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# Environmental controls for the precipitation of different fibrous calcite cement fabrics

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Abiogenic calcite cements are widely used as climate archives. They can yield information on environmental change and climate dynamics at the time when the sediment was lithified in a (marine) diagenetic environment. Radiaxial-fibrous (RFC) and fascicular-optic fibrous (FOFC) calcite cements are two very common and similar pore-filling cement fabrics in Palaeozoic and Mesozoic carbonate rocks (Richter et al., 2011) and in Holocene Mg-calcitic speleothems (Richter et al., 2015). Both fabrics are characterised by distinct crystallographic properties. Current research has shown that these fabrics are often underexplored and that a careful combination of conservative and innovative proxies allows for a better applicability of these carbonate archives to paleoenvironmental reconstructions (Ritter et al., 2015). A main uncertainty in this context is that it is still poorly understood which parameters lead to the formation of either RFC or FOFC and if differential crystallographic parameters affect proxy data from these fabrics.
This study aims at a better understanding of the environmental factors that may control either RFC or FOFC precipitation. Therefore, suitable samples (a stalagmite and a Triassic marine cement succession), each with clearly differentiable layers of RFC and FOFC, were identified and analysed in high detail using a multi-proxy approach. Detailed thin section and cathodoluminescence analysis of the samples allowed for a precise identification of layers consisting solely of either RFC or FOFC. Isotopic ($\delta$13C, $\delta$18O) as well as trace elemental compositions have been determined and the comparison of data obtained from these different carbonate archives sheds light on changes in environmental parameters during RFC or FOFC precipitation.

References:
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