Response to community comments by Dr. Martin Hoelzle

This manuscript presents glacier mass-balance measurements from a glacier in the eastern Pamir mountain range. This region has recently been described as one of the few areas where glaciers have experienced relatively little mass loss and were thought to remain close to equilibrium conditions. However, the study suggests that the so-called Pamir–Karakoram Anomaly may be coming to an end, a conclusion the authors support with their mass-balance observations.The paper documents daily glacier mass-balance measurements from 2019 to 2023. It analyzes the characteristics of these daily mass-balance variations and their responses to heatwaves, drawing on time-lapse photography, ablation-stake and snow-pit measurements, as well as meteorological data collected at Kangxiwa Glacier in the eastern Pamir. The manuscript describes in particular the influence of heatwaves—most notably in 2022—on the glacier's behavior near the Muztagh Ata range. Overall, the paper is well structured and carefully prepared. The authors present well-developed mass-balance measurements, and the discussion offers a balanced and thoughtful analysis of the study's findings. I strongly support this paper for publication.
Response: Thank Dr. Martin Hoelzle for your time in reviewing our manuscript. We are grateful for all your comments. Below are our point-by-point responses (blue color) and the changes we've made to the paper (in italic).

There are, however, a few points that could strengthen the manuscript. In the Methods section, the authors should more clearly explain how the point measurements were interpolated to estimate mass balance across the entire glacier surface, and they should specify which interpolation method was used. These results should also be illustrated in a figure.
Response: Thanks for pointing out such issue which was also addressed by other reviewers. Following all reviewer's comments, we added more detailed description of how the three camera-based point mass balance data was interpolated to derive the glacier-wide mass balance. Glacier-wide mass balance was derived via a weighted average of the three pointing mass balance observations by Cameras and their representative elevation-area. Although there are only three cameras available, their spatial representativeness was carefully considered before the installation near the terminus (5005m asl), middle (5137m asl) and upper region (5300 m asl) of Kangxiwa Glacier. The location of camera 1 at 5005m roughly represents the zone of 5005±60 m in elevations (~4960-5080m asl); Camera2 represents the zonal range of 5137±60 m in elevations (~5080 to ~5200 m asl); Camera3 represents the zonal range of 5300±100 m in elevations (~5200 to ~5390 m asl). Actually, the topography condition of Kangxiwa Glacier is relatively flat and the 10 stake mass balance measurement evidenced that there are linear mass balance gradients (See the following Figure). It allows us to use the weighing method to calculate the glacier-wide mass balance. Please see the details in the revised manuscript in Method.

We also added one new Figure 4 (please see in following) to show the comparison between the field stake method and camera-based mass balance observations in both point scale and glacier-wide scale. Such comparisons evidenced the robustness of daily glacier mass balance calculation by using three camera-based mass balance observations, which covered the lower, middle and upper glacierized region.

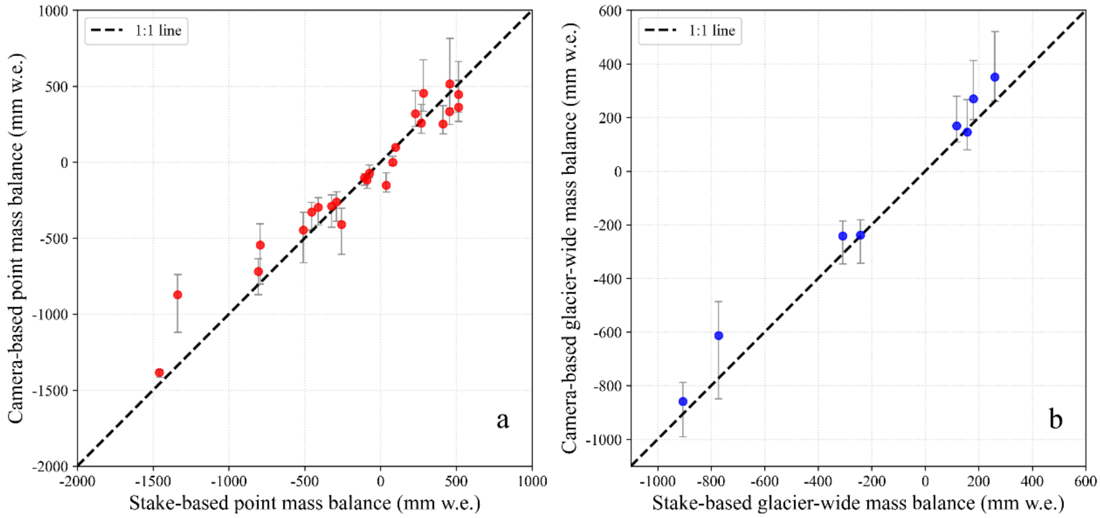


Figure 4 The comparison of pointed mass balance (a) and glacier-wide mass balance (b) measured by using the stake method and the Time-lapse photography on the Kangxiwa Glacier.

