Reply to the editor

We would like to thank the editor for the constructive comments on our revised manuscript. We have also found missing Fig. 18 in manuscript. We added it (L422). And we added A. Sakai as second corresponding author (L9, 18-19, 494-497). We also described the detail in the Author contributions.

(Original comments are in italic, our replies are in bold)

Major comments:

The language of the newly integrated parts is partly awkward. Please carefully proofread the paper before resubmission.
We carried out English corrections from a professional English editing company. All of revised parts in this manuscript are shown in red coloured text.

The important information about the minimum glacier size needs to be presented in the methods section. In addition, a short justification to the selected threshold (e.g. reference) needs to be provided.
We added explanation and cited Rastner et al. (2012) for justification of minimum threshold (L235-238).

The information about how the uncertainty was estimated should be presented in the methods section instead of the discussion. In this way, the reader knows how the uncertainty range (e.g. given in L. 277) is calculated.
We have moved the section 'Evaluation of uncertainties' from discussion to the end of the method part as '3.6 Evaluation of uncertainties' (L285-299).

The conclusion is not well written. It should present all major conclusions from your study, but this is not the case. It contains also several parts which are better suited in the main text:
We added about the comparison between GGI and GlobGlacier, as a potential cause of discrepancy in total area between GGI and RGI (L485-488).

The comparison to the GlobGlacier inventory should be presented in the sections where you compare your inventory to other ones.
We moved the sentence to the section 4.3 (L365-374).

L. 447-452: Fits better in the discussion.
We have added one sub section '5.1 Intended purpose of the GGI', and moved those sentence. (L396-409)

L455ff: Fits also better in the discussion.
We have added one sub section '5.1 Intended purpose of the GGI', and moved those sentence (L396-409).

Further comments

L4: "The state and fate of Asian glaciers" reads like the title of the 2012 review about Himalayan glaciers which could also be cited here.
We cited it here (L43).

L45/46: The cited remote sensing studies are using ICESat and GRACE. I suggest to include also one study which used DEM differencing (e.g. Gardelle et al. 2013) a widely used method to assess glacier volume and mass changes
We added it (L49).

L48: I do not fully agree with this statement. Most of the studies agree well and the general picture in HMA is now clear (significant mass loss in the Tien Shan, and Himalaya balanced budgets, at least for the last decade in the Karakoram and Western Kunlun). Please adjust the statement.
We adjusted the statement (L51) as 'discrepancies exist among estimates based on these different methods '.

L. 60. Replace "but" with "however"
We revised it (L64).

L. 61/L130: Please cite the technical document for the version 4.0 (Arendt et al. 2014) here. You may omit Arendt et al. (2012) in line 55.
We cited Arendt et al., 2014 (L65 and L121) . We updated Arendt et al. (2012) to Arendt et al. (2014) through manuscript (L81, 512-525). And we omitted Arendt et al. (2012) in line 55.

L. 102-112: This is mainly important methodological information and should be move to the methods section.
We moved the description on usage of multiple Landsat images (Fig. 5: number changed from 2 to 5) to the method section (L212-225).

L. 102-104, L108f: Please correct the sentences: glaciers delineation are not "based on" or not "delineated using" Fig 2x.

We revised to 'glacier outlines at shaded glacier area are delineated based on image of Fig. 5a'(L216-217) and 'glaciers on south-facing slopes are delineated using image of Fig. 5b' (L217-218). We revised them as "image of Fig. 5x" (figure number changed from 2 to 5).

L. 104: "Red lines indicate"… This read like a figure captions and should be deleted here.
We deleted it.

L. 114: TM scenes prior to 1999 can also be processed in Level 1T. Please clarify.
We revised here as "Where appropriate Landsat ETM+ scene were unavailable, ..." (L103-104).

L. 118f: I do not agree that ASTER GDEM generally "exhibits superior accuracy to the SRTM". I know examples where the SRTM is morphological more correct. Please adjust your sentence.
We revised as "There is a report which asserts the ASTER GDEM has superior accuracy to the SRTM (Hayakawa et al., 2008). However, the evaluation was performed over non-glaciated region." (L111).

