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The Cryosphere Discussions
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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.

A. Trouvilliez et al.

alexandre.trouvilliez@gmail.com

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The pdf version of the response in available in supplement We thank both reviewers for their thorough reading of our paper and for the proposed corrections. We deeply considered their remarks on the English quality and agree that our paper may present a more advanced sensitivity test. If the Editor allows us to submit a new version of this paper, we propose:

1. to more accurately evaluate the model behavior, particularly by adding a new section

dedicated to the model sensitivity to the roughness length, 2. to improve the English language by having recourse to a native English speaker before re-submission, 3. to standardize the paper by including the suggestions made by the reviewers and the new analyzes proposed in the following review.

The following paragraph has been added in the conclusion, and is reported here to provide an insight of our approach in the new version of the paper.

The original calibration of z0 (Gallée et al. 2013) gives satisfactory results for modeled wind speed at D17. This good behavior is not maintained when considering another measurement point located 100 km away (D47). A modification of z0 considerably improves the simulation at D47, but reduces the agreement between modeled and observed wind speed at D17. This suggests that z0 might be varying regionally, and implies that the model may account for a spatial distribution of z0 (because of various feedbacks between aeolian transport of snow and z0) to allow a consistent representation of the aeolian snow mass fluxes. All those modifications, mainly related to the model, will induce a change in the authors list with Charles Amory will be the first author. He has greatly contributed to the review and has made new simulations of the MAR to evaluate the roughness length. Alexandre Trouvilliez will be second author. Our responses are reported hereafter.

Response to reviewer #1

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. This remark has been taken into account in the manuscript and the new version of the paper will be corrected by a native English speaker before submission.

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? We propose to add the following sentence: "Simulation data are extracted from the nearest grid point from the considered automatic weather and snow stations". The model outputs have been examined at two different sites (i.e., D17 and D47), showing that the MAR model presents accurate results for both locations, which are more than 100 km away from each other. This distance represents roughly 20 grid points in our MAR simulations. In addition, we propose a further evaluation of temperature in Figure 1 for both observation sites. The temperature is not a consistent validation support since Gallée et al. (2013) showed that the model is likely to overestimate the amplitude of the diurnal cycle due to an underestimation of cloud fraction above the study site leading to incorrect downward longwave radiation flux. Moreover, no radiation data are available at both stations, which impedes the evaluation of the corresponding modeled variables. Nevertheless, statistical efficiencies for temperature at both locations are positive (0.05 and 0.48 for D17 and D57, respectively). See Figure 1. Comparison

between simulated and observed temperature at 2 m height for D17 and D47stations. 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? We propose to include the following sentence in the text: "Eroded snow particles from the ground are drifted into the atmosphere, and the airborne snow particles are advected from one horizontal grid cell to the next one downwind. More generally airborne snow particles are modeled according to the cloud microphysical scheme described by Gallée (1995)."

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 be 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? Recurrent zones of erosion and deposition depend on flow convergence or divergence, and on gravity waves of various wavelengths relative to the generating process. The magnitude of transport fluxes does not influence strongly the snow accumulation distribution. However, modeled accumulation is very sensitive to spatial snow transport variations, which reflect converging or diverging fluxes. This is clearly visible on an accumulation map (Figure 2) over the simulation domain for January 2011. Here, accumulation is computed as deposition minus erosion, and includes divergence of blowing snow fluxes. Please note that the uncertainty resulting from an incorrect representation of the snowdrift process itself is much larger than the one resulting from the absence of data interpolation. As already suggested in our paper, this uncertainty suggests that the model still requires improvements, and further validation based on new observation datasets (see our response to comments n°2a and 2e of reviewer #2). Therefore, the spatial distribution of modeled accumulation should be considered with caution if the magnitude of fluxes is not checked previously using field data. In this context, analyzing spatial plots of blowing snow and/or sublimation fluxes might be premature. See Figure 2. Accumulation map (deposition minus erosion) for January 2011 over a portion of the simulated domain including the two observational sites. X

and Y axis are in kilometers, altitude lines are in meters. The vertical colorbar on the right represents the accumulation in mm.w.e.

