

**Interactive comment on: “Palaeoclimate significance of speleothems in crystalline rocks: a test case from the Lateglacial and Early Holocene (Vinschgau, northern Italy)” by G. Koltai, H. Cheng and C. Spötl**

**Dana Riechelmann # 3:**

In this study, the authors present very well dated speleothems, which grew in the fractures of a gneiss hostrock. They analysed the petrography and the  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  values of eight flowstones. This study shows the potential of such carbonate deposits as palaeoclimate archives, which are however, in this case not straight to interpret in case of past climate variations, due to low time overlap between the different flowstones. However, this is a nice dataset and a very well written paper.

There are some general and minor comments and corrections to be done, which are listed below. I could recommend this manuscript, after minor revisions, for publication.

**General Comments:**

- The introduction is a bit short. The introducing part (Page 1, Line 22 to 35) could be more extended, with for example more details about the study of Frisia et al. (2017) about the analyses and results of similar studies. The part with the aim of your study (Page 1, Line 36 to Page 2 Line 17) is in relation to the introducing part quite long. Perhaps it is possible to move some of this to the methods part.
- Overview pictures of the samples would be nice for the reader. In these pictures, it would be helpful for the reader, if all datings are marked and the ages are written next to them and the parts are marked used for this study. Therefore, it is clear that you used only specific time spans and that there is more material from other time spans.
- Could you please mark the similarities of the isotope records in Figure 5. That would make it much easier for the reader to follow.
- Could the occurrence of aragonite in the flowstone be interpreted as drier periods?

**Specific and technical Comments in chronological order:**

Page 1, Line 13: Please replace “kinetic” with “disequilibrium”.

Page 2, Line 29: Please replace “by mass movements” with “by the mass movements”.

Page 2, Line 29: Please delete the “on” at the end of the line.

Page 4, Line 8: What calcite fabric occurs in LAS 72, 1, 2, 21 and 34? Please provide this information. Are these also columnar fascicular optic?

Page 4, Line 29: Please replace “more enriched” with “higher”.

Page 4, Line 30: Please replace “most depleted” with “lowest”.

Page 4, Lines 33-34: I do not see two regression lines for LAS 2 in Figure 3. There should be one for the calcite part and one for the aragonite part, as I understood from the text.

Page 5, Line 6: Please replace “more negative” with “lower”.

Page 5, Line 8: Please replace “more positive” with “higher”.

Page 5, Lines 12-13: Please add that the referred Table 1 is the Supplement Table 1.

Page 5, Line 29: I think you mean “Suppl. Fig. 2a” instead of “Suppl. Fig. 5”.

Page 6, Lines 9-10: Please give the exact temperature as a number.

Page 6, Line 14: What do you exactly mean with “...primarily regarded as a proxy for  $\delta^{18}\text{O}$  of local precipitation.”? There is no amount effect in the  $\delta^{18}\text{O}$  of the precipitation in the Alps. Therefore, the  $\delta^{18}\text{O}$  of the precipitation should have a relation to temperature. Due to the quite long transfer time of the water you mentioned, the water should contain long-term changes in the  $\delta^{18}\text{O}$  of precipitation and therefore, of long-term changes in temperature. Please add some more information to this topic at this point.

Page 6, Line 19: Please replace “kinetic” with “disequilibrium”.

Page 6, Line 27: Please replace “more enriched” with “higher”.

Page 6, Line 29: I am not sure if a co-variation of  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  indicate in-aquifer processes. Therefore, please delete “as indicated by the co-variation of  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  isotopes.”.

Page 6, Line 35: Please replace “kinetic” with “disequilibrium”.

Page 7, Line 5: Please replace “kinetic” with “disequilibrium”.

Page 7, Line 9: Please replace “kinetic” with “disequilibrium”.

Page 7, Line 23: Please replace “kinetic” with “disequilibrium”.

Page 7, Lines 34-35: Please delete “and thus provide short snapshots of local climate.”. For me a multi-decadal to centennial resolution to not provide snapshots, which are some very short time-intervals for me.

Page 8, Line 9: Please replace “kinetic” with “disequilibrium”.

Page 8, Line 13: You refer to Fig. 8, however, there is no Figure 8 in the manuscript.

Page 8, Lines 16-18: Please show this in a figure. That makes it easier for the reader.

Page 8, Line 20: Please refer also to the specific panel in Figure 6.

Page 8, Line 20: Please mark the Younger Dryas and the Boling-Allerod in Figure 6.

Page 8: Line 30: Please replace “more negative” with “lower”.

Page 8, Line 35: Please replace “kinetic” with “disequilibrium”.

Page 9, Line 2: Please specify the in-aquifer processes.

Page 9, Lines 3-4: You write here about changing hydrological condition. This could be discussed a bit more in detail in the discussion. For me it did not come up so clearly from the discussion. This is more a general comment.

Table 1: Could you perhaps mark values from aragonite and calcite in different colours? That make it straight forward for the reader.

Figure 1: Are there samples from the vein-filling flowstones from the two other sites at Sponding and Eysr? Do they perhaps provide time-spans missing in the other and could complete the record or give a better overlap?

Figure 3: Please replace “kinetically” with “disequilibrium”.

Figure 4: Please replace “ $^{230}\text{Th}$ ” with “ $^{230}\text{Th}$ ”.

Figure 6: Please replace “shown in (e) and (d)” with “shown in (d) and (e)”.

Figure 6: There is something missing in “represents the of LAS2,”.

Figure 6: I think the blue rectangle marks the Younger Dryas, but this is not indicated in the figure or the figure caption.