

Remarks on the manuscript by Davies et al. entitled

“A new glacier inventory for 2009 reveals spatial and temporal variability in glacier response to atmospheric warming in the Northern Antarctic Peninsula, 1988 to 2009”

submitted to The Cryosphere

*General:*

The topic of the paper is very relevant as it presents for the first time comprehensive investigations and thorough analysis of the reaction of glaciers and ice caps to climate and the breakup of the ice shelf on the northern Antarctic Peninsula. This is especially important as these glaciers might significantly contribute to sea-level rise.

I have the following general comments on the manuscript:

- The manuscript is lengthy and can be shortened without significant loss of information. I suggest shortening by about one third.
- There is too much basic glaciologic knowledge presented (e.g. P. 3550, L. 26 or P. 3351, L. 13ff., P. 52, L. 11 just to mention few examples). The authors should consider that the readers of the article have this knowledge.
- I see no reason why the methodology is presented in the supplements. I suggest to include it in the main text. Only Table S1 and S2 should remain in the supplement. The description of the methods can also be shortened without loss of information.
- The suggested ELA determination is useful for to get a rough estimation about the glacier characteristics but has to be treated with caution as already mentioned by the short comments.
- It is highly appreciated that the glacier outlines are available at the GLIMS data base. However, it is enough to mention it once in the beginning of the manuscript.
- Sometimes the terminology is not used correctly. “retreat” refers to a “reduction in length” while the authors mean the reduction in area. The authors may use “shrinkage” instead. Please check throughout.
- I appreciate that a thorough error analysis is included. I feel that the resultant uncertainty is at the upper bound. However, this is still much better than no uncertainty measure. Assign to all presented numbers the uncertainty term.

More specific comments are presented below:

*Title*

The title is a bit long. The authors may shorten it to: “Spatial and temporal variability in glacier response to atmospheric warming in the Northern Antarctic Peninsula, 1988 to 2009”

*Abstract*

Please include the absolute area of the mapped glaciers.

L. 12: What does “relatively little” mean? Please be specific and provide numbers.

L. 13: Use “shrinkage” instead of “recession” as the presented numbers refer to area.

L. 14: Include information about the % change and include terms of uncertainty  
L. 20ff: The statement “Strong variability of tidewater glaciers...” is very general and the parameters influence the reaction of all glaciers not only of tide water glaciers. Please revise.  
L. 22: The sentence “High snowfalls means...” is not specific enough. As of course the temperature change is the other most important variable. I suggest reformulation in something like: “Reduced recession ... may be due to high snowfall”

### *1. Introduction*

P. 3543, L. 6: Please indicate the time period to which “the last 50 years” refer. The cited references are 11 years apart.  
P...44, L. 11 ff: This section should be rewritten. The statement in L. 11 should be included in the objectives.

### *2. Regional Setting*

General: Is there anything known about vertical gradients of precipitation and temperature and its trends? Low elevation weather stations may not reflect the situation in the accumulation area. Please include at least a short statement.

P. 45, L. 15: Please include the MAAT of the east and west coast.

P. 46, L. 11: Include a reference for the statement of the ice thickness.

P. 47, L. 10ff: You may think to move the specific statements to the discussion to avoid duplication.

L. 13: Use shrinkage instead of retreat. See my general comment above.

### *3. Data and Methods*

P. 47, L. 21ff: The first sentences are misplaced in this section about data sources

P. 49, L. 15: Why do you use GIJR and not GJRI for the glaciers at James Ross Island?

P. 50, L. 24: Please include more information here. You may refer to:

Haeberli, W., and M. Hoelzle (1995), Application of inventory data for estimating characteristics of and regional climate-change effects on mountain glaciers: a pilot study with the European Alps, *Ann. Glaciol.* 21, 206–212.

### *5. Glacier change results*

General: The section is a bit descriptive and may be shortened.

P. 57, L. 10ff: I do not think it is suitable to use data from an earlier inventory if no data is available.

P. 59, L. 12ff: The sentences may be moved to the discussion.

P. 25, L. 26. Use “uncertainties” instead of “errors”.

### *6. Discussion*

General: This section is also lengthy and should be shortened.

The content of the sections does partly not fit to the header of the section, e.g. P. 64, l. 7ff

### *7. Conclusions*

Also the conclusions can be shortened and should be more specific. E.g. P. 68 L. 11ff can be omitted. I am missing the influence of precipitation

### *Captions:*

The captions are sometimes too long. Do not repeat methods or other sections form the main text.