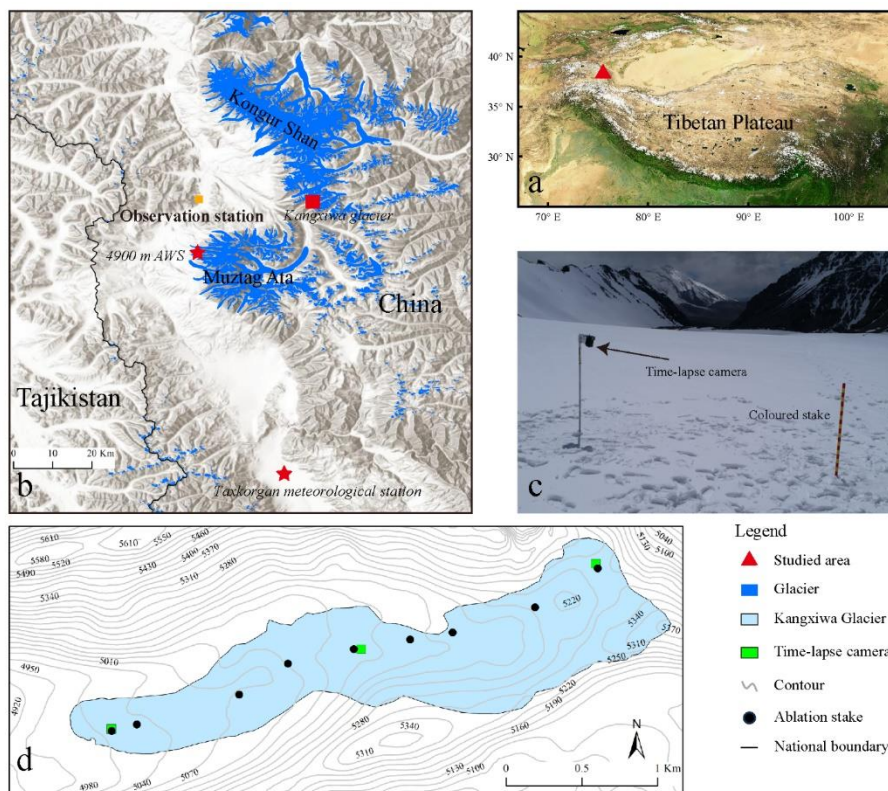


## Response to RC1

We are grateful to your careful review and constructive suggestions on our manuscript. These comments are valuable and helpful, and we have thoroughly revised the manuscript in response to all the comments. Below are our point-by-point responses (blue color) and the changes we've made to the manuscript (in italic).

1. The first comment is based on the author's response: Fig 1R: I only see 9 mass balance points, not 10. Please check this.

Response: Sorry for the mistake on our part. There are 9 mass balance points for the period 2019/2020–2022/2023 (please also refer to the dataset provided in our previous response document). Starting from the 2023/2024 season, 10 ablation stakes have been installed on Kangxiwa Glacier. We previously misidentified their locations, and have now corrected both Figure 1d and the corresponding text in the revised manuscript.



The following comments are based on the document with the track changes:

2. L55 process --> processes

Response: Done

3. L119: remove systematic or replace by yearly glaciological observationS (...) since year XXXX.

Response: Following this comment, the original sentence was revised to “*Glaciological observation of Kangxiwa Glacier has been conducted by the Muztagh Ata Station for Westerly Environment Observation and Research, Chinese Academy of Sciences (Fig. 1b) since the 2010/2011 hydrologic year.*”

4. Section 3.1: also mention here that 10 stakes were used

Response: we corrected the number here.

5. L200: remove manually

Response: “manually” was removed.

