

New U-Pb LA-ICPMS geochronological evidences of a Neoproterozoic arc along the easternmost Pampean ranges sequences

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The Eastern Pampean Ranges show a north-south trend along the northeast of San Luis, west of Córdoba and the south of Santiago del Estero provinces, in the centre of Argentina. They are composed of sets of old and strongly deformed metamorphic rocks that arise from the Chacopampeana plains recording a complex tectonic history developed during the assembly of the Gondwana west margin. The genesis of these rocks is still controversial, some authors proposed that they are part of an allochthonous terrane called Pampia that was assembled to the Amazonian Craton during Rodinian times (1), and later on to the Rio de La Plata Craton (RPC) in the early Cambrian (2). Others supports that these units constitute sedimentary sequences accreted to the RPC southwest margin that were exhumed in the Cambrian after the collision between the Craton and the Western Sierras Pampeanas, as part of the Arequipa Antofalla block (3), or as proposed by other authors, during the collision of Mara block (4). Currently, the collision between the Pampia terrane against the RPC is still under debate. (5) grouped the existing hypotheses into 3 main interpretation lines: a) Island arc collision against the RPC, b) Ridge subduction under a Cambrian accretionary prism, and c) Oblique collision of a large Paleoproterozoic age continental basement to the Kalahari Craton, later displaced by a transform fault.

According to (3), the Eastern Pampean Ranges were built by two temporarily lagged orogenic cycles. The first occurred in the Neoproterozoic, linked to the Goiás ocean closure during the Brazilian II cycle, and the second in the Cambrian, associated with the Puncoviscana ocean closure and the Brazilian III cycle (or Pampean orogeny). Based on detrital zircons distribution patterns and Sm-Nd ages, (6) proposed the emplacement of an island arc on the western margin of the RPC between 700 and 600 Ma ago. This arc, obliterated by the Pampean deformation, would have acted as a source for the Puncoviscana basin, constituting the southern end of a larger scale orogen.

Preliminary isotopic evidence from amphibolites, biotite gneisses and silicate-rich metacarbonate outcrops, supports the docking of a magmatic arc against the RPC during Neoproterozoic times (7). We present here new U-Pb isotopic data from some of those units, reinforcing those hypotheses.

LA-ICPMS analysis on zircon performed at Centro de Pesquisas Geocronológicas – USP, added 54 and 80 spots from amphibolites located north from El Sauce village (ES) and west from Falda del Carmen (FC), respectively. Backscattering and cathodoluminescence images show for the Neoproterozoic population a mixture of euhedral and subhedral crystal morphology and absence of fractures, suggesting a probable igneous source. Multifaceted *football shaped* crystals and wavy extinction are also present as well as rim development, indicating that these rocks underwent through a pervasive metamorphism during the Pampean and Famatinian cycles. Dated spots from ES showed a new maximum crystallization age of 675 Ma and a Concordia age of 591 ± 8.1 Ma, being in total 18 spots older than 550 Ma, 10 of these exceeding 590 Ma. FC outcrops, previously dated in 564 Ma, yielded a maximum crystallization age of 597 Ma, adding other four Neoproterozoic ages to database.

Obtained ages reinforce previous published amphibolite data, being also consistent with prevailing Neoproterozoic and Cambrian ages from two biotite gneisses outcrops from Sierra Chica (7). We propose that all these units were part of the same Oceanic Arc Depositional System (8) developed along the west margin of the RPC during the Neoproterozoic.

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