



High-resolution and high-sensitivity tephra-inferred fingerprints in stalagmite geochemistry

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High-resolution and high-sensitivity rare earth elements (REEs) profiles of Holocene stalagmites collected from East Timor (8° 47' S, 126° 23' E) provide detailed fluctuation information which can be inferred to super volcano eruptions. Since REEs are enriched in igneous rocks ($\sim \mu\text{g/g}$) but depleted in carbonates ($\sim \text{ng/g}$ to pg/g), REEs preserved in stalagmites are acted as an ideal proxy of tephra-inferred signature; however, due to the low REE abundances in most natural stalagmite samples (1-100s ng/g), overall applicability has been sharply limited. Here we develop and apply an improved LA-GED-ICPMS methodology to determine REEs in such low concentration stalagmites. Two pronounced REE peaks occur where their concentrations sharply increased by 1-2 order of magnitudes, from 10s of ng/g to 100s of ng/g . This event was dated at 80 thousand years ago by U-Th methods. Nevertheless, the accurate timing of this REE anomalous event should be examined carefully. Also more multi-proxies evidences such as stable isotopes $\delta^{13}\text{C}$, $\delta^{18}\text{O}$, and S isotope, should be provided in the future.