Review of "Brief Communication: Mass Balance of Glaciers in the Eastern Hindu Kush from 1979 to 2002 using KH-9 Panoramic and SPOT-5 stereo imagery"

In this paper, Ramzan and Ghuffar report geodetic mass balance of glaciers located in the eastern Hindu Kush for the period 1979-2002. They find a moderate glacier mass change of -0.13 ± 0.12 m w.e. a^{-1}, which is similar to post 2000 mass changes documented in the literature.

Overall, the authors use state of the art methods to differentiate KH-9 Panoramic and SPOT-5 stereo imagery. It is very nice to see the use of KH-9 Panoramic imagery as described in Ghuffar et al. (2023). It is also great to see a SPOT-5 instead of SRTM reference for circa. 2000 dates. To my knowledge, the study area is on the edge of previous studies, but not covered for the pre 2000 period. Still the glacier area covered is relatively modest (< 1000 km^2), and thus the results are not expected to have a major impact.

I recommend publication of the paper after minor corrections.

Main comments

A- I am surprised to see so few glaciers on figures 1 and 2. I quickly looked at the RGI and there are indeed many missing glaciers (see figure below)! It is not an issue not to calculate the mass balance for each and every glacier, but the criteria for glacier exclusion should be clearly stated, and glaciers without mass balance data should still be plotted on the maps. The authors need to better quantify the total area, the area with valid pixels and the sum of the glacier area with mass balance values.
On figure 2, I would like to see the off-glacier elevation changes as well. The figure S3 is clearly not enough to see the quality of the elevation difference map because the color scale is not adapted, I recommend using the same as for figure 2.

B- I am missing a short paragraph about the climate context of the region. The stability of the glacier mass balance from 1979 to 2020 should be discussed further.

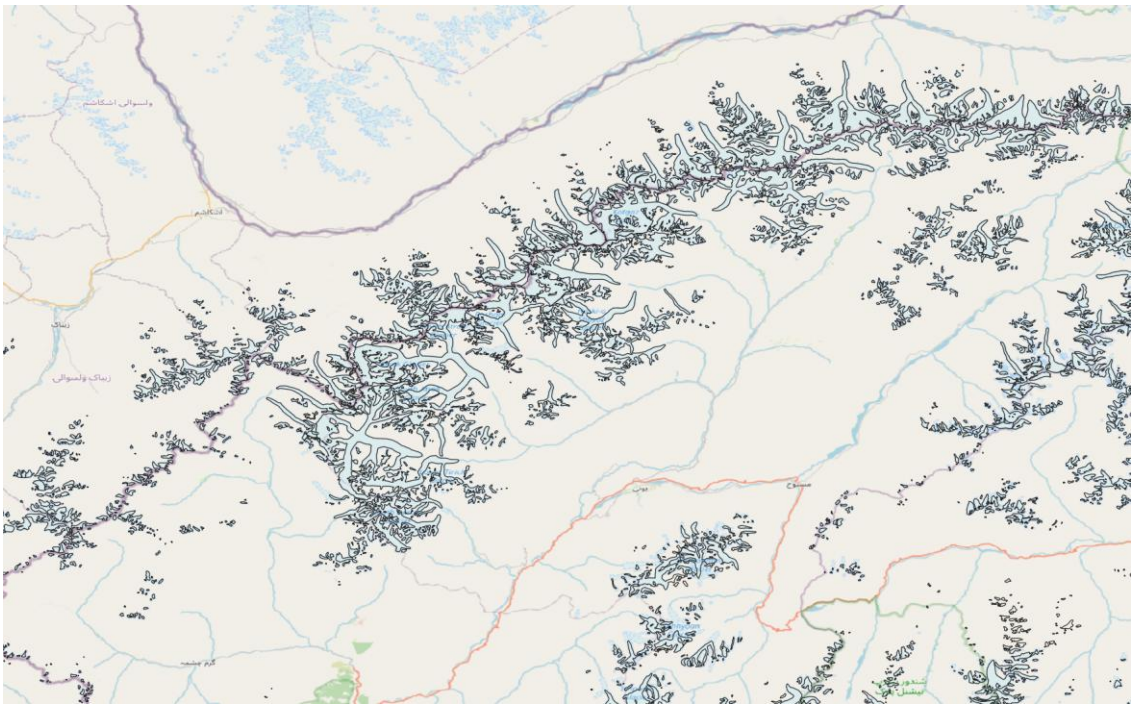

Figure 1: map of the study area with RGI outlines

Specific comments:

L11-12: more references are needed, and the description should be a bit more precise at the scale of the High Mountain of Asia. Additional references should include: King et al., 2019; Maurer et al., 2019; Zhou et al., 2017, 2018

L12-13: this statement is too strong, see for instance Gascoin (2024)

L29: dditional references should include: Zhou et al., 2017, 2018

L62: contradiction with the line above. Why not co-registring KH9 and SPOT5?

Equation 1: what is the link with Rolstad? (L84-85) I think that the whole error propagation calculation is not very clear. For instance, on L84-85, the mean off glacier elevation difference is used as a systematic error, but it should be zero by construction? I simply don't understand the link between the calculations L83 and equation 2.

L91: what is represented by each term? Why should they be equal?

Eq. 2: definition of f ??

Fig. 2: colorbar not centered on zero + glacier names should be shown somewhere on figure 1 or 2

L104-105: -0.23 m w.e. is not a large thinning…

L101-105: give the dates of known surges

L111: give the area of the glacier

L161-162: I don’t understand this sentence

L168-169: different periods so not meaningful

L170-171: this needs to be better quantified!! Warning, errors are larger for small glaciers than for big ones -> this could explain the discrepancies

L184: “high variability” compared to what??

L190-191: again there is no reason to agree because periods are different

Data availability: only DEMs and orthos available -> add the per glacier mass balance data?

References

Gascoin, S.: A call for an accurate presentation of glaciers as water resources, WIREs Water, 11, e1705, https://doi.org/10.1002/wat2.1705, 2024.

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