

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 the reviewer for his/her comments, and provide our response below.

COMMENT: *There clearly have been a lot of simulations run especially with HadRM3P and MAR dealing with the important climate change problem of the surface mass balance of the Greenland ice sheet. It is a pity that not more participation of the well regarded RAMCO2 model is included. The paper has the feel of reinventing the wheel when it concludes that it is important to use “a detailed snow physics, especially regarding the representations of albedo and meltwater refreezing.” Does anyone seriously doubt this conclusion? I would look forward to this comparison if it focused on*

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comparing the detailed performance of the advanced MAR and RACMO2 models for both retrospective conditions and future climate projections, and am not aware such an analysis has appeared. HadRM3P (especially) and HIRHAM5 are not state-of-the-art models for simulation of Greenland surface mass balance – see Table 7. I am in a quandary about this manuscript that is competently done but lean in the direction of rejection with the hope that the MAR-RACMO2 comparison will appear elsewhere.

RESPONSE: Our intention with this paper was to provide a range of SMB output from RCMs, and in particular to obtain an uncertainty estimate, and to investigate the sources of uncertainty. For this reason, it was important to use several different and diverse RCMs, rather than pre-selecting models which were perceived as “good”. The reviewer suggests that the conclusion that good surface snow and albedo schemes are important is not in doubt. While it may appear to be an obvious conclusion, we think it is still important to investigate it quantitatively, something we believe has not been done before, but which is of importance for the ice sheet modelling community.

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

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