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? The calibration of the MAR model in this paper is the same as the one presented in Gallée et al. (2013). Several sensitivity tests have been performed to assess the impact of surface roughness length variation on final drifting snow flux. We propose to include a new additional section in the paper to present our results. This new section is described hereafter: 4.4 Model sensitivity to roughness length for momentum MAR significantly underestimates aeolian snow transport, particularly for small drifting snow events when wind-borne particles are only detected in the first meter above the ground. The model also fails at reproducing the large snow mass fluxes (>100 g.m-2.s-1) associated with strong wind events (>13 m.s-1). Previous evaluation of the MAR in Adélie Land (Gallée et al. 2013) provided similar conclusions for the same model set-up. In the model, z0 partly depends on the wind speed, whose vertical evolution is in turn controlled by z0. In Gallée et al (2013), z0 was calibrated to correctly reproduce the wind minima measured at D17. This configuration was used again in the present work without performing any adjustment, and results in a median z0 value of about 3 mm at D47 over our period of interest. Although somewhat higher, it is consistent with other millimetric z0 values retained for realistic simulations of the Antarctic surface wind field (Reijmer 2005, Lenaerts et al. 2012). However, the model exhibits a different behavior for wind speed according to the location (Fig. 3): at D17, the MAR underestimates wind speed maxima, but correctly reproduces observation when wind speed is weaker. The situation is different at D47, where an almost constant underestimation of about 2 m.s-1 is observed. A single calibration of z0 does not allow a consistent representation of the wind speed at both locations. When the wind speed is stronger, higher snow mass fluxes should inherently be observed, leading to larger relative humidity in the lowest levels as a consequence of the sublimation of additional wind-borne snow particles. Since wind speed is the most relevant forcing for snow erosion (Gallée et al. 2013),

we performed a sensitivity test that first aimed at increasing the wind speed towards a better agreement between observations and simulations. We have tuned the model by reducing the z0 dependence on the wind speed value, which results in a decrease of the modeled z0. The model evaluation for various median z0 values is summarized in Table 2. Best results were obtained for a reduction of z0 by a factor 30 (i.e., a median z0 value of about 0.1 mm) over the simulated period at D47. Corresponding statistical efficiency for wind speed reaches 0.89, while efficiencies for snow mass flux and relative humidity are both positive. This means that the simulation is significantly improved at D47 if a decrease of one order of magnitude of z0 is accounted for. The resulting local snow transport is still underestimated but by about one third of the observed one only. See Table 2. Comparison of Nash tests for wind speed, blowing snow flux and relative humidity for D47 at 2 m height relative to various median values of z0.

