

## **LA or ID? Exploring the limits of *in situ* U-Pb carbonate geochronology using speleothems**

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Over the past decade U-Pb dating of speleothem carbonate has seen increasing use in studies of climate change, human evolution and migration, bio-diversity and ecosystem change, tectonics and landscape evolution. As yet, however, a thorough exploration of the utility of *in situ* techniques to speleothem research has not been conducted. Speleothems offer a variety of unique challenges for the method - not least because of their highly variable and often very low levels of radiogenic Pb, but also the fact that most samples of interest are also relatively young. Here we explore the utility of *LA-ICPMS* techniques as applied to speleothems not only to highlight important new research avenues but also to provide greater insight into the limitations of the *in situ* methodology for the dating of carbonates more generally.

We compare LA-ages for a variety of samples for which bulk, solution ID-U-Pb age data have already been published, as a benchmark against which to judge the reliability of the *in situ* technique, explore optimal calibration strategies and, ultimately, assess the limitations of the method.