High-resolution Sr isotope data of speleothems by LA-MC-ICP-MS

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Speleothems offer a variety of geochemical proxies for palaeoclimate reconstructions [1]. Sr isotope ratios ($^{87}Sr/^{86}Sr$) provide useful information about water residence time and different Sr sources in the drip water [2]. While most speleothem studies applied TIMS for analysis of Sr isotopes, LA-MC-ICP-MS has been utilized for other archives, including otoliths and teeth [3,4]. This *in-situ* method provides several advantages, such as faster data acquisition, larger sample throughput, higher spatial resolution and the absence of chemical treatment prior to analysis.

Here we present LA-MC-ICP-MS Sr isotope data for several speleothems, covering different time scales and climate settings. We have developed a robust and reproducible method [5], which was optimised by analysis of carbonate and phosphate reference materials with two laser ablation systems [6]. We applied our approach to samples from Morocco, India, Italy and Germany. Some of the samples show only very small changes in their $^{87}Sr/^{86}Sr$ ratio, while others exhibit significant variability over time. Stalagmite HBSH-1 from Hüttenbläserschachthöhle, Germany, allows measuring Sr isotope ratios on an almost continuous section between ca. 130 and 80 ka. A prominent increase in $^{87}Sr/^{86}Sr$ during Marine Isotope Stage 5e coincides with a negative peak in $\delta^{13}C$, suggesting a significant change in Sr sources between stadial and interstadial conditions, with a radiogenic Sr source and soil development during interglacials.

[1] McDermott (2004) *QSR* **23**, 901-918. [2] Banner *et al.* (1996) *Geology* **22**, 687-690. [3] Outridge *et al.* (2002) *Environ Geol* **42**, 891-899 [4] Lugli *et al.* (2017) *Scientific Reports* **7**:8615. [5] Weber *et al*. (2017) *Chem Geol* **468**, 63-74. [6] Weber *et al.* (2018) *GGR* **42**, 77-89.