Author Responses in ***bold italics***

The authors present an updated inventory of glacier, rock glaciers and perennial snowfields. This is a much appreciated and needed update since the currently available inventory is based on topographic maps from the 1980s or earlier. This inventory is available through the GLIMS data base also part of the current version of the Randolph Glacier Inventory (vers. 6.0).

The authors identify and digitise the glaciers based on very-high resolution aerial imagery (spatial resolution 1m or better) and use imagery available through Google Earth as additional information. The inventory is nicely illustrated and details of the different mountain ranges presented.

Overall, the work seems to be performed with care and outlines seem to be of high quality. However, the paper is written like a report and not a scientific paper, the description of the methodology is a bit thin and the accuracy assessment could be improved. Moreover, some additional analyses, like the comparison to the old inventory and the inclusion of typical inventory parameters would be very beneficial. Overall the manuscript needs some improvements and revisions but should ultimately be published.

> ***We appreciate the reviewer's efforts editing our manuscript. Wehave extensively revised the text to improve clarity and rigor.***

More details are presented below.

L16/17: All numbers of glacier areas should be presented along with their uncertainty ranges.

> ***Revised***

L17: What are buried-ice features? Do these include rock glaciers? As I understand you have a separate class "rock glaciers". However as these are not glaciers per se, these should also be treated separately (see more details below)

> ***The buried ice features are related to glaciers, probably dead ice adjacent to a glacier. They are not rock glaciers. See response your more detailed comment below.***

L32: A nice paper which showed this (although for Asia not for the US) is Pritchard (2019). A consideration of Huss and Hock (2018) would also nicely fit here.

> ***Good suggestions, thanks!***

L39ff: This is a bit confusing: You may want to mention already here that an inventory is existing (and refer to the reference), but that the inventory is outdated.

> ***Revised***

L 62: This should be rather a scientific paper and not a report.

> ***Revised***

L 69ff: The info how the utilised images were orthorectified is missing but should be included along with some info about the accuracy of the orthoimages. How were the google earth images used? Were they co-registered to the aerial imagery? How well does the geolocation fit to the old maps resp. the former inventory?

> ***Revised***

L 82: Provide a rational for the ***selected*** threshold.

> ***We're unclear the reason for the question. The resolution is that of the imagery and 1m or less is more than sufficient for digitizing outlines.***

L86: It would be beneficial to attempt to distinguish between perennial snow and ice. I think it should be possible, e.g. if at one scene only bare ice is visible than it is an ice patch. But I do not know the images and it might be difficult or introduce to much subjectivity.

> ***This would be lots of work to go through all of the images again to determine which are ice patches for what we feel would be little gain. From our experience there were only a few ice patches. And as the reviewer suggest distinguishing the two will be difficult largely because of the dark shadow that often blankets ice patches***.

Paragraph L94ff: I ask the authors to be more specific with the challenges and present some example figures in the main text and not only in the regions. It is e.g. well known that debris-covered ice is partially difficult to identify and the delineation subject to the operator (and even the operation is not consistent) as nicely illustrated by Paul et al. (2013). How did you deal with the problem?

> ***Figures moved from the Appendix to the main text. Regarding debris-covered glaciers difficult to outline were largely limited to the volcanoes of the Cascade Range. We had local knowledge in many places. In others, the independent digitizations by the authors and others helped to define uncertainty (explained in Uncertainty). The text was revised to address this issue.***

Paragraph L103ff: This section needs more depth and more detailed information. As correctly mentioned, it is not trivial to separate glaciers from rock glaciers. I recommend moving some of the text from the different regions to the main text (e.g. L271f, l309ff) and be more specific. Moreover, rock glaciers are commonly associated with permafrost. I know that opinions diverge, but this should at least be mentioned, and you need to consider the guidelines by the IPA Action Group Rock glacier inventories and kinematics (RGIK, 2022). You may also think about overlaying existing permafrost modelling results with the rock glacier inventory. Snow fields above rock glaciers are usually not considered as a part of rock glaciers. In general, the literature should be better considered here (e.g. Ostrem, 1970, Janke 2007, Mölg et al. 2018, Charbonneau and Smith, 2018, Janke and Bolch 2021 but there are several other relevant papers).

> ***Some of the text from the appendix was moved to the main article per the reviewer's suggestion to better explain how we distinguished glaciers from rock glaciers. We read the*** **suggested citations and adjusted the text. We found the RGIK (2022) to be most useful.**

L113ff: I appreciate that you include buried ice adjacent to glaciers. However, the terminology is a bit unclear. Are these ice-cored moraines (see e.g. Lukas 2011)? Or ice identified in the forefield of glaciers? Interesting papers in this regard might be Lukas et al. (2005), Bolch et al. (2019).

> ***Thank you for these references, we found Bolch et al (2019) to be helpful.***

L127f: More details are needed. What were the difficulties? How where they overcome (e.g. in case of debris cover)? How many of the outlines had to be adjusted?

> ***Text was adjusted. The issues regarding debris cover was addressed in the Uncertainty section. We didn't record how many outlines had to be adjusted. As mentioned in the uncertainty section, the adjustment was used in the uncertainty estimate.***

L132ff (Uncertainty). A more rigorous uncertainty assessment is needed. The digitisation error itself might be small if the glaciers are well identifiable, but many are not. The image resolution had also an influence (cf. Paul et al. 2013 as cited earlier). You may think to use a buffer (e.g. Granshaw and Fountain, 2006, Bolch et al. 2010) as additional measure. It makes sense that a higher uncertainty is assigned to perennial snow fields. However, a justification for the 30% used would be beneficial. What about the uncertainty of rock glaciers and buried ice? There should at least be some information.

> ***Text was revised to better explain our methods. We do not use the buffer method because a constant buffer because the resulting uncertainty is determined by glacier size (high for small glaciers, low for large glaciers). Image resolution is not an issue because all our imagery was 1 m or better.***

Paragraphs L148ff and L161ff should be moved before the uncertainty paragraph.

> ***Agreed.***

L172ff (Results section): The results section is too thin also for a data paper. More information and analysis (e.g. about topographic variables: min, max, median elevation, hypsometry, slope, aspect, mean elevation vs. distance from the sea, e.g. a figure similar to Fig. 1 but with the mean elevation colour coded would be very valuable) can easily be included and would strongly increase the value of the paper. The other inventory papers in ESSD typically provide information beyond the pure description if the inventory. Moreover, all numbers should be presented along with the uncertainty ranges.

A paragraph summarizing the topographic variables was added as well as two figures.

Table 1: Rock glaciers should be an own class.

We cannot include rock glaciers here. We understand the motivation; however those data are the subject of a forthcoming report with its own methodological issues separate from this report. Here we focus solely on glaciers and perennial snowfields.

I recommend to show the total uncertainty are ranges along with the area (e.g. 10.63 ± 0.61 km²).

Agreed

The meaning of Max area and Mean area is unclear.

Text revised

A discussion section is completely missing but would be highly beneficial. Here the authors can discuss methodological challenges and how they overcome along with the literature and in particular compare their inventory with the existing former one(s).

A brief discussion added

The summary section should be turned into a conclusion section.

Revised

Do not hesitate to contact me in case you have any question or a comment need clarifications.

Best regards,

Tobias Bolch

References:

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