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PROTEROZOIC DYKES OF SALVADOR AND ILHÉUS-OLIVENÇA AREAS : A GEOLOGICAL-GEOCHEMICAL COMPARISON

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The mafic dykes of Salvador and the dyke swarm of Ilhéus-Olivença present very similar geological, geochronological, paleomagnetic, petrographical, and geochemical characteristics. Such similarity suggests that both areas may have been subjected in Late Proterozoic times to similar crustal extension processes besides other processes, followed by basaltic magmatism. These dykes are located on the eastern edge of the São Francisco Craton intruding Early Proterozoic granulitic rocks of the Atlantic Coast Mobile Belt (PEDREIRA et al., 1976; MASCARENHAS, 1979; Fig. 1).

In Salvador two dyke assemblages are observed : the first one, with individual dyke thicknesses around 2 m, is metamorphosed (orthoamphibolites), trends E-W, and is associated with metagranitoids. The second assemblage is unmetamorphosed, trending N-S, and the dykes are up to 50 m thick, although thicknesses less than 5 m predominate (MORAES-BRITO et al., 1989). The latter assemblage is not widespread. The Ilhéus-Olivença dyke swarm trends E-W and is unmetamorphosed with predominant thicknesses, of less than 5m (TANNER DE OLIVEIRA et al., 1989).

Geochronological data ($^{40}Ar/^{39}Ar$ method, RENNE et al.1990) yielded ages of 1,000 and 1,100 Ma for the emplacement of the unmetamorphosed dykes of Salvador and Ilhéus-

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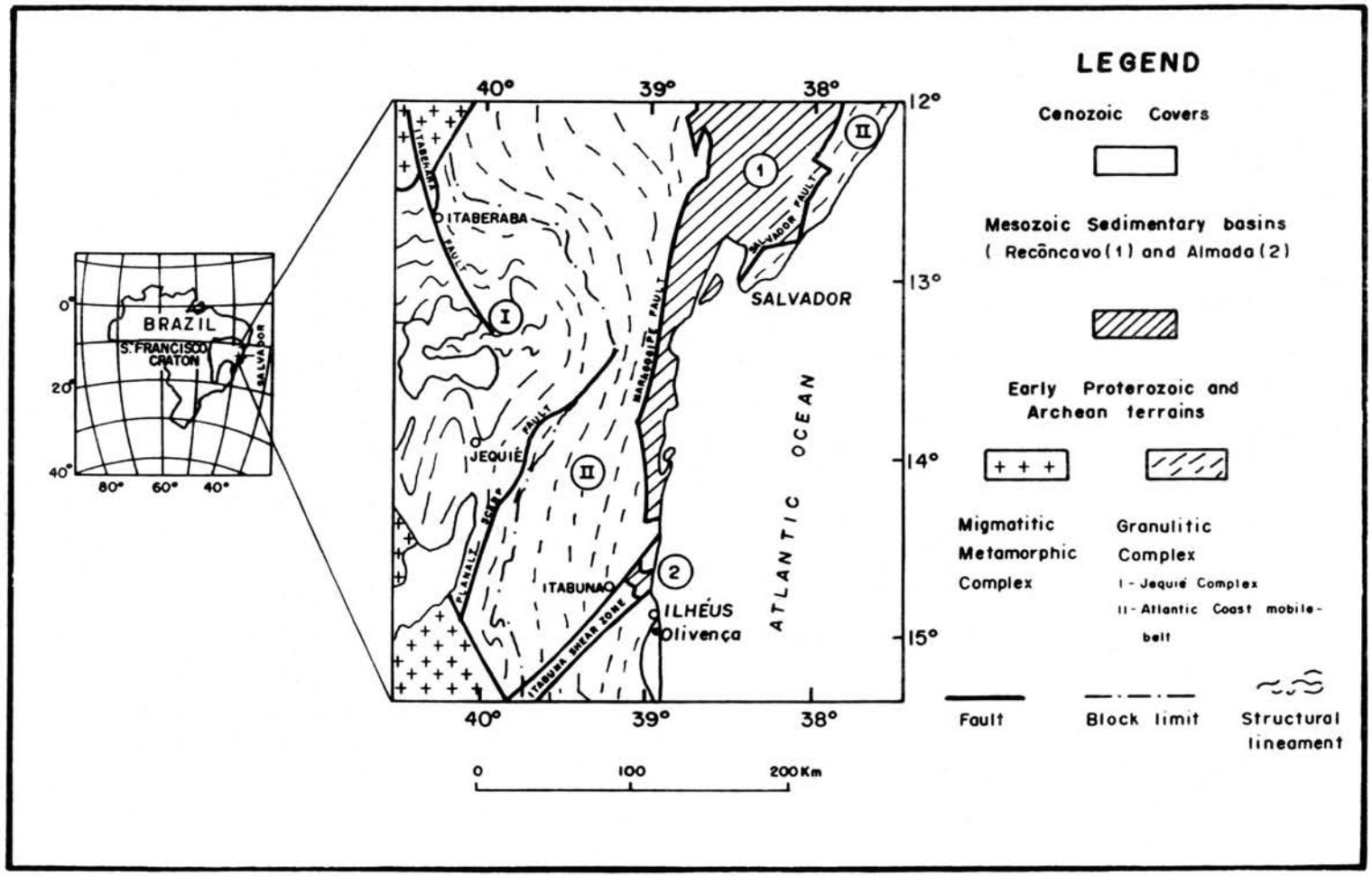

