

## **QUATERNARY ANALOGS OF ANCIENT PHOSPHORITES OFF CHENNAI, SOUTHEAST COAST OF INDIA**

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Detailed petrological, mineralogical, geochemical and radiogenic (Sr, Nd) and stable isotope (C, O, S) studies have been carried out on the Quaternary phosphorites of the continental margin off Chennai. These phosphorites are formed as a result of trapping and binding of sediments by microbial mats and are similar to phosphate stratiform stromatolites. The major and minor element composition of the phosphorites is largely influenced by the associated detrital and biogenic constituents. Except Sr and U, the concentrations of most of the trace metals are lower than those in average shale and phosphorite. Middle rare earth element (MREE)-enriched patterns are the characteristic feature.  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of the phosphorites are higher than that of present day sea water and  $\epsilon\text{Nd}$  values are more negative than the sea water of the Atlantic Ocean. Carbon isotope ratios are within the range expected for the oxic/suboxic zone but sulfur isotope ratios indicate suboxic conditions during phosphorite formation. These results imply that the benthic microbial community thrived at the shelf margin under eutrophic conditions, during the Quaternary lowered sea levels. The bacteria associated with decaying microbial mats may have utilised phosphorus supplied by continental sources and rapidly precipitated phosphate in shallow marine environment. Phosphorus supply seems to be the most important controlling factor for their formation. The composition of these phosphorites differ from the modern phosphorites in upwelling regions, but similar to Cambrian apatite stromatolites, Contrary to the earlier belief, these phosphorites provide evidence that the replicates of ancient phosphorites do exist in Quaternary. This finding negates the necessity of upwelling for the formation of ancient phosphorites.