1.4 and 1.8 Ga with ϵNd ($t=0$) values around -16 (Table 1). Preliminary U-Pb zircon data from the syenogranite yield a nearly concordant age of 585 Ma, attributed to the timing magmatic crystallization. In the leucogranite, Guimarães et al., (1998) obtained an U-Pb zircon age of 581 Ma. The pluton shows ϵNd ($t=0$) values normally higher than -15 and $T_{(DM)}$ model ages in the range of 1.6 and 1.4 Ga for the tonalite and syenogranite, and of 1.6 up to 1.9 Ga for the coarse porphyritic and leucogranite. Similar isotopic results were documented to the southeast in the Campina Grande pluton (Almeida et al., 2002).

These combined results indicate that the regional structures of the eastern Alto Pajeú belt were formed in a tectono-thermal event in the Brasiliano, around 580 Ma, and that includes the low angle regional foliations and folds and the strike-slip shear zone system. The high-K calc-alkalic syn-kinematic plutons of Esperança and Campina Grande seem to have emplaced occupying principally the contact zone between the Paleoproterozoic and Early Neoproterozoic rocks. $T_{(DM)}$ model ages and ϵNd values indicate that these granitoids were contaminated during their emplacement by partial melting of the regional host rocks. The entire rock sequence forms a stacked sheet pile dipping to the southeast, with the Alto Pajeú belt sandwiched between the older Paleoproterozoic basement.

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Table 1. Sm-Nd data of the Esperança pluton and its host rocks. 1. This work, 2. Brito Neves et al. (2001).

Rock	Sm¹⁴⁷/Nd¹⁴⁴	Nd¹⁴³/Nd¹⁴⁴	ε_{Nd(t)}	T_{DM} (Ma)	ref
Esperança pluton					
tonalite	0.1187	0.512047	-11.53	1.595	1
syenogranite	0.0830	0.511891	-14.57	1.344	1
porphyritic granite	0.1299	0.512127	-9.97	1.662	2
Northern host rock					
bi gneiss	0.0936	0.511397	-24.21	2.092	1
augen gneiss	0.1136	0.511497	-22.26	2.363	1
Southern host rock					
mus. bi gneiss	0.1283	0.512252	-7.53	1.406	2
augen gneiss	0.1310	0.512079	-2.92	1.774	2