Specific Comments: 1) P. 6008, line 4: Write as “one month”. Corrected accordingly 2) P. 6008, lines 17-19: The sentence starting with “It will conduct” is incomplete and needs to be revised. The sentence is the same written P. 6020 line. both sentences were corrected: “Our results indicate that the MAR, with this parameterization, will underestimate the effect of the aeolian snow transport on the Antarctic surface mass balance.” 3) P. 6009, line 24: Write as “rarer (Lenaerts et al., 2012b) and could” Changed accordingly 4) P. 6010, line 1: Revise to “simulations”.âĂÍ Changed accordingly 5) P. 6010, line 3: Write as “one month”.âĂÍ Changed accordingly 6) P. 6010, line 10: Perhaps add “instruments” after “FlowCapt”? Changed according to the remark. The word instrument has also been added after “first-generation FlowCapt” P. 6010, line 7. 7) P. 6010, line 22: Replace “described” with “monitored”. Changed according to the remark 8) P. 6010, line 24: Should this be “100 km h-1”? The maximum wind speed occurs geographically at the break in slope observed between the plateau and the coast. In Adélie Land, this break is located approximately 250 km inland from the coast. The sentence has been changed for: “The coastal region is characterized by frequent and strong katabatic winds with a maximum wind speed near the break in slope located approximately 250 km inland [. . .]”. 9) P. 6012, lines 11 and 14: What is a “classic automatic weather station"? The term classic has been removed. We now describe measurements performed at the AWS: P. 6011 lines 13 to 17: "Automatic weather stations (AWS) measuring wind speed, wind direction, temperature, relative humidity and snow height every 10 s were installed at three different locations along a transect extending from the coastline to 100 km inland (Trouvilliez et al. 2014). [...] The combination of an automatic weather station with FlowCaptTM sensors is hereinafter referred to as automatic weather and snow station (AWSS)." 10) P. 6015, line 10: Write as "one month". Changed according to the remark 11) P. 6015, line 11: Write "snowpack" as one word. Idem 12) P. 6016, line 3: Insert "a" before "1-D". Idem 13) P. 6017, line 22: It should read "events". Idem 14) P. 6019, line 19: Rather than "strong" perhaps refer to as "heavy simulated precipi- tation"? Idem 15) P. 6019, line 22: Change to "speeds". âĂÍIdem 16) P. 6020, line 2: Write "snowpack" as one word. âĂÍIdem 17) P. 6020, line 4: Write as "one month". âĂÍIdem 18) P. 6020, line 14: Delete "And" at the start of the sentence. Idem 19) P. 6020, line 20: Replace "conduct" with "lead". Idem 20) P. 6020, line 28: Write as "Sørensen (1991)". Idem 21) P. 6021, line 1: Here write as "the Sørensen (1991) formulation. Idem 22) P. 6021, line 9: Write as "the Kotlyakov (1961) formulation". Idem 23) P. 6022, line 21: Insert the article number for this reference ("4679"). Idem 24) P. 6022, line 22: Note the spelling mistake in "Equilibrium". Idem 25) P. 6024, line 1: Insert the article number for this reference ("L04501"). Idem 26) P. 6024, line 25: Note the spelling mistake in "forecasting". Idem 27) P. 6024, line 32: Insert the article for this reference ("D16123"). Idem 28) P. 6025, line 24: Note the spelling mistake in "Dordrecht". Idem 29) P. 6026, Table 1: Replace "Localisation" with "Location". Furthermore, degree symbols are missing for the coordinates. Suggestions have been considered and included into Table 1 See Table 1. Location and characteristics of the two automatic weather and snow stations used in the study

Response to reviewer #2

This paper compares observed blowing snow transport rates with output from a regional climate model for a site in East Antarctica. The authors find a reasonable agree-

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ment between model and observations for wind speed, but the model underestimates observed drifting snow fluxes. Although the subject suits well for The Cryosphere, and the paper is potentially interesting for the glaciological community, I am afraid that it is, in its current state, not suited for publication. The paper contains really little new information (compared to e.g. Gallée et al., 2013 or Trouvilliez et al., 2014), discusses a really short time series (whereas, according to the authors, three years of observations are available), does not discuss model sensitivity to several parameters, and the use of English language is really poor. Therefore, I strongly recommend declining publication in the The Cryosphere. We claim our paper is a great improvement in comparison with our previous papers (Gallée et al., 2013 and Trouvilliez et al., 2014). In Trouvilliez et al. (2014) we were focusing on the description of automatic weather stations designed to survey drifting snow mass fluxes, whereas Gallée et al. (2013) was dedicated to verify that the MAR was able to reproduce drifting snow occurrences. In more details, in Gallée et al. (2013) the model outputs were compared with measurements performed at only one location (D3), while in the present work, datasets from two observation sites (D17 and D47) located 100 km away from each other are used to evaluate the model. Furthermore, Gallée et al. (2013) only focus on the timing and duration of aeolian snow transport events. In our paper, we propose a quantitative evaluation of the aeolian erosion process at one location (D47) by comparing observed and modeled aeolian snow mass fluxes and relative humidities. We also investigate the influence of the wind speed underestimation on the modeled aeolian snow mass fluxes by comparing observations and simulations for four strong events during January 2011 at D47. In addition, we propose to study the model behavior in terms of friction velocity and threshold friction velocity (see our response to next comment) at D17 where these variables can be determined experimentally. Although it is restricted to a short period without simultaneous precipitations, such an analyze is not conducted in Gallée et al. (2013). Finally, we propose to add a new section dedicated to the model sensitivity to the roughness length for momentum (see our response to comment n°5 of reviewer#1), showing that the simulation can be significantly improved by use of a different median value of z0. This suggests that 1) z0 might be varying regionally because of various feedbacks between aeolian transport of snow and z0, and 2) distributed modeling should account for a spatial distribution of z0 to allow a consistent representation of the aeolian snow mass fluxes.

