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Geochemistry and isotopic signatures of metavolcanic and metaplutonic rocks of the Faina and Serra de Santa Rita Greenstone belts, Central Brazil: Evidences for a mesoarchean intraoceanic arc

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The Archean-Paleoproterozoic Terrane of Goiás, Central Brazil, is an allochthonous block within the Neoproterozoic Tocantins Province and consists of an association of Archean TTG complexes and gold-bearing Archean-Paleoproterozoic greenstone belts. The Faina and Serra Santa Rita greenstone belts, located in the southern portion of the terrane, are investigated using geochemistry and isotope geology to establish the time of magmatism and tectonic environment. Our data show that the ultramafic rocks have some chemical characteristics similar to modern boninites, whereas the amphibolites are subdivided into two groups: the type 1 basalts group are tholeiites with flat REE patterns and are similar to back-arc basin basalts; the type 2 basalts group have high Nb contents and are comparable to Nb-enriched basalts. Felsic to intermediate rocks present some of the main chemical diagnostic features of adakites, in which the metandesites and metatonalites are comparable to high-SiO2 adakites, and the meta diorites, characterized by very high MgO, Cr and Ni contents, are comparable to low-SiO2 adakites or high-Mg andesites. Metavolcanic and metaplutonic rocks show two main periods of magmatic crystallization ages with juvenile and slightly crustal contaminated rocks. The first occurred at 2.96–2.92 Ga with positive Nd (t) values of +2.16 to +2.77, while the second formed at 2.8Ga with slightly negative Nd (t) value of #0.15. The volcanic and plutonic protoliths of the two greenstone belts were formed in an intraoceanic forearc-arc-back-arc system. The initial stage corresponds to ultramafic lava eruption in the forearc region of a proto-island arc, at 2.96Ga. The evolution of the island arc and subduction progression led to oceanic slab-melting and generation of adakites. At 2.92Ga, the adakitic melt was totally consumed by peridotite mantle and the subsequent melting of these hybridized mantle wedge generated high-Mg andesites that lodged in the crust as dioritic intrusions with high MgO, Cr and Ni contents. The late-stage corresponds to a continental arc formation at 2.8Ga, marked by tonalitic magmatism and amalgamation with other island arcs and continental arcs of the TTG complexes of the Archean-Paleoproterozoic Terrane of Goiás. The present work has been recently published in Precambrian Research Journal in 2017.

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