Response to reviewers' comments

Reviewer 2

comments have been marked in the manuscript.

mild and arid climate (contrasting words). Maybe semi-arid to an arid climate

Our Response: Done.

Line 478-480:

"Reconstructed Pann (mean: 547 mm) and Mtwa (mean: 8.3 ℃) decrease significantly, suggesting climatic conditions deteriorated (Fig. 7)."

Line 483-486:

"In brief, the climate tended to be arid with enhanced aeolian activity and deteriorating environmental conditions. Alpine steppe dominated across the study region during this period."

Grass and shrub coppice vegetation around the lake margin increases erosion by grazing and pastoral activity. It also suggests less intensity and amount of precipitation by all the three monsoonal activities i.e. Asian monsoon, Indian summer monsoon, and the westerlies.

Our Response: Agreed and done. In addition, the vegetation change since 1710 CE is likely disturbed by human activities according to the evidence available, while this does not exclude the influence of environmental factors.

Line 507-513:

"Hence the vegetation during this period could have been disturbed by human activities. In addition, TOC, TN, and pollen concentration notably increase, indicating terrestrial material input strengthened, possibly as a result of increased surface erosion (silt fraction increases; Fig. 7) due to the destruction of vegetation by grazing and pastoral activities. Reduced precipitation and monsoonal activity is also suggested by the increases in TOC, TN, and pollen concentration."

Poaceae and Cyperaceae are typical examples of being introduced into the landscape

by human activity and have become invasive throughout the landscape by totally removing the native species.

Our Response: We agree that Poaceae and Cyperaceae could be important indicators to evaluate the human activity intensity. In addition, these taxa are widespread on the Tibetan Plateau natively, which are important components of the alpine meadow and alpine steppe. They could represent anthropogenic impacts when there is an abnormal change in their percentage, and the information of human indicators (Cyperaceae, Poaceae, Ranunculaceae) have been added in the revised version.

We changed the sentence from "of vegetation by human activities" to "by grazing and pastoral activities".

Line 505-514:

"According to earlier topsoil studies, Ranunculaceae and Poaceae are important indicators of grazing activities on the north-east Tibetan Plateau, with pollen percentages changing significantly in the overgrazed sites (Wei et al., 2018; Duan et al., 2021). Hence the vegetation during this period could have been disturbed by human activities. In addition, TOC, TN, and pollen concentration notably increase, indicating terrestrial material input strengthened, possibly as a result of increased surface erosion (silt fraction increases; Fig. 7) due to the destruction of vegetation by grazing and pastoral activities. Reduced precipitation and monsoonal activity is also suggested by the increases in TOC, TN, and pollen concentration."

English language to be upgraded.

Our Response: Agreed and a native language expert has revised it.

Figure 1. to be redrawn with other lakes if any near the study site.

Figure 2 is a local map of the lake with GPS locations of the modern surface samples collected. and the site where the sediment core has been collected.

Our Response: We have added other records in figure 1. In addition, we think the issue you highlight (Figure 2) probably refers to figure 1 and we have

modified the title according to your suggestion.