

Dear Dr. Denis-Didier Rousseau,

Thanks for your comments and constructive suggestions regarding our manuscript “A chironomid-based record of temperature variability during the past 4000 years in northern China and its possible societal implications” (ID: cp-2017-126). We find these comments and suggestions very helpful, and have carefully considered them in our revision. The revised manuscript includes the following points:

- 1) We have corrected all the technical mistakes.
- 2) We have added necessary statements to make readers understand more clearly.
- 3) All the revisions are marked in **red** in the revised manuscript. We respond to the comments following their questions below (responses are marked in **blue**).

Sincerely yours,

Haipeng Wang and Jianhui Chen (on behalf of all authors)

1. Line 160, can you provide a reference to the meteorological data you used?

Response: The meteorological data was from CHINA METEOROLOGICAL DATA SERVICE CENTER (CMDA) which shares meteorological data online. The website reference has been added in the new revision. Please refer to Lines 160-161.

Dataset of monthly values of climate data from Chinese surface station: http://data.cma.cn/data/cdcdetail/dataCode/SURF_CLI_CHN_MUL_MON.html, last access: 10 October 2017.

2. Lines 197-200 concerning the modern chironomid assemblages, can you be more precise when indicating “a warmer” or “a colder” environment as you may have modern data to provide much more precise indication

Response: Thanks for the suggestion. However, the quantitative estimation does not make much sense because the indicator-species approach basically focuses on the relative changes between environmentally significant species. We are trying to obtain quantitative temperature reconstruction using suitable calibration set including modern samples covering a much longer temperature gradient.

3. Lines 491-493. Why aren't you considering that the population collapse could be also related to the people uptake when conducting the wars?

Response: Yes, the population collapse was very likely related to the people uptake when conducting wars, which have been discussed in Lines 460-463. To make readers understand more clearly, some necessary statements have been added in Lines 492-494 of the revision.

4. Fig. 1, you indicate Mountain (Mid and High), Loess plateau. Could you provide some general range of elevation to the general reader who is not necessarily familiar with China?

Response: Thanks for the reminder. Mountain (Mid and High) indicates the area above 1000 m.a.s.l., which has been added in the caption of Fig. 1. Please refer to Line 794.

5. Fig. 3 can you add “SE” for South East in front of Asian Monsoon boundary?

Response: Thanks for the suggestion. It is difficult to accurately distinguish between the SE monsoon boundary and SW monsoon boundary. Therefore “modern Asian summer monsoon boundary” is used, consistent with the original reference (Chen et al., 2010), which has been added in Line 795 of the revised version.

*Chen, F.H., Chen, J.H., Holmes, J., Boomer, I., Austin, P., Gates, J.B., Wang, N.L., Brooks, S.J., and Zhang, J.W.: Moisture changes over the last millennium in arid central Asia: a review, synthesis and comparison with monsoon region, *Quat. Sci. Rev.*, 29, 1055-1068, 2010.*

6. Fig. 5 and 6, Could you please remind the cold events corresponding to the grey shaded zones?

Response: Thanks for the suggestion. The statements corresponding to the grey shaded zones in Fig. 5 and 6 have been revised as “cold events”. Please refer to Lines 811 and 820.

7. Fig. 6 Remove the big arrow on the right hand side, which could be confusing. Better indicate this in the caption.

Response: Thanks for the suggestion. The big arrow in Fig. 6 has been deleted, and more necessary statements have been added in the caption (Lines 817-818).

8. In the figures, when mentioning the species and genus, can you use the "italic" font?

Response: We checked the figures again and made sure that all the species and genus were written in italic font. The “Chironomini” is a tribe name and thus was not written in italic. The fact that the ‘italic’ font and ‘standard’ font are difficult to distinguish may be due to the low resolution of the PDF.