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Practical experience using speleothem data in multi-proxy climate reconstructions

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Speleothem records have clear potential to extend and sharpen our understanding of past climate change. Many speleothem records feature both high sample resolution and precision age models, characteristics generally available only in tree-ring records, among terrestrial climate proxies. Speleothem records also avoid some processes that add uncertainty to the interpretation of biological proxy records. At the same time, model results suggest that even if speleothems did provide long and perfect records of meteoric water isotope concentrations, it would not be always be obvious how to interpret the isotopic fluctuations unambiguously in terms of precipitation or temperature variability. Other uncertainties can arise from local hydrologic and speleothem growth processes, as well as sampling and calibration uncertainties. Similar comments apply to other sorts of speleothem-derived records, e.g., verve thickness. These issues of interpretation are especially important in cases where data availability makes calibration to local climate data problematic and when past climate conditions limit the relevance of such calibrations.

The presentation will focus broadly on the use of speleothem records together with other sorts of proxy records either to get a general idea of climatic change during some period, or for more formal climate field reconstruction. Examples from few such efforts will be given. Results from simulations with models incorporating stable water isotopes will be discussed, with consideration of what the results imply about the climatic interpretation of speleothem isotope records. The views will be those a climate scientist trying to make better use of speleothem data, a perspective which will highlight 1) where climate researchers would benefit from better understanding of isotope and speleothem processes, and 2) what steps that speleothem researchers could take to tighten the physical interpretation of their records. Convergence on these points will allow us to take better take advantage of the precision and spatial distribution of speleothem records offer for the understanding of past climate.