Figure 1 - Simplified geological map of the Salvador and Ilhéus-Olivença regions (modified from PEDREIRA et al., 1976).

Olivença, respectively. Paleomagnetic data on the dykes from both areas show similarities suggesting a similar age of emplacement for both occurrences (D'AGRELLA FILHO et al., 1989).

The orthoamphibolites of Salvador are fine-grained and composed of andesine, hornblende, red biotite, opaque minerals, and seldomly pyroxene. The accessory minerals are zircon and abundant apatite. The texture is predominantly granonematoblastic, but primary magmatic textures are still preserved.

The unmetamorphosed dykes of Salvador and Ilhéus-Olivença are composed of labradorite (An_{50-60}), augite, and opaque minerals; some contain hypersthene and others, pigeonite. Olivine seldomly appears and is often altered to iddingsite and opaque minerals. Textures are glassy (in dykes less than 5 cm thick; FARIAS & CONCEIÇÃO, 1985), porphyritic with aphanitic groundmass, or medium-grained aphyric.

Major and trace element concentrations show that the Salvador and Ilhéus-Olivença dykes are similar. Table 1 shows that the average values for the TiO_2-bearing dykes are lower than 3%. Nevertheless, dykes with TiO_2 greater than 3% occur in the Ilhéus-Olivença area. When compared to rocks from known tectonic environments, the studied dykes show great similarity to continental rift basalts.

In the R_1-R_2 diagram (Fig. 2), the dykes plot in the transitional, tholeiitic, lati- and andesitic-basalt field. Their tholeiitic character is clearly demonstrated in the AFM diagram (Fig. 3). The Ilhéus-Olivença dykes present a slight enrichment in FeO_t in relation to MgO and the alkali elements.

For the Salvador orthoamphibolites the results seem to indicate dramatic changes in their original composition. The most remarkable modification involves their content in SiO_2, FeO_t, K_2O, Cr, Sr, Ba, Zr and La (Table 1), which would explain the plot of these rocks in the intermediate field (latite, lati-andesite and andesite) of Figure 2 and mostly in the calc-alkaline field of Figure 3.

Field observations show that anatexis affected the crystalline basement rocks (acid and basic granulites and migmatitic gneisses) and probably led to the formation of granitoids. The orthoamphibolites were also affected by such processes, which would account for the changes in their original composition as is also evident from certain geochemical similarities between the granitoids and the orthoamphibolites.

Finally, it can be inferred that during the Proterozoic, when South America and Africa comprised a single block, two major events of intraplate continental magmatism occurred, which are recorded by these dykes: the first one, represented by the orthoamphibolites, probably 1,800-1,900 Ma old (as suggested by field data) and the second, represented by 1,000-1,100 Ma-old unmetamorphosed dykes of probable common origin from Salvador and Ilhéus-Olivença.

