

The Cryosphere Discuss., referee comment RC2  
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## **Comment on tc-2021-312**

Rakesh Bhambri (Referee)

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Referee comment on "Strong acceleration of glacier area loss in the Greater Caucasus between 2000 and 2020" by Levan G. Tielidze et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-312-RC2>, 2021

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Strong acceleration of glacier area loss in the Greater Caucasus over the past two decades

By Levan G. Tielidze et al.

### Summary

This study presented a new glacier inventory for two time periods (2000, 2020) covering the entire Greater Caucasus (Georgia, Russia, and Azerbaijan) using satellite imagery (Landsat, Sentinel, SPOT) and reported significant area loss in the study area. The manuscript is very well written and nicely structured. I have given some minor suggestions for improvement. The Caucasus region has several debris-covered glaciers and therefore this study mapped these glaciers manually. I could not see results/numbers on debris-covered glacier changes in the manuscript. There is a need to present changes in debris-covered ice in the results section and comparison with other regions in the discussion. Also, in the introduction, there is a need to highlight gap areas in previous glacier inventories and their changes and how the present study is going to fill these gaps.

### General comments:

L21: By 2020, glacier surface area had decreased to  $1060.9 \pm 33.6$  km<sup>2</sup>. After this sentence, you can present results in % which have given at line 24. You can shift this sentence here.

L24, 28, 289, 290-292: -1.16% yr. Present results in single-digit after the point (-1.2% yr). Please carefully check the entire manuscript. At some places, it is single-digit, and at some places in double-digit.

L31: Two glaciers. Please mention here the name of glaciers.

L46: Johansen et al., 2018. Please use any English reference. There is so much published literature on this.

L52: complete detachment? Glacier or rock? Please correct.

L57-65: I would suggest to highlight gap areas in previous glacier inventories and their change and linking with your study objectives. You have given this gap area at 110 to 127. Please shift these sentences here and modify the text.

L69: GLIMS and RGI ver6?

L154: 'Topographic details' such as aspect, slope, and elevation....

L176, 190....: Generally, the glaciology community use the term glacier outline for glacier boundary. Your study used the term contours for glacier boundary at many places and in some places, your study also used outline (L210). Readers may be confused with this term as normally contour represent a line on a map that joins points of equal height or depth. I would suggest to use glacier outline or glacier boundary term instead of glacier contours.

L190: half-pixel buffer size. You can refer here to Bolch et al. 2010. They have given reason for the selection of half-pixel buffer size.

L312: Figure 10. What is the source of the 1960s-1980s data? Please mention this in the caption.

L365, 369: You can show the location of these stations (Terskol and Mestia meteorological stations) in Figure 1.

L367: Negative trend or decreasing trend?

L385: since the 1980s (10 W/m<sup>2</sup> over 10 years). How computed this value? or provide a reference here.

L390: Two different pollution events (5/05/2009 and 23/03/2018) are.... provide a reference here.

Reference:

Bolch, T., Menounos, B. and Wheate, R., 2010. Landsat-based inventory of glaciers in western Canada, 1985–2005. *Remote sensing of Environment*, 114(1), pp.127-137.