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PETROLOGICAL AND GEOCHEMICAL ASPECTS OF MAFIC DYKES OF THE GOIÁS STATE, BRAZIL

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Archean terrains of Goiás State are cut by a dominantly NE trending dyke swarn. The dykes have been sampled in the Crixás and Goiás Velho areas. All of them, presumably of Precambrian age, are metamorphosed in greenschist-amphibolite facies, but 5 dykes preserve the igneous ophitic texture and mineralogy and one of them is exceptionally fresh. These dykes, which have also distinct chemical characteristics, might be younger than the others.

Compositionally, the dykes of the Crixás area (CXD) are dominantly tholeiitic basalts, with an mg (molar MgO/MgO+FeOtot) range between 0.6 and 0.53. Those of the Goiás Velho area (GVD) are tholeiitic andesi-basalts (mg range 0.55-0.35). (Fig. 1).

Element mobility induced by metamorphism has been checked by MPR (molecular proportion ratio) plots, using as normalizing element LILE and HFSE, considering that the first are easily mobilized and the second ones are stable. It is shown in Fig. 2 that the Si: Fm (=FeO+MgO) remains constant at about 2:1 (suggesting clinopyroxene control) irrespective of the element used. Moreover the correlation coefficient is very high and the variation trends do not pass through the origin of the diagrams. Therefore no metamorphic mobilization, even for LILE, seem to have affected the samples.

Major element variation diagrams (Fig. 3) show that the CXD and GVD follow trends consistent with fractionation of clinopyroxene and plagioclase. The non metamorphic dykes are enriched in Al_2O_3 and depleted in CaO and MgO with respect to the others, indicating higher normative plagioclase. Incompatible element variation trends with respect to mg (Fig. 4) are consistent with fractional crystallization, but, at a given mg, the non metamorphic dykes are richer in LILE, Ce and Nb and poorer in Ti and Sc.

Trace element vz Zr plots (Fig. 5) show that the CXD and GVD have similar P/Zr and Ti/Zr, but GVD has higher Zr/Nb, Zr/Y and LILE/Zr with respect to CXD (Zr/Nb=10±2 in CXD and 14±2 in GVD; Zr/Y=3.7±0.8 in CXD and 4.8±0.7 in GVD; K/Zr=31±17 in CXD and 41±18 in GVD; Ba/Zr=1.2±0.7 in CXD and 1.6±0.1 in GVD). The non metamorphic dykes have lower Ti/Zr, Zr/Nb, Zr/Ce and higher LILE/Zr and Zr/Y.

Further differences are shown in the incompatible element spidergram of Fig. 6. The CXD, besides having a lower trace element concentration, in agreement with being less evolved, are also characterized by a more flat REE pattern (considering Y as an analogue of Yb, (Ce/Y)n is 1.77±0.7 in CXD and 2.3±0.6 in GVD) and by positive Nb and Sr anomalies, which are negative in GVD. While some of the variations may be attributed to fractionation or to different melting degrees of the same source, the different Nb behaviour cannot. This, together with the LILE enrichment of GVD, may be explained by metasomatism effecting more extensively the GVD source than the CXD one, creating a phase which retains preferentially Nb relative to K and Ce. Crustal contamination is not favoured because it would have induced a drastic decrease in elements such as Ti, Y and Sc, which is not observed.

The non metamorphic dykes have patterns approaching those of the GVD (Fig. 7).

A comparison of the present metamorphic dykes with the metabasaltic component of the greenstone belts (Fig. 5) shows that the second is, at a given Zr, enriched in Ba, P and Y, and depleted in Nb, while Ce is similar, Preliminarely, these features could be interpreted in terms of evolution of the parent mantle composition.