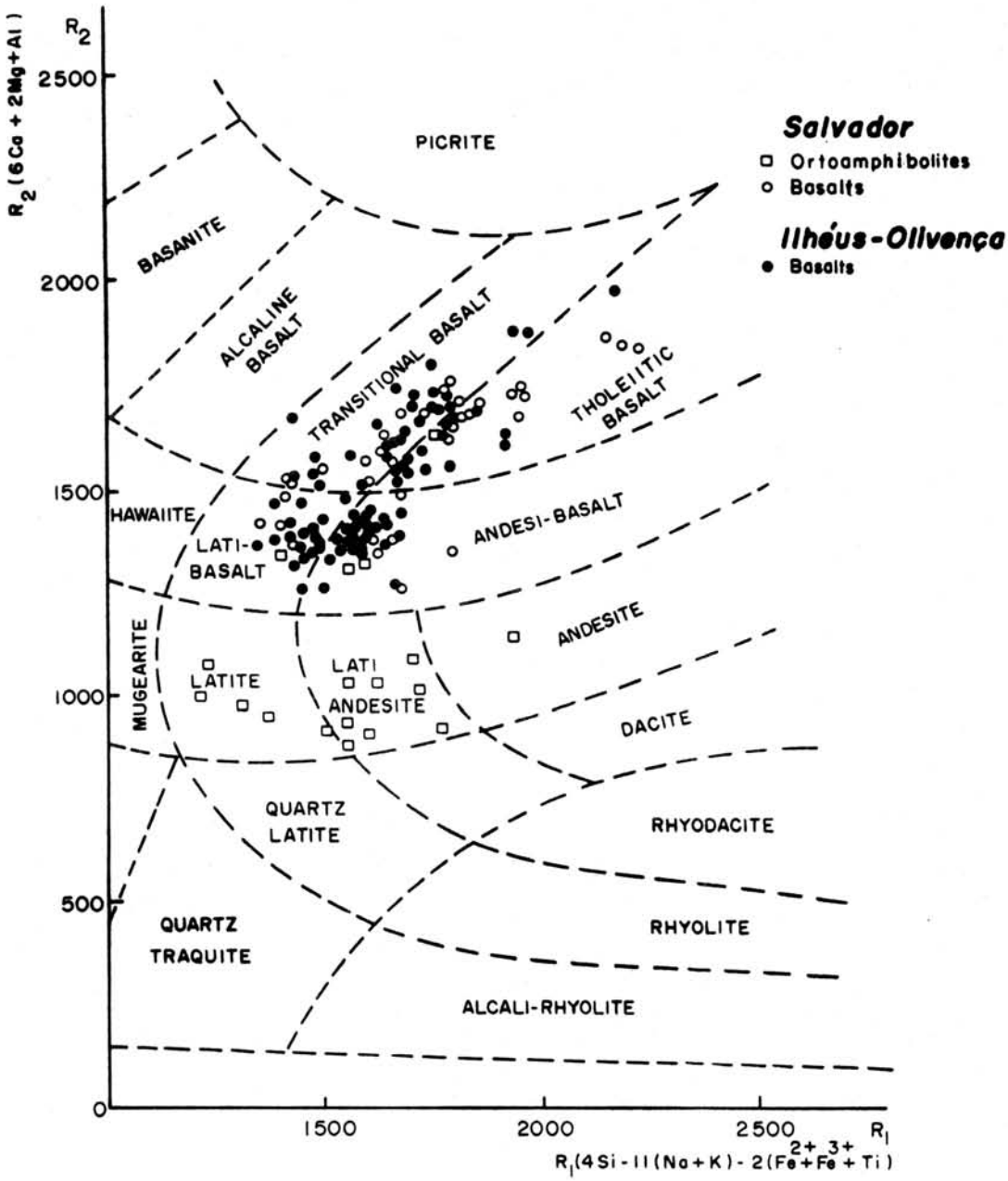

Figure 2 - Data from the Salvador and Ilhéus-Olivença dykes plotted on the diagram of De La ROCHE et al. (1980) as modified by BELLIENI et al. (1981).

