

Stromatolitic carbonates and cherty dolomites from Chitradurga greenstone belt of Western Dharwar Craton, India: Geochemical evidence for Archean biogenic activity and paleoenvironmental conditions

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The sedimentary sequences of Archean greenstone belts of Western Dharwar Craton, India are marked by signatures of ancient biogenic activity preserved in stromatolitic carbonates, carbonaceous shales, manganese and banded iron formations. Stromatolitic carbonates are primarily composed of sediments formed by trapping and binding of ambient sediment or from the precipitation of authigenic mineral particulates. Trace element and rare earth element (REE) signatures of the studied samples show depletion in LREE, positive La and Gd anomalies and negative Ce anomalies with chondritic Y/Ho ratios. These geochemical features collectively point towards their deposition in marine conditions. The negative Ce anomalies reflect on the oxidation of Ce trivalent to tetravalent state and its desorption from the mineral particles. Low Th concentrations suggest that these carbonates contain few fine terrigenous materials and reflect on minor role of trapping and binding activity. These geochemical signatures of the stromatolitic carbonates and cherty dolomites characterize the Archean depositional environment in which they precipitated and provide understanding on the paleo redox conditions that promoted the evolution of the Earth's earliest biota.