***Figura 1** - R1-R2 classification plot. Circles = Crixás dykes (CXD); + = Goiás Velho dykes (GVD); asterisk and X = non metamorphic Crixás and Goiás Velho dykes, respectively.*

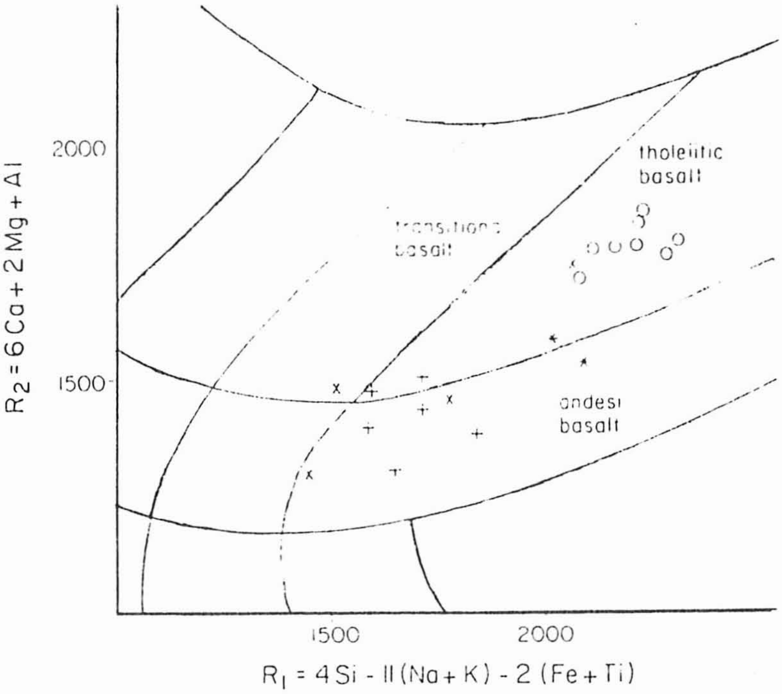

***Figura 2** - MPR (molecular proportion ratio) plot of Si/K-FM/K. Equations with Si and FM normalized to Ti, Ce and Zr are also reported. Symbols as in Fig. 1.*

