

## ***Interactive comment on “Stable isotope records for the last 10 000 years from Okshola cave (Fauske, northern Norway), and regional comparisons” by H. Linge et al.***

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Regarding the age model for Oks82, we have not considered using an age error weighing of the data. Because of its overall high Th content and shorter time span, the Oks82 record was considered complementary to the FM3 record.

1) Speleothem deposition close to or under glaciers will be acknowledged in the introduction (e.g. Atkinson et al. 1983, Spötl and Mangini 2007).

2) P. 1779, l 18-19: on discrimination of isotopically light winter water during cooler phases: This can be argued for periods with cooler winters and frozen ground. Snowmelt cannot penetrate the ground until it has thawed; hence isotopically light win-

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ter water will to a lesser degree be incorporated in the cave drip water. Milder years would then allow a progressively larger fraction of winter precipitation to enter the percolation system, providing overall lighter dripwater, compared to cooler years (winters). Although the isotopic composition of the precipitation should govern the composition of the dripwater, the surface temperature oversteers this by selective infiltration (see #3 below).

3) Isotope pattern for the last 1000 years: The change in  $d18O_c$  from its relatively depleted values around AD 1500 to relatively enriched around AD1725 amounts to a relative change of 0.6-0.8‰ (P. 1779, l. 6 and onwards). In a simple system where all meteoric precipitation seeps into a cave, an enrichment of this order should reflect a  $\sim +2^\circ\text{C}$  warming of the source water (since the effect on fractionation of meteoric precipitation is greater than the opposing direction of fractionation during calcite precipitation).

This contradicts all other observations of the climate transition onto the LIA (e.g. outlet-glacier fluctuations from Svartisen record expansion from AD 1700; SST (Aug) based on alkenones in the Nordic sea/Vøring plateau). The observed trend in  $d18O_c$  is thus taken as confirmation of a negative relationship between  $d18O_c$  and surface/cave temperature. In order to explain the relative change (0.6-0.8‰) a selective or amplifying mechanism is suggested to be responsible for enhancing the apparent dominance of  $T_{\text{cave}}$  on the direction of change in  $d18O_c$  (see #2 above).

4) Humidity conditions from carbon isotopes: Soil- $p\text{CO}_2$  is reduced by both cool and wet conditions. Low soil- $p\text{CO}_2$  cause ‘enriched’  $d13C$  values in the seepage waters. Enriched  $d13C_c$  can thus be interpreted as reflecting either cool or very wet conditions.

Minor corrections: will be performed as listed by referee

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