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PALEOMAGNETISM OF THE DYKES OF THE PONTA GROSSA ARCH

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INTRODUCTION

The Ponta Grossa Arch, on the eastern border of the Paraná Basin, corresponds to a tectonic feature which was active at least since the Devonian. However, during the Jurassic and Early Cretaceous it was upliftted and took on its present configuration (ALMEIDA, 1986). The northern and southern limits of the arch are marked by the Guapiara and Rio Piquiri magnetic lineaments, respectively (FERREIRA, 1982; Fig. 1).

One of the most impressive Phanerozoic mafic dyke swarms of southeast Brazil occurs in the Ponta Grossa Arch (OLIVEIRA & MONTES, 1984; SIAL et al., 1987). The dykes trend preferentially NW and are parallel or sub-parallel to the arch axis.

A paleomagnetic study of the Ponta Grossa dykes is being carried out in order to establish the time relationships between these intrusive rocks and the volcanic Serra Geral Formation of the Paraná Basin and also to investigate the tectono-magmatic event responsible for the dykes.

MAGNETIZATION DIRECTIONS

About 270 samples from 84 dykes mainly from the western part of the arch were analyzed (RAPOSO & ERNESTO, 1989). Magnetization directions are of normal and reverse polarities

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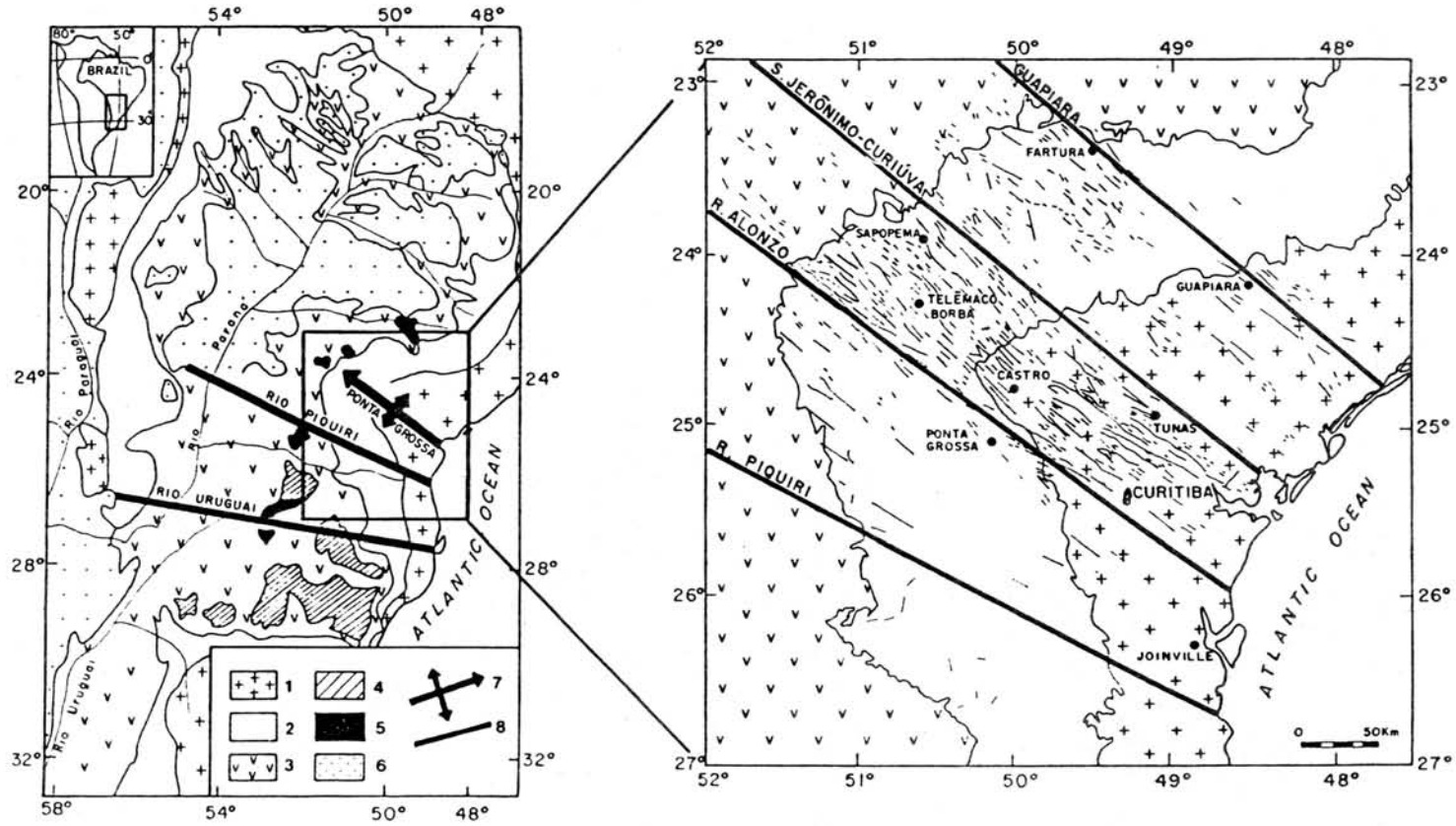

Figure 1 - Generalized geologic map of the Paraná Basin. The Ponta Grossa Arch is shown in detail: 1 = crystalline basement rocks; 2 = pre-volcanic sediments (mainly Paleozoic); 3 = basic/intermediate Serra Geral Formation flows; 4 = Palmas type acid flows; 5 = Chapecó type acid flows; 6 = post-volcanic sediments (mainly Upper Cretaceous); 7 = arch structure; 8 = tectonic and/or magnetic lineaments.

indicating that at least two episodes of intrusion took place.

