Earth Syst. Sci. Data Discuss., community comment CC2
https://doi.org/10.5194/essd-2021-28-CC2, 2021

Comment on essd-2021-28

Sher Muhammad

Community comment on "Evaluation of the global and regional glacier inventories and assessment of glacier elevation changes over the north-western Himalaya" by Shakil Ahmad Romshoo et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-28-CC2, 2021

The authors derive a new glacier inventory for selected Himalayan river basins using manual delineation and various data sources. The authors also highlight the strength of their inventory through the field data. The derived inventory is compared with RGI, ICIMOD, and GAMDAM inventories and highlighted the limitations in the mentioned inventories. In addition to the comparison of inventories, the authors estimated the surface elevation changes of glaciers in the basin between 2000 and 2012. It is important and interesting to see the comparison of various inventories (e.g., Muhammad et al., 2019a) to support the glaciological community to use the most appropriate inventory for their research. I only review part of the manuscript and suggest few comments to incorporate in the revision to strengthen their manuscript.

- Interesting to see that ICIMOD inventory is not only underestimating (as in the Karakoram (Muhammad et al., 2019a) but also overestimating. The main reason for underestimation in the Karakoram by ICIMOD inventory is the slope criteria. Most of the glaciers are avalanche-fed in the Karakoram and the accumulation falls on the steep slopes which is mostly not considered. However, I found that the inventory here shows that there is overestimation as well in the ICIMOD inventory. The authors are suggested to discuss the overestimation in ICIMOD inventory and its potential reasons and also discuss the results in comparison with Muhammad et al., 2019a.
- The authors manually digitize the glaciers which is extremely inconvenient in the presence of state of the art automatic techniques considering the >2000 glaciers. Mapping only a single (medium to large) glacier with manual digitization takes several hours. Usually, automatically derived extents are improved using manual digitization but the approach is different here. The authors may explain why they selected manual digitization.
- Also, it is unclear why the authors use topographic parameters if they use manual digitization? These parameters are useful when the glaciers are automatically mapped.
- The authors indicate field surveys data for glacier inventory validation but did not show the results of the survey anywhere (in any figure or text). The authors are suggested to add detailed information of the field survey including 1) the number of glaciers surveyed in the field, 2) what kind of information/data collected in the field, 3) how the survey information/data improved/validated the remote sensing results?

References

Farhan, SB, Zhang, Y, Ma, Y, Guo, Y and Ma, N (2015) Hydrological regimes under the conjunction of westerly and monsoon climates: a case investigation in the Astore Basin, Northwestern Himalaya. Clim. Dynam., 44(11–12), 3015–3032

Muhammad, Sher, Lide Tian, and Asif Khan. "Early twenty-first century glacier mass losses in the Indus Basin constrained by density assumptions." Journal of Hydrology 574 (2019a): 467-475.

Muhammad, S., Tian, L., & Nüsser, M. (2019b). No significant mass loss in the glaciers of Astore Basin (North-Western Himalaya), between 1999 and 2016. Journal of Glaciology, 65(250), 270-278. doi:10.1017/jog.2019.5