Climate of the Past

19 Jun, 2013

Dear Editor and reviewers,

Thank you very much for your valuable and encouraging comments to revise and resubmit our paper [Late Cenozoic continuous aridification in the western Qaidam Basin: evidence from sporopollen records]. We have completely revised the paper and hope that it meets with your and reviewers' approval. We followed most of the reviewers' suggestions. Our responses to the reviewers' comments are underlined. Six new figures are added into the revision in order to clearly define our compiled data and driving mechanism. The language of our manuscript was also helped to be improved by GeoEditing Company (a UK company specialising in English language editing). Here we show every correction after our revision as "revised manuscript" in order to easily identify the places of change. Line numbers as remarked by the reviewers in the original manuscript are named firstly. Line numbers named in our comments to the reviewers' remarks refer to the revised manuscript.

Thank you again for re-considering this manuscript.

Sincerely,

Yunfa Miao

The comment from the handling Editor

Dear Assoc Miao,

your Ms has been seen by 3 reviewers with contrasted reports. Overall, I recommend the submission of a revised version, owing to the quality and interest of this work. However, you must account for all the comments made by the reviewers, which are constructive and will help to improve the Ms. Additionally, I would like to stress the following points:

1) You should state more clearly that this is a review paper, with no new data. In agreement with the reviewers, I suggest that you remove the 'Materials and Methods' section, and that you replace it by a new section describing all the aggregated data with enough details. This can be easily done.

2) I agree with rev 2 that the conclusions of this contribution are a bit frustrating. It would be extremely interesting to quantify the relative contributions of the global and regional climate changes, and of the tectonic uplift on the West Qaidam basin climate evolution. Your paper lacks some statistical analysis, that would help to discriminate between the various causes.

3) Fig 4 is a key figure of your paper. The arguments developed here are not fully convincing. Indeed, at first glance, all signals seem to be correlated with the d18O signal from benthic forams. However, (1) the d18O signal is a deep sea signal, tracing the temperatures of the deep sea, and not directly the climate. (2) The gap between 5 and 3 Ma is critical: is it a step or a continuous decrease ? The answer to this question will strongly impact the quality of the correlation between your signals and the d18O. This must be discussed. (3) I'm not fully convince by the existence of a strong correlation between the Qaidam signals and the d18O. Visually, the main trend is an overall decrease, but in details, many features are not correlated. These include the gap between 5 and 3 Ma (see above), the wiggles between 14 and 5 Ma, and even after 3 Ma. You should explore mathematically the correlations, particularly since you have a lot of data.

Response: Thank you for giving us the opportunity to reply, we have read with great interest the pertinent comments made by D. Mildenhall, J.Nie, C. Jaramillo and an anonymous reviewer. After carefully thinking about their and your suggestions, our main modifications are as follows:

1) The 'Materials and Methods' section is replaced by the 'Data and methods', describing the data sources and the methods for the statistical analysis used in pollen zone and ecological divisions (including Tilia for CONISS, and Canoco for DCA and PCA, see lines 97-117).

2) In order to discuss clearly the relationship between the aridification and temperature, DCA

and PCA analysis (Fig. 6), and correlation between thermophilic taxa and oxygen isotope data (Fig. 8) are added to discuss aridification and temperature trends and their relationship with the global temperature. Additionally, the relationship between the water vapor and temperature, and the global temperature and precipitation distribution with latitude (Fig. 9) are added to help understand the aridification mechanism. Then, a comparison between the western and eastern Qaidam Basin, and a correlation with the tectonics, are shown in Fig. 10, in order to discuss their possible linkages. Thus, we think the conclusions are credible, and the structure is now more logical.

3) (1) The deep-sea $\delta^{18}O$ data are regarded as an averaged global temperature although there are some other signals within them (e.g., ice-sheets), and the 1-D ice-sheet model shows a good relationship between the $\delta^{18}O$ and north hemisphere temperature. In Fig. 8, strong correlation between the thermophilic percentages and deep-sea $\delta^{18}O$ data shows a better relationship between them (please see Fig. 8).

(2) One paragraph '5.4 Aridification during 5-3.1 Ma' is added in the last part of 'Discussion' to discuss the drying characteristics, which supports our opinion (please see lines 370-386).

(3) We have noticed that the main trends comprise an overall decrease with some fluctuations. However, the strong correlations (Fig. 8) show that the trends are the dominant feature, and this is exactly what we want to get across. In fact, the time resolutions for KC-1 and SG-3 cores are 0.22 Ma per sample and 0.03 Ma per sample, respectively. It is not practical to discuss these fluctuations in the manuscript when the time scales are so different. Instead, one of our future plans is to obtain the same high-resolution in both cores to discuss the fluctuations (please see the last paragraph of 'Conclusion', lines 407-411).