In the Introduction and Discussion sections, it would be beneficial to compare the Kangxiwa Glacier measurements with other mass-balance records from nearby glaciers. Relevant examples include the Zulmart Glacier, Glacier No. 457 in the Pamir, as well as the Abramov Glacier. Additionally, the question arises as to why the newly measured data have not been submitted to the World Glacier Monitoring Service.

Response: Following your suggestion, we have compared the published annual mass balance from nearby glaciers including Zulmart Glacier, Glacier No. 457 in the Pamir, and Abramov Glacier. We found the Zulmart Glacier in the Pamir, which is about 200 Km northwestern from Kangxiwa Glacier, also exhibited the most negative mass balance in 2022. However, neither the Abramov Glacier nor the No. 457 Glacier showed such a pattern and the most negative mass loss occurs in 2021(Abramov Glacier) and 2023 (No. 457 Glacier). It evidenced that heterogeneous glacier mass changes in the Pamir and Tien Shan region. Our four-year observations also pointed out the fact that both the variations in the timing of heatwave occurrence and the seasonal distribution of precipitation can also contribute to substantial disparities in the response of glacier surface mass balance to climatic conditions. Although this study did not provide quantitative analysis by using sophisticated models, we highlight the complexity of glacier responses to climate change in Pamir and the critical importance of continuous, high-temporal-resolution monitoring of glacier surface mass changes to support future model-based explanations. We added the relevant discussion in Section 5.1.

Regarding the in-situ mass balance data, we will submit to the WGMS after the publication of this paper.

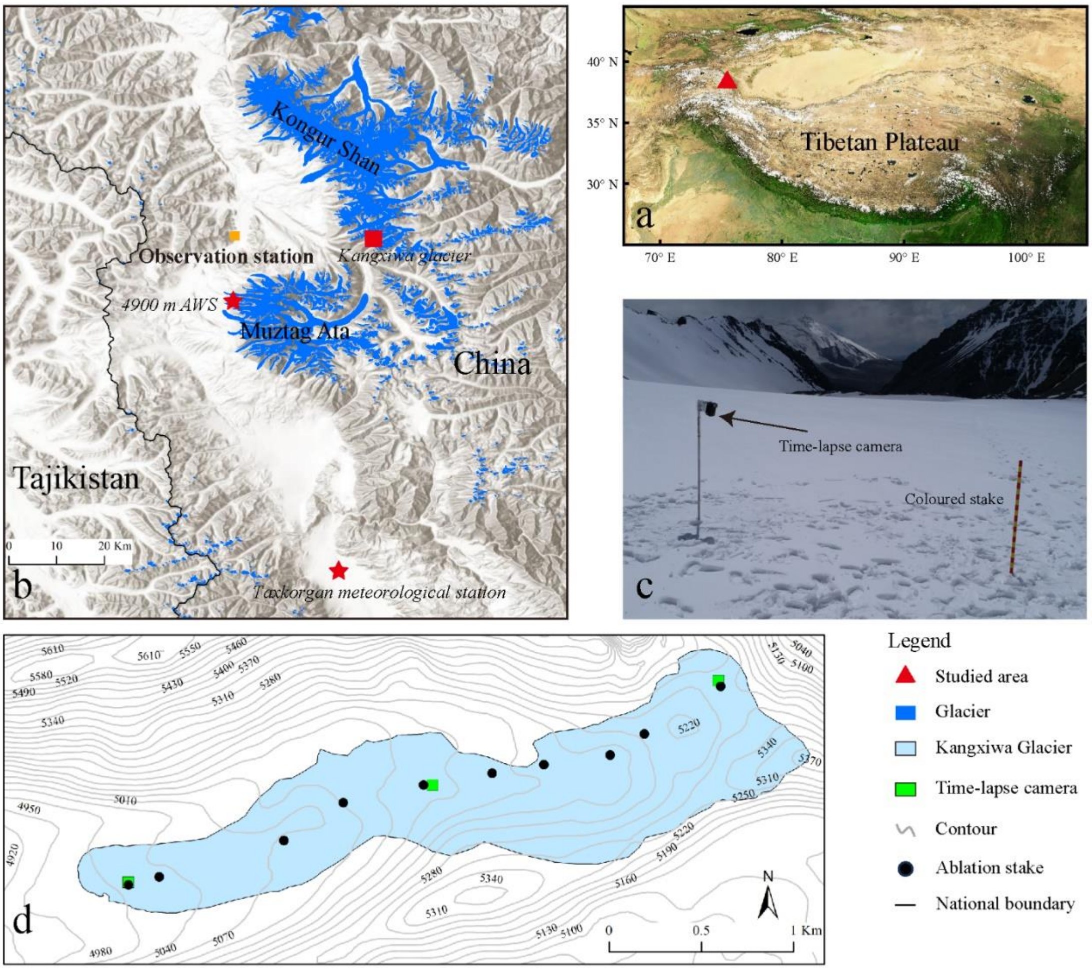
Minor corrections:

