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The Cryosphere Discussions

Interactive comment on "Greenland ice sheet surface mass balance: evaluating simulations and making projections with regional climate models" *by* J. G. L. Rae et al.

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We thank Alexander Robinson for his comment, and give our response below.

COMMENT: *I am happy to see an article comparing the performance and predictions of several regional climate models in detail. I only wanted to comment on the section concerning threshold estimates for reaching a negative SMB. The range of 1.1-2.3 K for this threshold is cited from Robinson et al. (2012). However, this is incorrect. In our simulations, the predicted Greenland temperature range for reaching negative SMB was 2.0-3.5 K (see the grey solid curve in Fig. 2 or the table in the Supplementary Information). This range was obtained by running only the climate and surface model*

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with a fixed topography, which is comparable to the simulations presented here. The lower range of 1.3-2.3 K was obtained by running fully coupled simulations of the surface mass balance with an interactive ice sheet model, and it does not represent the SMB turning negative. Therefore, I would recommend correcting this reference to be consistent with your range (ie cite the range 2.0-3.5 for zero surface mass balance).

RESPONSE: We have now changed the sentence: "Meanwhile, the values for HadRM3 and MAR are higher than the range of 1.1–2.3°C found by Robinson et al. (2012), while the value for HIRHAM5 is at the extreme lower end of that range" to "Similarly, the value for HadRM3 is higher, and that for HIRHAM5 lower, than the range of 2.0–3.5°C found by Robinson et al. (2012), while the value for MAR lies towards the lower end of that range".

We have also changed the appropriate paragraph in the conclusions to read: "The equivalent thresholds for annual-mean Tas change are similar to those for JJA, and, when taken relative to the pre-industrial period, the threshold for MAR is consistent with previous estimates (Gregory Huybrechts 2006, Robinson et al. 2012), while those for HadRM3P and HIRHAM5 are outside the ranges given in those studies".

Interactive comment on The Cryosphere Discuss., 6, 2059, 2012.