

## **Speleothem $^{14}\text{C}$ as a paleoclimate proxy in Northern Laos: comparisons with multiproxy data**

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Speleothem  $^{14}\text{C}$  measurements provide information of climatic significance, such as the extent of bedrock dissolution, which adds significant amounts of  $^{14}\text{C}$ -depleted, or “dead,” carbon to speleothem calcite. Bedrock input may be enhanced by sulfuric acid dissolution (SAD), and organic matter in the epikarst and can also supply aged carbon that creates an additional offset from atmospheric  $^{14}\text{C}$  ages.

Tham Doun Mai Cave in Northern Laos (N20°45.24', E102°39.09', 352 m asl) is a site of ongoing sampling and monitoring for paleoclimatic reconstructions of the Southeast Asian Monsoon.  $^{14}\text{C}$  sampling of TM-17 (43 samples by AMS), a stalagmite dated to ~38,000 years BP, shows variable dead carbon proportion (DCP) of ~37-60% (avg. U/Th age offset = 4,944 yrs). Theory suggests that closed system bedrock dissolution maximizes DCP at 50%. However, aged organic matter can also be incorporated in porous fabrics as colloidal particulate transported from the soil, and a high pCO<sub>2</sub> below the soil zone, as well as a discrete amount of SAD, may also be significant sources of  $^{14}\text{C}$ -depleted inputs. The geologic setting of the cave, situated below several 10s of meters of highly weathered bedrock, promotes long water residence times and may contribute to the high DCP, while fluctuations in DCP are potentially related to long-term hydroclimatic changes.

Stable isotope and trace element records from Tham Doun Mai show long-term trends in monsoon intensity and local hydrology as well as responses to deglacial and Holocene climate events, including Heinrich Event 1 (H1), the Younger Dryas, and the 8.2 kyr Event (8.2). The DCP variations in TM-17 confirm multiproxy responses to H1 and 8.2, and a positive correlation with  $\delta^{13}\text{C}$  (R = 0.66) suggests bedrock dissolution control on both proxies. Estimates of the maximum dissolution control on  $\delta^{13}\text{C}$  based on the DCP relationship may allow attribution of other variables on  $\delta^{13}\text{C}$ .