Archean-Proterozoic stromatolitic carbonates, India: disparity in their biogeochemical processes

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Introduction

The biogeochemical processes of stromatolitic carbonates which are well preserved in the Neoarchean greenstone belts of Dharwar Craton and Proterozoic Cuddapah Basin of Peninsular India displaying varied morphological and geochemical characteristics were studied.

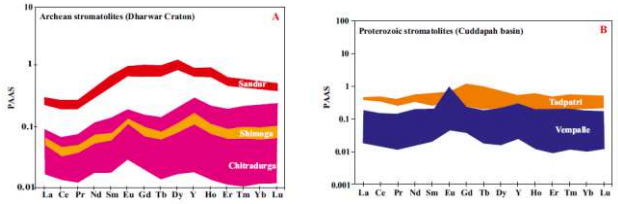

Figure 1: Post Archean Australian Shale (PAAS) normalised Rare Earth Elements plus Yttrium (REY) distribution patterns of (A) Dharwar Craton stromatolites and (B) Cuddapah Basin stromatolites.

Results and Discussions

The trace and REY geochemistry of stromatolitic carbonates of the Dharwar Craton are depleted in ∑REY and display positive La, Eu, Gd and Y anomalies reflecting hydrothermal signatures and minimal detrital input. Stromatolites of Proterozoic Cuddapah Basin exhibit positive Ce along with Eu, Gd, Y anomalies which collectively reflect on marine water anoxic conditions for their deposition with variable inputs of siliciclastic/terrigenous materials and minor hydrothermal signatures. These anoxic conditions in the Proterozoic stromatolites may be due to variation in the depth of the water column in an open ocean system.

The stromatolitic carbonates of Archean Dharwar Craton and Proterozoic Cuddapah Basin were deposited in an environment ranging from subtidal to supratidal zone. The biogeochemical changes appear to reflect on the smaller plate geometry during Archean with limited continental shelf area for the deposition of stromatolites. In contrary to this, an increased surface area during Proterozoic period provided prolonged continental shelf that paved the way for the deposition of Proterozoic stromatolites with varied morphological features.