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Climate of the Past Discussions

Interactive comment on "Bunker Cave stalagmites: an archive for central European Holocene climate variability" *by* J. Fohlmeister et al.

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We thank the anonymous Referee 1 for the helpful and constructive comments and the technical corrections suggested for our manuscript "Bunker Cave stalagmites: an archive for central European Holocene climate variability". The points raised by Referee 1 provide the basis for important improvements on the revised version of our manuscript. Here we respond to the major points of the reviewer.

Point 1: Possible influence of storm tracks and lacking explanation of the climatic link between the North Atlantic and central Europe.

We agree with this point. It is possible that variations in storm tracks have contributed

to changes in the δ^{18}O values of the speleothems. For example, the increase in δ^{18}O in the early Holocene might be ascribed to such changes, which could be caused by the reorganisation of atmospheric circulation towards the end of the deglaciation. In the revised version of the manuscript, we will explicitly address the climatic link between the North Atlantic and central Europe.

Point 2: Influence of seasonality on δ^{18}O

We agree that it is worth to include a discussion of recent seasonal changes in meteoric δ^{18}O. A change in the seasonality of precipitation can lead to variations in the δ^{18}O values of speleothem calcite and, thus, affect the δ^{18}O signal preserved in the stalagmite. This depends on the stationarity of the recent precipitation and evaporation patterns throughout the Holocene. In the revised version of the manuscript, we will include changes in seasonality as one possibility to contribute to the changes in δ^{18}O.

Point 3: Temperature influence on the speleothem δ^{18}O

On page 1691, we stated that the modern cave temperature is 10.8°C. Drip water has essentially the same temperature. We will include this information in the revised manuscript in section 2.1. Furthermore, we will discuss the modern cave drip water temperature relationship in the revised version. For further details, we will refer to the manuscript by Riechelmann et al. (submitted to GCA).

Minor Comments:

Dating of the top sections of Bu4 and Bu1

The referee is right here. The ^{14}C measurements were used to test whether calcite was precipitated during the atmospheric ^{14}C anomaly in the 20th century. The bomb peak is used as a kind of tie point. However, due to the low growth rate, a better resolution of the ^{14}C bomb peak in the stalagmites is unfortunately not possible. For the top section of Bu4, the ^{14}C content of the calcite varies by more than 12 pmC within 2 mm with the highest value at 0.6 mm. This is ascribed to reflect the atmospheric ^{14}C anomaly. This supports the assumption of continuous growth until the time of removal of the stalagmite (2007 AD) and for safety we ascribed 1997 AD to the top and added a relatively large uncertainty of 10 years. Since Bu1 does not show a ^{14}C anomaly in its top section, we concluded that Bu1 stopped growing before 1950 AD. In addition, the strong increase in δ^{13}C observed in Bu4 is not observed in Bu1 (section 3.4, Fig. 3) suggesting that Bu1 stopped growing earlier. To provide the age modelling software the possibility to define an appropriate time for the growth stop, we prescribed that the top section of Bu1 ceased growing around 100 a BP and included a large uncertainty of 40 a.

Explanation for the "development of a denser vegetation cover above the cave" as derived from the decrease in speleothem δ^{13}C

We do not have an explanation for the suggested scenario ("development of a denser vegetation cover above the cave"). However, as stated in the manuscript, this scenario is the most likely explanation for the evolution of the δ^{13}C values since we ruled out other possible processes.

Interactive comment on Clim. Past Discuss., 8, 1687, 2012.