L180ff: You first write that "decreased colour contrast … may be responsible for large uncertainty in GDEM2" but then you conclude that GDEM2 is more appropriate. Please clarify.
The sentence means that If we focus on distribution of large difference points (Fig. 3c: number changed from 4 to 3), geographical characteristics such as errors of SRTM caused by numerous voids in the original SRTM-3 products and errors of GDEM2 caused by low relief and decreased colour contrast of snowfields on Tibetan Plateau are shown. As shown in Fig. 3ab, GDEM2 has smaller uncertainty than SRTM in high mountain Asia. We revised here for avoiding misunderstanding as 'Therefore, considering the relatively small uncertainty in the GDEM2 is more appropriate for glacier altitude analysis for the entire high mountain Asia region (Fig. 4a, b), we conclude...' (L173-175).

L182: Toutin (2002) is a good reference for ASTER DEMs in general, but not for the GDEM.
We removed Toutin (2002).

L. 187ff: The recommendation glacier mapping from GLIMS (which is the basis for the mapping activities within the GLIMS, GlobGlacier and other initiatives/projects) should more explicitly be mentioned ("Bodies of ice above the bergschrund that are connected to the glacier shall be considered part of the glacier", Raup and Khalsa 2007, p.4), along with your reasons why you deviate from this recommendation.
We added the sentence before our reasons (L181-182).

L. 192: "(…), surface elevation changes related to glacier mass fluctuations do not often occur." Please provide little more info and/or reference.
We revised explanation of it as "In our study, however, we excluded steep headwalls even where snow covered, since avalanching precludes development of a permanent ice cover there. Although this avalanching is an important source of glacier nourishment, steep

headwalls generally do not experience changes in surface elevation related to glacier mass fluctuations." (L182-186).

L. 220: "slope transition zones". These zones are indicated by high curvature values. It was already presented in the literature, that using curvature information from a DEM is suitable to detect glacier margins. This should be mentioned here.
We added citation of Paul et al. (2004) here (L228).

L. 284: It would be interesting to know how the "snow-line elevation" was calculated. Is it different from: Shi, Y., Hsieh, T.-c., Chen, P.-h., & Li, C.-c. (1980). Distribution, features and variation of glaciers in China. IAHS Publication, 126, 111–116. who write "Some firn line elevations were determined on the spot, while most were diagnosed according to topographical maps or calculated by Hôfer's method."
Thank you for information, we added the explanation (L311-313).

L. 287ff: The median glacier elevation is a relevant and interesting result of your study. Therefore more info also for other regions can be given. You may also shortly compare your results with the results of Bolch et al. (2012), Fig. S2, for the Himalaya based on a different data set.
We also compared with Bolch et al. (2012) and added explanation as "Median elevation increase with distance from the moisture source and low elevation in the north west in the Himalaya and Karakoram ranges which reported by Bolch et al. (2012) are also shown." (L317-320).

L. 298: Remove "slightly". 7% is not slightly.
We removed it.

L. 305: "28, 26%". Not clear why you mention two values here.
Here, we are mentioning about three factors, glacier number, area, and median elevation. Former value (28%) indicates rmse of glacier number and latter (26%) indicates glacier area. We revised from '28, 26%' to '28%, 26%' (L336).

L. 324: Mention the uncertainty here.
The value (28,615 km^2) is calculated by simple subtraction between 119,878 and 91,263 km^2. Considering uncertainty of them, maximum difference case is 51,505 km^2 (=(119,878 + 9201) - (91,263 - 13,689)), meanwhile minimum difference case is 5725 km^2 (=(119,878 - 9201) - (91,263 + 13,689)). Therefore, we recalculated the difference as 28,615 ± 22,890 km^2. We added this uncertainty here (L355).

L. 331: Bolch et al. (2010), TC report possible similar overestimation of the glacier area of the CGI due to the inclusion of seasonal snow for Western Nyainqentanglha.
Thank you for your information.
We added 'and at Western Nyainqentanglha (Bolch et al., 2010) in the RGI' in the fourth potential reason of glacier Area difference between GGI and RGI (L363).
And we also added Bolch et al., 2010 in the reference list (L532-535).

