Comments on "The GAMDAM Glacier Inventory: a quality controlled inventory of Asian glaciers", by T. Nuimura, A. Sakai, K. Taniguchi, H. Nagai, D. Lamsal, S. Tsutaki, A. Kozawa, Y. Hoshina, S. Takenaka, S. Omiya, K. Tsunematsu, P. Tshering and K. Fujita, submitted to *The Cryosphere Discussions*

Graham Cogley, January 2015

General Comments

This paper is a revised version of an initial submission on which I commented earlier. The revision appears to have covered most or all of the points raised in the first round of review.

The paper is well written, and is commendably short. There remain some problems to do with clarity of style and some minor substantive points to be clarified, but these criticisms, detailed below, are not fundamental. I think that this important new inventory should be documented in the literature, and I would be happy to see it published in *The Cryosphere*.

Substantive Comments

P2	
L31	The authors must have worked extensively on revision of their original glacier outlines, with the result that the difference (GGI–RGI)/GGI is now –24% rather than –31%. Thus a significant difference remains. There is a lesser difference of –7%, perhaps not statistically significant, with respect to the ICIMOD inventory of the Himalaya and Hindu Kush. I think that the discussion of reasons for these differences in the body of the paper is a fair summary of the "state of the art" in large-scale glacier inventory research. It should stimulate further work on the problems of clarity of definitions and accurate recognition of glaciers in remote-sensing imagery.
P3	
L61-62	These fractions are out of date. Assuming that the authors have not made their own special calculation for High Mountain Asia, the correct percentages for undated glaciers in RGI version 4.0 are 6% by area and 12% by number. (See Figure 2 of Arendt et al. 2014.)
P4	
L66	"since 2011" could be deleted. The GGI is based on imagery from 1999–2003 (L85).
P6	
L122	"(excluding the Greenland and Antarctic ice sheets)". The RGI includes peripheral glaciers in Greenland and on the Antarctic Islands.
P7	
L137	If the three false-colour bands were weighted unequally, give the weights.
P8	
L180-181	Clarify. I would delete "probably", first checking one or two representative tiles of the SRTM without void-filling if you have not done so already. Then after "numerous voids" you could add something like "due to shadowing and layover".
P11	
L247-249	Clarify. I do not understand how changing the image "corrects" the first polygon. Presumably it is the digitized outline that needs to be changed.
P12	
L263	"mid": this should be expanded to "mid-range elevation", if that is what it is.
P13	
L298-299	First, these are differences rather than errors. Second, consider expressing the rms area difference as a percentage (of the average area).
P14	

L307-309	Perhaps remark that these differences may be due to the exclusion of headwalls in the GGI. Clarify the discrepancy in the central Himalaya; presumably its sign is the same as that for the northern Hindu Kush and Karakoram, but the reader cannot tell.
P19	
L438-440	This sentence is garbled. Say something like "a repeated inventory using Landsat 8 imagery will …". But also consider deleting the sentence, which adds no value to the text. What is more, if the sentence is kept it would have to address the matter of accuracy. If the uncertainty in GGI areas is of the order of 15% (L348), then given typical shrinkage rates of $-0.5\ \%\ a^{-1}$ (say) a reliable estimate of change may be difficult in the "near" future.
P27	
Figure 2a,b	Why were the smaller red (RGI) objects excluded from the GGI? Was it because they are smaller than 0.5 km^2? At L583, add a comma after "imagery" (or delete the one after "2001").
P33	
Figure 7d	I do not understand how non-glacial lakes are of any use for identifying debris-covered glacier surfaces.
P40	
L702	This sentence does not make sense. Presumably what is meant is "The dashed lines indicate 1:1 correspondence between ICIMOD and GGI. The solid lines are the best-fitting linear equations."

Stylistic Comments

P3	
L54-55	I would say "while uncertainty in glacier outlines influences estimates of mass changes …".
L56	"To support" would be better than"To contribute to".
P4	
L68-69	"to evaluating", and delete the unnecessary "(imbalance of glaciers)".
P6	
L117-120	I think this repetitive sentence (see L56-57) could be deleted.
L127	Do not capitalize "basins".
L128	"… and the Qinghai-Tibetan plateau" (not one basin, but many).
P7	
L149	Add a "±" sign before "1–2 grid cells".
L151	For clarity, I would say "often failed" or "sometimes failed". Otherwise the reader might understand this as "always failed".
P8	
L169-171	Delete the first sentence, which adds little or no value, and begin "We compared glacier outlines delineated from the gap-filled SRTM …".
P9	
L193	Add "ground-surface" before "elevation changes" for clarity.
L196	Perhaps add "and valleysides" after "headwalls".
P10	
L212	The best word here is "inflections", rather than "turnoff points". It could also be used to replace "folding points" at L634.
P13	
L288	Change ">" to "<". Confusion between the greater-than and less-than signs occurs more than once in this manuscript; double-check all of them.
P14	
L316	This sentence is constructed awkwardly. Simply say "Glaciers in the RGI are larger …", and mention the size constraint at L312: "we compared glaciers larger than 0.5 km^2 in the GGI and RGI …".

L323	Change “1st” to “First”.
L326	Do not capitalize “basins”.
P15	
L344	Change “<” to>”.
P16	
L355	“close (93% similar) to” is unclear. Say “is only 7% less than”.
L371	I would add “long-term” before “changes” for clarity.
P17	
L388-389	Delete “path row”.
P19	
L428-429	I do not see why “omitted” is needed. Say “revision of glacier boundaries that are in shadow will”.
P20	
L460	“König”.
L464	“Sigurðsson”. This Icelandic character (eth) is Unicode 00F0.
P31	
Figure 5	I think that “(c,d)” is needed before “Steep” at L618.
P33	
L634	“inflections”, not “folding points”.
P38	
L686	“Dashed”, not “Dotted”.
L687	“elevations from the First Chinese”.
P39	
L695-696	“Only glaciers larger than 0.05 km^2 are included in the calculations for each inventory.”
P43	
Figure 17	The debris-covered symbols need to be in a brighter colour. Or perhaps they could just be made solid. Consider replotting the graph with a logarithmic scale for the horizontal axis.
P45	
L742	Change “mean” to “means of”.
P46	
L748	Delete “in area”.

Supplementary Information

Table S5	I do not understand “pass over”. Does it mean “Revise <shadowed parts/some glaciers/seasonally snow-covered areas>”?
Figure S1	Add information to the caption about what is shown in Figures 15 and 18 of the paper.