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The Cryosphere Discussions

Interactive comment on "Freshwater flux to Sermilik Fjord, SE Greenland" *by* S. H. Mernild et al.

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Anonymous Referee #2

Specific issues: SnowModel is described in detail in previous papers (se below, there references are also mentioned in the manuscript). Therefore we will not do it again, to avoid scientific overlap. If the reader is interested in a detailed SnowModel description, please then look into the references mentioned in the SnowModel Chapter. However, sentences about each SnowModel sub-models are added to the manuscript.

Liston, G. E. and Elder, K.: A distributed snow-evolution modeling system (SnowModel), J. Hydrometeorol., 7, 1259–1276, 2006a. Liston, G. E. and Elder, K.: A meteorological distribution system for high-resolution terrestrial modeling (MicroMet), J.

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Hydrometeorol., 7, 217–234, 2006b. Mernild, S. H., Liston, G. E., Hasholt, B., and Knudsen, N. T.: Snow distribution and melt modeling for Mittivakkat Glacier, Ammassalik Island, SE Greenland, J. Hydrometeorol., 7, 808–824, 2006a. Mernild, S. H. and Liston, G. E.: The influence of air temperature inversion on snow melt and glacier surface mass-balance simulations, SW Ammassalik Island, SE Greenland, J. Appl. Meteorol. Clim., 49(1), 47–67, 2010.

The spatial variability in SnowModel driving forcings over a simulation domain is also described in detail in the references below, and therefore, we will not mention it again, due avoid scientific overlap. If the reader wants further info, he should dig into the listed SnowModel references in the manuscript. Liston, G. E. and Elder, K.: A distributed snow-evolution modeling system (SnowModel), J. Hydrometeorol., 7, 1259–1276, 2006a. Liston, G. E. and Elder, K.: A meteorological distribution system for high-resolution terrestrial modeling (MicroMet), J. Hydrometeorol., 7, 217–234, 2006b.

The text is re-written different places to better motivate our choice of model for this study.

The englacial and subglacial flow to/from neighboring glacier sub-catchments is having an impact on the runoff (even though it is minor), but three other issues are expected to be the main reasons for the difference between observed and simulated runoff. The three main reasons are: (1) uncertainties associated with model inputs (e.g., Mernild and Liston 2010); (2) unrepresented or poorly-represented processes in SnowModel (Liston and Elder 2006a, 2006b); (3) uncertainties related to runoff observations (Hasholt et al., 2006; Mernild and Hasholt, 2009). Due to the main reasons mentioned here, we see no reason, not to use the correction we did.

It is added to the manuscript, that the paper doesn't include ocean fluxes.

Technical issues: P1196, L 22: Here, we are talking about changes that has happened since 1970s and today. Therefore we will use past tense.

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P1201, L18: Is changed.

P1202, L1-3: For further information see references mentioned in the manuscript: Hasholt, B., Bobrovitskaya, N., Bogen, J., McNamara, J., Mernild, S. H., Milbourn, D., and Walling, D. E.: Sediment transport to the Arctic Ocean and adjoining cold oceans, Nord. Hydrol., 37(4–5), 413–432, 2006. Mernild, S. H. and Hasholt, B.. Observed runoff, jökulhlaups, and suspended sediment load from the Greenland Ice Sheet at Kangerlussuaq, West Greenland, for 2007 and 2008. Journal of Glaciology, 55(193). 855–858, 2009.

Figure 2a: All coastal air temperature time series are shown with light colors. Precipitation is only illustrated for coastal stations: Station Tasiilaq, Station Coast and Station Nunatak. Precipitation is showed with light color for Tasiilaq, and for Station Coast and Nunatak (June, July, and August) with dark colors, to separate annual observations from summer observations.

Figure 2b: Is changed.

Figure 3a and 3b: Is explained and changed.

Figure 4a: Is explained.

Figure 6: The label is added, and in Figure 1 the locations of the different outlet glaciers: Helheim, Fenris, and Midgaard are shown. The sub-areas are added to the figure caption.

Interactive comment on The Cryosphere Discuss., 4, 1195, 2010.