

Martina Leone
CIMA Research Foundation
Via A. Magliotto, 2 17100 - Savona
Italy

July 03, 2026

To the editor and to the reviewer,

we thank you for your suggestions and comments. Here we report and explain the changes made to the new version of the paper.

Response to report

1. Description of results. The results section has been much approved and is more succinct which is great. A minor thing is the somewhat confusing % changes, e.g. line 230 and 232, e.g. (around -60-30 %). Maybe instead '(around -30 to -60%)' is better?

We thank the reviewer for bringing this confusing text to our attention.

Changes: In the revised manuscript, we have improved this section (see lines 229-232).

2. Clearer description of discussion and model uncertainties. Nice to see an improvement in Figure 2 and the additional statistics. However, the text does not yet mention that the model has a tendency to overestimate ablation and underestimate accumulation. The differences per elevation band are not so small and so I think it's important to recognise this, at least in the results and potentially in the discussion. What might be the impact of this bias in mass balance profile on the results?

We agree that the elevation-dependent pattern in the model biases deserves a more explicit discussion. We have therefore revised both the Results section to highlight that the model tends to underestimate melt at lower elevations, where debris cover and tongue processes are not represented, while showing a more variable behavior at higher elevations, likely reflecting uncertainties in snow accumulation and melt processes. We also clarify that model performance is strongest between approximately 2800 and 3200 m a.s.l., where a large fraction of glacier area is located. Finally, we discuss the implications of these biases for our estimates of glacier contribution to streamflow. Because the overall mean bias is negative, the model conservatively estimates glacier melt at the basin scale, suggesting that the reported glacier contributions to streamflow are more likely to be underestimated than overestimated, while acknowledging that local elevation-dependent biases remain an important source of uncertainty.

Changes: We revised the Results section (lines 198–205) to explicitly describe the elevation-dependent bias of the model and its likely causes.

3. It is also great to see the new calculations of contributions with the more recent glacier outlines, and it is clear that the main messages of the paper still stand, which is super. It would be nice though to have a sentence in the discussion which compares the glacier contributions between the RGI and more recent outlines directly, so that the impact in terms of the actual contributions (not just relative changes) is known.

We thank the reviewer for this positive feedback and helpful suggestion. We agree that directly

comparing the glacier contributions obtained using the RGI v6.0 and the updated regional glacier inventories provides a clearer picture of the impact of static glacier outlines on the absolute contribution estimates. We have therefore added a sentence in the Assumptions and limitations section explicitly reporting the mean annual glacier contributions obtained with both glacier inventories for each catchment and period.

Changes: A sentence in the discussion has been added (see lines 379-381).

4. *Also line 467: ‘regions are likely to be energy limited and thus evapotranspiration is small.’ Only since your modelling is not calculating the energy balance, so you are just inferring from another study here.*

We thank the reviewer for this comment.

Changes: In the revised version, this sentence has been changed (see lines 391-392).

5. *This is now much clearer thanks. Just watch line 108: ‘on and off glacier, off-glacier...’*

We thank the reviewer for this observation.

Changes: In the revised manuscript, we changed this sentence (see line 100).

6. *Great, much improved. In the caption ‘The yellow outlines are the modelled catchments.’*

We agree with the reviewer and we made this change.

Changes: See caption of Figure 1.

7. *This text is now much improved, but maybe there is a bit of repetition between lines 208 and 232 and the text in lines 233 to 241? I also see now that the temperature differences with elevation are in Figure 4, so perhaps the new Table is not so necessary? I am just not completely sure what differences are between the description of the temperature/precipitation differences against elevation mentioned in the first part of this section and the temperature anomalies mentioned later. Maybe you can better integrate the text still, so in other words mention the detailed anomalies of temperature (Figure 3) and the seasonal anomalies with elevation (Figure 4) together for each year/place?*

We thank the reviewer for this helpful suggestion. We agree that there was some redundancy between the descriptions accompanying Figures 3 and 4, and that the distinction between daily temperature evolution (Figure 3) and seasonal temperature anomalies by elevation (Figure 4) was not sufficiently clear. We have therefore revised this section by integrating the discussion of the two figures, describing the daily evolution and the seasonal elevation-dependent anomalies together for each year and region. We also removed the temperature table, as Figure 4 already summarizes the seasonal anomalies more effectively and avoids unnecessary repetition.

Changes: We revised the 4.2 Air temperature and precipitation over glaciers section (lines 207-237) to better integrate the interpretation of Figures 3 and 4, removed redundant text, and deleted the temperature table.

8. *Write out 2023 if you want to start a sentence with it. Still to do.*

We thank the reviewer for this comment. The sentence at line 217 starts with "2023".

9. *My apologies but the ‘-1’ also needs to be superscript. So use ‘m³ s⁻¹’. Also see line 400: ‘measured streamflow. As for Aosta Valley...’ [add space].*

We thank the reviewer for this comment.

Changes: In the revised manuscript we corrected the measure units at line 305 and added a space in line 400.