

Reply to Referee #2

In this manuscript, the authors present a modern pollen dataset based on surface sediments from 90 lakes covering the central and western Tibetan Plateau, and applied it to reconstruct the paleoprecipitation of a fossil pollen record from Lake Tangra Yumco on the central TP. This study provides a significant dataset for modern pollen research in the TP. The results of the investigation are important and this is a very interesting paper, I believe upon update will be a good article. Therefore, I suggest that some minor issues to be improved.

1) In the Study area, only the climate and vegetation are included, adding the geological and geomorphological information would provide a more comprehensive understanding, because these may also affect pollen assemblages.

Response: Thanks for the comments. We have added the related text in “2.1 Topography and climate”: “The TP is the broadest and highest elevation collisional system of the Earth (Ding et al., 2022). Under the long-term comprehensive effect of the internal and external agency, the TP manifests extremely complex topographic features. Our study region is located in the central and western TP between 28.5 °-35.2 °N and 79.8 °- 91.5 °E. Several nearly west-east trending mountain ranges are distributed in the region, which are the Himalayas, the Gangdese-Nyainqentanglha Mountains, the Karakorum-Tanggula Mountains and the Kunlun Mountains from south to north. Between these mountain ranges there are several broad valleys, which are divided by the secondary tectogenesis into many sedimentary basins of different sizes. A large number of lakes lie on the bottom of the basins (ITCAS, 1988)”.

2) Quercus E and Quercus D should be marked with their full names when they first appear in the text.

Response: According to the reviewer’s comments, we corrected them.

3) The sum of Variance explained of Pann, TJan and TJuly in RDA results is only 35.3%. Is there any influence of other factors considered?

Response: We agree that there may be other climatic or environmental factors influencing the modern pollen distribution. We select these variables because they are considered as important climatic factors for plant distribution and growth, and have been widely used for palaeoclimate reconstructions based on pollen data (Shen et al., 2006; Herzschuh et al, 2010; Cao et al., 2021). According to previous quantitative pollen-climate studies over the Tibetan Plateau, these factors, or some of them, are the only factors considered in most of the studies (Shen et al., 2006; Herzschuh et al., 2010; Wang et al., 2014; Cao et al., 2021). To increase the comparability of our analysis process with other studies, we also selected these factors as target variables. Partial RDA shows that our reconstructed target variable- P_{ann} , as a sole variable,

explains 24.2% of the variation in the pollen data, which also reveals the importance of P_{ann} for modern pollen distribution in our study region.

4) *Line 212, What the “Hill”s N2” means?*

Response: Hill’s N2 diversity (Hill, 1973) was used to measure the effective number of pollen taxa occurrences (Juggins, 2007). Fossil pollen samples with low Hill’s N2, such as several samples older than 16.2 cal kyr BP in our records, could lead to inaccuracy of climate reconstructions. Therefore, we set the threshold to eliminate the reconstruction results of the fossil samples with the relatively rare pollen taxa.

5) *“This dataset can be openly accessible via Zenodo portal: <https://doi.org/10.5281/zenodo.8008474>”, the URL cannot be opened, please check whether the URL is correct.*

Response: We have checked the URL by using different browsers (Microsoft Edge, Internet Explorer and Google), and found that it is correct. Perhaps the Zenodo website was under maintenance at the time you visited, or for some other reason. Please try again.

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