

Interactive comment on “Verification of the regional atmospheric model CCLM v5.0 with conventional data and Lidar measurements in Antarctica” by Rolf Zentek and Günther Heinemann

Anonymous Referee #2

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In this paper the authors present an interesting series of climate simulations for the Weddell Sea region of Antarctica run using the CCLM model version 5. They test two different turbulence parameterisations and use observations from manned and automatic weather stations as well as radiosondes and Lidar measurements to assess how well the model downscales Antarctic climate and the potential uses of CCLM in modelling atmosphere sea ice and ocean interactions.

This is an interesting paper presenting solid work evaluating a regional climate model in Antarctica with a range of data sources. It is well written and easy to follow and is

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in fact a pretty good model of an evaluation paper for other groups who run climate simulations in the polar regions. I have a few comments that I think could help to improve the paper:

1) My main comment is the lack of detail in describing the model set-up. As one example, in section 2.1 (page 3 lines 6-11) the modifications to the turbulence parameterisation is discussed. The improvement in results shown in the figures is significant and it is therefore important, given also that this is a GMD paper, to be clear on exactly what was implemented.

2) Similarly when looking at the results compared with the station data it is not really clear what surface scheme is being used here as this may also have an impact on the biases shown.

3) The section on sea ice and SST setup is fairly clear but the authors do not mention if there is snow on sea ice and if/how this is dealt with in the model. Snow on sea ice can have important effects on the energy balance and it would be interesting to hear more about this aspect in CCLM.

4) It would similarly be useful to briefly discuss if/how similar this model version is with others that have been published recently such as by Gossart et al and Souverijns et al.

5) Is there nudging or relaxation in the domain or is forcing applied only on the boundaries? This has been shown by van Wessem to have a very significant effect on simulated Antarctic climate and details should be included if it is used

6) Figures 3- 5 showing the bias with respect to the different reanalyses is very interesting, in particular because it seems clear that reanalyses themselves disagree substantially in some locations. This point is not however well expressed within the paper and should be brought to the fore as it makes it challenging to verify against a reanalysis product if the reanalysis itself has some issues.

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