

Interactive comment on “Isotope hydrology of dripwaters in a Scottish cave and implications for stalagmite palaeoclimate research” by L. Fuller et al.

Anonymous Referee #2

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Fuller et al., present a study of the isotopic chemistry of precipitation and cave drip waters for a site in northern Scotland. Such work is important if we are to more fully understand the applications of speleothems to studies of paleoclimate in various settings. I think they have done an admirable job of data collection and interpretation. This paper is a valuable case study.

The data clearly show that for some karst areas, cave drip waters are sourced from water that is stored in the overlying soil and rock for fairly long periods of time, and thereby mixed well enough to filter out any seasonal variability in the isotopic composition of precipitation. At best, only mean annual $d_{18}O$ -precip variations may be

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recorded in speleothems from the studied caves. The authors present a thoughtful, well-considered analysis of their own data. For example, in spite of the lack of correlation between temperature and d18O-precipitation in their samples, they recognize that the time period over which they have measurements is short and that over longer time periods there may well be (as expected for the setting) a significant correlation. Their data point out the more general need for longer d18O-precip time series from as any locations as possible.

One set of information, however, that I would have liked to see in this study is an estimation of just how long the signal-averaging goes on for this site, and an estimation of how long is water stored in the overlying karst. Is it one year, or several? And how much of a time lag might there be as a potential signal in d18O-precip percolates down to the cave? Such information is important in determining the potential resolution of any isotopic time series from a stalagmite. Annual? decadal? It is also important for estimating whether there might be a time-lag between signal (d18O-precip) and response (d18O-stal) that will need to be taken into account when comparing time series of, for example, meteorological data and speleothem data. I realize that such an estimate may be difficult based on the data in this paper, but perhaps there is other information that could bear on this question.

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