**Review of tc-2018-139 by A. Sakai**

**General comments**

The Brief Communication by A. Sakai summarizes the main steps and results for creating a revised version of the GAMDAM glacier inventory. Before I forward my comments, I want to congratulate the author for this huge achievement. The effort and dedication to create this dataset is hard to imagine. Over the past two decades, I have likely digitized or corrected outlines from several ten thousand glaciers, but getting 130,000+ in just 3 years done is really impressive (this is more than 60% of the entire RGI). Despite the mentioned regional quality issues of the dataset I am pretty sure that GAMDAM2 will be a highly valuable baseline dataset for the years to come. But now to my general comments:

(1) This study is about glaciers so a publication in The Cryosphere makes sense. However, the paper is just a description of a dataset. There is no scientific advance or analysis included warranting publication in TC. This might be an editorial decision but in my opinion this study should be published in ESSD rather than TC.

(2) I agree with the comments forwarded by reviewer 1 (W. Guo) and will thus only partly or shortly repeat them here.

(3) The English wording/grammar is not good. Although it is mostly still possible to understand the text, I strongly recommend having the final version of the revised ms corrected by a native speaker before resubmission. I will not further comment on grammar issues.

(4) Methods: I suggest adding here a short section explaining what a glacier is in the context of this study, how this definition has been implemented practically, and what has been done when a strict application was not possible (have outlines then be transferred from a previous inventory?). For example, in the supplement one could show the time series of available images for a particular small region and describe why a specific scene has finally been selected to map a glacier (regarding snow, cloud, shadow conditions) or which scenes have been selected to get a complete outline. This would also be helpful advice for others creating a glacier inventory under difficult mapping conditions. The practical implementation should describe how seasonal snow has been distinguished from perennial snow and completely snow covered ice. At best, also this is illustrated with one or two examples of such conditions (in the supplemental material) to understand the related decisions and improve traceability.

(5) In the methods section I would insert a further section on uncertainty assessment. Just saying it is 15% as before is not convincing in my opinion. Uncertainties will likely be much smaller for larger glaciers so that it will be closer to 5-10% overall. As uncertainty scales with glacier size, one possibility is using a size-dependent empirical function as shown in Pfeffer et al. (2014) for RGI data. Instead of an empirical function one might also use the buffer method (with ±1/2 pixel) to determine a more realistic uncertainty (all ice divides should be removed beforehand). Of course, for debris-covered glaciers uncertainties might be higher but this can be commented on. The likely best method to determine an uncertainty value for this dataset would be independent multiple digitizing (at least three times) of several (say 10-20) glaciers of different size and with different challenges (debris, shadow, snow). The related standard deviation of the resulting relative area differences would be a good uncertainty measure for this datatset. Finally, it would also be possible to select a region with clean glaciers, map them automatically (e.g. with a band ratio) and use them as a reference for uncertainty assessment of the manual digitizing (see also doi: 10.1016/j.rse.2017.08.038).

6. I suggest moving several of the illustrations from the supplement into the main text and arrange them differently (i.e. more compact). Fig. 1 should be the current Fig. 1 plus Fig. S8 side-by-side (S8 is providing key information about dataset quality!). Fig. 2 should be the current Fig. 2 (please add a) and b)) but side-by-side to save some space. Fig. 3 should be Fig. S3 and S4 side-by-side. The a) panels of both figures can be included or remain in the supplement. Figure 4 should be the d) panels of Fig. S5 and S6, also side-by-side. The a) to c) panels of both figures and all other figures (S1, S2) and tables can remain in the supplement.

7. When comparing the outlines from GMADAM2 with NM18, I would describe the differences more precisely. As also visible in the current Fig. 2, NM18 seems to have included many regions with seasonal snow and is thus clearly overestimating glacier area and the number of small glaciers. As wrongly mapped seasonal snow has been mentioned in NM18 as a source of uncertainty, this can be confirmed here. I would also mention that there are sometimes larger differences in the extent of debris-covered glaciers between GAMDAM2 and NM18. In part, these might be due to the well-known difficulties in the interpretation or in-between glacier surges, but in comparison with very high-resolution GE images I have the impression that NM18 is often overestimating glacier extents, i.e. including parts that are actually rock glaciers. This might be due to the use of SAR coherence images in NM18 that might have included larger parts of them. By describing the observed differences more explicitly, the reader might also get a better impression of the main challenges and where special care has to be taken.

**Specific comments**

P2, L16: not sensitive to temperature change: I would write 'less sensitive'

P2, L18/19: I think the purpose of a consistent and precise glacier inventory for the region is less on relating glacier fluctuations (changes in length and area) to climate change (which is a very difficult task), but more to facilitate calculations that rely on exact glacier extents. This includes modelling of total glacier volume, spatially constrain calculation of elevation or volume changes from altimetry and DEM differencing or flow velocity and snow cover on glaciers, hydrologic modelling from the catchment to the regional scale, determination of future glacier extents and volume evolution, and by providing stable ground for uncertainty assessment. All these would be error prone without exact outlines.

P3, L20: How could you determine the size of a glacier (to decide that it is smaller than 0.01 km2) before its extent is digitised?

P3, L27: Please add some words on how many GE images have been consulted (can be very rough order of magnitude) and the percentage of images that supported the interpretation. We have not been very successful in finding suitable GE images for all glaciers in NM18.

P4, L18: For the total region, I would contrast directly here the main numbers for GGI18 with those for GGI15, including the percentage of change in number and area. In section 4.1 you can then describe specifics for the regional numbers (Table S2).

**Tables and Figures**

Please see point 6 of my general comments for general feedback on Figures.

P10, Table 1: I suggest transposing this table so that is has 7 columns and three rows. This would also help in keeping the ms compact.

P12, Fig. 2: Please use white instead of green lines, increase the brightness level somewhat and arrange both images side-by-side.

Tables S3 and S4: I suggest merging the two tables into one

Fig. S1: a) I suggest using yellow instead of green lines and white instead of red.