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# Preliminary evidence of the 8.2 ka event in speleothem records from Cueva Fantasma (Atapuerca site, Spain)

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The 8.2 ka event is widely recognized as one of the most pronounced climatic anomalies of the Holocene, attributed to a massive freshwater release into the North Atlantic that disrupted the Atlantic Meridional Overturning Circulation (AMOC). This event is well-documented in Greenland ice-core records, yet its regional impacts remain spatially variable due to discrepancies in chronological constraints and proxy resolution. Here, we present preliminary evidence of the 8.2 ka event from a speleothem recovered in Cueva Fantasma (Atapuerca site, Burgos, Spain), based on U-Th dating, geochemical proxies, and detailed microstructural analyses.

The speleothem stratigraphy spans 12.7 ± 0.2 to 5.7 ± 0.3 ka, with a pronounced transition in mineralogy and texture at ~8.5 ± 0.6 ka. The lower section (12.7–8.5 ka) comprises spar calcite with a well-developed columnar structure, whereas the upper section (post-8.5 ka) is dominated by micritic calcite interbedded with black organic-rich laminae (0.8 mm to 1.2 cm thick). Fluorescence and polarized light microscopy reveal a shift from detrital-rich layers to organic-rich laminae, while SEM-EDX and elemental mapping identify sulfur- and carbon-enriched zones within the organic material. HR-ICP-MS analyses highlight distinct geochemical shifts corresponding to these organic-rich deposits.

These preliminary findings suggest that the organic-rich laminae reflect hydrological and environmental responses during the period between 8.5 and 7.7 ka. While direct chronological attribution remains challenging due to the high detrital content of the laminae, the observed geochemical perturbations may suggest localized environmental influences, which require further investigation to determine their origin and potential anthropogenic contributions.