Comparision of paleomagnetic data from the Serra Geral volcanic rocks (ERNESTO & PACCA, 1989) with that from the Ponta Grossa dykes points to the conclusion that the intrusive rocks are younger than the volcanics. However, the dykes could be contemporaneous with a second phase of Paraná volcanism, as recognized by ERNESTO & PACCA (1989), represented by basic and acid (Chapecó type) flow sequences in the central region of the basin. Hence, the paleomagnetic data do not support the presumption that the Ponta Grossa Arch structure provided the feeders for the Paraná Basin flows, as reported in most of the papers on the subject, with the exception of those by PICCIRILLO et al. (1988, 1989), ERNESTO et al., (1989) and ERNESTO & PACCA (1989).

The paleomagnetic data also suggest that the dyke activity might have been controlled by tectonic lineaments within the Arch. However, in order to better identify this influence, data are needed from the eastern portion of the Arch.

ANISOTROPY OF THE MAGNETIC SUSCEPTIBILITY

Knowledge as to how existing fractures are fed to give rise to the formation of a dyke swarm provides an important constraint for defining the relative position of the magmatic sources. Depending on the location of the magma source, flow may be either vertical or horizontal within the fractures.

The anisotropy of the magnetic susceptibility (AMS) refers to the variation in susceptibility of magnetic minerals according to their principal axes, designated as maximum, intermediate and minimum susceptibility axes.

In the case of dykes, the shape and distribution of the magnetic minerals are probably controlled by the development of flux planes or lines during the fracture feeding. Thus, in vertical fluxes maximum susceptibility axes should be aligned in vertical planes whereas in horizontal fluxes they would be expected to define horizontal planes.

Preliminary data on AMS of the Ponta Grossa dykes indicate that most of the maximum susceptibility axes lie within horizontal planes, although other planes also exist.

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REFERENCES

ALMEIDA, F.F.M. (1986) Distribuição regional e relações tectônicas do magmatismo pós-Paleozóico no Brasil. **Revista Brasileira de Geociências**, **16**(4):325-349.

ERNESTO, M.; PACCA, I.G.; HIODO, F.Y.; NARDY, A.J.R. (1989) Paleomagnetism of the Mesozoic Serra Geral Formation, Southern Brazil. Phys.Earth Planet.Int. (submitted).

ERNESTO, M. & PACCA, I.G. (1989) Paleomagnetism of the Paraná Basin flood volcanics, southern Brazil. In: PICCIRILLO, E.M. & MELFI, A.J. (ed.) **The Mesozoic flood volcanism from the Paraná Basin**: petrogenetic and geophysical aspects. São Paulo, IAG. p.229-255.

FERREIRA, F.J.F. (1982) Alinhamentos estruturais e magnéticos da região centro-oriental da Bacia do Paraná e seu significado tectônico. In: INSTITUTO DE PESQUISAS TECNOLÓGICAS DO ESTADO DE SÃO PAULO. **Geologia da Bacia do Paraná**, São Paulo, IPT. p.143-166.

OLIVEIRA, E.P. & MONTES, M.L. (1984) Os enxames de dique máficos do Brasil. In: CONGRESSO BRASILEIRO DE GEOLOGIA, 34., Rio de Janeiro, 1984. **Anais**. Rio de Janeiro, SBG. V.9, p.4137-4154.

PICCIRILLO, E.M.; MELFI, A.J.; COMIN-CHIARAMONTI, P.; BELLIENI, G.; ERNESTO, M.; MARQUES, L.S.; NARDY, A.J.R.; PACCA, I.G.; ROISEMBERG, A.; STOLFA, D. (1988) Continental flood volcanism from the Paraná Basin (Brazil). In: MACDOUGAL, J.D. (ed.) **Continental flood basalts**. Dorcrecht, Kluwer Academic. p.195-238.

PICCIRILLO, E.M.; COMIN-CHIARAMONTI, P.; MELFI, A.J.: STOLFA, D.; BELLIENI, G.; MARQUES, L.S.; NARDY, A.J.R.; PINESE, J.P.P.; RAPOSO, M.I.B.; ROISENBERG, A. (1989) Petrochemical of continental flood basalt-rhyolite suites and related intrusives from the Paraná Basin (Brazil). In: PICCIRILLO, E.M. & MELFI, A.J. (ed.) **The Mesozoic flood volcanism from the Paraná Basin**: petrogenetic and geophysical aspects. São Paulo, IAG. p.107-156.

RAPOSO, M.I.B. & ERNESTO, M. (1989) Rochas intrusivas básicas do arco de Ponta Grossa: resultados paleomagnéticos preliminares. **Revista Brasileira de Geociências**, **19**(3):392-400.

SIAL, A.N.; OLIVEIRA, E.P.; CHOUDHURI, A. (1987) Mafic dyke swarms of Brazil. In: HALLS, H.C. & FAHRIG, W.F. (ed.) **Mafic dyke swarms**. St. John's, G.A.C. p.467-483. (Geological Association of Canada Special Paper, 34)