

MESOPROTEROZOIC BIMODAL MAGMATISM IN THE SOUTHEASTERN PART OF RONDONIA, SW AMAZONIAN CRATON: $^{40}\text{Ar}/^{39}\text{Ar}$ GEOCHRONOLOGY AND TECTONIC IMPLICATIONS

Teixeira, W.¹; Bettencourt, J.S.¹; Vasconcelos, P.M.P.²; Rizzotto, G.J.³; Pacca, I.G.I.¹ and D'Agrella Filho, M.S.¹

1. University of São Paulo, Brazil - Institute of Geosciences. Rua do Lago 562 – Butantã, 05508-080, São Paulo-SP, Brazil.

Fone: +55 (11) 3091-4274. Fax: +55 (11) 3091 4295. wteixeir@usp.br

2. University of Queensland, Australia; University of Queensland – Dept. of Earth Sciences. Fone: +61 (7) 3365-2297, Brisbane, Qld 4072. Austrália. paulo@sol.earthsciences.uq.edu.au

3. Brazilian Geological Survey. Av. Lauro Sodré, 256, 78904-300, Porto Velho-RO, Brazil. Fone: +55(69) 223-3544.

Fax: +55(69) 221-5435. cprmrepo@enter-net.com.br

Keywords: Amazonian Craton, geochronology, tectonics, Mesoproterozoic

$^{40}\text{Ar}/^{39}\text{Ar}$ analyses, coupled with U-Pb and Rb-Sr radiometric data were performed on basic rocks, granites and gneisses that occur along a 1000 km transverse (Fig. 1), in the Southeastern part of the State of Rondonia. This area embraces parts of the Rio Negro-Juruena (1.75 - 1.55 Ga), Rondonian (1.48 - 1.41 Ga) and Sunsás (1.36 - 0.97 Ga) provinces – SW sector of Amazonian Craton. This is a key-area for understanding the tectonic and magmatic processes related to the agglutination of Rodinia (1.20 - 1.00 Ga), as well as for global correlation of late Mesoproterozoic intraplate features, widely reported within the broad Grenville province, such as: recurrent bimodal magmatism of AMCG suites, supracrustal sequences, intracontinental shear zones, and rift-basins. Nevertheless, despite the remarkable increase of the geologic knowledge in the SW Amazonian Craton during the last decade there are many open questions regarding the crustal evolution: i) the age and nature of the primary crust, and ii) the number of crustal/ juvenile accretion events that took place in this area during the Mesoproterozoic – among others.

The new $^{40}\text{Ar}/^{39}\text{Ar}$ radiometric data, combined with the geochronologic background and geologic setting, are used to constrain the timing of significant processes of extension tectonics and associated bimodal magmatism, and crustal reworking during the Mesoproterozoic, particularly associated with the Rondonian and Sunsás provinces. In addition, such a framework is used for global implications by means of the Eastern Laurentia/ Baltica - SW Amazonia connection.

Mafic and felsic plutonic rocks, located in the northern part of the area, yield $^{40}\text{Ar}/^{39}\text{Ar}$ ages in the range of 1.51 – 1.58 Ga, correlatable with the ages of the Serra da Providência Intrusive Suite. The interpretation of the new data is credit to an intraplate episode that originated the oldest phase of MCG magmatism, intrusive into the Rio Negro-Juruena province.

In the southeastern sector of the Rondonian province, the new $^{40}\text{Ar}/^{39}\text{Ar}$ ages of amphibolites, paragneisses and granites range from 1.36 to 1.30 Ga. Such rocks comprise the Colorado Metamorphic Suite (CMS), which is older than the evolution of the Nova Brasilândia Group (1.12 - 1.00 Ga). The latter sequence fills one of the rift-basins ascribed to be related to the Sunsás orogen. Undeformed

metagabbros of the CMS, as well as the neighbouring gneissic rocks yield U-Pb and Rb-Sr ages of 1.35 and 1.36 Ga, respectively. These data are therefore indicative of a tectonomagmatic event (juvenile accretion and metamorphism) in the SW Amazonian craton. This interpretation is also supported by comparable SHRIMP U-Pb zircon ages that have been reported for the peak of regional granulitic metamorphism in north-central Rondônia, as well as for the time of emplacement of some of the intrusive plutons.

A third group of $^{40}\text{Ar}/^{39}\text{Ar}$ ages for mafic and felsic rocks of the Nova Brasilândia sequence (western portion of the rift-basin) yielded plateau ages (hornblende and biotite) between 1125 - 980 Ma. Some of these ages (i.e., 1110 – 1000 Ma) probably reflect the tectonic closure of this basin, and the timing of associated shearing and hydrothermal episodes, resulted from the tectonic overprint of the Sunsás events. The youngest $^{40}\text{Ar}/^{39}\text{Ar}$ ages (980 Ma) also agree with the time of emplacement of the “Younger Granites” of Rondônia.

Finally, some scattered amphibolites yield constraining $^{40}\text{Ar}/^{39}\text{Ar}$ ages: 1.08 Ga; 1.13 - 1.15 Ga; 1.16 - 1.17 Ga and 1.25 Ga. These apparent ages compare well with the range of K/Ar and Rb-Sr ages available for country rocks in Central Rondônia (Rondônia-San Ignacio province), which have been reworked due to the Sunsás orogen. Nevertheless, some of these ages may have somewhat been influenced either by emplacement of the Alto Candeias Intrusive (1.34 - 1.33 Ga) and Santa Clara (1.08 - 1.07 Ga) plutonic suites, or by the evolution of the Ji-Paraná shear zone (1.08 - 1.05 Ga) – an important tectonic feature of the Rondonian-San Ignacio province, representing a strike-slip motion accompanied by thrust and granite emplacement associated with the Sunsás tectonic overprint.