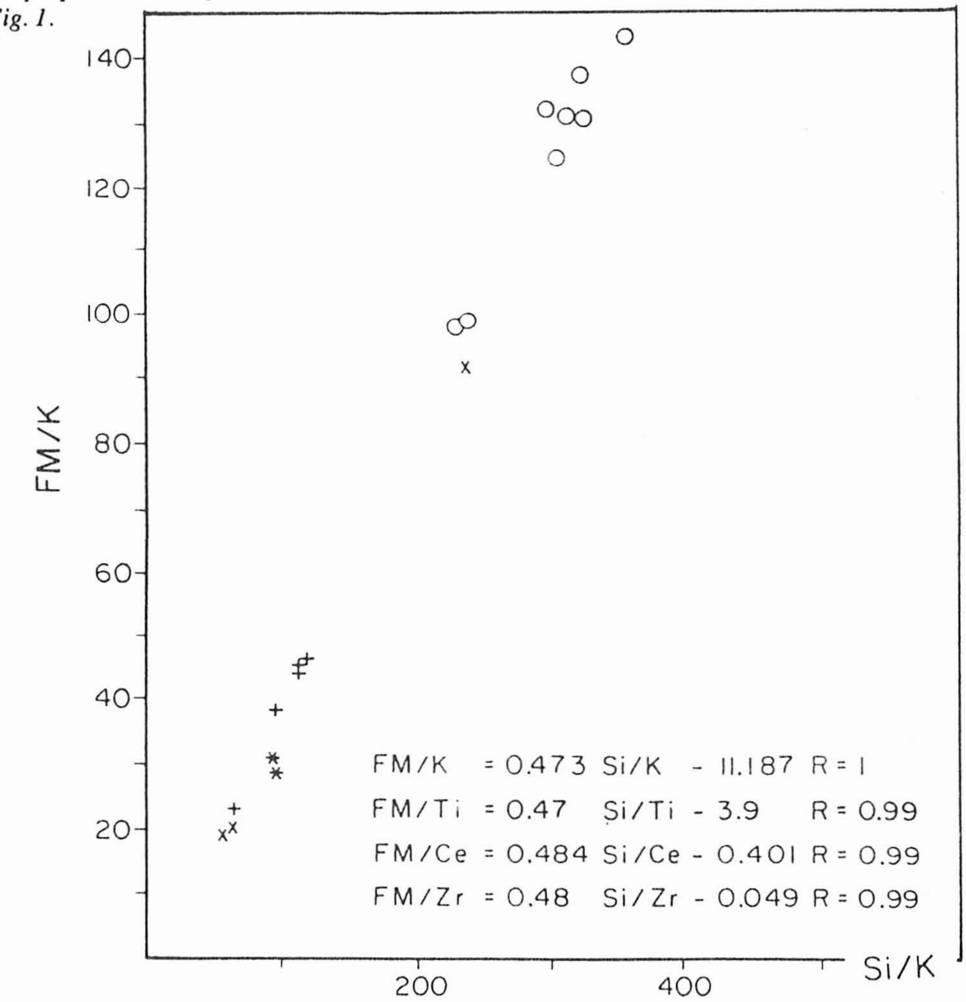

Figura 3 - Plot of major elements (%Wt) vs mg. Symbols as in Figura 1.

