MESOZOIC MAFIC DYKE SWARM FROM RIO CEARÁ-MIRIM (NORTHEAST BRAZIL)

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The Mesozoic mafic dyke swarm cropping out along the southern border of the Potiguar basin (NE-Brazil) trends from E-W (from the continental margin to c. 37°W longitude) to NE-SW (west of 37° W longitude) (Fig.1).

The Rio Ceará-Mirim dyke swarm cuts the Proterozoic supracrustals and the polycyclic crystalline basement of the Borborema Province (Paraíba, Rio Grande do Norte and Ceará States). Most of the dykes were emplaced during the early Cretaceous (av. 135 Ma; range= 230-102 Ma), as suggested by 17 whole rock K-Ar measurements (using the 6% HF-solution technique) and 3 fission-track (apatite) dates.

Major and trace element contents (45 samples) show that most of the dykes correspond in composition to tholeiitic and transitional basaltic (and intermediate) rock-types. These are characterized by augite (Wo_{41-32}) and pigeonite (Wo_{6-14}); few basaltic samples show alkaline affinity.

Geochemistry allows distinction of basalt dykes with low (<2% wt.) and high (>2%wt.) TiO_2 concentration as well as low and high contents of P_2O_5, K_2O and other incompatible elements (e.g. Zr, La, Ce, Ba, Rb). High-TiO_2 dykes prevail in the northern region (latitude less than 6°S), while those low in TiO_2 are found in the southern regions.

For rocks 135 Ma old, $^{87}Sr/^{86}Sr$ initial ratios (R_o) of both studied low- and high-TiO_2 basalt dykes usually range between 0.7051 and 0.7066; some samples have R_o in the range 0.7070-0.7100. The initial ratios do not display any significant correlation with SiO_2, K_2O, Rb, Ba, or other major or trace elements. As a whole, these data indicate that crustal contamination may have played a minor role in the genesis of the basalt types of the Rio Ceará-Mirim dykes, particulary those with R_o lower than 0.7060.

All the data consistently indicate that the chemical differences between low- and high-TiO_2 basalt dykes cannot be explained by low and/or high-pressure fractional crystallization. Such chemical differences may be better related to different parent melts whose generation is compatible with different degrees of melting of a small-scale, heterogeneous mantle source.

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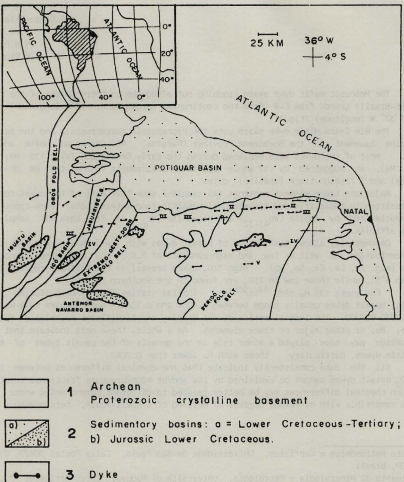

Figure 1 - Locality map.