I have several suggestions for improvement if the authors would like to resubmit the manuscript.

(1) the manuscript needs thorough (!) revision of language. The manuscript contains many language errors and vague statements. A shortlist of language comments is found below, but this list is certainly not complete. I am astonished that with such a large group of well-respected authors, the quality of the text is so poor. The new version of the paper has been red by a native English speaker to meet with the Cryosphere standards.

(2) the analysis needs to be strongly enhanced: (a) The time series need to be extended, as –apparently- there are much more data available. The model needs to be evaluated in more detail, e.g. surface pressure, temperature, SMB, etc. More stations could/should be used in the evaluation.... In the first version of the paper, the comparison between model and field data was made on: - wind speed and blowing snow occurrence data recorded at 2 m above the surface, at two geographical location (i.e. at the automatic weather and snow station located at D17 and D47), - friction velocity at D17, - snow mass fluxes from 0 to 2 m and relative humidity at D47. We propose to include a new comparison between simulated and observed threshold friction velocity as shown in the following Figure 4. In this updated figure we show that the MAR gives overestimated threshold friction velocity values for the period over which friction velocities have been evaluated, leading to the absence of drifting snow in the model during this period: See Figure 3. Top panel: Comparison between observed aeolian snow mass fluxes from 0 to 1 m (black), simulated ones from 0 to 2 m (red) and precipitation from ERA-interim at D17. The black rectangle delimits the period without precipitation analyzed in the bottom panel. Bottom panel: Comparison of observed/simulated fric-

tion velocity (black line/red line, respectively) and observed/simulated threshold friction velocity (dashed line/black dots, respectively) at D17 for a transport period without simultaneous precipitation. The vertical blue bars represent the 95% confidence limit of the observed friction velocity. The horizontal green bars represent observed aeolian snow transport events numbered from 1 to 6. Temperature evaluation was initially not included to keep the paper brief and concise. It is now proposed in Figure 1 as presented in our response to reviewer#1 (see general comment n°2). The evaluated fields are now nearly the same as those used in an evaluation of the RACMO 2.3 model done in Greenland at one observation site (Lenaerts et al., 2014): temperature at 2 m, wind speed at 10 m, relative humidity at 2 m, horizontal snow flux at 1 m, friction velocity, threshold friction velocity and frequency of particle diameter. There still subsist small differences in data used for validation because sensors installed at the AWS are different in our study and in Lenaerts et al., (2014). In Greenland, a SPC was installed during the field campaign, allowing to monitor the flux at one height, and to give the particle size distribution. This second variable is not available with the FlowCaptTM instrument. We believe that the study period is too short (only one month) to offer a robust distribution of accumulation. In other words, the distribution of modeled SMB over the simulation domain may be significantly different from annual SMB distribution. This is an important limitation because stake networks in the area are surveyed only once a year and do not give access to monthly SMB values. Moreover, field SMB data in Adélie Land reflect a strong influence of gravity waves on accumulation/ablation patterns (Agosta et al. 2012, Verfaillie et al. 2012) that cannot be efficiently represented by the model considering both the horizontal resolution and the size of the integrative domain adopted in our simulation. Finally, the use of ultrasonic gauge data may be proposed to roughly estimate the monthly SMB at the AWS sites, but this sensor is extremely sensitive to erosion/building of sastrugi in the immediate vicinity of the sampled surface area and data may not offer a robust information for a validation of aeolian snow mass fluxes. As a consequence, we believe that using SMB values for model validation was complex here. Conversely, our validation step performed at more than one AWS is sufficiently robust to demonstrate our main conclusions (i.e., a distributed modeling should account for a spatial distribution of z0 to allow a consistent representation of the aeolian snow mass fluxes). Data from D3 AWS were not included here, because we focused on aeolian snow mass fluxes, and this data is not accurate there because the FlowCaptTM sensors at this station are of the first generation design, which strongly overestimates aeolian snow mass fluxes (Trouvilliez et al. 2014) and then does not allow a relevant evaluation of simulated fluxes.

