

## **Comments on the revised manuscript “Brief Communication: Updated GAMDAM Glacier Inventory over the High Mountain Asia” by Dr. Akiko Sakai**

Wanqin Guo, April 2019

### **General Comments**

Firstly allow my apology on the later referee report.

I read carefully through the revised manuscript. The comments were generally well considered. However, the author added too many contents in response to some comments of Dr. Paul and I on previous version, and also many other contents, which make the manuscript not as “brief” as previous version. Since the author has deleted many aspects in this revised version, which largely simplified the questions aroused in previous version, many explanations are not necessary again (e.g. on the Landsat imagery selection, and delineation of glacier area on steep back-wall). See specific comments for some revise suggestions.

This revision aroused another question on the differences between rock glacier and debris-covered parts of glacier, which were not well discussed among researchers in glacier inventory compilation, and should be dealt with much more cautions. I suggest the author to look through the manuscript again and describe related contents well, but should also be in brief words.

#### **One suggestion on future works**

I am truly suspecting that the author’s research group has overestimated the overall area uncertainty (15%) in both versions merely by comparisons between different delineation tests, which is much larger than the generally achievable areal accuracy (3-5%) by Landsat series suggested by many authors. I suggest Dr. Sakai or other interested researchers to do further works on precisely evaluating the areal uncertainties of both versions of GGI. It can be done by comparing the glacier outlines with those delineated from free high resolution images from Google Earth or BING map, etc. The direct comparisons suggested in Paul *et al.* (2013)@Annals of Glaciology or the definitive method used by us (in Guo *et al.*, 2015@Journal of Glaciology) are suggested, but also can be done by some other solutions. The comparisons should consider different circumstances, i.e. on typical debris-covered glaciers, and glaciers influenced by long lasting snow/cloud covers and also heavy cast shadow, as well as clean-ice glaciers with fine image quality, to provide an overview of the precise areal uncertainties achieved by GGI dataset.

### **Some specific comments:**

#### **Page 2:**

Line 8: “millions of” should better to be “billions of” here considering the much large area of the HMA region in this manuscript.

Line 15: Suggest to delete “overall” after “less sensitive”.

Line 17-22: This sentence seems too long and should better to be more summarized.

Line 26: Actually the CGI2 was compiled firstly by automatic glacier delineation, then by intensive and multi-round of manual corrections, although the manual works have completely changed the appearances of the glacier outlines.

Line 32: It's better to add "in" or "of" before "longitude" and "latitude".

**Page 3:**

Line 6: "final" may mean that you will never change it in the future, but in Section 4.3 you mentioned this version may need further revision. Is it the right word?

Line 14-15: You may not have clearly defined glacier outlines when selecting the Landsat images.

Line 16: The citations to figures all through the manuscript are inconsistent (many Fig. and also many Figure).

Section 3.1: Since you have removed the section of Quality of Landsat images in previous version, it's not necessary to explain the selection of the imagery in such detail. Although the selection of Landsat image is really a hard work for you considering the vast spatial coverage of GGI dataset, it's a common challenge faced by all researchers who want to accurately delineate glacier outlines using remote sensing methods, and all of them may use identical methods you mentioned here. Therefore, I suggest to completely remove this section and related supplementary figure.

**Page 4:**

Line 12: "for which ....." seems not a common expression. Suggest to revise.

Line 16-19: "Furthermore, ..... measuring area.", this part is not necessary and suggested to be deleted.

Line 21-29: I suppose that the author didn't use any criterion on the slope range when delineating glacier areas on steep back-wall, so just describe here on how to distinguish hanging ice/glacier from seasonal snow in previous paragraph is good enough (I think it should be done by visual check from multiple Landsat images). Therefore, this part is also not necessary and should better to be completely deleted.

Line 32-33: Not a question, but honestly to say, I cannot see the reasonability to exclude the lowest part as rock glacier in Figure S3c&d.

**Page 5:**

Section 3.3: This section can also be much shortened, by simply tell the method you used to evaluate the area uncertainty (multiple delineation test on different images, and expressed in NSD value, maybe in several sentences).

Line 31: It's better to add a blank space between "RGI" and "6.0". Same in other places.

Line 34: Should "RGI16" here be "RGI 6.0"?

**Page 6:**

Line 32: Should "Figs. 11b, c and 12b, c" be "Figure S11b, c and S12b, c"? And "greater" maybe ambiguous here, suggest to use "more" or other word instead.

**Page 7:**

Line 19-22: "For instance, ..... (Fig. S13c)", this part is also in too much detail, and suggested to be removed.

Line 25: Suggest to revise the last part of this sentence as "and shorter acquisition interval ( $\leq 5$  days)".

Line 30: See comment on Line 6 in Page 3. Maybe "latest version" or "new version" is better.