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# *Interactive comment on* "SISALv2: A comprehensive speleothem isotope database with multiple age-depth models" *by* Laia Comas-Bru et al.

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Paleoclimate data compilations are unsung heroes right now for paleoclimate and climate science. Well, not so much unsung, as under funded. They are huge volunteer efforts that will lead to some interesting new science based on the abundance of machine readable data, i.e. Big Data. For this aspect alone, I congratulate and thank the team, and I recommend to publish this manuscript. I was also happy to see that SISAL V2 is upping the game to include alternate age modeling techniques. A major strength of speleothem records are absolute ages via the U-Th decay series. However, I think that this paper has the opportunity, given the long list of top notch authors, to



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establish some firm guidelines for future papers using speleothems to reconstruct past climate. And since they wrote the code, and are the experts on V2, I suggest a few more calculations are warranted for this publication to aid in the use of the database.

Can you please describe in more detail how the 95% confidence intervals are calculated (line 227) in the SISAL chronologies? Lines 204-210 are hard to follow. I'm not sure, but I think it is the 95% spread in the ages using all of the age models, i.e. the spread in the curves in Figure 5 a and b. If so, I wholeheartedly support this idea. If not, then please describe in more detail.

I recommend that the authors take this opportunity to strengthen their language for section 4, and provide a clear road map for exactly how future users should use their code on new speleothem records to produce not only alternate MC age models from a single technique, but alternate age models from different techniques as well – as done here. I acknowledge that not all techniques are possible for all records. But still - all techniques worked on 503 or 504 of 533 records (Figure 4). So in the future, people should utilize as many as possible.

Going on the premise that I'm not sure of the methodology, I advocate that the 95% spread in all of the Monte Carlo ensembles from all of the age modeling techniques that are successfully executed is used for the final age model (Figure 5a, 5b). Or at the very least, the spread in the medians of the different age models, though an MC ensemble is quite useful. The idea here is simple: we work so hard to get these absolute ages that we should be rewarded for getting multiple ages on a sample, not penalized. Errors in age models should not be constrained simply by the analytical (or analytical plus correction) based error bars.

For example in Figure 5, there are a string of ages from 3400 – 3550 year BP that all follow each other. For this region of the d18O curve, there is fairly good agreement between the various age modeling techniques. Therefore, when all of those ages are viewed together, our confidence in the timing of any d18O excursion is less than that

based on the error bars on each individual date (seen by less 'blur' in Figure 5c between the alternate age models). In other words, the multiple ages help to decrease our uncertainty to less than that of the analytical error bars on each U-Th dates. It's a bit like decreasing the signal to noise ratio by taking more measurements (by the square root of N). (Again SISAL may be doing this, but I'm not sure)

To quantify the degree to which multiple age modeling techniques may reduce temporal uncertainty, I recommend that this manuscript includes a plot of the average of the analytical error in a record versus the average SISAL 95% chronology error in a record (i.e. average of 5b). Is the fit to that scatter plot a 1:1 line? Or is there a systematic reduction in the error across many records in the database b/c of time periods like 3400-3550 BP in Figure 5? Or do problematic areas, like unresolved hiatuses, compensate the reduction in errors for when the age model is tightly constrained? This would be an enlightening plot.

Please give more detail in the text of the principles used in your calculations for when the SISAL chronology decides that there is a hiatus in the record. While you reference Breitenbach, 2012, it would be good to review the guiding principles that SISAL is using in lines 83-86 in more detail to make the manuscript more self contained. Also, what happens if there is disagreement among the various techniques about a hiatus - how does SISAL decide on a 'yes' or 'no' to split the record? Does majority rule??

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