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Proterozoic and Cretaceous gabbroic rocks from Serra dos Órgãos region, southeastern Brazil

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The Cretaceous breakup of western Gondwana is registered along southeast Brazil by numerous NE trending undeformed mafic dikes1. The host rocks are gneisses of the Ribeira Belt, affected by the Brasiliano Orogeny (580-520 Ma[2]). The mafic rocks, usually non foliated, ocurre as dikes or major sheets and bodies, and are generally related to Cretaceous extensional tectonics[1,3,4]. Nevertheless, geological maps[5] and K/Ar ages of 500 Ma[6] for a gabbroic body near Nova Friburgo town, reveale that some of these mafic bodies might be of Precambrian age. In order to contribute to this question, we have studied in detail an area at the highlands of the Rio de Janeiro State (fig. 1) that includes several types of gabbroic plutons and dikes.

Precambrian gabbros

Three bodies of hornblende gabbro intrude tonalitic gneisses of the Rio Negro Complex[7] and paragneisses of the Paraíba do Sul Group. Their contacts are subparalel to the low angle dipping regional foliation. Non foliated textures are preserved at the core of the bodies, while a strong foliation and a mineral lineation are observed at their contacts. Detailed geological mapping reveale that one of them is a sill (Corrego do Oliveira). The Fazenda Fortaleza and Corrego da Prata[8] bodies do not show clear relationships with the host rocks. The gabbros present primary green hornblende megacrysts, locally zoned, enclosing tinny and rounded crystals of clinopyroxene, biotite flakes and sphene. Lenses with plagioclase and quartz are observed among hornblende megacrysts. A K/Ar hornblende age of 551 ± 6 Ma of the Córrego do Oliveira gabbro is related with the Brasiliano Orogeny at the central segment of the Ribeira Belt. A younger hornblende age of Corrego da Prata gabbro (550 ± 15 Ma[6]) is doubtful, because of value Ar^{atm} (table 1).

Cretaceous dikes

A NE trending dike swarm near Carmo town (fig.1) was also studied. The dikes have vertical walls and thickness of tens of meters and are composed of medium to coarse grained dolerites and gabbros. Clinopyroxene and plagioclase (labradorite) in an intersticial texture, constitute their essential mineralogy. Clinopyroxene is surrounded by biotite flakes and green hornblende. Granophyric intergrowths were observed within intergranular spaces of plagioclase laths. Sphene, apatite and opaque minerals are common accessory constituents. The saussuritized portions of plagioclase laths are aligned in thin regularly spaced planes that cut the isotropic texture of the rock. A K/Ar determination on a thin dolerite dike that clearly crosscuts the Corrego do Oliveira hornblende gabbro yields an age of 126 +/- 2 Ma, concordant with published data (table 1).

Campos do Jordão. Abstracts.

Whole rock chemical analyses of 4 Cretaceous dike samples (Group A) and 8 Precambrian gabbros (Group B) confirm the described petrografic and field differences. The two groups are tholeiitic magmas: Group A consists of basalts and andesitic basalts, bearing high contents of FeO, TiO_2 (> 3,0%), LILE, Nb, Y, Zr and REE; Group B rocks comprise gabbros and diorites with low TiO_2 (<2,0%), LILE and HFS and high MgO_2 (>6,0%). Group A displays high fractionated condrite normalized patterns and plot within the continental intraplate field in tectonic discriminant diagrams, with compatible N-Morb normalized spidergrams. Group B rocks show higher dispersion in tectonic discriminant diagrams, probably related with the Brasiliano metamorphism.

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Sample	SPK[1]	Material[2]	%K	Ar_{40} [3]	% Ar Atm	Age[4] (Ma)	Reference[5]
A	932	Hbl	0.68	15.226	55.6	500 ±15	1
B	1039	WR	9.421	1.657	7.8	141 ± 7	1
	1048	Plag	2.832	15.092	3.8	132 ± 6	1
C	7539	WR	1.1118	5.65	27.50	126 ± 2	2
D	7540	Hbl	0.4578	11.46	7.94	551 ± 6	2

Table 1 - K-Ar age determination. 1: Laboratory code (CEPEGEO/USP); 2: WR:whole rock, Hbl:hornblende, Plag: plagioclase; 3:(10^{-6} ccSTP/g); 4:Ages with new decay constants, as in Sonoki & Garda [9], 1988; 5: 1 - Delhal et al (1969)[6]; 2 - this work.

