

## Revision notes no. 3 for cp-2016-137

2017.10. 12

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Editors and Reviewers notes are indicated in black in this note.

Authors comments are in red. All changes made in the manuscript are also in red. Specific responses to Editor's comment are indicated with Line numbers to ease tracking of changes.

We thank the Editor for her time and efforts.

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Editor Decision: Reconsider after major revisions (30 Aug 2017) by Nerilie Abram

### Comments to the Author:

Thank you for submitting your revised manuscript to *Climate of the Past*. The manuscript required major revisions and has been substantially improved following the advice of the two reviewers and the short comment made during the discussion phase. Rather than resend your manuscript to the original reviewers I have carried out a detailed review of the manuscript myself. There are still further revisions that I feel are needed before the manuscript could be accepted for publication in *Climate of the Past*. These are:

\*Abstract: the abstract is much too long. Please revise so that the abstract provides a concise account of the motivation and findings of your study.

Revised and shortened (now 239 words) to reflect the updates made in the revised manuscript (Lines 21–39)

\*Please make sure that there is consistency in your use of age abbreviations throughout the text. Make sure all abbreviations are defined on first use (e.g. ka) Avoid jumping between different age scales (e.g. ka BP, yr BP, cal BP and AD are all used in section 5.2.3).

Considered. Also, Section 5.2.3 was revised and un-necessary sentences were removed. (now at Lines 440–450)

Definition of ka first appears in section 2.4 at Line 141.

\*Please try to reduce the length of the text wherever possible, and in particular keep the text more focused on the processes/concepts that are important for this study. E.g. There are long discussions about IOD and ENSO in both sections 2.3 and section 5.6, but no interpretations are made regarding the role that these climate processes may have played in the climate of Madagascar during the Holocene, so these sections should be much shorter than they currently are, or incorporated better into the interpretations made with your records.

Section 2.3. was revised and shortened (now at Lines 108–133), and Section 5.6 was moved to supplementary (now in the Suppl. Text no. 4).

\*There are some sections that are still far too speculative and should be removed from the text. Things that in my opinion can't be justified include:

- the discussion in section 5.2.3 linking events in the last millennium with the speleothem isotope records. The lack of replication of the isotopic records between the two samples makes this conclusion very weak. I would suggest sticking just with the broader-scale “growth-non growth” information, rather than trying to interpret features of the poorly reproduced isotope records.

This section has been revised (Lines 440–450), and thus we considered the growth-non-growth inferences. Un-necessary information was removed.

- Figure 8: Too speculative, suggest removing this figure and be more careful with associated discussion.

Deleted, and subsequent figures updated. Texts updated.

- Figure 9: Too speculative, suggest removing this figure and be more careful with associated discussion.

Deleted, and subsequent figures updated. Texts updated.

- Figure S18: Too speculative, suggest removing this figure and be more careful with associated discussion.

Deleted, and corresponding texts were removed (including the previous suppl. Text no. 4)

\*The discussion of the 8.2ka event is still a bit problematic, particularly as it isn't clear that this excursion in the Madagascar record is reproducible, or that it is significantly different from other isotopic excursions in the records. I would suggest further reducing the emphasis on this event, although it would be OK to still mention it as a possible link that requires further verification with additional high resolution records from this time interval. Also, in the section at line 297, please don't describe this as the 8.2ka event (this is an interpretation, not a result): instead you can say something like “A prominent isotopic excursion is evident at xx ka BP +/- xx y.”

This has been considered. In the result section, we considered the Editor's suggestion about mentioning the isotopic excursion instead of mentioning directly the 8.2 ka event (see Line 264). We also revised the section 5.5 on the 8.2 event (Lines 493–516). We mentioned the need of high resolution records at that time interval at regional scale (Lines 513–516).

Minor comments:

\*The sentence beginning line 59 needs to be rephrased to make sense.

Done (See Line 48–52)

\*Line 303/304: I think that you are referring to “local karst conditions”, not invoking “local climate conditions” as a difference between the caves. Please clarify.

Done (see Line 269)

\*Section 4.3: I was expecting to see details in here describing why the mineralogy was primary and not a secondary alteration product. Consider moving this information to this section.

Good point, we moved that information in this section (see Line 289–299)

\*Line 417: start a new paragraph here to break up the long section of text.

Since the texts about primary calcite were moved to earlier section, this paragraph has been revised and thus breaking up the remaining paragraph is no longer applicable.

\*Line 523: I don't think "6ka event" is right in this context. I believe that this is a 6ka time slice simulation, rather than a climate event?

Revised, and we added 'although the simulation is of shorter term than the MMHI hiatus, but additional paleoclimate records are needed to improve its spatial and temporal resolution'. (Lines 463–465).

\*Line 560: There is no need to bring in "Bond Cycles" here when you don't look at any other of the proposed cycles in your work.

Sentence removed. Also, the section 5.5 on the 8.2 was revised according to Editor's comments above.

\*Line 629: I think you mean "migration" not "expansion" here, as this is followed by "and/or expansion".

The word is 'contraction' (i.e., expansion and/or contraction), and texts have been updated. (Lines 536).

\*Figure 1b: please fix formatting so that all components of the figure are legible and not covered by labels.

Done

\*Figure 1d-e: Show location within caves where samples were collected.

Done

\*Figure 2: it is very difficult to compare the age information of the two speleothems in the current format of this figure. Consider combining into a single panel with two depth axes so that it is more obvious to the reader how the two age scales compare.

This figure has been revised. However, we would like to note that because of the height difference between the two samples, combining the age model into one depth series would compromise the readability of one of the models. Instead, we re-arranged the figures so that the lines of hiatus are aligned, and we added scanned images of the samples to help the reader see the three intervals in the samples. We hope this is a better version of the age model.

\*Figures 5 and 6: Information about aragonite and calcite sections of the speleothems has been lost in the revisions. This is important, so please consider adding this information into these figures.

Added, and figure caption updated accordingly.

Figure 7: it would be helpful to use a symbol to show Madagascar on the maps. Is it necessary to include the Walker and the Head and Gibbard subdivisions on this figure?

Revised accordingly. Some unnecessary texts in the introductory paragraph of Sect. 5.2 that pertain to this comment were removed (Lines 364–367).

Figure 11: Add information beside these records to show information on their interpretation (e.g. double arrows showing direction of wet/dry or warm/cool, etc.)

Done, and it is now Figure 9

**Additional comments from authors:**

- The corresponding author and few other co-authors' affiliation have been updated.
- Figures S6 and S7 in the supplementary material have been updated because the corrected  $\delta^{18}\text{O}$  (dashed blue lines) values have been accidentally plotted with the same axis as  $\delta^{13}\text{C}$ .
- The previous supplementary text no. 4 was removed and has been replaced with previous section 5.6 of the manuscript. This section can be deleted permanently if necessary.
- References in both manuscript and supplementary have been updated.