

## **Carbonate speleothems from western Mediterranean gypsum karst: palaeoclimate implications**

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Gypsum caves are uncommon environments for carbonate speleothems (cave deposits). Contrary to limestone caves, the only source of non-atmospheric carbon is from biogenic CO<sub>2</sub> produced by the overlying soils. Enhanced CO<sub>2</sub> content in soils is in turn related with climate, where warm temperatures and high humidity favour plant activity .()......(Fairchild and Baker, 2012).

Although poorly decorated, the exploration of northern Italian and Spanish gypsum karst systems reveals the existence of several generations of carbonate speleothems, which have been dated with the U-Th series method .()......(Hellstrom, 2003; Scholz and Hoffmann, 2008). Their ages coincide with current and previous two interglacials (MIS 1, 5e and 7e and Greenland interstadials (GIS) 19, 20, 21 and 24. Considering that these periods are amongst the most pronounced warm-wet pulsations over the last 250,000 ... (Martrat et al., 2007; NGRIP, 2004), and that CO<sub>2</sub> has a fundamental role in this karst process, this study explores the climate-driven hydrogeological conditions necessary to trigger carbonate deposition in gypsum voids. The further correlation with sapropel events 5, 4, 3 and 1, considered symptomatic of enhanced rainfall across the whole Mediterranean basin .(). (Emeis et al., 1991), highlights the importance of flow-rate in the fracture network and infiltration of meteoric water into the caves.

The combination of high CO<sub>2</sub> and a phreatic status of the fracture network is thus indispensable for the formation of carbonate speleothems in gypsum karst. This condition appears to be triggered by periods of orbital precession minimum, when the monsoonal activity peaked in the Atlantic area. Stable oxygen isotope signatures suggest that the speleothems did not grow during any interglacial-glacial or main interstadial-stadial transitions, confirming that variations from optimum climate conditions may hamper the formation of this category of speleothems.

New speleological exploration and sampling campaign may extend this model in space (extra-Mediterranean regions) and time (500,000 BP – the limit of U-Th dating), enhancing knowledge on the latitudinal impact and timing of such climate variability.

### References

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