(b) The explanation of the underestimation of wind speed is extremely poor. It is not clear why the authors do not try to improve the model instead of just remarking its deficiency. Here, we deliberately used the same calibration as in previous publication by Gallée et al. (2013) because we wanted to keep consistency between both publications. In this calibration, the calibrated variable was the roughness length, and its value was tuned to correctly reproduce the observed wind speed 30 min-means minima at the D17 station. We propose to mention the role of this calibration in the underestimation of the wind speed, and to add a new section in the text to describe a sensitivity test that we performed on the roughness length values (see our response to comment n°5 of reviewer#1).

(c) The bias of relative humidity is large, but this is barely discussed in the paper. Conversely, relative humidity could/should be also used as a parameter to tune the blowing snow model and improve the modeled blowing snow! The bias on the relative humidity is caused by underestimation of aeolian snow transport and resulting sublimation of snow particles in the model. As a consequence, the first step in present model calibration is to correctly simulate the horizontal snow mass fluxes because tuning relative humidity would be meaningless without this condition. Sensitivity test on the roughness length lead to a better agreement between observed and simulated variables (see our response to comment n°5 of reviewer#1).

(d) If the model is used, its sensitivity for input parameters needs to be discussed, especially since it underestimates the transport with a factor of 10. Which improvements are necessary to increase correspondence to the observations? Many more model tests are necessary. Equation 5 is used for correction, but the resulting transport is wrong. The equation 5 allows computation of fluxes in the first meter, which is not possible in the MAR model simulation in which the first level is located at 2 m. This equation was considered to account for the strong decrease of aeolian snow mass fluxes above the first meter. It is based on results of modeling with the 1-D version of the MAR model with the same parameterization as used in our 3-D MAR simulation. It results in a dimensionless correction factor. This correction demonstrates that underestimation of fluxes in the 3-D MAR is not caused by the strong decrease in the first meter. This element is thus important for modelers because it demonstrates that other improvements are necessary. In the paper, we propose to describe the way this equation was obtained as follows: "Snow mass fluxes were first obtained with the coarse resolution 3D model, in which the first level is located at 2 m. In order to account for the strong decrease in aeolian snow mass fluxes above the first meter, a correction factor was assumed. This factor results from comparison between snow transport fluxes computed in our 3-D Mar simulation and those obtained with a 1-D version of the MAR model using the same parameterization.".

