Earth Syst. Sci. Data Discuss.,
doi:10.5194/essd-2016-47-AC2, 2016

Open Access Earth System Science Data Discussions

Interactive comment on "A complete glacier inventory of the Antarctic Peninsula based on Landsat7 images from 2000–2002 and other pre-existing datasets" *by* Jacqueline Huber et al.

Jacqueline Huber et al.

jhuber@access.uzh.ch

Received and published: 7 December 2016

Author response on: Interactive comment on "A complete glacier inventory of the Antarctic Peninsula based on Landsat7 images from 2000–2002 and other pre-existing datasets" by Jacqueline Huber et al.

Anonymous Referee #2 Received and published: 31 October 2016

General: In this manuscript the authors present and describe a very nice dataset as the so far most complete glacier inventory of the Antarctic Peninsula. This is very useful and will be used as baseline data in coming assessments of the sensitivity and responses of AP glaciers to climate changes, based on monitoring, modelling and

remote sensing. The paper is in general very well written, clear and easy to follow. I am not able to suggest any improvements of the language. It is nice to see that the inventory is easy accessible at the GLIMS website. The paper can be published nearly as it is but the authors should go through the paper and clear up the more specific comments I have below.

Specific comments: It is nice that they have a fairly large section 6 on Uncertainties, but still I think they could have done more on that. Especially the volume estimates should have been given with error bars or +-. There must be fairly large uncertainties in ice thickness estimates and thus also in the volume estimates. In Table 3 they give exact numbers on volumes in each sector, but these estimates must have a fairly large uncertainty. Also in Table 2 were they give an example of a glacier in the inventory they give very exact numbers. How is the position of the point where coordinates are taken selected? They give the position with six decimals. Thus it is a point derived from a GIS tool, but still the location selected must follow a definition. In the same Table 2, and I suppose thus for all glaciers in the inventory, they give area with three decimals (68.911 km2) and the same with elevations given on mm scale. This does not make sense to me. Mean thickness is given as 191.427 m so again on mm scale. Thus error bars/intervals would be informative together With s short comment on the uncertainties.

Response: We fully agree that providing three decimals is of limited value when considering the uncertainties. In particular, for the thickness estimates the mm scale is certainly meaningless. For normal we give two decimals for area and one for thickness and have thus now reduced both to one decimal. We also added an estimation of uncertainty to the respective numbers where possible. As uncertainties depend in a complex way on each other (e.g. area on the position of drainage divides as derived from the DEM) we have also added a section describing these dependencies in a systematic way to inform about error propagation at least in a qualitative way. We further added the various uncertainty estimates from the original studies to also provide

quantitative values. Further reassessment

Regarding the selection and precision of the label point for each glacier we have now clarified that the points were either selected manually following the guidelines of the GLIMS Analysis Tutorial (Raup and Khalsa, 2007) or assigned automatically by the GIS within the glacier polygon. Its value must have at least 4 decimals in geographic coordinates to have a 10 m precision in metric coordinates. Assuming they should be accurate on the metre, 5 decimals are required. The given six decimals are thus too precise but have been retained for computational reasons (e.g. floating point values are stored in the GIS with double precision).

Comment: In line 123 they write 1590 glacier catchments while in line 209 it says 1589 In line 292 it says that the volume of AP glaciers is 33 770 km3, but in Table 4 it says 34 590 km3. The total glacier area is given as different numbers: in line 123 it says 96 982 km2, in line 238 it says 95 273.2. This number 95 273 is also listed in Table 3 and given as the total area in the conclusions in line 481, in line 323 it says 93 767 km2, in line 358 it says 94 743 km2. They should go through the numbers so it is consistent throughout.

Response: Thank you for recognizing the differences. Regarding the volume in line 292 and the area in line 358 we indeed provided the wrong values. The correct ones are 34 590 km3 for the volume and 95 273.2 km2 for the area. Both have been corrected now. Regarding the other numbers of glacier catchment area, glacier area and glacier number: The numbers are correct as they refer to different datasets (with very subtle differences): First, there are 1590 glacier catchments with an area of 96 982 km2, after removing the rock outcrops, we have 1589 glaciers with an area of 95 273.2 km2. Finally, the 93 767km2 refer to the area covered by the DEM (not all glaciers are covered by the DEM).

Comment: In line 387 they refer to Supplement 5. But there is no Supplement 5 in the file I can find. The figures with map plots, Figs.1, 2, 3 and also Supplement 4 are

all nice and give some good information, but in a printed version they will be almost impossible to read. I had to zoom in my pdf-file to 300 %. Then it is fine. Most users of the inventory will work on digital versions so maybe this is fine.

Response: We hope that the PDF quality and size of the figures stays like this, so that a 300% zoom reveals all details. For the publication, the figures should only be an illustration of the various datasets and full details are accessible from the freely available digital data.

Comment: The other figures present data from statistics and are to some extent informative but give few surprises. It is fairly obvious and as expected that in general larger areas give larger thickness, steep glaciers are thinner than less steep glaciers, and thus also that large glaciers in general has a lower slope than small.

Response: We agree that some statistics give few surprises as they might only confirm well-known glaciological / physical relationships. However, we would like to provide them nevertheless as the glaciers in this region are quite different from other regions and the figures give quick access to key characteristics of the new dataset. As such statistics are also used in most other studies to characterize the glaciers/inventory they also allow easy comparison across regions.

Comment: Fig. 8. a. This figure is reproduced in grey-scale. It is almost impossible to separate out the information between the three categories; 1) outlines excluding rock outcrops, 2) outlines including rock outcrops and 3) marine terminating and ice shelf tributary glaciers. It is only in the elevation range 200-500 meter that there is any notable difference. Otherwise they overlap. I suggest that they only show one curve for outlines excluding rock outcrops in addition to the bedrock curve.

Response: We fully agree that the different lines are difficult to distinguish and have adjusted line colours and styles to be more clear. The curve “outlines including rock outcrops” has been removed. The curve “marine terminating and ice shelf tributary glaciers” is still shown as we refer to it in the text.

Interactive comment on Earth Syst. Sci. Data Discuss., doi:10.5194/essd-2016-47, 2016.