We thank Reviewer2 for the supportive review and the constructive comments. We are happy to accept R2's suggestions and meet all their requests.

General comments

[…] I generally agree to the finding of this and previous studies that there is some quite strong bias in the GICC05 layer counting for the 15-28 ka section that was fairly unconstrained at the time. In some sections, the bias appears larger than the stated MCE, and quite likely, the bias goes in both directions for different periods ending up at a close-to-correct absolute age for much of the 30-40 ka section. Still, I would think there is also the possibility that the U-Th stalagmite ages may sometimes have their accuracy issues although they are often published with very small error bars. Alone the observed scatter among different stalagmites covering the same events points in this direction. I think we have an example of this for the applied stalagmite records at around GI-10, where they 'exhibit some temporal inconsistencies' (Figure 4). Therefore, I would be careful to assume that all of the observed disagreement in absolute ages between the ice core and U-Th chronologies can be attributed issues related to the ice-core time scale(s). In any case, a long-term absolute error of about 1% is certainly much smaller than we thought it possible some 15-20 years ago, when GICC05 was put together.

This is a fair point and we agree with the Reviewer. We welcome this opportunity to tone down our claims and stress that the U-Th timescale (although absolute) may be problematic in certain intervals. We will discuss this potential issue more prominently in the revised version of the manuscript.

The following recent papers may be relevant to mention or discuss in the manuscript:

Dong et al., 2022, is concerned with GS-3 and introduces some accurately dated Asian stalagmites that allow for a detailed comparison of ice core and U-Th ages across that interval. The paper is supportive of the ice-core Ca/dust – Asian monsoon relationship for significant and abrupt climate events and it identifies biases of the ice-core chronologies in the same direction as the present manuscript although with somewhat smaller amplitudes.

Sinnl et al., 2023, identifies new 10Be bipolar links between G and A in the older part of the difficult GS-2 interval. The study is thus relevant for comparison in a similar way to that of Martin et al., 2023.

Many thanks for the suggestions. We will certainly discuss these studies in the revised version of the manuscript.

Specific comments:

Lines 331-341: To test the robustness of the suggested similarity of the Greenland and East Asian records across GS-2 it may be an idea to apply a different Greenland record for the inversion algorithm.

We appreciate the Reviewer raising this point as it was brought up by R1 as well. This is a good suggestion and we are happy to provide two new Δt transfer functions based on NGRIP and GRIP $\delta^{18}O$ records (as recommended by R1), respectively. As discussed in our replies to R1, the new transfer functions are consistent and overall support the results based on NGRIP Ca2+. These new findings will be presented in the new version of the manuscript.

Figure 6: In the attached figure, I compare the Sieben Hengste Cave (SHC) isotope record to the Ca and dust profiles of NGRIP and NEEM (all ice core records are on log scales). The SHC record is shown on its original time scale without application of the transfer function. Shown on those time scales, there appears to be a good correspondence between the ice core records and the SHC isotopes for the 22-28 ka period. In particular, the sharp transition associated with the onset of the younger of the Greenland dust spikes close to 24 ka and the adjacent structures seem to be well aligned between all records. Therefore, assuming there is a one-to-one relationship between ice-core dust/Ca and European stalagmite d18O, it appears that the transfer function makes things worse for this interval. If there are common events between the two records at around 18 ka, the transfer function may do a better job here?

We appreciate the Reviewer taking the time to compare SHC $\delta^{18}O$ to Greenland ice core data. Estimating the offset between SHC $\delta^{18}O$ and GICC05 using our methodology is an interesting suggestion but somewhat beyond the scope of this study. We are concerned that the SHC $\delta^{18}O$ reflects a compound signal of changes in atmospheric circulation and moisture advection pathways that is not as physically well understood as for the EASM speleothem records (e.g. Luetscher et al., 2015). We should also point out that any mismatch between SHC $\delta^{18}O$ and Greenland records may be an expression of dating uncertainties associated with assumptions about growth rates, interpolation models, purity of U-Th samples, etc. The limitations of over-emphasizing one record for synchronization purposes has been a key matter of discussion during a previous iteration of the current manuscript, and the reason why we now "stack" several $\delta^{18}O$ records rather than relying on one record (e.g. Hulu Cave). For these reasons we prefer to use the SHC $\delta^{18}O$ data only for a qualitative comparison to the long-term biases in RCEs presented in Fig. 6.

Other specific comments

All the other minor comments and suggestions raised by the Reviewer will be respected in our revised manuscript.