As a whole, the geochronologic and geologic scenario is consistent with the proposed link between Eastern Laurentia/ Baltica and SW Amazonian Craton during the Mesoproterozoic, signed by the Grenville-Sunsás collage. This assessment has implications for establishing the paleocontinental margin during the final agglutination of Rodinia (1.2 - 1.0 Ga), mirrored by the investigated MCG magmatism, tectonic basins and shear zones.

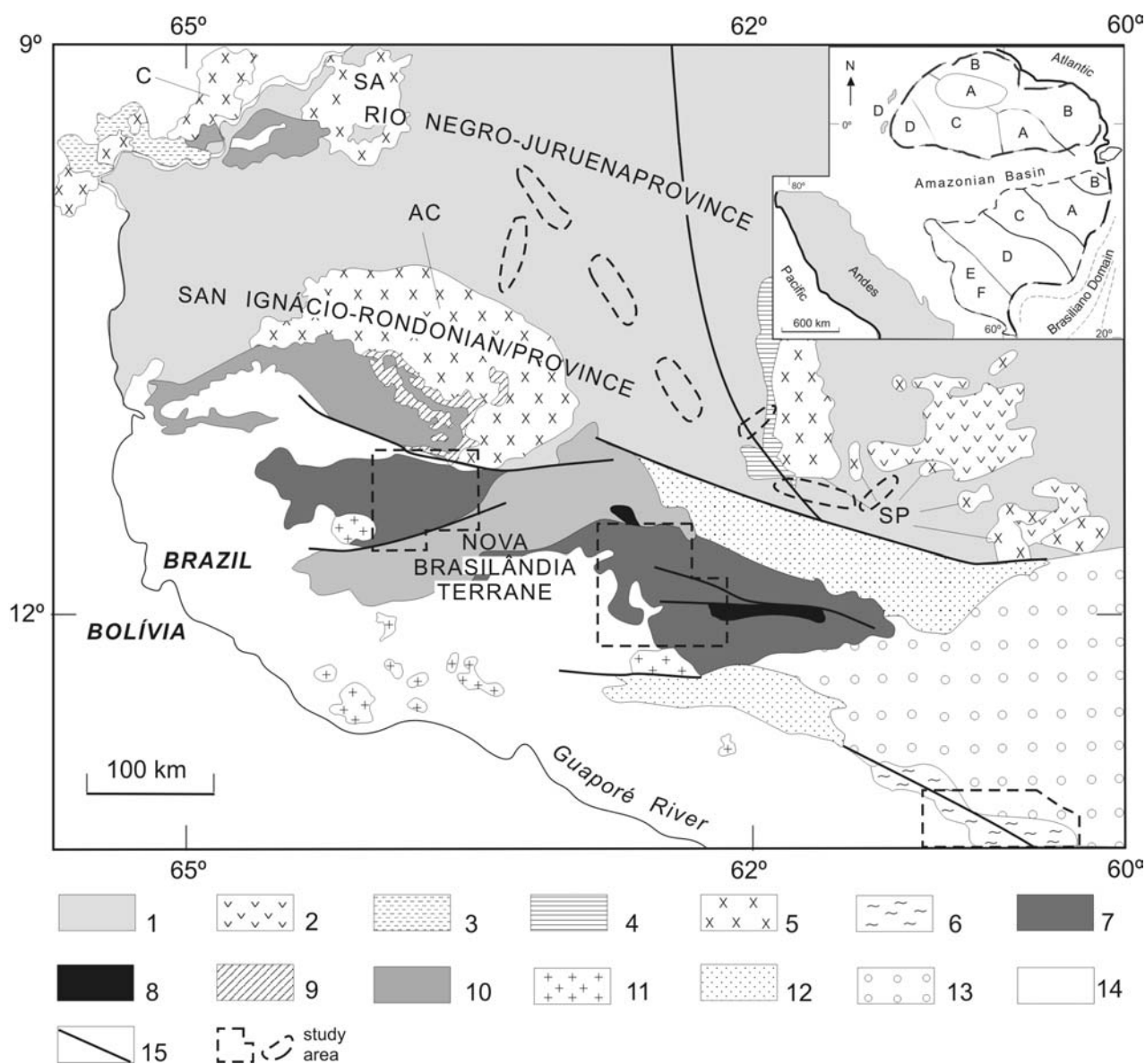


Figure 1. Geological sketch map of part of the SW sector of the Amazonian Craton, showing the study area. 1) Polycyclic basement; 2) Roosevelt volcano-sedimentary sequence; 3) Mutum Paraná metavolcano-sedimentary sequence; 4) Beneficiente Group; 5) Intrusive granitoid suites; 6) Colorado metamorphic suite; 7) Nova Brasilândia Group; 8) Nova Brasilândia Group mafic rocks; 9) Mafic rocks of the Nova Floresta Formation; 10) Supracrustal sequences of the Sunsás/Aguapeí orogeny; 11) Post-tectonic granitoids of the Sunsás/Aguapeí orogeny; 12) Paleozoic cover; 13) Mesozoic cover; 14) Recent; 15) Main tectonic structures. Inset: Main provinces of the Craton: A) Central Amazônia; B) Maroni-Itacaiunas; B) Ventuari-Tapajós; D) Rio Negro - Juruena; E) San Ignácio-Rondonian; F) Sunsás-Aguapeí.