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Interactive comment on "Comparison of aeolian snow transport events and snow mass fluxes between observations and simulations made by the regional climate model MAR in Adélie Land, East Antarctica" *by* A. Trouvilliez et al.

Anonymous Referee #1

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Summary: In this paper, the authors describe a set of simulations performed with the MAR regional climate model for the month of January 2011 over parts of Antarctica. The model is run at high spatial and temporal scales and is validated using observations of meteorological conditions and blowing snow particles at three automatic weather stations in Adélie Land. It is shown that the model generally captures the observed meteorological conditions but underestimates by about a factor of 10 the blowing snow transport rates. The authors end their paper by providing insights on the possible causes for the underestimated snow transport fluxes, including lower wind

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speeds simulated by MAR when observations are above 10 m s-1.

There are results in this manuscript that will be of interest to the readership of the journal and contribute to the growing body of work on snow transport processes and their simulation. There are some aspects of the comparisons between simulated and observed conditions that are unclear. The language also needs some improvement as described in my report below:

General Comments:

1) Some of the language used in the paper needs improvement. Some language issues are highlighted in the specific comments below.

2) Although the MAR regional climate model simulations are run at relatively high horizontal resolution (5 km), it is unclear how the simulation data are compared with the in situ point data. Are the simulation data extracted simply from the nearest grid point to the automatic weather stations, or is spatial interpolation performed to do the comparisons? Are there large spatial variations in the model output near the observational sites?

3) Is there any advection of the blowing snow from one horizontal grid cell to the next one downwind? If so, how is the advection treated by MAR?

4) It is surprising that no spatial plots of blowing snow fluxes over the entire simulation domain (see Figure 1) are presented in the paper. It would interesting to visualize how the blowing snow transport and sublimation fluxes vary across the simulation domain during the study period, rather than just time series at individual sites. Can the model simulations also be used to identify recurrent zones of snow erosion or deposition?

5) Have any sensitivity tests been conducted with the MAR regional climate model to clearly identify the reason(s) why it simulates less blowing snow transport than observed?

Specific Comments:

1) P. 6008, line 4: Write as "one month".

2) P. 6008, lines 17-19: The sentence starting with "It will conduct" is incomplete and needs to be revised.

3) P. 6009, line 24: Write as "rarer (Lenaerts et al., 2012b) and could"

4) P. 6010, line 1: Revise to "simulations".

5) P. 6010, line 3: Write as "one month".

6) P. 6010, line 10: Perhaps add "instruments" after "FlowCapt"?

7) P. 6010, line 22: Replace "described" with "monitored".

8) P. 6010, line 24: Should this be "100 km h-1"?

9) P. 6012, lines 11 and 14: What is a "classic automatic weather station"?

10) P. 6015, line 10: Write as "one month".

11) P. 6015, line 11: Write "snowpack" as one word.

12) P. 6016, line 3: Insert "a" before "1-D".

13) P. 6017, line 22: It should read "events".

14) P. 6019, line 19: Rather than "strong" perhaps refer to as "heavy simulated precipitation"?

15) P. 6019, line 22: Change to "speeds".

16) P. 6020, line 2: Write "snowpack" as one word.

17) P. 6020, line 4: Write as "one month".

18) P. 6020, line 14: Delete "And" at the start of the sentence.

19) P. 6020, line 20: Replace "conduct" with "lead".

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20) P. 6020, line 28: Write as "Sørensen (1991)".

21) P. 6021, line 1: Here write as "the Sørensen (1991) formulation".

22) P. 6021, line 9: Write as "the Kotlyakov (1961) formulation".

23) P. 6022, line 21: Insert the article number for this reference ("4679").

24) P. 6022, line 22: Note the spelling mistake in "Equilibrium".

25) P. 6024, line 1: Insert the article number for this reference ("L04501").

26) P. 6024, line 25: Note the spelling mistake in "forecasting".

27) P. 6024, line 32: Insert the article for this reference ("D16123").

28) P. 6025, line 24: Note the spelling mistake in "Dordrecht".

29) P. 6026, Table 1: Replace "Localisation" with "Location". Furthermore, degree symbols are missing for the coordinates.

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Interactive comment on The Cryosphere Discuss., 8, 6007, 2014.