

A Review of the Proterozoic Carbon Isotope record of India: Inferences on global redox and climate cycles

PRONOY ROY^{1,2} AND BULUSU SREENIVAS³

¹CSIR-National Geophysical Research Institute

²Academy of Scientific and Innovative Research (AcSIR)

³CSIR-National Geophysical Research Institute, Hyderabad
500007, India

Presenting Author: r.starpro0009@gmail.com

Proterozoic eon is one of the most intriguing parts of Earth history. The most dramatic changes occurred in the atmosphere, hydrosphere, and biosphere. A fundamental shift in the plate tectonic style is conceived across the Archean-Proterozoic transition. Carbon and Oxygen isotope compositions of sedimentary carbonates provide clues about biogeochemical cycles and the intertwined nature of climate and life. Global excursions, especially in $\delta^{13}\text{C}$ isotope records, indicate perturbances in the carbon cycle and can be linked to major atmospheric and ocean chemistry changes such as the Great Oxidation Event, snowball Earth conditions (global glaciations), etc. For instance, the global positive excursions during the early Paleoproterozoic (~2.3 to 2.06 Ga) known as the Lomagundi event are associated with GOE.

Further, the association of negative $\delta^{13}\text{C}$ isotope excursions with global glaciations at the beginning and end of the Proterozoic indicates the influence of the carbon cycle on climate. In this work, we attempted an updated review on the $\delta^{13}\text{C}$ isotope record of the Indian Proterozoic sedimentary carbonates to test their adherence to global records and draw inferences on events like GOE and snowball Earth scenarios. The Indian example of the Lomagundi excursion is found only from the micritic dolomites from Ghasiar belonging to Paleoproterozoic Aravalli Supergroup (Sreenivas et al., 2001). The Late Paleoproterozoic carbonates records from Cuddapah, Kaladgi, Aravalli supergroup show $\delta^{13}\text{C}$ values from 0 to ± 3 ‰, which are in coherence with the global record. The $\delta^{13}\text{C}$ values of the late Mesoproterozoic to early Neoproterozoic carbonates of the Chattisgarh, Badami, Indravati, Kurnool, and Bhima basins, show moderately positive $\delta^{13}\text{C}$ upto + 4.5‰, which also adheres to the global positive carbon isotope record. The Neoproterozoic-Cambrian carbonates from Marwar, Birmania, and Lesser Himalaya register both positive and negative $\delta^{13}\text{C}$ isotope excursions values despite glacial deposits are not omnipresent.

[1] Sreenivas, B., Sharma, S. D., Kumar, B., Patil, D. J., Roy, A. B., & Srinivasan, R. (2001). Positive $\delta^{13}\text{C}$ excursion in carbonate and organic fractions from the Paleoproterozoic Aravalli Supergroup, Northwestern India. *Precambrian Research*, 106(3-4), 277-290.