

No clear correlation with insolation in a speleothem $\delta^{18}\text{O}$ record from central Brazil

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We have obtained a high-resolution $\delta^{18}\text{O}$ record of calcite speleothems from Gruta do Padre (PAD), central Brazil, over the last 20,000 years. Its chronology was determined by U-Th ages from two column-shaped stalagmites. Their $\delta^{18}\text{O}$ profiles replicate among their contemporaneous growth periods. Therefore, the samples were likely precipitated under equilibrium conditions and their oxygen isotopic variations are primarily caused by climate change. The $\delta^{18}\text{O}$ profile shows clear abrupt millennial-scale shifts with amplitudes as large as 5 per mil during the last deglacial period. Variations in $\delta^{18}\text{O}$ however are small during the Holocene, with a decreasing trend in early Holocene, then a gradual increase from ~ 6.0 to 2.0 thousand years ago. $\delta^{18}\text{O}$ remains nearly constant in the last ~ 2.0 thousand years.

Our record shows neither a positive nor negative correlation with local summer insolation. During the last deglaciation, PAD $\delta^{18}\text{O}$ positively correlates with the $\delta^{18}\text{O}$ record from Botuvera Cave, southern Brazil, but anti-correlates remarkably with the Hulu/Dongge $\delta^{18}\text{O}$ records from eastern China. This is likely related to the displacement of the mean position of the intertropical convergence zone and associated asymmetry of Hadley cells and local manifested shifts of the South Atlantic Convergence Zone, consistent with an oceanic meridional overturning circulation mechanism for driving the abrupt climate events. Such correlations however do not exist during the Holocene after the climate boundary conditions changed.