Comments on

The Cryosphere Discuss., 8, 3117–3139, 2014 REVISED
Title: Quantifying mass balance processes on the Southern Patagonia Icefield
Authors: M. Schaefer et al.

I wish to thank the authors for their detailed response to the reviews. This clarifies many of the critical points addressed in the reviews. However, the issues which the authors are communicating in the response to the reviews have not been fully taken into account when revising the manuscript.

A main critical issue that is not well communicated is the comparatively high uncertainty in modelling of precipitation and the resulting values of net accumulation:

- In line 193 ff the authors state: "In Fig. 3 we compare the results of our simulations to these direct point measurements of the surface mass balance. Satisfactory agreement can be observed between the modelled and the measured data." This is true for the ablation area, but by no means valid for the accumulation area, as obvious from the scatter of the 3 points of Fig. 3 (Nr. 3, 5, 6) in the accumulation area (which the authors correctly recognize as an inadequate sample).
- In line 206 ff the authors state: "The process of wind drift …… These local effects are important when comparing point measurements with modelled surface mass balance, but should not play an important role when estimating the surface mass balance of larger areas as glacier basins or even the entire SPI." This is rather speculative, not supported by analysis or references. Elevation gradients of precipitation depend on several factors, not just wind drift. Also, there should be major differences in wind effects between the luv and lee sides of the ice field.
- On page 6 of the response document the authors state: "We can get an idea about the uncertainties of the individual mass balance components at every glacier by comparing columns 1 and 2 to columns 3 in Table1. We think that this is much more informative then inventing some arbitrarily high a priori uncertainty to the modelled accumulation." These statements imply that a clearly defined and traceable error assessment is missing and that the uncertainty of modelled net accumulation is not known, and thus could possibly be quite high. This should be communicated not only in the author's response, but also in the manuscript.
- " comparing columns 1 and 2 to columns 3 in Table1" in the statement above probably refers to Table 1 of manuscript Version 1 (Qc inferred and Qc from velocities) . "Comparing" these columns does not enable any clear quantitative error assessment. On one hand, two multi-year periods are compared with a short term data set. On the other hand, column 4 (Qc from 2004 velocities) has high error bars; these translate into high error bars for the modelled surface mass balance if the relation of Equation 1 is used.
- Table 1: overall uncertainties should be provided for Qc inferred rather than uncertainties considering only one of the error sources. The rather low error bars in the present version of Table 1 may lead to misinterpretation and are telling little about the uncertainty of the modelled mass balance.
- Table 1, columns 1 and 2 of revised manuscript: ELA data of the same years should be compared (2002 and 2004). It is not meaningful comparing the mean value of a long time series with data of 2 specific years.
- Conclusions: uncertainty estimates should be provided together with the mass balance numbers. The basis for estimating uncertainties needs to be explained in the manuscript (or in Supplementary Material).

Further issues:

- In the previous review there was a comment on the 1975 to 2000 (resp. 1968 to 2000 for Argentinean glaciers) volume change that has not been taken into account (or communicated) in the revised manuscript: Rignot et al.(2003) explain that the 1975 DEM did not cover areas at elevations above 1200 m. Obviously, this results in is a mismatch with the area covered by SMB simulations that extend over the whole ice field.
- Line 335 ff: "A literature reference on the 2004 SPI velocity field is missing.
- In line 335 ff it is explained: "The model ELAs are considerably lower than the average SLA at the end of the summers 2002 and 2004 for the glaciers HPS12, HPS13, HPS29 and HPS34. This discrepancy can be explained by the possibility of snowfalls before the acquisition of the examined satellite images." Snowfall effects should be rather the opposite. Summer snowfall in satellite images should lead to underestimation of inferred ELA.