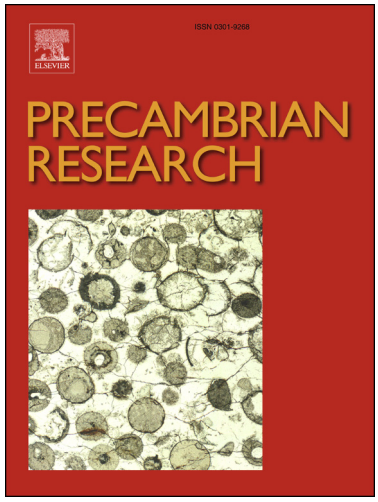

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C.C.A. Borges, C.L.B. Toledo, A.M. Silva, F. Chemale Jr., H. Jost, C.C. Lana

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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.

Borges, C.C.A.[a,*], *Toledo, C.L.B.*[a], *Silva, A.M.*[a], *Chemale Jr., F.*[b], *Jost, H.*[a], *Lana, C.C.*[c]

[a] Universidade de Brasília, Instituto de Geociências, 70910-900 Brasília, DF, Brazil.
[b] Universidade do Vale do Rio dos Sinos, Departamento de Geologia, 93022-000 São Leopoldo, RS, Brazil.
[c] Escola de Minas de Ouro Preto, Departamento de Geologia, 35400-000 Ouro Preto, MG, Brazil.

*Corresponding author. Tel: +55 61996912386
Email address: caioaguiar0@gmail.com (C.C.A. Borges)

ABSTRACT

The Archean-Paleoproterozoic Terrane of Goiás, Central Brazil, is an allochthonous block within the Neoproterozoic Tocatins 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-SiO_2 adakites, and the metadiorites, characterized by very high MgO, Cr and Ni contents, are comparable to low-SiO_2 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 ε_{Nd} (t) values of +2.16 to +2.77, while the second formed at 2.8 Ga with slightly negative ε_{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 2.96 Ga. The evolution of the island arc and subduction progression led to oceanic slab-melting and generation of adakites. At 2.92 Ga, 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