Review of "Brief Communication: Sensitivity analysis of peak water to ice thickness and temperature: A case study in the Western Kunlun Mountains of the Tibetan plateau."

In this study, Gimenes et al. use OGGM and two ice thickness products to assess the impact of geometric data and temperature bias on the magnitude and timing of peak runoff in the Western Kunlun Mountains. For future projections, the authors employ one GCM simulation extending to 2300 under SSP1-2.6 and SSP5-8.5 scenarios.

The topic is certainly interesting and relevant, but the study provides limited innovation in terms of methodology or analysis. The level of depth is rather modest, and several aspects of the methods and datasets require clarification. Even for a Brief Communication, I believe these points should be in depth addressed. While the results show that initial ice thickness strongly influences runoff, this outcome is somewhat expected. The "so-what" aspect of the study is currently missing and should be emphasised more clearly through deeper analysis and contextualization as well as richer figures. Given the potential of the topic, I recommend major revisions, with the hope that the comments below will help strengthen the manuscript.

Major comments

- **Introduction:** The second part of the introduction does not really serve as an introduction to the study itself, but rather as a general overview of glacier modelling approaches. It would be more relevant to provide additional context on which variables most strongly influence glacier runoff and why ice thickness and temperature bias are key factors controlling peak water so that these are chosen. This could then naturally lead into the motivation and significance of the present study. Why is the Western Kunlun Mountains are chosen should also be addressed.

- **Methods:**
  - The authors mention that the ice thickness data from Millan et al. (2022) were corrected to match the consensus estimate (reported for 2003), but the procedure is not entirely clear. Was the ice thickness change from 2000–2019 (Hugonnet et al., 2021) applied across the full domain, or only partially (e.g. 2003–2017)? It would also be helpful to clarify what the reported average value of 4.0 km³ (line 90) represents.
  - The calibration section needs revision. It currently reads as a mix of "limitations" and "comparison with previous studies", which weakens the message and the perceived robustness of the study. Why not rerunning OGGM using the new configuration to ensure consistency with the latest developments?
  - The discussion of the temperature bias (lines 180-181) is too brief, as it is a central element of the title. Is this bias the same as that derived during the calibration? Was the same procedure repeated but with a uniform bias applied over the full simulation period? Please clarify this.

- **Results and discussion:**
  - Figures 2 and 3 could be further optimised. Axis limits are inconsistent, which makes comparison difficult. Colour choices are sometimes awkward; using the IPCC standard colour palette would improve clarity. Labels are not always self-explanatory, making the caption crucial for interpretation, and overall label thickness should be increased for readability.
  - The discussion lacks comparison with previous studies or observational runoff datasets that could provide at least partial validation. As a result, the broader context

and implications of the results remain unclear.

Minor comments and suggestions:

Abstract

- Line 1: Sensitivity to what? Please specify (-> ice thickness and temperature?).
- Line 4: Replace Predicted with Projected.

Introduction

- Line 11: Add a reference for the Sea Level Rise component.
- Line 12: Remove also.

Data and Methods

- Line 37: Replace with "more precisely, the Western Kunlun Mountains." (or West?)
- Line 38: Clarify why RGI v6.0 is used to define the study area (maybe better add this reference in the next sentence).
- Line 45: The phrase "these glaciers" currently implies 10% of 70%. Please reword for clarity.
- Line 50: A thinning rate of -9.6 m yr^{-1} seems unrealistically high? Please verify the source or units.
- Region 13 is generally thinning, but the Karakoram is an exception within RGI13, what does this imply for interpreting the Hugonnet (2021) regional value? Why not taking the Karakoram region from Hugonnet (2021) data separately?
- Figure 1: The inset zoom on the study area in HMA is too small. Please revise and consider adding the ice thickness dataset already in the panel (not only in the caption). The figure should be interpretable without relying on the caption. If ice thickness measurements exist in the study region, they could be included.
- Line 63: Add a reference for this statement. This could also be moved to the introduction to justify the regional focus.
- Line 67: Replace Predicted with Projected or Simulated.
- Line 68: The consensus (or community) estimate was published in 2019 but represents 2003 (I thought actually more 2000), not 2019.
- Line 73: Clarify the phrase "the use of glacier by."
- Line 84: Confirm whether Farinotti et al. (2019) used measurements.
- Lines 84-89: The correction method for the Millan dataset is unclear — was the Hugonnet thickness change simply added?
- The OGGM initialization description is too detailed for a Brief Communication. Focus on "We use OGGM, a model…" and emphasize what was new or modified for this study.
- Lines 108–112: Clarify which dataset was ultimately used and for what time period.
- Lines 113–127: This section reads more like discussion than methods. It could be shortened substantially. Based on line 121, it even seems that part of the research question has already been answered.
- Lines 154–159: This belongs more logically in the description of the reanalysis dataset. Ensure consistent verb tense (past or present) throughout each section.

- Consider first presenting the individual glacier runoff results before aggregating to the regional scale.
- There is some mixing of climate data, geometry, and model description; please reorder for clarity.
- Why was only one GCM used, given that six are available? The paper itself acknowledges that using a single GCM limits accuracy — please justify this choice.

Results

- Figure 2: It is unclear what the "multiplication factor" represents. Also, clarify the meaning of "temperature bias." Ensure consistent y-axis ranges across panels and apply IPCC colours for SSP1-2.6 and SSP5-8.5.
- Figure 3: Move the figure closer to the relevant text. The colour scheme used to distinguish Farinotti et al. (2019) and Millan et al. (2022) is identical to that used for SSP scenarios in Figure 2 — please revise for clarity. Label font size should be increased.
- The content of panel C is not intuitive, why not show annual mean temperature and total precipitation instead?
- Lines 241–246: Move to the discussion section.

Discussion

- Consider subdividing this section into subsections for clarity.
- Is Millan et al. (2022) systematically thicker across the entire glacier, or mainly in the accumulation area? If the latter, would that difference significantly affect runoff?
- Line 280: Please clarify what "sufficient" refers to.
- Lines 297-304: The outlook is vague. The discussion should place the results in a broader context and compare them with previous studies. Many results are rather intuitive (e.g. thicker ice leads to delayed and higher peak water). It would be more appropriate to revisit the research questions rather than expand on new remote-sensing products, which remain uncertain if and when they will come.
- Why is there no **conclusion section**? Please include one to summarise the key findings and implications, even in a couple of sentences.