

Comments on “Brief Communication: Updated GAMDAM Glacier Inventory over the High Mountain Asia” submitted to *The Cryosphere Discussions* by Akiko Sakai

Wanqin Guo, August 2018

General Comments

This manuscript reports the new updated GAMDAM Glacier Inventory over the High Mountain Asia. The author has done great and respectable jobs on manually revise the previous versions of GAMDAM Glacier Inventory only by herself, which must involves tremendous work loads. As a manuscript for brief communication, this paper is generally well written. But from my point of view, some aspects should be revised to further improve the paper quality. I can understand that as a brief communication, the manuscript should be as brief as possible. But the author should describe some details on the methods or processes of the data revision (see suggestions in **Specific Comments**), or at least in the supplementary document. The absence of such details makes current version very ambiguous thus hard to follow.

Specific Comments

Page 2:

Line 14-16: The first half of this sentence is somehow repetitive with previous one (“... are relatively stable”). It’s better to be rewrite properly.

Page 3:

Line 4: There’s no other authors in this manuscript. Should you use “I” instead? Or is this refer to GGI15 data sources? It should be clearly marked if so.

Line 7: “seasonal cloud-free, seasonal-snow-free”, seasonal in this part seems repetitive, maybe remove the second “seasonal-“ will be better. Besides, add “incidence” or other confining words between “solar angle” may be better.

Line 25-27: Although it’s not consistent with common sense glacier inventory, Nuimura *et al.* (2015) provides a meaningful reason to exclude steep wall beyond the glacier. Same to that paper, you should also give a reason that why you choose to include the snow- and ice-covered steep wall into the glacier, or researchers’ comments or suggestions on this. You should better also mention the criteria of the steep wall here, e.g. same as the definitions in Nuimura *et al.* (2015) ($>40^\circ$)? Or just by visual judgements?

Besides, the criteria you used to judge a patch as perennial snow or ice is also very important and should better to be presented somewhere, e.g. just as you saw in primarily used Landsat images acquired during one of the ablation season? Or carefully validated through comparing multiple images? Normally these steep back walls are always in rapid changes due to unpredictable snow/ice avalanches and/or frequent orographic snowfalls that may occur at anytime.

Line 27-28: It’s not very clear from this sentence that which part of the debris-covered glacier were omitted. Maybe add a figure to illustrate the criteria will be much better.

Page 4:

Section 3.2: No methodology was described on how the quality of Landsat images was evaluated.

It’s a very important content for readers and potential glacier inventory compilers to understand the impacts of Landsat image quality on glacier inventory compilation.

Line 10-11: I suppose that one or a series criterion(a) was(were) used to evaluate the image

quality and assign the three quality ranks (A, B, and C) to each image. It will be too subjective if only using human judgements to do that work. So It's necessary to describe the method(s) on how the ranks were evaluated on a Landsat image, at least in the supplementary material.

Line 14: What is the score represented? And how the score was assigned to each factor on each image? It's fairly obscure in this section.

Line 26: On Fig.2, it is suggested to add coordinates on each sub-figures and thus will be much convenient for readers who want check the glacier outlines shown in the figure.

Line 29: On Fig.S2, same as the suggestion for Fig.2. Besides, it's not very clear here on the meaning of glacier area shown in Fig.S2. Are the glacier area shown counted by pixels numbers in glacier facing to different aspect ranges? Or simple the area of glacier whose average aspect belong to those aspect ranges?

Page 5:

Line 10: Actually there's no rule of "one glacier has one terminus" neither from the earliest WGI handbook (Müller *et al.*, 1977), or from GLIMS tutorial (Raup and Khalsa, 2007&2010), or the guideline for glacier inventory compilation (Paul *et al.*, 2009). Just like what is said in Raup and Khalsa (2010), it isn't always easy to delineate ice divide for these glaciers by human judgement or even by common DEM analyze. Some glaciers like the diffluent glaciers actually do have two or more termini, and some hanging glaciers that on a long slope with similar orientations are also difficult to tell where the divides are. Actually the ice divides for these glaciers are changing that may be caused by even slight differences in the accumulation rate on different parts or changes in the flow velocity. Some ice caps even don't have apparent terminus but just occupying a flat mountain top. So it's not always necessary to divid these glacier into individual glaciers with single terminus.

Line 12: It's not very clear here that how the glacier size can determine the glacier number. It should be clearly clarified.

Line 17-18: It's also unclear that how the glaciers in 1×1 degree grids in Fig.S6d and S7d were grouped and how the discrepancies between GGI18 and CGI2 as well as NM18 were calculated in those grids (according to their label/centre points? Or cut by grid boundaries?). What the size (three levels) of the gridded points represents is also ambiguous (largest/mean area of all glaciers in the grid?). It needs to be clarified to avoid confusions.

Line 19: Should "Figs. 7b, c and 8b, c" be "Figs. S6b, c and S7b, c"?

Line 21: See above comments on Line 10. It is not always necessary to divide the diffluent glaciers especially the hanging glaciers into more individual glaciers.

Page 6:

Line 2-3: Same as comments on Page 4, Line 10-11, descriptions on the methods and criteria to evaluate Landsat image qualities are needed somewhere in the manuscript for better readers' understandings on how they are evaluated.

Line 5-6: The regions you called here as "Hengduan" in Fig. S8 are actually composed by East Himalaya Mountain and East NyenChen Tanglha Mountain. These regions are also dominated thus heavily influenced by monsoon called as India Monsoon or South Asia Monsoon through the river valleys of Yarlung Zangbo, leading to very poor satellite images that are always covered by snow or clouds. Please correct it.