6. L255: data WERE used (data is plural)

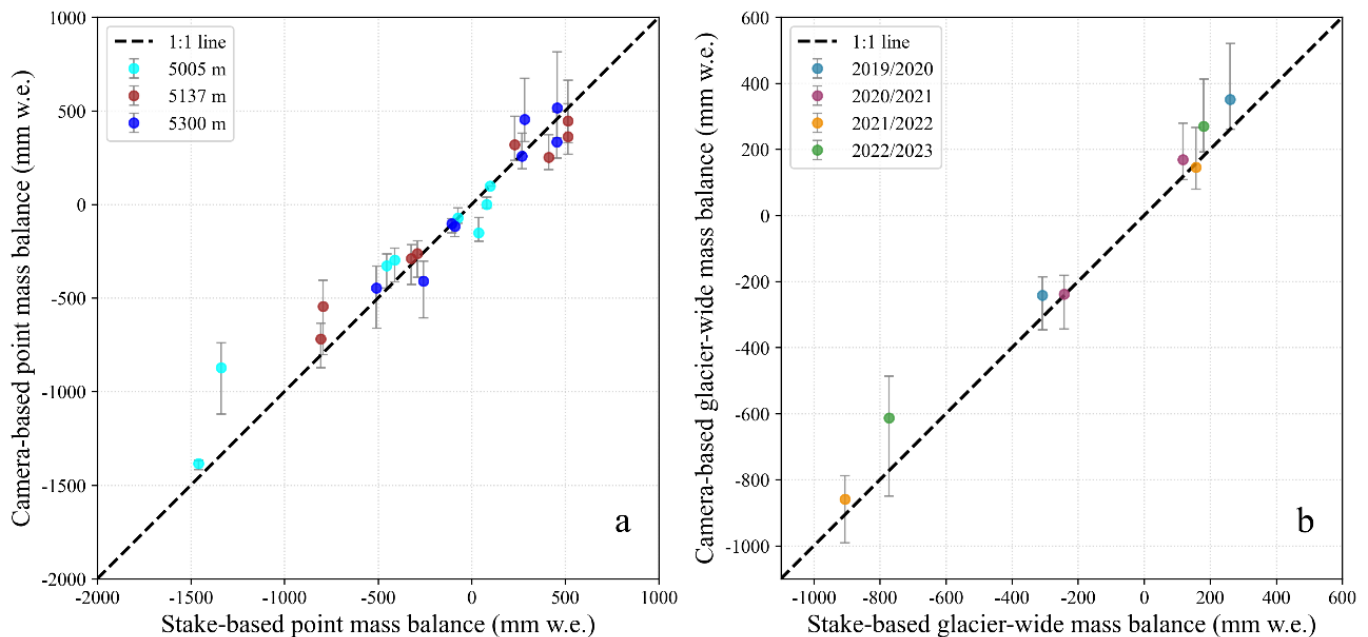
Response: Done.

7. Section 4.1: please comment here also on where the differences between the two methods come from. Does it have to do with the conversions from height to w.e. (density value)? Or consider making this a new section in the discussion.

Response: we agree with that the discrepancy between the two methods mainly caused by the density uncertain of snowpack and we have added comment here. It is extremely difficult to quantify the dynamic changes in snowpack density. We therefore only provide the maximum and minimum possible bounds to estimate the associated uncertainties. For this reason, we did not further address this point in the discussion section.

8. Fig 4: consider using different colors for the stakes at different altitudes in Fig 4a and different colors for the different hydrological years in fig 4b. Also, the extend of the axis is annual mass balance, compared to the start of the hydrological year, right?

Response: Figure 4 was modified following your suggestion. The data shown in Figure 4 represents seasonal mass balances which were derived from in-situ and camera measurements. We have added “seasonal” in the figure caption accordingly.



9. L269: I think these SD are very high. Please comment on it.

Response: we added comment on the high SD here: “These discrepancies between the two methods could be largely attributed to temporal variations in snowpack density throughout the observation period.”

10. L313: keep Glacier Loss Day fully written out in this line.

Response: we used “Glacier Loss Day” throughout the manuscript.

