Diagenetic uptake of P-Tr conodont rare earth elements from shallow to deep environments: An assessment

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It is widely acknowledged that the rare-earth elements (REEs) of conodont bioapatite can provide information regarding the influence of weathering fluxes and hydrothermal inputs on seawater chemistry. However, researchers gradually found that the remobilization and inter-elemental fractionation of REEs during diagenesis generally accompany redox reactions in sediment porewaters assimilated by bioapatite, trigerring the doubt about the accurancy of paleoceanic environment reconstructed by REEs.

Here, to evaluate the degree of diagenesis uptake of REEs in Permian-Triassic conodonts, we reviewed previous results and measured the REE content of in-situ, single albid conodonts'crowns from various depositional settings in a nearly contemporaneous strata unit, the P-Tr boundary bed, just above the extinction horizon from four sections in South China, using laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS).

The data show that the REEs of all the conodont samples undergo strong lithogenic influence, shown as significant "MREE bulge" pattern and positive relationship berween SREE with [Th] (R^2=0.66), while there is moderate hydrogenous source, especailly in the samples from lower ramp setting, a handful of which has relatively higher Y/Ho (30-45) and lower SREE (< 100 ppm), also lower MREE/MREE* (< 3). Although we could work out the ratio of Ce/Ce*, according to the formula of $Ce_{N/}(La_N^{2/3}+Nd_N^{1/3})$, even find the trend with water depth, it is suggested by the dominated positive covariation of Ce/Ce* vs Pr/Pr* that the "true" anomaly of Ce are rare and mostly influenced by detrital signature or MREE enrichment. Besides, partial conodonts from lower ramp (Meishan Section) display negative covariation of Ce/Ce* vs Pr/Pr*, that is to say, the REEs conodonts from this environment undergo less diagenesis.