Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.15677

Controls on Stable Sr and Mg Isotope variations in Speleothems

ASHLEA N WAINWRIGHT, TIM POLLARD, JON D WOODHEAD AND RUSSELL DRYSDALE

University of Melbourne

Presenting Author: awai@unimelb.edu.au

Understanding Earth's past climate variation is crucial to our ability to both model future climate regimes, and to understand the effects of human driven climate change. Developing well-dated paleoclimate time series that encompass a diverse range of environmental parameters is fundamental to this goal. Speleothems represent a unique tool for paleoclimate reconstruction, as they record changes in the climate above the cave through changes in the chemistry of the associated drip waters. Traditionally, a variety of climate proxies such as $\delta^{13}C$, $\delta^{18}O$, Mg/Ca etc are combined with U-Th-Pb ages, in order to produce robust and reliable paleoclimate reconstructions. Recently, a number of new, so-called 'non-traditional' stable isotope systems have also been suggested to record temperature information, but, as yet, the effects of alternate influences, such as weathering, and growth rate on these systems have not been fully assessed.

Here we outline a technique for the separation and analysis of stable Sr ($^{88}Sr/^{86}Sr$) and Mg isotopes ($^{25}Mg/^{24}Mg$ and $^{25}Mg/^{24}Mg$) on micro-drilled speleothem samples, using DGA and Sr resins for matrix separation, prior to analysis on a Nu Instruments Sapphire MC-ICPMS mass spectrometer. As a first approach to deconvolving the potential influences on speleothem stable Mg and Sr isotopic composition we designed a variety of experiments using samples from Corchia cave, Italy which encompass glacial terminations — providing a well understood temperature response —and which are already very well characterised in terms of O, C and clumped isotope palaeotemperature responses, and growth rate. Preliminary stable Sr and Mg isotope data will be presented for these samples.