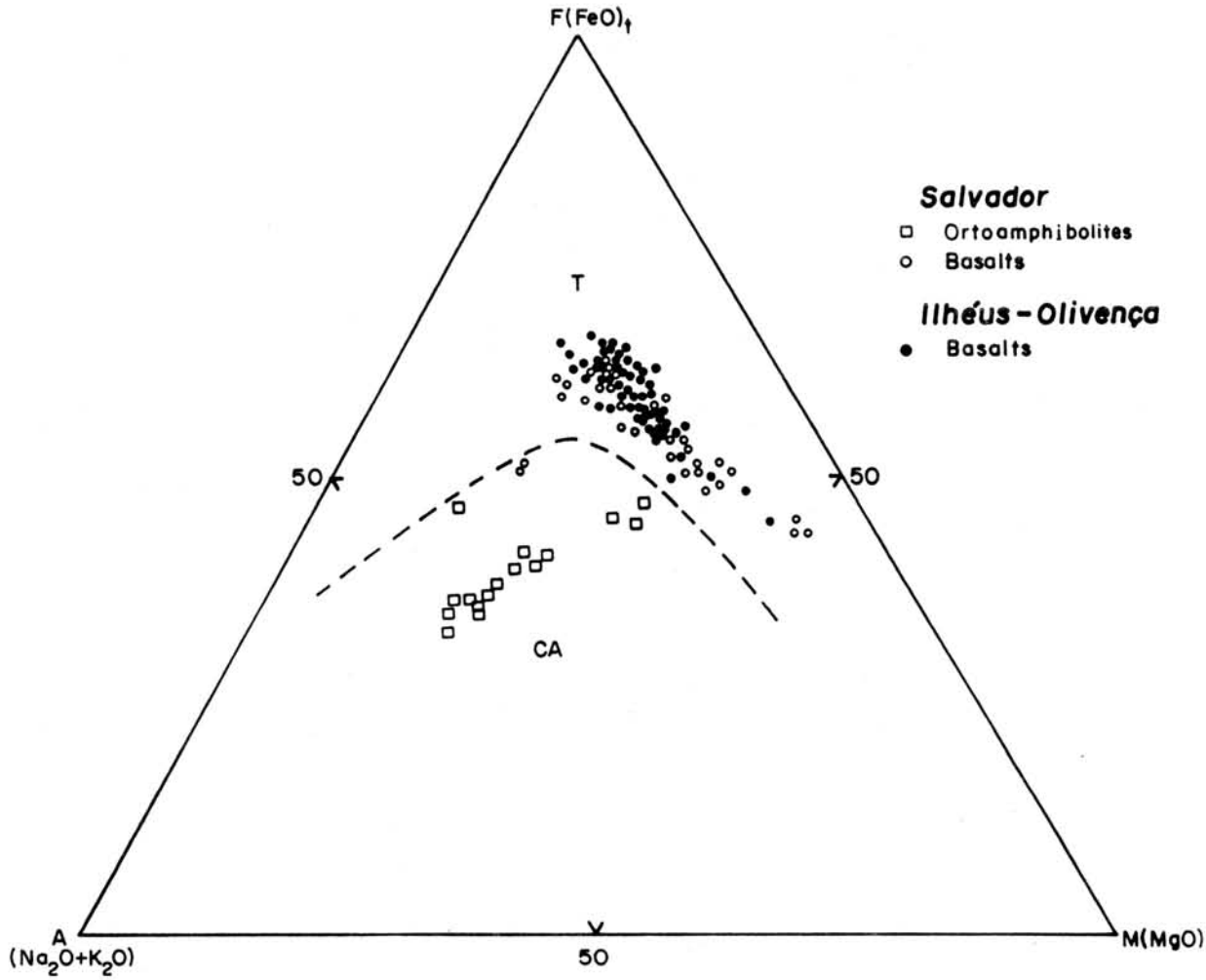

Figure 3 - AFM diagram showing the distribution of the Salvador and Ilhéus-Olivença dykes, calc-alkaline (CA) and tholeiitic (T) fields, after IRVINE & BARAGAR (1971).

Table 1 - Average compositions of dykes and country rocks from Salvador and Ilhéus-Olivença and continental rift basalts. References: 1 - This work; 2 - TANNER DE OLIVEIRA (1989); 3 - CONDIE (1982).

	ORTHOAMPHIBOLITES OF SALVADOR[1]	UNMETAMORPHOSED DYKES OF SALVADOR[1]	UNMETAMORPHOSED DYKES OF ILHÉUS-OLIVENÇA[2]	BASALTS OF CONTINENTAL RIFTS[3]	METAGRANITOIDS OF SALVADOR[1]
SiO_2	56.5	49.0	49.0	50.3	66.4
TiO_2	2.0	2.5	2.0	2.2	1.0
Al_2O_3	14.5	14.5	14.5	14.3	14.6
FeO_T	8.0	13.0	13.8	13.5	4.3
MgO	4.2	5.7	5.6	5.9	1.3
CaO	5.0	9.0	10.0	9.7	2.0
Na_2O	2.8	2.6	2.8	2.5	3.0
K_2O	3.8	0.7	0.6	0.66	5.8
Cr	88	140	113	160	12.7
Ni	50	80	79	85	11.3
Rb	110	22	16	31	175
Sr	540	265	237	350	284
Ba	1500	450	288	170	1335
Zr	310	130	151	200	506
La	77	24	17.5	33	97
Ce	115	45	48	98	158

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