

CONTRASTING CARBONATE LITHOFACIES FROM THE PALAEOPROTEROZOIC LOWER ARAVALLI GROUP, NW INDIA

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Abstract

Carbonate litho-facies, located proximally in the Lower Aravalli Group (LAG) of northwest India, are deciphered by contrasting geochemical characters. In the LAG, the carbonates from the underlying Babarmal Formation are calcitic while the carbonates of the overlying Jhamarkotra Formation are dolomitic. The calcitic carbonates show 85% average carbonate content as compared to the dolomitic carbonates which reportedly show 55% average carbonate content. Similarly, Mg values in the studied calcitic carbonates are about 1.2wt% which is considerably low as compared to the 10wt% Mg in the dolomitic carbonates. The calcitic carbonates do not bear phosphate and related organic bio-markers like the dolomitic carbonates. Unlike the dolomitic carbonates the calcitic carbonates do not show significant replacement of Ca⁺⁺ ions by Fe, Mg and Mn ions and hence retain better pristine geochemical features. Mg/Ca (0.024) and Fe/Mn (0.25) for calcitic rocks are low in contrast to the dolomitic carbonates where Mg/Ca (0.53) and Fe/Mn (from 0.5 to 2) are high. These low values of the ratios for the calcitic carbonates suggest that there was very low influx and their deposition took place under considerable restricted conditions as compared with the dolomitic carbonates. This inference is further confirmed from high positive Ce anomalies in the dolomitic carbonates. The calcitic carbonates show average Sr value of 80 ppm which is less than the average concentration of 100 ppm in dolomitic carbonates. Sr values for both the carbonates are much low and lie within small range which indicates that source for both the carbonates was uniform. 1000Sr/Ca facies variation ratios crowd between 0.25 and 0.75 which indicate typical shelf environment for both calcitic and dolomitic carbonates. Calcitic carbonates unlike dolomitic carbonates invariably show low Mn/Sr ranging from 0.8 to 2.5 that suggests that the samples are diagenetically unaltered and imply that the carbonates bear the original depositional features inherited from the coeval seawater that was perhaps depleted in Mn. Significant differences in the geochemical compositions between two contrasting carbonate litho-facies indicate different palaeo-environment and provenance

Keywords: Carbonate lithofacies, Babarmal Formation, Jhamarkotra Formation, Aravalli Supergroup.