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Climate of the Past Discussions

Interactive comment on "Relationship between climate, environment, and anthropogenic activities in coastal North China recorded by speleothem δ^{18}O and δ^{13}C ratios in the last 1 ka" *by* Qing Wang et al.

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Author's response to anonymous Reviewer#1 - "Relationship between climate, environment, and anthropogenic activities in coastal North China recorded by speleothem ïĄď18O and ïĄď13C ratios in the last 1 ka)"

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Discussion paper

Firstly, we would like to thank anonymous reviewer#1 for his/her comments and constructive suggestions, which will improve the manuscript, and for recommending this study for publication in Climate of the Past. Please find enclosed point by point responses to the comments. The referee suggestions and comments are displayed in red, and our answers in black.

General The manuscript entitled "Relationship between climate, environment, and anthropogenic activities in coastal North China recorded by speleothem ïĄď18O and ïĄď13C ratios in the last 1 ka" by Wang et al. extends the previous Kaiyuan cave record (Wang et al., 2015 Marine Geology and & Quaternary Geology; Wang et al., 2016 Clim. Past) from ∼AD1200 further back to AD 900. While the ïĄď13C record is new, the ïĄď18O is essentially the same as the data published previously. The majority of the discussions/conclusions is not only tentative and/or ambiguous (see examples as listed below), but also already published in Wang et al., 2015 Marine Geology and & Quaternary Geology and Wang et al., 2016 Clim. Past. As such, this manuscript is not suitable for considering publication in Climate of the Past.

In this manuscript, the stalagmite KY1 was dated by U-Th technique, and discussed the climatic-environmental meanings by ïĄď18O and ïĄď13C. The ïĄď18O ratios of the upper part of stalagmite KY1 has been discussed and published in Wang et al., 2015 Marine Geology and & Quaternary Geology; Wang et al., 2016 Clim. Past. As for this problem, the discussions of ïĄď18O ratios will be deleted substantially only in comparison with ïĄď13C ratios in the next modification. And the abstract will be improved.

Comments 1. More than half of the abstract is virtually as same as those in Wang et al., 2015 Marine Geology and & Quaternary Geology, and Wang et al., 2016 Clim. Past.

The abstract will be improved.

2. The link between the Kaiyuan record and Chinese cultural history is not convinc-

ing. For instance, if the Kaiyuan record is indeed a rainfall amount proxy on large spatial-scale in China, how about the differences with other existing records (such as Wangxiang, Heshang and Shihua records)? It really requires a detailed discussion how a record from 'the warm temperate zone (also need a definition)' can affect hydrological condition in China and thus the Chinese culture history.

Thank you for your comment. According to the record of stalagmite KY1, paleoclimate and history records, we discussed the correlation between the stalagmite record and the replacement of major dynasties of ancient China. We will find much more results and evidences to further research and verification.

3. It is necessary to give the reasoning why the 230Th age at $\sim$ 45mm was discarded.

As the laminae of the lower part is almost indistinguishable, we can't establish the timescale by the method of laminae counting.

4. The extended portion of the record has very poor age control and the methodology is problematic (e.g., the assumption of linear-growth is too weak). Thus, the new record cannot be used to address the issues in the way that presented in the current manuscript.

The dating results of the lower part of stalagmite KY1 is established by the methods of interpolation and extrapolation. By the boundary of the position of 64.5mm, we calculate the average growth rate of the part of 42.769mm-64.5mm first, and then extrapolate the age of the position of 75mm by the average growth rate. The position of 45mm is much close to the boundary of 42.769mm, so we chose position of 64.5mm. The expressions need to be improved.

5. The age uncertainties are not carefully considered throughout the manuscript when discussing relent issues such as age comparison, and the lead/lag among climate forcings. For example, the Five Dynasties and Ten Kingdoms has a duration less than the age uncertainty of the cave record at the time, and thus their correlation in the

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Figure 5 needs a justification.

Thank you for your suggestion. The age uncertainties are determined by U-230Th technique, we will check and verify the discussion.

6. The authors interpreted the ïĄď13C record as an indicator of the land use. Given the fact of significant correlation between the ïĄď18O and ïĄď13C data (r=0.46, p<0.01), what about the ïĄď18O? Any anthropogenic (e.g., land use) effect? The data of land use are an overall summary from Shandong Province, which are not necessary to be equivalent to or describe the local variations at the cave site.

The ïĄď18O value of stalagmites in monsoonal areas like eastern China has been used as a proxy for the variability in the amount of rainfall because of the associated changes in the ïĄď18O values with changing moisture sources and shifting rainy season. Kaiyuan Cave is located at the warm temperate zone of the East Asia monsoon area. Rainfall is concentrated in the summer months, brought from the low latitudes of the Pacific by the summer monsoon. The data of land use of Shandong Province is alternative indicator to discuss the climatic-environmental meanings.

7. The authors had published the “Hendy Test” data already. In addition, the simple test presented in the manuscript is not necessary to be a robust verification of ‘sample deposition under isotopic equilibrium’.

Thanks. This result has been published, we will check it. The expressions need to be improved.

8. The statement, “This report is the first example of a high-resolution study”, is not proper, regarding many existing records, including that in authors’ last paper (Wang et al., 2016 Clim. Past).

Thanks. We will delete this sentence.

9. The ïĄď18O variation is causally linked to the rainfall amount effect. This requires a very careful assessment.

The ïĄď18O value of stalagmites in monsoonal areas like eastern China has been used as a proxy for the variability in the amount of rainfall because of the associated changes in the ïĄď18O values with changing moisture sources and shifting rainy season. We will check the statements and discussions.

10. The reinterpretation of other cave records in the manuscript is problematic. For instance, the Wangxiang record is also an East Asian monsoon record, rather than a typical Westerlies record.

Wangxiang Cave is located in China's inland area, Kaiyuan Cave is located in coastal area. This comparison need to be improved.

11. Many climate records are now available for the last millennia in the East Asian monsoon region. I suggest considering a more comprehensive comparison. The comparison with records from Turkey and Europe is ambiguous and not helpful here, unless the authors provide a mechanism to explain their correlations.

Thank you for your comment. We are considering to compare with more achievements in East Asian monsoon region.

13. Almost all reported data in the manuscript have too many significant digits, which is obviously impossible.

All reported data in this manuscript are measured by professional equipment in laboratory, the sampling methods are expressed clearly in section 3. We are considering to improve the expressions.

14. The conclusion part is unusually long with many redundant contents.

Thanks. We will simplify the contents of conclusion.

15. The current manuscript is not sufficiently comprehensible, including English.

We will improve the expressions and consider to find language editing service by professional institution, and make the manuscript much easier to read.

16. Some references are not very appropriate and some need to update.

Thanks. We will check it.

17. Check the unit of U contents: ppt or ppb?

Thanks. The unit of U is ppb.

Please also note the supplement to this comment:
https://www.clim-past-discuss.net/cp-2017-73/cp-2017-73-AC1-supplement.pdf

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