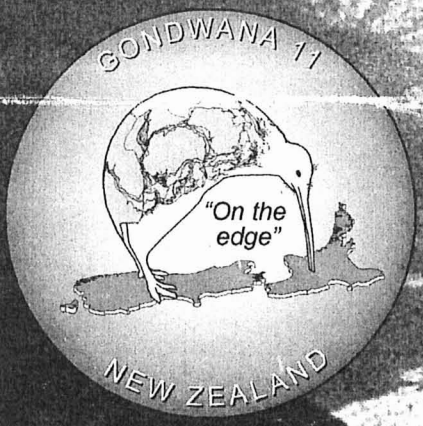
Programme and Abstracts



GONDWANA 11

Correlations and Connections

Sunday 25th August to
Friday 30th August 2002

University of Canterbury
Christchurch
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Sr and Nd characteristics of Neoproterozoic (630-500 Ma) granitoids of the Araçuaí belt, southeast Brazil: tectonic implications

Martins, V. T.[1], **Teixeira, W.**[1], Noce, C. M.[2], & Pedrosa-Soares, A. C.[2]

[1]Geochronological Research Center, Institute of Geosciences, University of São Paulo, SP, 05422-970, Brazil. wteixeir@usp.br
[2]Institute of Geosciences, Federal University of Minas Gerais, BH/MG, 31270-010, Brazil.

Crustal evolution of the Araçuaí belt (AB) took place during Neoproterozoic agglutination of Western Gondwanaland, as a result from the Adamastor-Brasilide ocean closure. The whole belt units (metasediments, granitic plutons, Archean and Paleoproterozoic basements rocks), including the African counterpart (West Congo belt), were affected by the Brasiliano/ Pan-African metamorphism and deformation; most of these units showing tectonic vergence toward the São Francisco and Congo cratons.

The AB presents a complex collisional history, mirrored by pré-, syn- and post-orogenic granitic intrusions that yield Pb-Pb and U-Pb ages from 630 to 500 Ma. Petrographic and geochemical features provide discrimination of six distinct AB granitic suites (G-1 to G-6), whilst the field relations are consistent with mixing and mingling processes for magma generation. New Sr and Nd isotopic data of five AB granitic suites are presented here, addressing issues related to the crustal evolution and tectonic polarity of the belt. These data are compared with isotopic signatures from the basement rocks, thereby constraining participation of newly formed crust and crustal components in the subduction phenomenon from which the Neoproterozoic plutonism was formed.

The granitic suites have ε_{Nd} values between –4.05 to –23.79 (T_{DM} ages from 1.33 to 2.8 Ga) whereas the country rocks from –5 to –40 (T_{DM} ages from 3.5-3.0 Ga and 1.9 to 1.5 Ga). The main crustal component for these suites is Paleoproterozoic in age, except of the post-collisional G-6 suite that is mostly crustal-derived (Archean and Paleoproterozoic components). Conversely, the pre- and syn collisional granites with relatively low ε_{Nd} values (-4 to –6) have T_{DM} ages in the range 1.7-1.3 Ga that are not related to any known event in the AB. These isotopic features are consistent with a minor, but important, participation of Neoproterozoic oceanic lithosphere in their source. Therefore, a confined orogenic setting for Araçuaí/ West Congo belt can be envisaged, in which a narrow ocean has been consumed (B-subduction model).

Finally, integration of age patterns, isotopic evidences and compositional variety of the studied suites support the following tectonic inferences: a) G-1 pre-collisional (I-type) suite originated at 630-590 Ma, probably only consuming lower crust (Neoproterozoic and/or Paleoproterozoic) – preceding complete closure of the Adamastor ocean; b) G-2 (S-type) suite originated at 591-575 Ma (early collisional stage) from an oceanic crust component combined with anatexis of crust material (e.g., sediments) due to increasing thickness of the belt; c) G-3 calc-alkaline suite (I-type; 585-574 Ma) may have mostly formed from reworking of Paleoproterozoic lower crust (granulites?); d) G-5 calc-alkaline suite (I-type) was formed at 520-505 Ma from a source with isotopic features similar of the G-3 protholiths; e) G-6 non-foliated suite (I-type; 503 Ma) is intrusive into G-5, marking the final magmatic evolution of AB.