



# CARBON ISOTOPE STRATIGRAPHY OF THE PALAEO-NEOPROTEROZOIC VINDHYAN SUPERGROUP, CENTRAL INDIA: IMPLICATIONS FOR BASIN EVOLUTION AND INTRABASINAL CORRELATION

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## ABSTRACT

To establish the carbon isotope stratigraphy of the Vindhyan Supergroup fifty two bulk samples of the carbonate rocks were analysed for total carbon content, organic carbon content,  $\delta^{13}\text{C}_{\text{org}}$ ,  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$ . In addition 35 samples were also analysed for  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$ . Three regions were selected for sampling viz., Chopan area, Uttar Pradesh, Maihar area, Madhya Pradesh and Kota – Chittorgarh area, Rajasthan. The carbonate content of the rocks varies from 24 to 99% but generally it is more than 70%. The organic carbon is present in very small quantities and is generally less than 0.05%. Over the whole Vindhyan profile  $\delta^{13}\text{C}_{\text{org}}$  shows a wide range from -24 to -34‰ (PDB). The mean value (-29.0‰) for the Semri Group is slightly lower in comparison to the mean value (-26.8‰) for the Upper Vindhyan (the Rewa and Bhandar Groups).  $\delta^{13}\text{C}_{\text{carb}}$  varies between -5.9 and 4.4‰. In the Semri Group, it is around zero per mil with 2‰ variation to either side. In the Maihar area,  $\delta^{13}\text{C}_{\text{carb}}$  variation for the Bhandar Group is bracketed within 2.6 and 4.4‰, whereas in Rajasthan it shows a wide range from -5.9 to 3.4‰, implying a total spread of about 9‰. The Lakheri Limestone of Rajasthan gives the mean value of  $\delta^{13}\text{C}_{\text{carb}}$  as -5.4‰ whereas the mean value for the Bhandar Limestone of Maihar area is 3.9‰. Thus, both the limestone horizons are not correlatable on the basis of isotope signatures. It is also suggested that the Lakheri Limestone is stratigraphically older than the Bhandar Limestone. The negative values for the Lakheri Limestone may indicate colder climate and the sedimentation of this limestone may coincide with Sturtian glaciation. However, the field evidence for the glacial event is yet to be established.  $\delta^{18}\text{O}_{\text{carb}}$  values for the entire Vindhyan succession varies quite widely between -2.3 and -15.5‰ (PDB). It is concluded that isotopically the successions in the western and eastern parts of the Vindhyan Basin differ considerably. However, the carbon isotope values matches well with the global trend.

There is no evidence to suggest that the Precambrian/Cambrian boundary exists within the Vindhyan Supergroup. It appears that the sedimentation in the Vindhyan Basin ceased around ca. 700 Ma. and the Vindhyan are in no way related to the Krol-Tal succession of the Lesser Himalaya.

**Key words:** Carbon isotope, Vindhyan Supergroup, Palaeo-Neoproterozoic, Central India, Stratigraphy