

AGE AND ORIGIN OF CHARNOCKITIC ROCKS FROM LUIS ALVES CRATON, SOUTH BRAZIL

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The Luis Alves Craton corresponds to a continental fragment that occurs between Ribeira (N) and Dom Feliciano (S) Neoproterozoic belts, in the southern part of Brazil. Its basement rocks consists of gneisses and migmatites, among which high-grade metamorphic associations characterized by the presence of orthopyroxene can be found. Regional studies involving zircon U-Pb ages and Hf isotope analyzes provide important constraints for the evolution of the high-grade gneisses and to infer the time when the protoliths of the charno-enderbític rocks were extracted from the mantle.

Two localities were examined in greater detail, one of them consists of a large cut of 150m length in the BR280 road near Guaramirim City, and the other site is a large quarry of the Infrasul Mining Company, near Joinville City. Both places have excellent outcrops of charnockitic rocks with clear evidences of magmatic differentiation as the main process to explain the compositional variation found. Centimetric to metric bands of amphibolites, enderbites, charnockites (predominant rock), and mafic granulite enclaves occurs in both areas. Pink leucogranite cross cutting the banding are also observed in both locations.

The charnockites have a mineral assemblage: Plag-Qtz-Opx-Opaque \pm K-fs \pm Hbl, with some secondary amphibole in Opx. Porphyroblastic amphibole and plagioclase defines the gneissic foliation. Petrographic studies of the mafic granulite enclaves provide textural evidence of hornblende breakdown producing orthopyroxene and plagioclase on the one hand and ilmenite deposition at the edges of hornblende on the other; these being good indicators of the progressive metamorphic pathway to high grade. It is proposed that these mafic granulite enclaves represent restites generated during the deep-crustal anatexis and magmatic differentiation process that formed the charnockites. The protoliths of the mafic granulite enclaves could be considered as hydrated basalts (or gabbros), that undergone hornblende-dehydration melting in the lower continental crust.

SHRIMP and LAICPMS zircon analyzes carried out on the rocks from both localities, including most of the described litho-types yield different ages. In the BR 280 Road the values are concentrated around 2.5Ga (enclaves of mafic granulites, enderbites and charnockites) while the leucogranite vein cutting the banding indicated 2.3Ga. On the other hand, in the Infrasul Quarry all ages of the five rocks analyzed are around 2.18Ga. The two U-Pb age clusters of 2.50 and 2.18Ga indicate a gap of almost 300Ma between the formation of the charnockitic rocks of BR280 and Infrasul quarry.

The Hf isotopic data of both locations are very similar, and impossible to establish a consistent difference between them. The vast majority of Epsilon Hf values (T1) is slightly negative (-9.0 to 0.0) and the model ages (TDM) are all predominantly Archean with values ranging from 3.0 to 3.2Ga proving the crustal origin of these rocks. Considering the differences in U-Pb ages and the similarities in the Hf model ages in both sets, it can be proposed that the studied charnockitic rocks were formed and simultaneously metamorphosed in deep crustal levels, representing the melting at 2.5 and 2.18 Ga of the material accreted at the base of the crust around 3.0Ga

KEY WORDS: LUIS ALVES, CHARNOCKITES, U-PB ZIRCON AGES, HF ISOTOPES