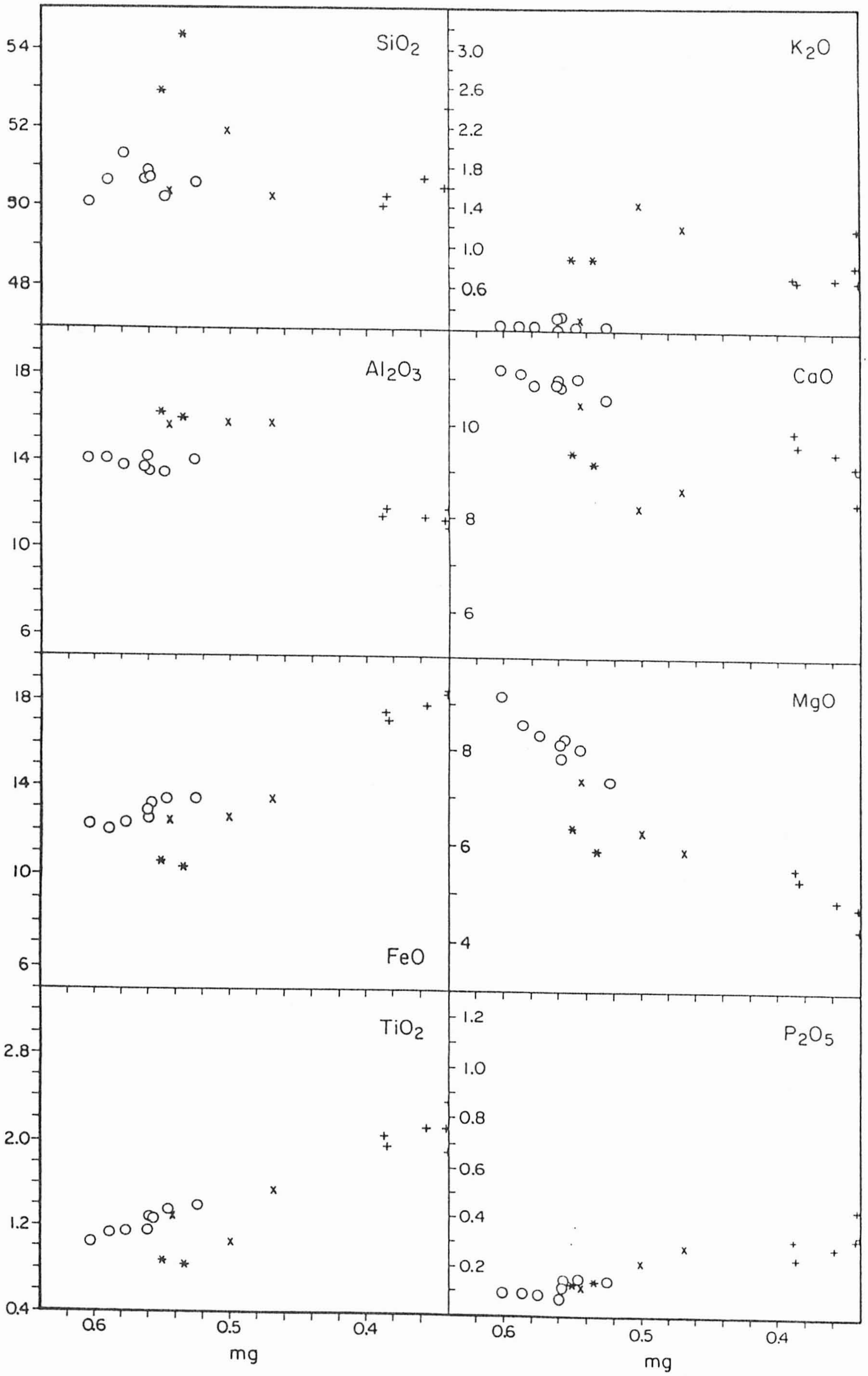

Figura 4 - Plot of trace elements (ppm) vs mg. Symbols as in Figura 1.

