

Oxygen isotope analysis of speleothem water inclusion: glacial temperatures reconstruction

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Speleothem inclusion water isotopic compositions are promising new climatic proxies. The applicability, however, is limited by low water content and challenging analytical difficulties. We have developed a precise and accurate isotopic technique based on cavity ring-down spectroscopy with a low sample-amount requirement of 20-260 nL of inclusion water from only 77-286 mg of stalagmite deposits in Gyokusen Cave, Okinawa Island, Japan. The 1σ reproducibility is ± 0.24 permil for $\delta^{18}\text{O}$ and ± 1.8 permil for δD . The isotope values of inclusion water samples from the two most recently layers are within the expected range of isotopic monitoring data for drip water and rainwater at the island.

Keywords: stalagmite, speleothem, fluid inclusion, oxygen isotope, CRDS