*Supplement for*

***Huang et al., 2024. Stalagmite-based rare earth elements geochemistry from southwestern China and its implications for palaeoenvironment***

This file includes five figures (Figs. S1-S5).



Fig. S1. REE pattern comparisons with different references and demonstration forms. NASC (A and B) and PAAS (C and D) are applied to test, respectively. For each normalization, we plotted data directly on the logarithm scale (A and C) and calculated logarithm values plotted on the linear scale (B and D), respectively, all of which are closely consistent.

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Fig. S2. PAAS-normalized REE pattern of all subsamples for stalagmite SX15a. Around the depth of 125 mm, the patterns of Gd and Tb are different between lower and upper parts, which corroborate the results in Fig. 3.

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Fig. S3. Comparisons of the *δ*Ce and *δ*Eu calculative method between linear difference and geometric ration for neighbouring pairs. (A): the difference between Nd and Pr (red dotted line) compared with the ratio of Nd to Pr (black dotted line); plot (B) is the same as (A), but between Nd and Sm. It is easy to observe that the difference between two nearby elements produce smaller deviations relative to that of ratios between.



Fig. S4. REE anomaly variations indicated by CeN/CeN\* (δCe, A), and EuN/EuN\* (δEu, B) with depth. The high-resolution lithofacies changes are also shown from a depth of 210 mm to the top (C). The ruby red shading bar marks the CIS 24 event.



Fig. S5. Comparison between δ18O and ΣREE records of SX15a stalagmite. (A): stalagmite SX15a δ18O; (B-D): ΣREE, ΣHREE and ΣLREE within SX15a, respectively. The abrupt changes of ASM indicated by δ18O and ΣREE records of SX15a are marked with the gray shading bar.