A FTIR and Raman spectroscopic study on sedimentary apatites from the PC-C boundary: A case study on Central and South Asian phosphorites

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The Precambrian-Cambrian (PC-C) boundary is marked by unique environmental and evolutionary changes. Concomitant with these changes is the widespread formation of phosphate deposits in Central and South Asia. The most abundant mineral in sedimentary phosphorites is carbonate fluorapatite (CFA), which is either formed by (1) direct precipitation, or indirectly through (2) microbial mediation or (3) replacement of carbonates. Previous studies have proven FTIR and Raman spectroscopy to be powerful tools in analysing magmatic, biogenic or synthetic apatites. Published FTIR and Raman data of sedimentary apatite however are sparse.

We present a new spectroscopic study on three types of sedimentary apatite that represent different depositional facies: (1) phos-stromatolith, (2) phosphatic concretion and (3) phosphatic grainstone, all covering the PC-C boundary interval. This study aims to shed light on the individual formation and/or alteration conditions of the distinct apatite deposits to improve our fundamental understanding of both modern and ancient phosphogenesis. Therefore, mineralogical and (micro-) structural features, crystallinity indices and chemical signatures like C/P ratios are used to evaluate how differences in the depositional environment influence sedimentary apatite formation.

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