XVIII IX

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XVIII REUNIÓN ARGENTINA DE SEDIMENTOLOGÍA

IX CONGRESO LATINOAMERICANO DE SEDIMENTOLOGÍA

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19 al 22 de Septiembre 2023

Centro de Convenciones, Congresos y Eventos de Posgrado S. Karakachoff
Universidad Nacional de La Plata

La Plata – Buenos Aires – Argentina

Actas XVIII Reunión Argentina de Sedimentología : IX Congreso Latinoamericano de Sedimentología / Maria Sol Raigemborn ... [et al.]. - 1a ed. - La Plata : Asociación Argentina de Sedimentología, 2023.
Libro digital, PDF

Archivo Digital: descarga y online
ISBN 978-631-90299-0-1

1. Sedimentología. 2. Energía. 3. Ambiente. I. Raigemborn, Maria Sol.
CDD 551.071

TYING THE C-ISOTOPE EXCURSIONS OF THE NEOPROTEROZOIC SUCCESSIONS OF TANDILIA SYSTEM: PHANTOM GLACIATIONS?

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The Neoproterozoic era (1000–539 Ma) encompasses drastic global changes, including extreme climatic events and transformative evolutionary transitions. Snowball Earth hypothesis (cf. *Snowball vs Slushball Earth hypotheses*) suggests that during Cryogenian the Earth was “completely” ice-covered Sturtian (~720-710 Ma) and Marinoan (635 Ma) events. In Ediacaran times, Gaskiers (582 Ma) followed by Shuram (~570 Ma) events were related to $\delta^{13}C$ excursions recorded globally and commonly associated with prominent sedimentological, geobiological and geochemical changes.

In the Neoproterozoic sedimentary cover of Tandilia System we recorded two of the $\delta^{13}C$ anomalies correlated with glacial/deglacial periods, however glacial deposits *sensu stricto* are absent or poorly recognizable. The older $\delta^{13}C$ excursion was documented in dolostones of the Villa Mónica Formation (first stage of the sedimentary basin infill ~80 m). Regarding phosphorous rich levels, added to typical Cryogenian-stromatolites morphologies, $^{87}Sr/^{86}Sr$ values and dolomite origin, this unit was interpreted as a cap-dolostone deposited under deglaciation related to the Sturtian event. This unit was previously defined as the basal section of de Sierras Bayas Group. However, the recent record of the widespread Piedra Amarilla karstic-Surface in its upper contact, was indicated as the evidence of a large spatio-temporal interval bounding contrasting basin infill histories. Consequently, the Villa Mónica Formation was excluded from this group. The redefined Sierras Bayas Group (Colombo, Cerro Largo, Olavarría and Loma Negra formations) is delimited on top by another regional karst, Barker Surface. This surface was associated with an important sea level drop tentatively related to Gaskiers glaciation. The underlying limestones of Loma Negra Formation (~40 m) revealed $\delta^{13}C$ and $^{87}Sr/^{86}Sr$ relative to ~590-580 Ma seawater variations added to negative Ce anomaly correlative to an ~580 Ma oceanic oxic event (OOE) recorded globally.

The Avellaneda Formation, base of the La Providencia Group, constitutes the first sedimentary infill of this group with variable thickness (~3 to ~32 meters). The isolated carbonate phase (primary micrite) of samples was analyzed for stable C and O isotopes. Considering textural and mineralogical micrite preservation and primary geochemical signal, the isotopic data may reflect seawater conditions. $\delta^{13}C$ curves show a negative anomaly, age-constrained by geobiological and paleomagnetic results. Hence, the record of this negative anomaly is remarked in the studied sections allowing a very tight correlation. Although the magnitude of this excursion is not the expected, the time interval that represents is probably the incomplete expression of the Shuram excursion.

Considering the Slushball and Phantom Glacial models as the paleoclimatic contexts of the signals recorded in Villa Mónica, Loma Negra and Avellaneda formations, a correlation with changes in paleogeographic configurations can be tentatively assumed. Therefore, the two karsts carved over the carbonate successions may represent time-correlative glacial sea-level drops. Moreover, the karst-related surface on top of the VMF may be considered the fingerprint of the transition from the break-up of Rodinia to the southwestern Gondwana configuration.