(e) Then, if the model works better, the authors should present and analyse the spatial fields. Blowing snow transport is clearly a spatially homogeneous process, and exactly for that reason you need a model. Otherwise, the reason to use a model in this context is absent. This remark is not clear. If the process is homogeneous, or rather constant, there is no need to use a model. We suppose that the reviewer was actually suggesting that snow transport in "not" a "spatially homogeneous process". Several studies (Pettré et al. 1986, Agosta et al. 2012, Verfaillie et al. 2012) have shown that SMB heterogeneities are clearly visible down to the kilometric scale in Adélie Land, and these heterogeneities are probably partially related to aeolian redistribution/erosion of snow. As we use a regional climate model with a relative fine horizontal resolution (5 km) over this area, it could be possible to simulate the largest scales of these erosion/deposition patterns, but this is not the purpose of the present paper. The aim here is to perform an evaluation of the model from observations made by observers on the field (i.e., in summer), and we do not have observations in order to evaluate the spatial patterns simulated by the model over this period. Furthermore we show that a one-order decrease in the magnitude of z0 significantly improves the simulation at D47, but we have no way to affirm that this modified z0 is closer to its actual value in this area. In other words, getting a better spatial distribution of accumulation, and hence of snow transport does not mean that the modeled roughness length agrees with observation and that the processes governing its behavior are correctly modeled. This may result from error compensations. As a consequence, further investigations on the influence of roughness length on transported snow by the wind in Adélie Land are needed before making a spatial validation.

Language and text (not complete):

P6009 L2: “compared with Aeolian snow mass fluxes”. I guess “observed” needs to be added. Changed according to the remark L17: “It will conduct the MAR”. Poor English, I guess the authors mean that “Our results indicate that MAR, with...” Changed according to the remark L26: 10%. Transport does not contribute to the ASMB. The contribution comes from erosion or sublimation. The sentence has been changed; We now write : “Previous estimations of contribution of aeolian snow erosion and sublimation to the ASMB using numerical models [. . .]”. P6010: L24: “wind speed of around 100 km inland”. Interesting value for wind speed. The maximum wind speed occurs geographically at the break in slope between the plateau and the coast. This break in slope is located in Adélie Land approximately 250 km from the coast. The sentence has been changed to more accurately describe this point: “The coastal region is characterized by frequent and strong katabatic winds with a maximum wind speed near the break in slope located around 250 km inland [. . .]”. P6011 P23-30: it is not clear how the height of the sensors (which of course varies throughout the year) is determined. Variations in the surface elevation are retrieved using an ultrasonic depth gauge installed on the AWS. A description of the automatic weather stations has been

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added in the text: “Automatic weather stations (AWS) measuring wind speed, wind direction, temperature, relative humidity and snow height every 10 s were installed at three different locations along a transect extending from the coastline to 100 km inland. (Trouvilliez et al. 2014).” We also added the following sentence: “An ultrasonic gauge is installed to survey surface variations, from which the elevation of sensors above the surface is assessed throughout the year.”. P6014âĂÍSaltation is described, but how is suspension parameterized?âĂÍP 6016âĂÍEquation 5: If I can do my math, the number in the exponent is just 2.4. L21: “can be associated with the MAR outputs”. What does this mean? The exponent has been changed for 2.4. We change the sentence by: “The wind gust diagnostic model from Brasseur et al., (2002) is an adequate tool for [. . .] with high wind speeds. The MAR outputs can serve to force the wind gust model. Although the method [. . .]”. Suspension of snow is represented by the turbulent surface flux of snow particles (see e.g., Gallée et al. 2001, Gallée et al. 2005) and results from the equilibrium between turbulence, vertical advection and sedimentation speed. As exposed in our response to general comment n°3 from reviewer#1, airborne snow particles are treated by the microphysical scheme of MAR (see Gallée 1995, eq. A5 p. 2064).

References Agosta, C., Favier, V., Genthon, C., Gallée, H., Krinner, G., Lenaerts, J.T.M., van den Broeke, M.R., 2012. A 40-year accumulation dataset for Adelie Land, Antarctica and its application for model validation. Clim. Dyn. 38, 75–86. Brasseur, O., Gallée, H., Boyen, H., Tricot, C., 2002. Reply. Mon. Weather Rev. 130, 1936–1942. Gallée, H., 1995. Simulation of the Mesocyclonic Activity in the Ross Sea, Antarctica. Mon. Weather Rev. 123, 2051–2069. Gallée, H., Guyomarc’h, G., Brun, É., 2001. Impact of snow drift on the antarctic ice sheet surface mass balance: possible sensitivity to snow-surface properties. Boundary-layer Meteorol. 99, 1–19. Gallée, H., Peyaud, V., Goodwin, I., 2005. Simulation of the net snow accumulation along the Wilkes Land transect , Antarctica , with a regional climate model. Ann. Glaciol. 41, 1–6. Gallée, H., Trouvilliez, A., Agosta, C., Genthon, C., Favier, V., Naaim-Bouvet, F., 2013. Transport of Snow by the Wind: A Comparison

