Response to reviewer #2 (authors answers in blue)

1. The Hendy test plots are incorrect (I am going off the Supp A and B figure versions reproduced in the "author response" file): the C and O axis labels should be swapped.

Supplementary figures 4-5 have been corrected.

2. The conclusion that there is no correlation between C and O for the Hendy tests is not convincing. Many look well correlated (e.g. H1 to H3 of Supp B, and H1 to H6 in Supp A - it is hard to tell because the axis ranges on the right square plot of each plot pair are too wide, and conceal the upward trend - please reduce the range of axis values). So I would not be so dogmatic with statements about lack of isotopic equilibrium. Fortunately, the signal in these speleothems is so large, a modest amount of kinetic fractionation is not a big issue.

We have toned down our statement regarding isotopic equilibrium (line 266).

3. Some of the drill hole positions for the Hendy traverses for Supp B are either poorly aligned on the image or do not represent coeval calcite (I certainly hope it is the former). For the sake of future readers, it would be helpful to have this corrected / made more accurate, as it does not set a good example for those speleothemists new to the game.

Supplementary figures 4-5 have been corrected.

4. I remain adamant that the speleothem does not capture all of TIII because the older H-event (S8.2) is part of the termination, as correctly inferred in both Cheng et al. 2009 and Pérez-Mejías et al. 2017. The speleothem clearly started growing after S8.2, between S8.2 and S81, so it captures most of TIII but not all of it.

We have added the description "later part of TIII" to underscore this point throughout the abstract and discussion.

5. The time series from Columbu et al. (2019) is actually from Crovassa Azzurra Cave in Sardinia (Figure 5).

Figure 1 & 5 have been corrected.

6. Re contribution from the summit of Hintertux glacier: based on the oblique-angle image of Figure 1, it seems that during glacier advances, ice formed at or near the summit of the massif could flow under gravity over the surface above the cave and its meltwaters could infiltrate the cave - so meltwater from a higher altitude could reach the cave, unless my sense of 3D is letting me down.

Reviewer #2 is correct that meltwater from higher altitudes can infiltrate into cave. However, it is incorrect that the precipitation fell several km higher (as the reviewer argued in the first

revisions). The highest summit of Hintertux glacier (Olperer) is 3476 m, whereas the gentle glacier basin (i.e. main accumulation area) is located at about 2800-3000 m. This is only a few hundred meters above the speleothem sampling site. This also holds true for MIS 7, when the glacier tongue buried the cave.

7. Line 49: should be TIIIa, not TIIa.

Corrected.

8. Line 161: 'long and short timescales': please be more specific, e.g. orbital vs millennial (or centennial).

Clarified.

9. Line 234: To the best of my knowledge, the process of PCP cannot directly affect d18O unless evaporative enrichment occurs. Please provide a reference supporting this point. I would have thought differences in the recharge altitude of individual drip points (not out of the question for a deep cave set in mountainous terrain) could comfortably explain small d18O offsets.

We have removed this argument.

10. Throughout the Discussion, references to your figures are needed.

Corrected.