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Climate of the Past Discussions

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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It is valuable to see a systematic comparison of all these Norwegian records, which represents a large and careful effort by the research team. I do feel though, that they are straining to derive a simple climatic explanation for the data, using classical approaches. As a result I feel the discussion could discuss more even-handedly the potential role of variations in rainfall isotopic composition and of in-cave processes for modification of the isotopic values.

In the future, further analysis of archived samples using higher-resolution or complementary techniques may lead to more specific interpretations. In the meantime, it

would be valuable if the authors archived their data at the NOAA.

Regarding the age model for OKS82, I wonder if the authors have considered an approach where the data are weighted inversely to the age error. Perhaps some indication of the uncertainty in age could be added (say at 1000 year intervals) to the isotopic plots.

Other points:

1.Speleothem deposition can occur adjacent to or under glaciers provided that there is an alternative mechanism to generate high PCO2 such as by pyrite oxidation (Atkinson et al., 1983; Spötl et al., Spannagel). Can this mechanism be ruled out here?

2. Sense of isotope fractionation. p. 1779, lines 18-19 discrimination of isotopically light winter water during cooler phases because of surface runoff during snowmelt.... This might be better reworded. For example: because of the preferential loss of isotopically light snowmelt in colder conditions. However, this mechanism is not clear in the context of the paper – why does the snowmelt not drain into the cave system? Hence, this deserves a longer explanation because the conclusion itself in terms of the sense of temperature change versus oxygen isotope values is quite unusual.

3. I struggled to see the simple depletion-enrichment-depletion pattern (Fig. 3d) of the heavy isotopes reported for the last 1000 years (Figs. 3d, 5). It appears to be more complex and variable to me and also the age errors are significant as the authors acknowledge. If the authors persist with a temperature-related explanation, rather than one related to rainfall composition, it would be helpful if the authors were more specific about which parts of each record they would relate to Little Ice Age conditions.

4. Similarly I was unclear how one could infer humidity conditions from carbon isotope values when the authors also indicate that they believe that the development of vegetation was also a strong control. It may be more straightforward to say that the covariations with oxygen either reflect kinetic effects or climatic fluctuations for which

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independent mechanisms led to fractionations in both isotopes and to have a more open discussion about each.

Suggested minor corrections:

p. 1764, Line 22 Insert “values” before “display”

p. 1768, line 4: through

line 11, detrital

p. 1770, line 20, were

p. 1773, line 17 constructing

Figure 1 – some of the lettering has been truncated in a.

Table 2. It would be useful to provide latitude and longitude information for each of the sites.

Interactive comment on Clim. Past Discuss., 5, 1763, 2009.