11. Fig 5: I like this figure as it enables us to compare the different years to each other.

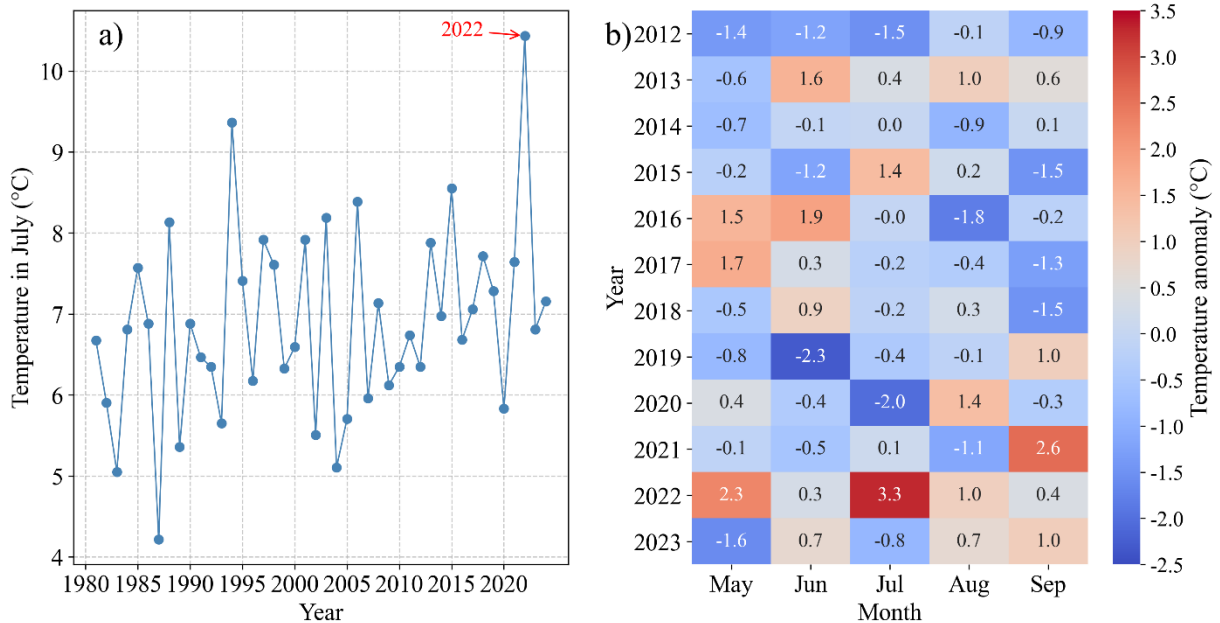
Response: Thanks for your suggestion again.

12. L346-360: some numbers are mentioned double here (or at least as far I can see in the document with track changes.) Please check this.

Response: Thanks for pointing this out. The annual balances of the 2019/2020 and 2021/2022 were mentioned twice, leading to redundant expression. We removed the correspond sentences with repeated numbers.

13. Fig 6: please add a label to 2022 in this plot, so it is directly clear to the reader that this year was very anomalous.

Response: 2022 is clearly visible in the heatmap of Fig. 6b, we added a label in Fig. 6a to highlight 2022 for the reader.



14. L416: what is warming magnitude? Please use a different phrase.

Response: the original sentence was revised to “*The air temperature during the August heatwave was only 2.5 °C higher than the corresponding average of the other three years.*”

L510: typo: Barandun et al.

Response: Done

Fig S5: There is no fig S5c here, even though it is mentioned in the caption.

Response: sorry for this error. We revised the Fig S5 caption.

## Response to RC2

We thank the reviewer for the insightful and constructive comments, which have been very helpful for revising our manuscript. We have addressed all comments point by point. Below are our point-by-point responses (blue color) and the changes we've made to the paper (in italic).

1. L25: State specifically that heatwave conditions during 2022 melted all snow one month earlier than other years

Response: we revised following your suggestion.

2. Intro: Check consistency of spelling of Karakoram/Karakorum.

Response: We used "Karakoram" throughout the manuscript.

Fig. 4 caption: explain the derivation of the uncertainty bounds and their meaning here.

Response: The meaning and derivation of the uncertainties were added to the caption: "*The vertical bars represent the uncertainty bounds of camera-derived results which were derived from the minimum and maximum snow densities, respectively.*"

L271: This is all ERA5 data, I assume? This should be stated as ERA5, not just "ERA" here to avoid ambiguity. Same for Fig. 6 caption and elsewhere.

Response: It is all ERA5 data. "ERA" was changed to "ERA5" throughout the manuscript.

L274: Replaced "evidenced" with "showed" (or similar).

Response: Done.

L424: The authors have spelled "phase" as "phrase"

Response: Done.