GEOCHEMICAL, GEOCHRONOLOGY AND Hf ISOTOPIC COMPOSITION OF THE CAMBRIAN POST-COLLISIONAL CHARNOCKITE-GRANITE ASSOCIATION FROM THE ARAÇUAÍ OROGEN (SOUTHEASTERN BRAZIL): CLUES FROM THE AIMORÉS SUITE

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ABSTRACT: The Araçuaí orogen (AO), situated in southeastern Brazil, and its African counterpart, the West Congo belt, constitute a confined orogenic system developed between the margins of the São Francisco and Congo cratons. The AO records an outstanding succession of granitoid production events from earliest (ca. 630 Ma) pre-collisional plutons to the latest (ca. 480 Ma) post-collisional intrusions. The Aimorés suite (AS) is a part of the Cambrian post-collisional magmatism, which mainly occurs as elongated bodies with NE-SW trending. The studied rocks consist of granular to porphyritic gray granites and dark-greenish colour charnockites, which occur as intrusion within syn-collisional garnet (± sillimanite)-bearing and garnet-sillimanite-orthopyroxene-bearing granites (Carlos Chagas and Ataléia suites, respectively) and subordinate migmatites and paragneisses assigned to the Nova Venécia complex. The plutons of the AS are free of the regional foliation, indicating post-tectonic emplacement relative to the main deformational event recorded in the orogen. Many of these granitoids have rounded, elliptic, elongated and lenticular mafic enclaves. The contacts of the enclaves with host pluton are generally sharp and marked by thin edges enriched in mafic minerals, but in some case are partly gradational. The studied rocks mainly consist of I-type, metaluminous to slightly peraluminous, high K-Fe calc-alkaline granitoids. They are characterized by relative LREE enrichment and HREE depletion. Negative Eu (Eu/Eu* = 0.04–0.14), P and Ti anomalies can indicate feldspar, apatite and Fe-Ti oxides fractionation at the source. The tectonic discrimination diagrams are compatible with within-plate granitoids. U-Pb (LA-ICP-MS) analyses performed on zircon grains from granites and charnockites yield weighted mean $^{206}Pb/^{238}U$ ages ranging from 507 ± 5 Ma to 514 ± 6 Ma, indicating they were emplaced during the latest regional magmatic event of the orogen. Taken into consideration the analytical error, we can interpreted that the emplacement of granites was probably synchronous with charnockites during the gravitational collapse of AO. One sample have inherited zircon population with weighted mean age of 603 ± 8, suggesting it is at least in part derived by recycling of Neoproterozoic crustal rocks. Magmatic zircons from granites show a range of Hf isotope compositions with initial $^{176}Hf/^{177}Hf$ ratios between 0.282209 and 0.282306, which are lower values compared to those zircons from the charnockite samples (0.282330-0.282435). For granites, the $\varepsilon_{Hf(t)}$ values range from -5.9 to -9.3, with model ages (T_{DM}) varying from 1.49 to 1.67 Ga. In contrast, zircons of charnockite samples display $\varepsilon_{Hf(t)}$ values between -1.2 e -4.9, corresponding to T_{DM} ages of 1.24 to 1.44 Ga. Field and texture evidences show that the enclaves preserve chilled margins against the surrounding granitoids, which are a common feature between two magmas with temperature contrasts. The texture combined with geochemical data probably reflects the combination of crystal fractionation and/or crustal contamination and magma mingling/mixing processes of the studied suite. In fact, the magmatic zircons of the studied rocks record a wide range of negative the $\varepsilon_{Hf(t)}$ values, indicating that they crystallized from isotopically heterogeneous melts.

KEYWORDS: HF ISOTOPE; POST-COLLISIONAL MAGMATISM; ARAÇUAÍ OROGEN