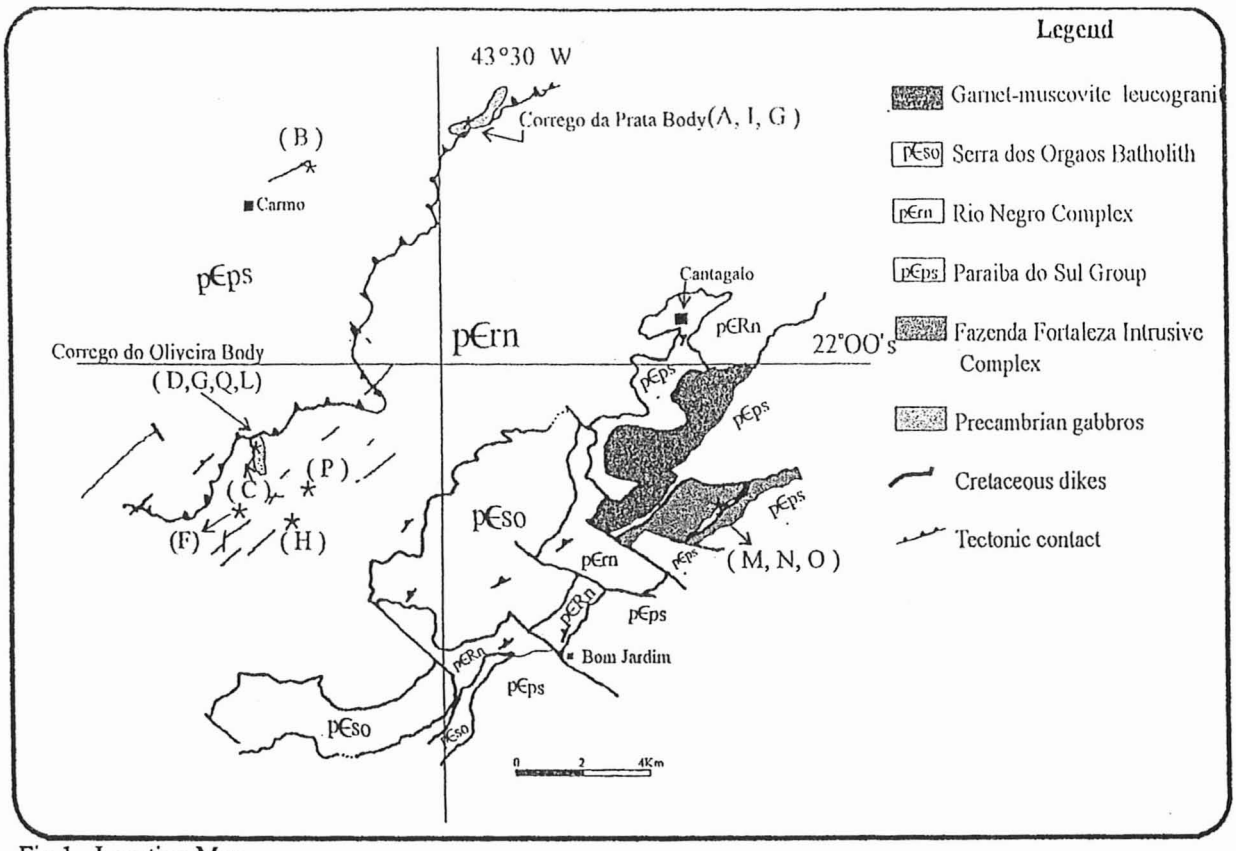

Fig 1 - Location Map

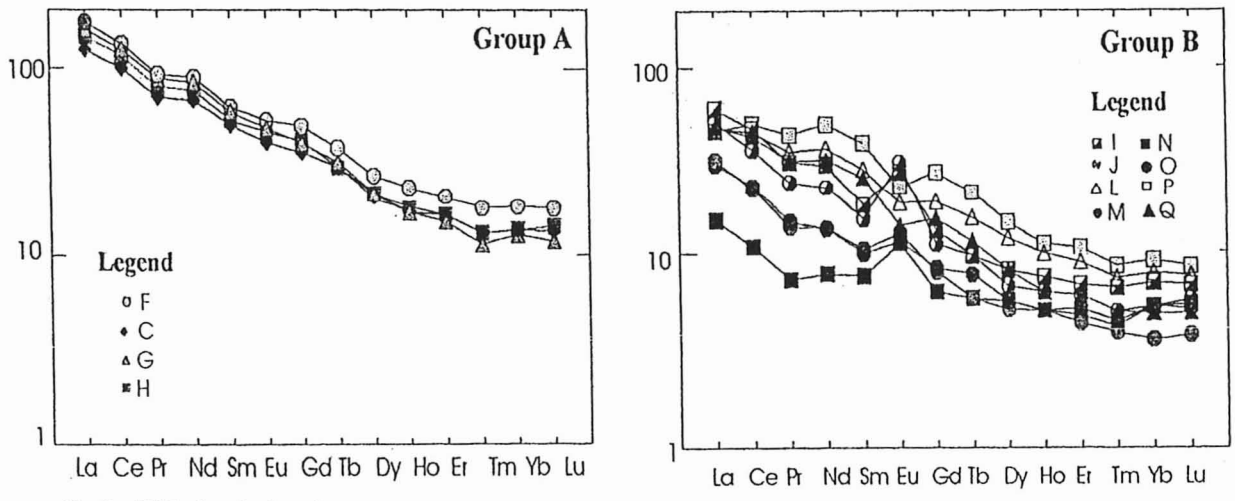

Fig 2 - REE chemical analyses