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The Cryosphere Discussions

Interactive comment on "Mapping and morphometric analysis of glaciers in Jotunheimen, South Norway, during the "Little Ice Age" maximum" *by* S. Baumann and S. Winkler

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This study presents the efforts to map the LIA glacier extents for a larger set of glaciers in the Jotunheimen region using various sources (e.g. maps, photos, satellite data). In this regard it is a very useful complement to the existing knowledge on glacier fluctuations since the LIA in this part of the world. The study includes a thorough discussion of the applied methods, the quality of the used data sets and mapping uncertainties which is most welcome. However, I see also some shortcomings that I would recommend to improve in a revised paper. Apart from some smaller points that have also been mentioned by the other reviewers (english grammar, used terminology, averag-

ing of length changes), my major objection is the missing presentation of the derived inventory data (e.g. mean, max., min elevation, slope, aspect, etc.). Where can I find them? The title also mentioned 'morphometric analysis' of the glaciers. What does this mean? I strongly encourage the authors to add at least a few of these derived data sets and their changes since the LIA (see details below) to make the study more comprehensible. Otherwise, the most interesting part of the study (in my opinion) would be missing.

Larger points:

The results section is currently rather thin and only aggregate figures are given for the observed changes. I see a large potential to improve the paper by adding more of the obtained results of the glacier inventory ('morphometric analysis') and the associated changes since the LIA. Please consider to include the following graphs (e.g. using scatter plots) with a discussion:

- mean aspect vs. mean or median elevation

- min/max elevation vs. glacier size

- relative change in size vs size (maybe also in a table per size class)

- change in length vs length

- area elevation distribution in 100 m bins (LIA and 2003)

Also, change in min or mean elevation since LIA would be interesting as this is a good proxy for the change in ELA0.

The statistical averaging of size or length dependent values like changes in length or area, should be avoided or at least commented. The differences to other mountain ranges might be more related to a different size/length class distribution rather than due to differences in climate forcing. Please compare only the values for similar size/length classes.

In part, this paper reads like a review of my own publications. However, it is not only me who have published papers in this field. A large number of other studies on glacier mapping and change assessment in different parts of the world exists as well and I would suggest to add a few of them.

Small points:

- The english grammar and wording needs improvement at several places. Please use the help of a native speaker to polish the english (e.g. in most cases 'larger' should be used for 'bigger')

- The terminology is sometimes not consistent with the standards (e.g. mean glacier flow length).

- When something has been done for this study, please write it. On page 353, L19 you write 'inventory data ... can be determined' (cf. also P 368, L18). I assume you have calculated them? On page 357, L11 you write 'All material has to be orthorectified ...'., I assume you have done this?

- Paul 2003 is only published electronically, please replace with Paul 2007 which is a book.

P 354, L2: '... with decreasing mass turnover ...'

P 358, L9: Please use 'separated' instead of disintegrated (which is close to disappearance).

P 361, L16: I would rephrase 'altitude difference' to elevation range

P 362, L6: Length changes should not be averaged as there is generally a strong dependence of the change on the original length.

P 366, L20: Please change to 'Sidjak and Wheate, 1999' (this is also wrong in references P 372, L23)

P 367/8: The comparison with glacier changes in the Alps, on Baffin Island or New Zealand should be justified somehow. Please only compare changes in the same size classes or give a comment on how size class distributions differ in the respective mountain ranges.

P369-373: It seems that the list of authors is not in the correct order for publications with the same first author (one author, two authors, three or more authors).

P 375, Table 2: The row '> 10 km' can be omitted when there is no glacier longer than this.

P378, Fig. 3: In the Fig. caption you write 'glacier outlines 1980s', but in the legend you show glacier area covered (shaded grey). I would suggest to only overlay the outlines using a colour that is different from grey (maybe light blue?).

P379, Fig. 4: The glacier with the red number 119 shows a straight line as a flowline which seems to be not perpendicular to the elevation contour lines. Please check. Can you add elevation contour lines also on the 2003 glacier surfaces?

Reference:

Paul, F.: The New Swiss Glacier Inventory 2000 - Application of Remote Sensing and GIS. Schriftenreihe Physische Geographie, Dept. of Geography, University of Zurich, 52, 210 pp., 2007.

Interactive comment on The Cryosphere Discuss., 3, 351, 2009.