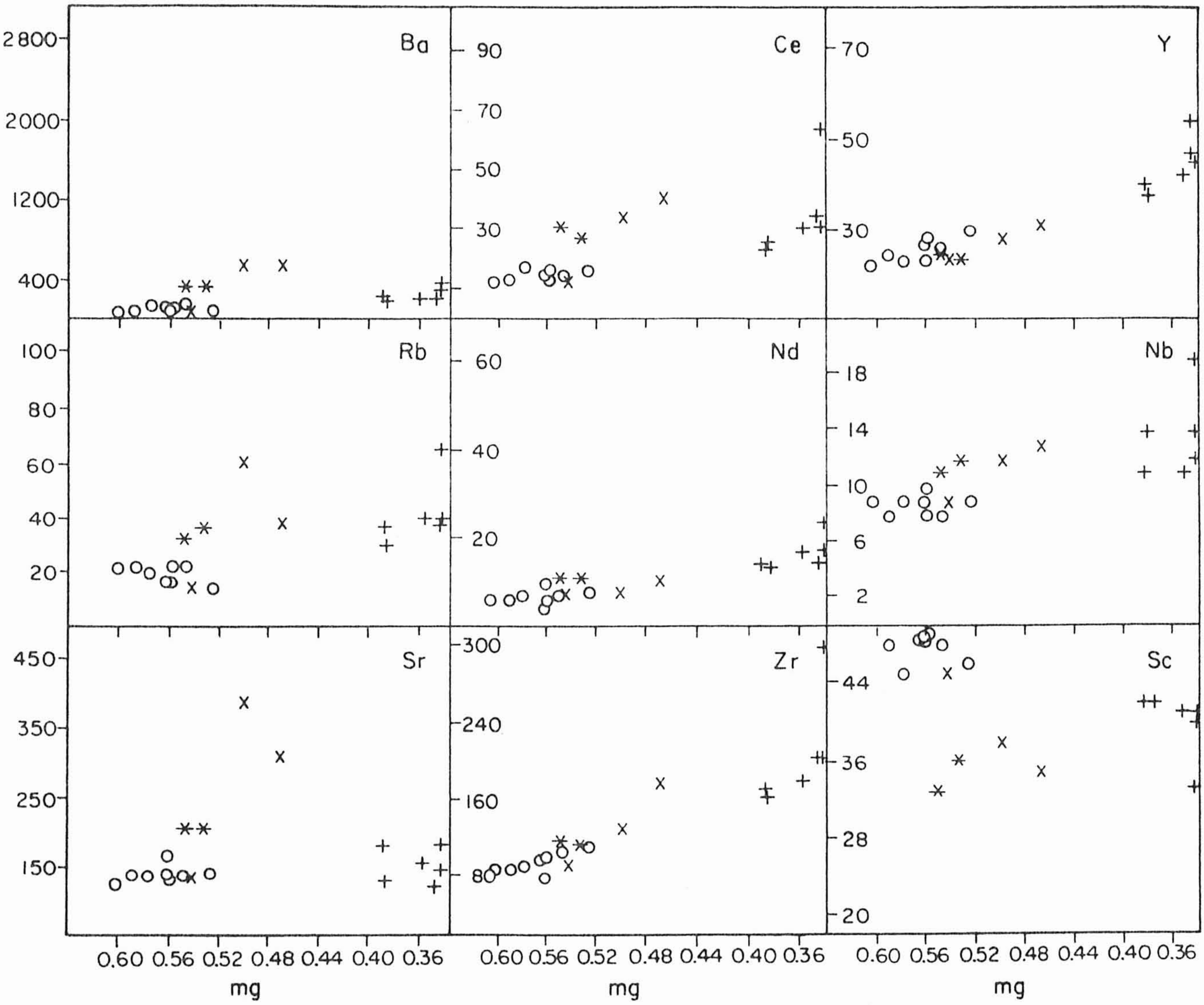

Figura 5 - Plot of trace elements (ppm) and TiO_2 (%Wt) vs Zr. Symbols as in Fig. 1. Dashed field = metabasalts of the Crixás greenstone belts.

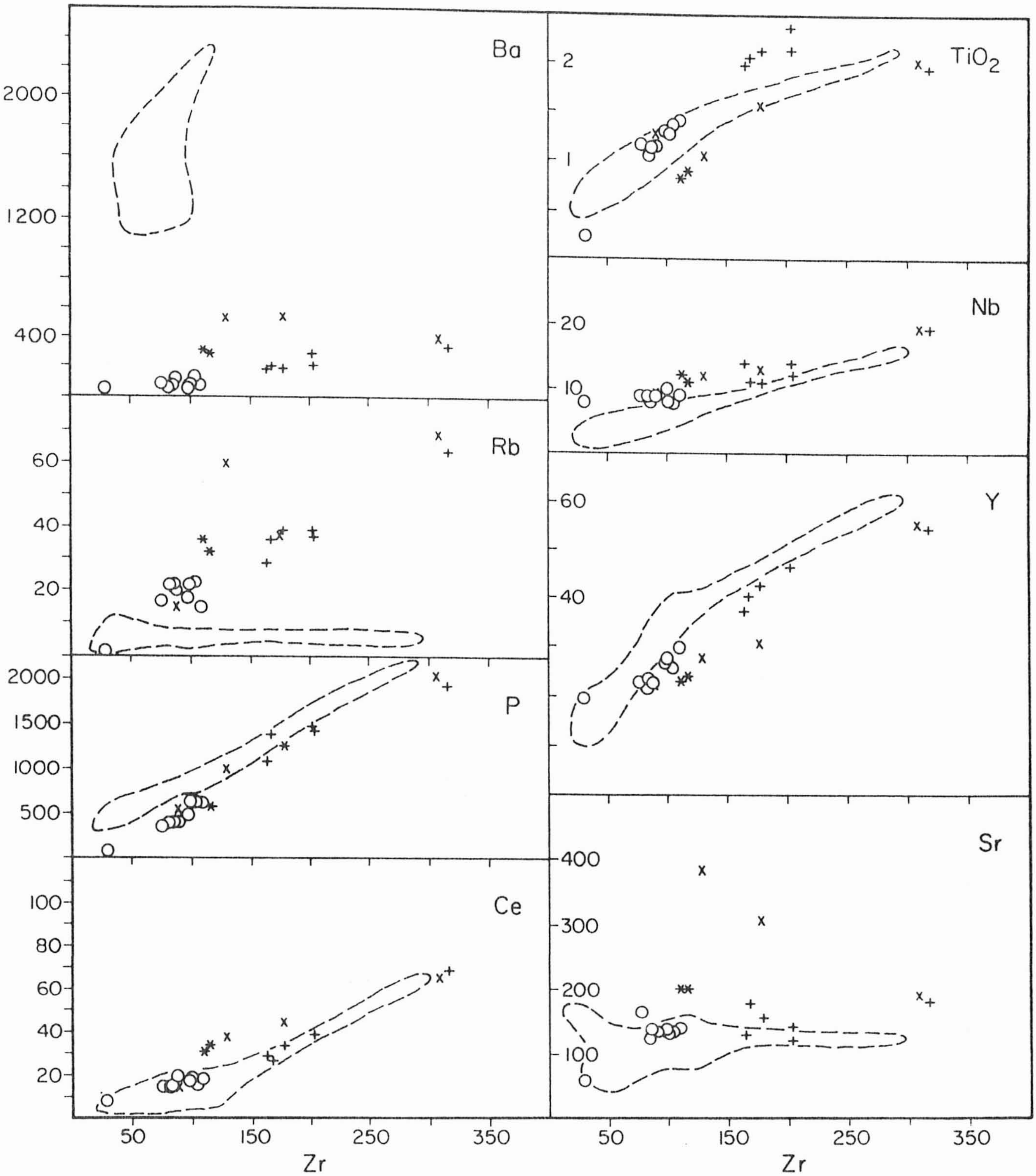

Figura 6 - "Spidergram" normalized to primitive mantle. Dashed lines = GVD; continuous lines = CXD.

