

Interactive
Comment

Interactive comment on “A model study of Abrahamsenbreen, a surging glacier in northern Spitsbergen” by J. Oerlemans and W. J. J. van Pelt

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The Final Response is provided in the attached PDF.

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/8/C2933/2015/tcd-8-C2933-2015-supplement.pdf>

Interactive comment on The Cryosphere Discuss., 8, 5687, 2014.

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Interactive Discussion

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Response to referee reports on

"A model study of Abrahamsenbreen, a surging glacier in northern Spitsbergen", by J. Oerlemans and W.J.J. van Pelt.

GENERAL

Referee #1 is very positive, and advises publication after minor adjustments. We are grateful for the careful reading and the suggestions for improving the clarity of the manuscript.

Referee #2 is very negative, and advises rejection. We feel that his/her judgement is mainly based on an intuitive disagreement with the approach we take, rather than on solid arguments.

In our view there should always be an opportunity to present different approaches, as otherwise our science becomes one-dimensional. The task of a reviewer is first of all to detect mistakes and flaws, and to make sure that a paper has a good style and the reader can follow what is going on. Our paper provides a different approach, in which the assumptions and limitations are clearly stated (as emphasized by *referee#1*). We therefore think that our paper deserves to be published.

Below we elaborate more on why we think that it makes sense to apply a simple model to a glacier with limited data.

MORE SPECIFIC

Response to referee #1

Response to comments:

- (p 5695) The reason why Kongsvegen was used to determine a value for α_m indeed is that it also is a surge-type glacier in its quiescent phase, only about 40 km away from Abrahamsenbreen.
- (p 5697) This is a mistake in the text: "northwesterly direction" should be "northeasterly direction". With respect to the balance gradients: Austre Brøggerbreen, Midtre Lovénbreen and Kongsvegen are within 60 km west of Abrahamsenbreen, Hansbreen 220 km to the south. However, the balance gradients measured on these glacier are quite similar (Fig. 5). It is thus reasonable to take the average value and apply it to Abrahamsenbreen.
- (p 5698) The increase in E when going in northeasterly direction is taken directly from the map of E over Svalbard provided in Hagen et al (1993, Fig. 8).
- (p 5688) Good suggestion to improve clarity. The increase in the ablation area is indeed the consequence of the surface lowering during the surge.
- (p 5692) Calculation of the ice velocities: the referee is correct. In the initial calculation a time interval of 20 years was used, because the dates of the maps were not precisely known. So 219 and 290 m/yr are the appropriate values.
- (p 5699) E in eqs (15)-(16) is corrected for each individual basin by the numbers in the 7th column of Table 1.
- (p 5708) The contribution from the tributaries becomes zero because they have a negative net surface balance even before the front of the main glacier has passed.
- All the other comments refer to typo's or clarifications which can easily be made.

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Fig. 1.