Line 25: change ‘wakened’ by ‘weakened’ or maybe better ‘decreased’

Response: Done

Figure 1, Legend in the figure: change ‘coutour’ to ‘contour’

Response: Done



Line 106 and everywhere in the paper: stake ‘hight’ should be replaced by stake ‘height’ or stake ‘length’

Response: The stake melt-out length was used in the revised paper.

Line 186: Using ERA5 data, it should be also mentioned that these type of data still has remarkable uncertainties (e.g. Barandun and Pohl 2023).

Response: Thanks for pointing out this issue. The ERA5 data do have remarkable uncertainties, in particular for high mountain regions. Actually, the ERA5 data including geopotential height, wind fields, and surface air temperature, was mainly used to investigate the large-scale atmospheric circulation pattern. The regional air temperature change was mainly investigated by using the ground-based automatic weather station (AWS). Thus, we did not address the uncertainty of ERA5 in the manuscript.

Line 205, Figure 6: the lines shown in Figure does not correspond to the lines in Figure a, b and d. Please correct the lines that they have the same pattern.

Response: This figure has been replotted following the comments provided by you and the other reviewers. We have also included cumulative precipitation data for comparative analysis, and standardized the color scheme for different years across all sub-figures to enhance visual clarity.

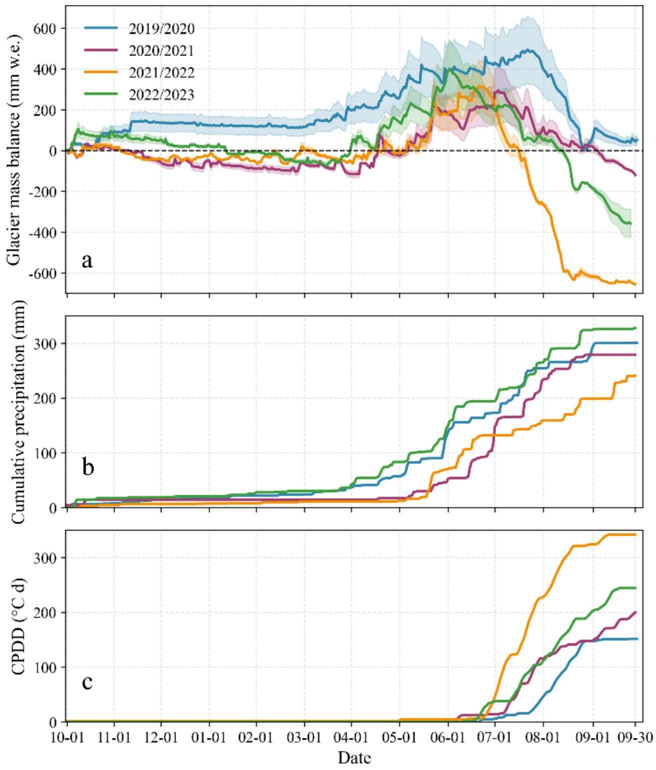


Figure 5. Cumulative glacier-wide mass balance of the Kangxiwa Glacier during the 2019/2020–2022/2023 hydrological years, with the uncertainties by shaded area (a). The accumulated precipitation (b) and positive degree recorded by the AWS4900 (c).

Line 271, Table 1: It would be nice to show all radiation components individual meaning that we have columns for shortwave incoming, shortwave outgoing, longwave incoming and longwave outgoing radiation.

Response: Regarding the AWS is located in the non-glacierized region, the outgoing shortwave and longwave radiation did not therefore provide. Following the other reviewer's comment, the Table was removed in the revised manuscript.

Line 350-352: Sentence is duplicated. Please remove.

Response: Thanks. We have done it.