

Interactive comment on “Melting over the East Antarctic Peninsula (1999–2009): evaluation of a high-resolution regional climate model” by Rajashree T. Datta et al.

Anonymous Referee #2

Received and published: 5 April 2018

General:

This study presents an evaluation of the regional climate model Modèle Atmosphérique Régionale (MAR) in simulating surface melting over the northern East Antarctic Peninsula for the period 1999–2009. MAR has been used for the first time over that region at a spatial resolution of 10 km. In addition, near-surface air temperature and wind speed/direction is taken into account in order to assess the model performance of these important drivers in surface melting. As observational reference data satellite estimates from passive and active microwave data and three automatic weather stations is used.

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Major Comments:

The manuscript provides an interesting and relevant topic in regional climate model evaluation of high resolution climate simulations for snowpack and its melting over the northern East Antarctic Peninsula. The authors present a good overview of used datasets, experimental setup and an interesting validation of melt extent and duration using satellite estimates of active and passive microwave data in combination with station-based near-surface air temperature and wind data to assess underlying processes.

However, in my point of view it would be good to consider the influence of driving reanalysis on the regional climate model results. In addition, the results should be discussed in more detail in the context of other model studies. It would revalue the paper if clear research questions are stated at the beginning and answered at the end.

What about observational uncertainty of satellite data or uncertainties introduced by the postprocessing of satellite data? Would it be possible to include a specific error-estimate to better evaluate the model results and to take into account the observational uncertainty?

What about the impact of ERA-Interim as driving reanalysis data? Would it be possible to add it in the evaluation? Could the mentioned aspects of wind biases and thus resulting biases of melt occurrence have also their origin in the obtained large-scale atmospheric information given by the boundary condition?

Could the mentioned cold bias in MAR (when maximum temperature and average daily temperature exceed 0 degree Celsius) origin from other model deficiencies as well? So far only wind is considered.

In Section 4.2 and 4.2.1 there are many abbreviations introduced which makes it a bit difficult to read. Would it be possible to already introduce those in the methods part and provide a table as overview? Or maybe it is possible to reduce the amount of

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abbreviations used in the text.

It would be interesting to discuss presented results (e.g. the underestimation in melting in the center and east of the Larsen C ice shelf) in greater detail to other studies e.g. to other regional climate model studies over the Antarctic region or in general in terms of e.g. issues in snow melting (e.g. onset and ending) in other regions. Also GCMs might have similar issues that would be of interest to consider.

Minor Comments:

Page 3 l. 29 + l. 33: use same space before unit

Page 4 l. 20: change to föhn

Page 5 in section 2.1: Please mention the size of the model domain

Page 5 l. 2: explain abbreviation RCM

Page 7 l. 6: add space after where

Page 7 l.35: remove space before Wilks

Page 12 l. 34: citation with 2 brackets

Page 34 l. 34: remove second brackets

Page 18 l. 8: remove slash in Royal

Page 24 l. 5: add space before Greenland

Figures:

Fig. 1: Please add coordinates to the axes

Fig. 2: Please add coordinates to the axes

Fig. 3: Please have a consistent labeling of axes throughout all the figures 1-8; variable [unit]

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Fig. 4: Same as Fig. 4

Fig. 7: ended with a comma

Recommendations:

As some aspects need to be considered, I think this manuscript is not yet ready for publication. Therefore, I would recommend 'major revisions' adding some more aspects with respect to the driving reanalysis and in the discussion to put the presented results in a broader context. A future version with a more concise introduction stating clearly the research questions, the consideration of influence of the boundary data on the results and an improved discussion section could make an interesting contribution.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-253>, 2017.

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