



Alchemy in the underworld – recent progress and future potential of organic geochemistry applied to speleothems.

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Speleothems are well used archives for chemical records of terrestrial environmental change, and the integration of records from a range of isotopic, inorganic, and organic geochemical techniques offers significant power in reconstructing both changes in past climates and identifying the resultant response in the overlying terrestrial ecosystems. The use of organic geochemistry in this field offers the opportunity to recover new records of vegetation change (via biomarkers and compound specific isotopes), temperature change (via analysis of glycerol dialkyl glycerol tetraethers, a compound group derived from microbes and varying in structure in response to temperature and pH), and changes in soil microbial behaviour (via combined carbon isotope analysis). However, to date the use of organic geochemical techniques has been relatively limited, due to issues relating to sample size, concerns about contamination, and unanswered questions about the origins of the preserved organic matter and rates of transport. Here I will briefly review recent progress in the field, and present a framework for the future research needed to establish organic geochemical analysis in speleothems as a robust palaeo-proxy approach.