MESOARCHEAN TTG CRUST OF THE CARAJÁS DOMAIN, SOUTHEAST AMAZON CRATON

Silva, M.A.D.[1], Monteiro, L.V.S.[2], Santos, T.J.S.[3], Moreto, C.P.N.[3], Sousa, S.D.[2], Faustinoni, J.M.[3], Melo, G.H.C.[4], Xavier, R.P.[3], Toledo, B.A.M.[3]
[1]Universidade Federal de Uberlândia; [2]Universidade de São Paulo; [3]Universidade Estadual de Campinas;
[4]Universidade Federal de Ouro Preto

ABSTRACT: The Carajás Domain corresponds to the northern portion of the Carajás Province, an Archean terrain located in the southeast portion of the Amazonian Craton. The basement of Carajás Domain has TTG gneisses of amphibolite to granulite facies, crosscut by late Mesoarchean (2.87 – 2.83 Ga) granites of tonalitic to alkali-feldspar granite modal composition. The Xicrim-Cateté Orthogranulite and the Xingu Complex constitute the oldest TTG portion of the basement. The Xicrim-Cateté Orthogranulite is composed of metatexite and diatexite migmatites with orthopyroxene–diopside tonalite, granodiorite gneiss or mafic granulite gneiss residuum, as well as metanorites. The Xingu Complex comprises metatexite migmatites with hornblende-biotite to biotite tonalite to granodiorite gneiss residuum. The diatexite and metatexite migmatites with mafic granulite residuum have the clues about the genesis of this TTG crust. The neosome in both migmatites contain ortho and clinopyroxene megacrystals immersed in a matrix of plagioclase and quartz. In addition, the mafic granulite residuum shows a peak paragenesis with orthopyroxene–clinopyroxene–plagioclase–ilmenite. The neosome of the metatexite and diatexite migmatites display the following geochemical characteristics: silica-rich (69.68 ±2.52 wt% of SiO_2) and sodic (K_2O/Na_2O = 0.27 ±0.08), shows no K-enrichment, $La_{average}$ of 20.3 ±6.0 ppm, $Yb_{average}$ of 0.15 ±0.03 ppm, La_N/Yb_N of 94.65 ±31.28, $Nb/Ta_{(average)}$ of 21.7 ±10.7 ratios, no significant Eu or Sr anomalies and negative Na, Ta and Ti anomalies. The chemical composition of the neosome suggests a TTG affinity derived from magmas generated in intermediate to high pressures. The analysis of oscillatory zoning domains of zircon crystals of the neosome yielded upper intercept ages of 2.932 ±20 Ma (MSWD = 1.0) and 2.979 ±31 Ma (MSWD = 4.4). The orthopyroxene–diopside tonalite and the granodiorite gneiss also share a TTG affinity. The oscillatory zoning domains of zircon grains yielded concordant and upper intercept ages between 3.05 and 2.94 Ga. Based on the petrological chemical and chronological data, we interpret the genesis of the orthopyroxene–diopside gneiss of the Xicrim-Cateté Orthogranulite through partial-melting of metabasites of the lower crust. The process was controlled by the breakdown of amphibole crystals through the reaction: Amph+Qtz = Cpx+Opx+M (±Pl). Therefore, ortho and clinopyroxene crystals occur as peritectic phases in the neosome and as part of the peak assemblage in the mafic granulite residuum. This interpretation can be extended to the hornblende–biotite and biotite tonalite to granodiorite gneisses of the Xingu Complex, since they show TTG affinity with magmas also generated in intermediate to high pressures and concordant and upper intercept zircon crystallization ages of 2.94 Ga. Hence, they are products of hydrated portions of the original anhydrous magmas generated in the lower crust and emplaced in the middle crust and do not preserve crystals of both ortho and clinopyroxene. The partial melting was trigged by the emplacement of mantle melts in the lower crust. The products of these underplated magmas are the coarse-grained metanorites that occur associated with the granulites of the Xicrim-Cateté Orthogranulite.

KEYWORDS: CARAJÁS PROVINCE; CONTINENTAL CRUST; TTG

ISBN | 978-65-992688-3-0