The Archean-Paleoproterozoic boundary in Amazonian craton: new isotope evidence for crustal growth

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The Amazonian craton has been interpreted as a collage of Proterozoic belts or provinces surrounding Archean nuclei (e.g. [1]). The boundaries of these provinces are key areas for understanding the growth of the craton as they represent important changes in time, tectonic regime and products (rocks and ore deposits).

In the southeastern Amazonian craton, the Paleoproterozoic Bacaja region borders the northern Archean Carajás block. The block has a 3.00-2.85 Ga granite-greenstone basement covered, in its northern part, by a ca. 2.76 Ga volcanosedimentary sequence hosting the most important mineral deposits of the craton (Cu, Fe, Au, Mn etc.). The Bacajá region is composed by granulites, gneisses, deformed granitoids, and Au-bearing greenstone belts. The boundary between the two provinces is suggested to be located near the 5ºS parallel [2].

Our new and previous (e.g. [3]) zircon and monazite ages (SHRIMP and Pb-evaporation) and Nd data have demonstrated that, in the Bacaja region, Rhyacian (2.08-2.15 Ga) granitoids and charnockitic rocks dominate. Inliers of Siderian meta-andesite (2.36 Ga) and orthogneisses (2.31-2.44 Ga), and Archean orthogneisses (2.67 Ga) were also recorded. Nd isotopes indicated two different sources for the Rhyacian granitoids: a late Siderian juvenile, and a Neoarchean crustal. Only a juvenile crust was determined as the source of the Neoarchean orthogneiss. Detrital zircon from paragneisses yielded ages from Siderian to Mesoarchean, including some typical from the Carajas region. U-Pb monazite ages are around 2.08 Ga, confirming that this region was tectonically stabilized after the Transamazonian orogeny.

In conclusion, the Bacaja region was mainly formed and welded to the Carajas block during the Rhyacian through complex tectonic and geochemical processes. It envolved Neoarchean and Siderian small blocks and greenstone belts (ocean floor?), as well as sediments from rocks of different ages, including the adjacent Carajas block. Apparently, it was derived from melting of their crustal components but, in the northern part, juvenile magmas were predominant.

References

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