



Progress and challenges of speleothem research in alpine caves

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Caves located at high elevation (and high latitudes) have traditionally been viewed as largely devoid of speleothems due to poorly developed or even lacking soil in the catchment area. Rare fossil speleothems found in these cavities were often attributed to short pulses of deposition during former warm episodes.

Our research on caves in the Alps during the last decade has forced us to critically reconsider this model. Based on a large database we can conclude that a significant number of alpine caves show evidence of abundant past, and in some cases also modern, deposition. Even more interesting is the observation that growth intervals are not confined to peak interglacials. In several caves we observed a rather unexpected bias toward deposition during cold periods including stadials. These findings open the door to extend proxy records well into the long glacials.

Low temperatures of calcite precipitation – locally barely above the freezing point – not only give rise to slow growth rates, but also favour crystal growth close to thermodynamic and isotopic equilibrium.

Despite these distinct advantages cold mountain caves provide a number of challenges part of which reflect the complex catchment topography in high-relief terrains. Unravelling drip site-specific effects on proxy composition is a key issue in the attempt to establish replicated records from these sites.