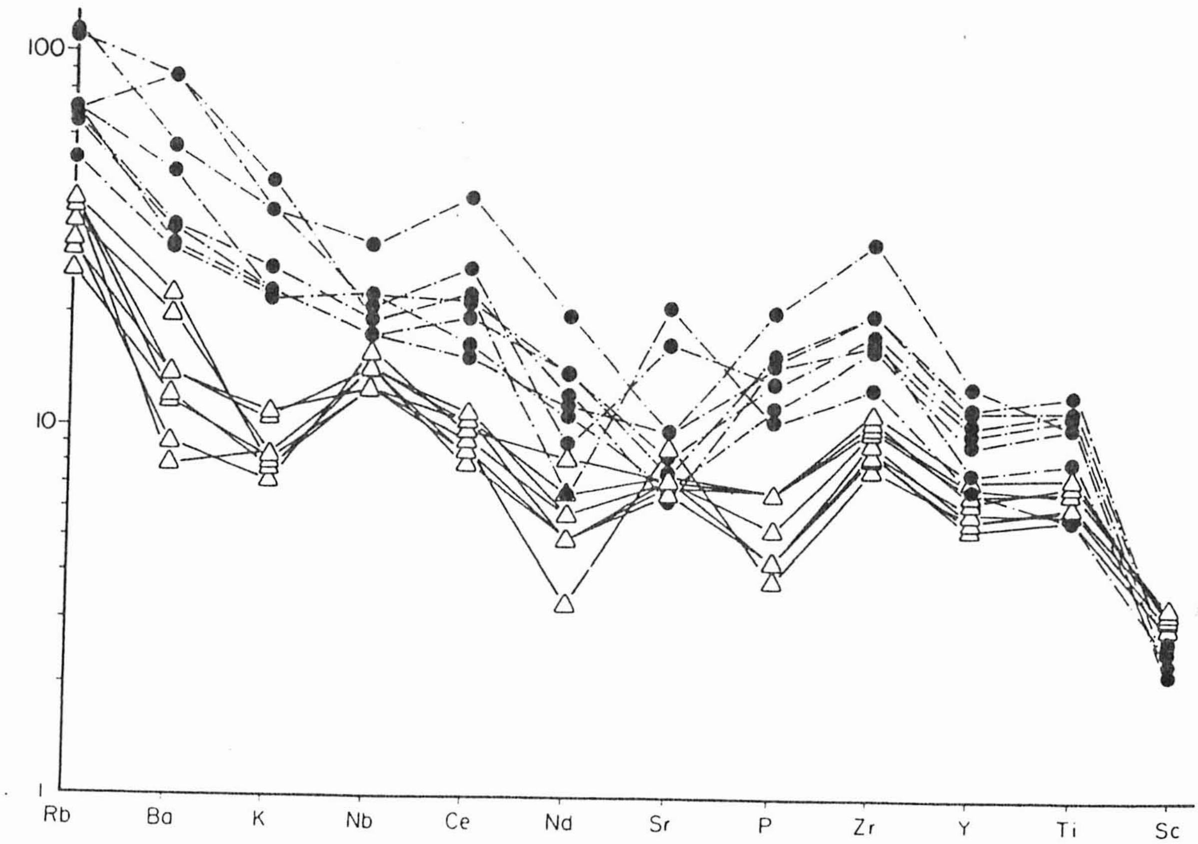

Figura 7 - "Spidergram" normalized to primitive mantle of the non metamorphic dykes. Continuous line = Crixás; dashed lines = Goiás Velho.