SW AMAZONIAN CRATON REVIEWED: A KEY-AREA FOR UNDERSTANDING MESOPROTEROZOIC EVOLUTION OF EARTH

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Archean and Proterozoic events have played important role in the Amazonian Craton, mirrored by the Precambrian evolution of six crustal provinces, all of them showing very coherent isotopic constraints.

The oldest Central Amazonian province (> 2.53 Ga) acted as a foreland for the Proterozoic mobile belts that succeeded each other in time and space toward SW Amazonia. The Maroni-Itacaiunas province comprises extensive Paleoproterozoic granite-greenstone and coeval high-grade assemblages, lying along the Guiana shield and the West Africa Craton counterpart. The country rocks of this province formed during the Transamazonian orogeny between 2.25/2.10 – 1.95Ga. The adjacent Ventuari-Tapajós province (1.98 – 1.83 Ga) comprises a major calc-alkaline plutonic-volcanic association, known as the Cuchivero Group, which is otherwise intruded by the large Parguazan rapakivi Batolith (1.5 Ga). The Cuchivero rocks show a regional, prominent NW-SE trend, cross-cutting the NE-SW structures of the adjoining Maroni – Itacaiunas province and Imataca Archean Complex. The Rio Negro-Juruena (1.8-1.55 Ga), Rondonian-San Ignácio (1.5-1.3 Ga) and Sunsás-Aguapeí (1.25-1.0 Ga) provinces make up a multi-orogenic domain toward the southwest resulted from the evolution of distinct mobile belts.

Mesoproterozoic evolution in the SW Amazonian Craton was accompanied by metamorphic and deformation events that regionally affected and reworked the relatively older provinces (see above), producing new complexes, as well as new juvenile continental crust. In addition, basin tectonics played an important role in the period 1.5- 1.0 Ga, during which mafic dikes and sills, and alkaline complexes have intruded the previously stabilized crust.

Geologic similarities coupled with roughly comparable radiometric and paleomagnetic evidences have been provided for the possible link of such a multi-orogenic domain with the framework of Southern Laurentia and Baltica at Late Mesoproterozoic times (Rodinia Supercontinent).

During the last decade much effort has been done to acquire relevant age database using detailed geologic mapping of particular Proterozoic domains of the craton, leading to characterization of distinct orogens and terrains. This investigation is, therefore, part of a broad project that involves not only geochronology - particularly SHRIMP, Nd isotopes and Ar ages, but paleomagnetic and other studies.

Particularly the SW Amazonian craton embraces parts of the Rio Negro-Juruena, Rondonian-San Ignacio, and the Sunsás provinces, including the Bolivian Precambrian shield. The region shows widespread Mesoproterozoic intraplate features, like extensive metavolcano-metasedimentary sequences, bimodal volcanism and plutonism and successive pulses of AMCG suites (e.g., "A type granitic gneisses and charnockites of the Serra da Providência suite: 1.57 – 1.53 Ga) that intrude the tonalitic and enderbitic gneisses em paragneisses dated between 1.75 – 1.73 Ga. Therefore, this is a key-piece in any reconstruction of Rodinia Supercontinent – known as the agglutination of large lithopheric fragments from 1.2 to 1.0 Ga ago (e.g., Grenville global orogen).

Here we report a significant group of $^{40}Ar/^{39}Ar$, Ub/Pb and Rb/Sr radiometric data, performed on rock associations related to different tectonic episodes that occur along a 1000 km section in the SW Rondonia. The data, combined with published U-Pb, Sm/Nd and Rb/Sr ages, are used to constrain the

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tectonic scenario in Late-Mesoproterozoic times (e.g., the age and nature of the primary crust; timing of extension and thermo-metamorphic episodes that took place in the area), during convergence between Laurentia and South West Amazonia. Consequently, our data have important role to better understanding of the available paleotectonic models at that time.

The sampling includes mafic and felsic rocks that crop out in a Late Mesoproterozoic rift basin – The Nova Brasilândia which exposure comprises two blocks. From here, the sampling profile goes to the North, crossing the polycyclic gneissic rocks of the Rondonia-San Ignacio and Rio Negro Juruena provinces, as well as supracrustal sequences, and distinct groups of bimodal magmatism. Also, large shear zones are present along the profile, which have important bearing in the Mesoproterozoic tectonics.

Mafic and felsic plutonic rocks located in the northern part of the profile yield $^{40}Ar/^{39}Ar$ ages in the range of 1.51 – 1.58 Ga. These ages are correlatable with those of the oldest intraplate episode that originated the AMCG magmatism, intrusive into the Rio Negro-Juruena province.

In the southeasterly sector of the Rondonian-San Ignácio province, a second group of $^{40}Ar/^{39}Ar$ ages in amphibolites, paragneisses and granites range from 1.36 to 1.30 Ga. Such rocks comprise the Colorado Metamorphic Suite, 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 of the Sunsás orogen. Undeformed meta-gabbros with cumulate igneous layer of this suite, as well as the neighboring gneissic rocks have been dated by U-Pb and Rb-Sr methods. The U-Pb isotopic data for three zircon fractions define an upper intercept with concordia (crystallization age) of 1352 +4/-3 Ma (MSWD=0,18). A porphyritic metamonzogranite yielded a comparable Rb-Sr whole rock isochron age of 1360 ± 45Ma, and $^{87}Sr/^{86}Sr_i$ = 0.7040 ± 0.0012 (MSWD=9.2). As a whole, these data indicate a previously unknown tectonomagmatic event (juvenile accretion and metamorphism: 1.36 – 1.32 Ga) 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 (1.33 – 1.30 Ga) in north-central Rondônia, as well as for the emplacement of intrusive granites.

A third group of $^{40}Ar/^{39}Ar$ ages for mafic and felsic rocks of the Nova Brasilândia sequence (western portion of the rift-basin) yielded plateau ages (horblende 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 hydrotermal episodes, resulted from the tectonic overprint of the Sunsás orogen. The youngest $^{40}Ar/^{39}Ar$ ages (980 Ma) found agree with the time of emplacement of the "Younger Granites" of Rondônia.

Finally, some scattered amphibolites yield contrasting $^{40}Ar/^{39}Ar$ ages: 1.08 Ga; 1.13 - 1.15 Ga; 1.16 - 1.17 Ga and 1.25 Ga. These apparent ages may have being influenced either by emplacement of the Alto Candeias (1.27 Ga) and Santa Clara (1.08 - 1.07 Ga) plutonic suites, or by the Ji-Paraná shear zone (1.08 - 1.05 Ga). This structure represents a strike slip motion accompanied by thrust and granite emplacement – associated with the Sunsás tectonic overprint.

From the above, the tectonic global scenario is consistent with the connection between SW Amazonia and Eastern Laurentia/ Baltica during Mesoproterozoic times, signed by the Grenville-Sunsás collage. This assessment has important implications for constraining the paleocontinental margin of Rodinia (1.2- 1.0 Ga), mirrored by roughly coeval AMCG bimodal magmatism, as well as formation of rift-basins and shear zones, and mineral deposits.