

THE ALTO RIBEIRA MAGMATIC ARC (PARANÁ STATE-SOUTHERN BRAZIL): GEOCHEMICAL AND ISOTOPIC EVIDENCE OF MAGMATIC FOCUS MIGRATION AND ITS TECTONIC IMPLICATIONS

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The Ribeira fold belt in Paraná State, Brazil, is the result of a series of superposed tectono-metamorphic events. Between 640 and 550 Ma an important crustal accretion event within the Brasiliano Megacycle was responsible for the generation of the Alto Ribeira Magmatic Arc (ARMA). This arc is represented by the Cunhaporanga (CPB) and Três Córregos (TCB) granitic batholiths, which occupy ca. 6,500 km².

The CPB is more homogeneous, being mainly composed of porphyritic to inequigranular, isotropic monzogranite, accompanied by rare granodiorite. The TCB is more heterogeneous, and includes quartz monzonite, granodiorite and monzogranite, as well as rare tonalite and syenogranite.

The rocks of the CPB are metaluminous to weakly peraluminous, and those of the TCB are predominantly metaluminous. Both batholiths are calc-alkaline. The main chemical contrast is in the alkali elements, the CPB being more potassic and less sodic, while the TCB is more sodic and less potassic.

Conventional multi-grain U-Pb (zircon) dating of the crystallization age is complex where inherited zircons are present. Nevertheless, a short time interval for intrusion of the CPB at ca. 590 Ma has been inferred. In contrast, intrusion of the TCB took place over a much longer interval (636-600 Ma). Titanite fractions from granites of both batholiths yielded U-Pb ages between 570 and 550 Ma.

Different Nd T_{DM} ages are inferred for CPB (1.8-2.0 Ga) and TCB (2.2-2.4 Ga). ϵNd values are highly negative (-11 to -13 CPB and -17 to -19 TCB). (⁸⁷Sr/⁸⁶Sr) values are higher than 0.709, while Pb isotopic compositions favor an upper crustal source for CPB, and a lower crustal source for TCB.

The geochemical and geochronological differences between the two batholiths are a result of the northwestward movement of the ARMA, a response to continuous northwestward subduction of an oceanic plate, towards the Paranapanema block, under a Paleoproterozoic continental margin. The titanite data could represent the age of collision between the Paranapanema and Curitiba blocks.