L. 335: You may mention that the data source of the Bolch et al. (2012) inventory is the new ICIMOD inventory for large parts of the Karakoram, Central and Eastern Himalaya, while the western Himalaya stems mainly from the GlobGlacier inventory (see Fig. S1).
We added explanation about data source of Bolch et al. (2012) (L378-384).

L. 343: I would not mention "rock glaciers". The definition of these ice-debris landforms differ and identification is difficult.
We removed "rock glacier".

L. 362: Clarify the difference between the headings of sections 4.3 and 5.2
We revised the heading of section 5.2 'Required revision for GGI by comparison with other inventories' (L410). And we did not change the heading of section 4.3.

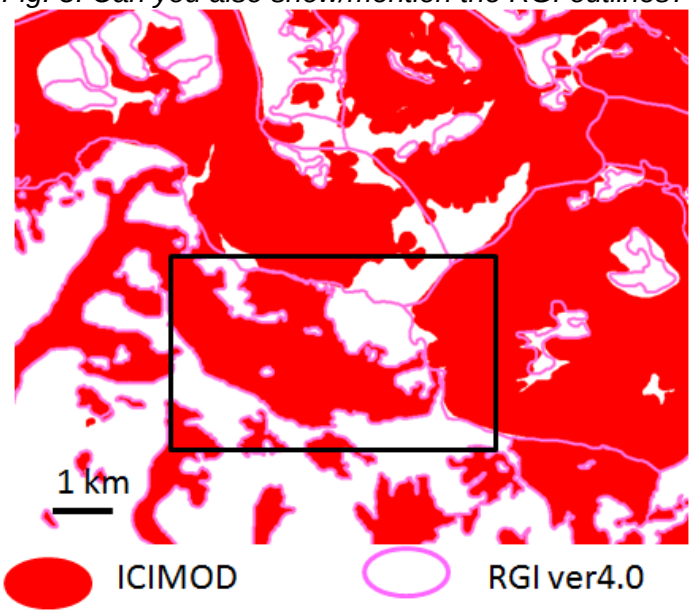
L. 402: Rastner et al. 2005 is not existing. Maybe you mean Paul and Kääb (2005) which mention the suitability of using band 1? Otherwise is it Rastner et al. (2012).
We have intended to refer Rastner et al. (2012). We revised it (L452).

L. 406: The gap filles SRTM DEM is used to "support" glacier delineation, I suppose.
That's right. We revised to 'we used the gap-filled SRTM DEM to support our delineation of glacier outlines and the GDEM2 to calculate median elevation' (L456-457).

L. 454: It might be worth to mention somewhere in the discussion that change assessment should only be done either by the same surveyor or if the outlines and the source of the outlines are available. In any case the definition criteria must be the same.
We added a section '5.1 Intended purpose of the GGI' in discussion section. And we also added the sentence 'Assessment of area change, therefore, should only be made using the same definition criteria.' (L408-409).

Fig. 3: L. 604f: Omit the sentence but include the manually delineated outlines in the legend.
We revised it (Fig. 2: number changed from 3 to 2).

Fig. 5: Can you also show/mention the RGI outlines?



Above figure shows the glacier outlines from ICIMOD and RGI4.0. Black rectangular indicates the target of Fig.4 (number changed from 5 to 4) (accumulation area of the Khumbu glacier). Both outlines are same in the Khumbu glacier and those glacier outlines of only north and east of the Khumbu glacier are different, which is not target in Fig.4. Then, we only added the description about RGI ver4.0 as 'Glacier outlines of RGI ver. 4.0 at the Khumbu Glacier is equal to the ICIMOD glacier inventory.' (L665-666).

Fig. 12: "median elevation … Purple dashed lines …" Please include the info in the Legend.
We revised it (Fig. 13: number changed from 12 to 13). (L754)

Fig. 16: Please include the most important information in the legend to keep the caption short.
We revised it (Fig. 17: number changed from 16 to 17).

Table. 3: Please include also the numbers of the ICIMOD inventory for comparison.
We included it (Table 3).