



A coherency analysis of Asian speleothems

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Asian speleothem records have been widely used to investigate hydroclimate variability on interannual to orbital timescales, particularly for studies of the Asian monsoons. Although speleothem $\delta^{18}\text{O}$ at orbital scales is very coherent across Asia [1,2,3], recent studies have shown that this coherency may vanish at scales shorter than millennial [4,5,6]. Thus it is necessary to investigate coherency among records. We analyze eight speleothem records in China and India of the last 2000 years from the SISAL database [7]. Multichannel Singular Spectrum Analysis (MSSA) [8] and Empirical Orthogonal Function (EOF) analysis are employed to investigate the dominant quasi-periodic oscillations and corresponding spatial-temporal variability. The result shows there are three significant quasi-cycles among these records, representing trends, 500 yr, and 250 yr quasi-periods. These modes feature anti-phasing between speleothem $\delta^{18}\text{O}$ in eastern China and that in western China and India. This coherency loss may be due to several factors: low-signal amplitude, karst processes, and chronological errors. The anti-phasing suggests inhomogenous regional climate variability in Asia at these timescales. We will use results from an isotope-enabled model to investigate this regional climate variability. Future study is necessary to assess the robustness of these results to age uncertainties via ensemble methods.

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