High-resolution record of the H4 event from a Puerto Rico speleothem

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In order to better understand and reconstruct the climate of the Caribbean region, stalagmites from two caves from northern karst region of Puerto Rico have been collected. Rainfall on the island is dominantly controlled by the phases of El Niño Southern Oscillation and Northern Annular Mode. These two coupled climate systems also affect or are related to the position of the Intertropical Convergence Zone.

This study presents the stable isotope and ICP-MS U/Th data of a selected section ($\sim$16 cm) from stalagmite ENS_1. Six U/Th dates constrain the stalagmite growth interval to be between 40.5 and 38.2 ($\pm$0.3) ka. The δ^{13}C and δ^{18}O measurements (n = 434) were performed at a 500 μm-interval, which corresponds to a sub-decadal time resolution.

The δ^{18}O time-series show a shift to heavier values during the investigated period, a trend also seen in the δ^{13}C record. We find that the isotope profiles are likely to be a proxy for changes between wetter and drier conditions in the Caribbean and suggest a relatively dry event. This is tentatively interpreted to be related to the Heinrich event H4. Stalagmite ENS_ 1 stable isotope time-series compare well with data from other locations such as Cariaco Basin, the sub-tropical North Atlantic, GRIP ice core, and speleothems from caves in Brazil and France. This suggests that stalagmites from Puerto Rico are indeed responding to climatic forcing. Considering that stalagmite ENS_1 speleothem grew $\sim$16 cm over 1,200 years, we have the potential to document at very high-resolution the H4 climatic event in the Caribbean region.