Isotope analysis of past drip water preserved as fluid-inclusions in stalagmites

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The oxygen isotope composition ($\delta^{18}O$) of speleothem is widely used as paleoclimate proxy. Interpretation of the $\delta^{18}O$ value is not straightforward because it is controlled by two factors; $\delta^{18}O$ of dripwater and temperature at calcite formation. The $\delta^{18}O$ of speleothem fluid-inclusions, paleo-dripwaters in cave (i.e., paleo ground water), will provide an important constraint for the unknown quantity. Its paleoclimatic applications, however, have been hampered by technical difficulties for isotope measurements of fluid inclusions, recent developments of a new laser-based isotope ratio mass spectrometer have opened a new door of fluid inclusions analysis (e.g., Affolter et al., 2014; Arienzo et al., 2013). We also have developed a precise isotopic technique based on cavity ring-down spectroscopy with a low sample-amount requirement of 20-300 nL of inclusion water from stalagmites (Uemura et al., 2016). I will show detailed comparison with modern observation and recent results.

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