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Interactive comment on "Stable climate and surface mass balance in Svalbard over 1979–2013 despite the Arctic warming" *by* C. Lang et al.

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Lang et al. study the multi-decadal history of the climate of Svalbard and the SMB of its glaciers. This is a largely understudied subject and therefore highly relevant for the community. The regional atmospheric model MAR is a well-known and robust tool to perform such study. I encourage publication of this work, although I have several remarks that need to be properly addressed in a revised version.

Major comment

I strongly advise to remove the part concerning the MIROC model. I believe this is a rather distracting part of the paper, and it does not add anything relevant to its content. I would recommend moving this part to a follow-up paper that discusses the climate

projections. For this review, I have therefore chosen to focus only on the ERA-Interim part.

Minor comments

1. I would like to see more discussion of the limitations of this study with respect to the forcing of sea-ice fields. In fact, many of the stations used for model evaluation are located next to fjords that are – at least partly – sea-ice covered. Because these fjords are so narrow, this sea-ice cover is not included in the ERA-Interim re-analysis; however, it largely determines the climate of the neighbouring land and glacier areas.

2. If the SMB has been negative for the past 30 years, this would imply that Svalbard glaciers lost mass. How important is calving in comparison with SMB? Is mass loss also observed (IceSAT, GRACE, etc.)? Does this approximately meet your SMB estimate minus the amount of calving?

3. How important is refreezing in Svalbard? Although MAR contains a sophisticated snow model, there is little to no discussion on the partitioning of melt into runoff vs. refreezing.

4. I really miss a figure and discussion, just showing temperature, wind speed, precipitation, etc. Since this is a paper describing the Svalbard climate, and the authors have all the data available, this is a necessity.

Textual comments

Generally, please re-read your text and try to remove unnecessary statements or repetitions. I have listed some of the most pressing issues below.

P4499, L4: "damping the climate change". Vague statement, what is climate change? Atmospheric circulation changes could also be a part of climate change.

P4499, L8: here I expect references, and they are not there. Try to link this sentence with the next paragraph a little better.

P4501: revise the section title , “set ups” is too vague.

P4501, L26: the entire simulation P4502: again “set ups”?

P4502, L13: move “respectively” to the end of the sentence

P4502, L19: MARv3.x?

P4503, L14: lower than 200 m

P4503, L17: in MAR/the model than in reality

P4503, L28: here I expected a discussion on the hypsometry correction, but I found it only a few pages later in the text. I suggest to move it to this section.

P4505, L1: dependent

P4505, L8: MAR compares well with

P4505, L11: the three products

P4506, L17: likely to coarse

P4506, L18: is more complex

P4507, L11: entire Svalbard

P4507, L17: of opposite sign

P4507, L23-24: flow was directed from east to west

P4508, L23: simulated by MAR_ERA in 2013

P4509, L9: bringing oceanic heat

P4509, L15: remove “which is”

P4509, L17: is found in the southeastern

P4509, L18: winds transport humid air onto the mountain slopes

P4510, L14: what is the background value of summer cloud cover? Otherwise, we don’t know if the change is significant or not.

Figures

Figure 7: I am a bit reluctant to see summer near-surface temperature trends plotted above ice/snow, since the surface temperature will not exceed the melting point during melt.

Figure 9: Rescale the graph to better see the changes/trends. Perhaps it is interesting to scale the fluxes by dividing them by the melt (as in Lenaerts et al., 2013).

Figure 15: as pointed out, the MIROC part should be moved. However, including such a figure with the MAR_ERA results would be a good idea.

Interactive comment on The Cryosphere Discuss., 8, 4497, 2014.