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Detrital zircon ages of Ediacaran and Early Cambrian successions at the edge of the Río de la Plata Craton (Uruguay) reveal contrasting geotectonic settings

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The Las Ventanas Formation (LVFm) is a volcanosedimentary succession deposited between 590 and 573 Ma at the eastern border of the Río de la Plata Craton (RPC, Nico Pérez Terrane). The unit comprises a fining- and thinning-upward sequence of conglomerates, sandstones and pelites, and interbedded basalts and acid volcanics. On the basis of its stratigraphy, bimodal volcanism and petrography it has been regarded as a rift basin. In its lower part glaciogenic diamictites occur which have been assigned to the Gaskiers glaciation.

The earliest Cambrian San Carlos Formation (SCFm), on the contrary, occurs in the Cuchilla Dionisio Terrane, only 20 km to the E of the boundary with the RPC. This terrane is considered as part of the exotic Arachania paleocontinent, which probably rifted away from the Kalahari Craton at ca. 740 Ma. The SCFm is made up of siliciclastic rocks and rare acid volcanic intercalations.

We report here the first U-Pb (SIMS) detrital zircon ages for the LVFm (Fig. 1). They are characterized by two different populations: (1) a mainly early Ediacaran population comprising 50% of concordant ages, and (2) a Paleoproterozoic-Archean population (50%). The Ediacaran population exhibits three maxima at ca. 585, 610 and 630 Ma, all of which coincide with reported ages of anorogenic igneous rocks in the RPC (Fig. 1). The older population matches the age of the Transamazonian Orogeny, rapakivi granites and the Archean La China Complex in the RPC.

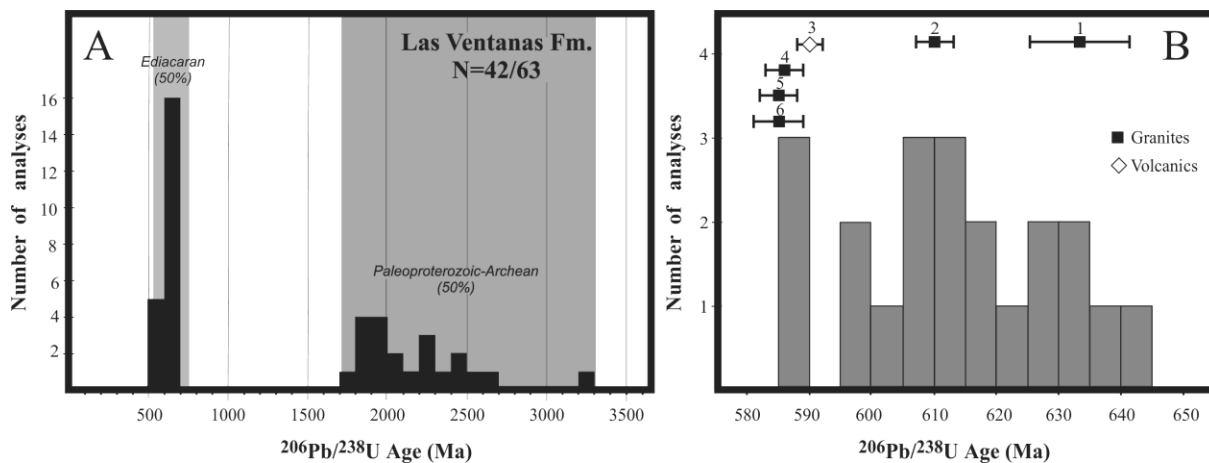


Figure 1: (A) All concordant ages for the Las Ventanas Formation. (B) Neoproterozoic ages, compared with reported ages of anorogenic igneous rocks (1: Puntas del Santa Lucía, 2: Lavaderos, 3: Las Ventanas basalts, 4: Las Flores, 5: Sobresaliente, 6: La Paz).

The age pattern of the LVFm is in strong contrast to that found for the SCFm, which is dominated by Neoproterozoic zircons (88%) between 908 ± 8 and 535 ± 6 Ma. Four peaks are distinguished at 750, 640-650, 585 and 560 Ma. Whereas the absence of the 560 Ma peak in the LVFm is due to its older age, the absence of the 640-650 Ma and 750 Ma peaks, the two main sub-populations of the SCFm, indicates a different source for the LVFm. The SCFm is thus interpreted as a molassic basin that represents the unroofing of the Brasiliano-Pan African Orogen in Arachania. On the other hand, the LVFm was not sourced in the orogen, but on the basement of the RPC and intruding anorogenic units. We envisage that Arachania and the RPC were still separated by an ocean by the time of deposition of the upper LVFm (573 Ma).