Between Observations in Adélie Land, Antarctica, and Simulations Made with the Regional Climate Model MAR. Boundary-Layer Meteorol. 146, 133–147. Lenaerts, J.T.M., Smeets, C.J.P.P., Nishimura, K., Eijkelboom, M., Boot, W., van den Broeke, M.R., van de Berg, W.J., 2014. Drifting snow measurements on the Greenland Ice Sheet and their application for model evaluation. Cryosph. 8, 801–814. Pettré, P., Pinglot, J.F., Pourchet, M. and Reynaud, L., 1986. Accumulation distribution in Terre Adélie, Antarctica: effect of meteorological parameters. J. Glaciol., 32(112), 486–500. Trouvilliez, A., Naaim-Bouvet, F., Genthon, C., Piard, L., Favier, V., Bellot, H., Agosta, C., Palerme, C., Amory, C., Gallée, H., 2014. A novel experimental study of aeolian snow transport in Adelie Land (Antarctica). Cold Reg. Sci. Technol. 108, 125–138. Verfaillie, D., Fily, M., Le Meur, E., Magand, O., Jourdain, B., Arnaud, L., and Favier, V., 2012. Snow accumulation variability derived from radar and firn core data along a 600 km transect in Adelie Land, East Antarctic plateau, The Cryosphere, 6, 1345-1358, doi:10.5194/tc-6-1345-2012.

Please also note the supplement to this comment:
http://www.the-cryosphere-discuss.net/8/C3224/2015/tcd-8-C3224-2015-supplement.pdf

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

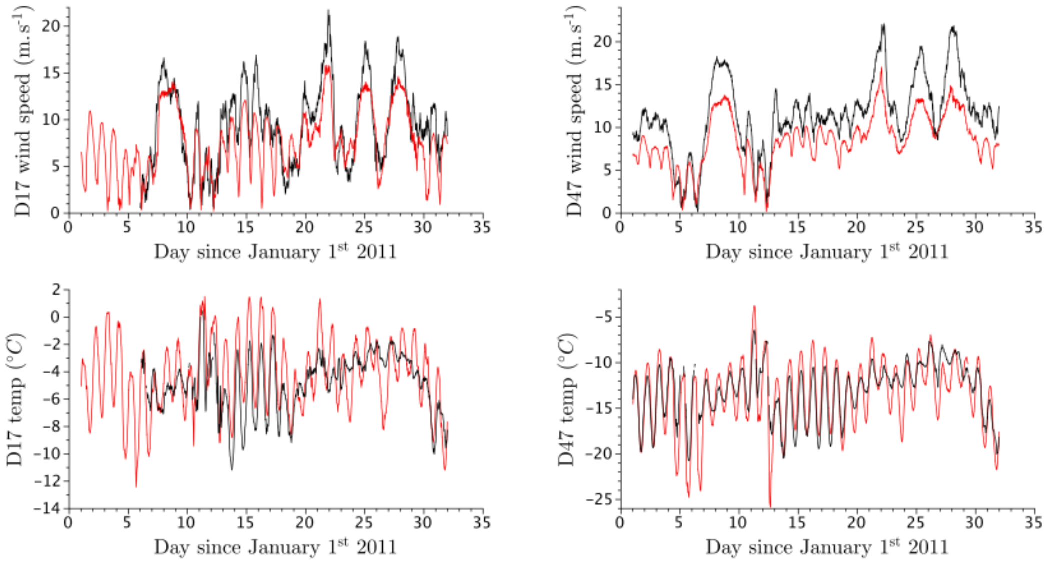
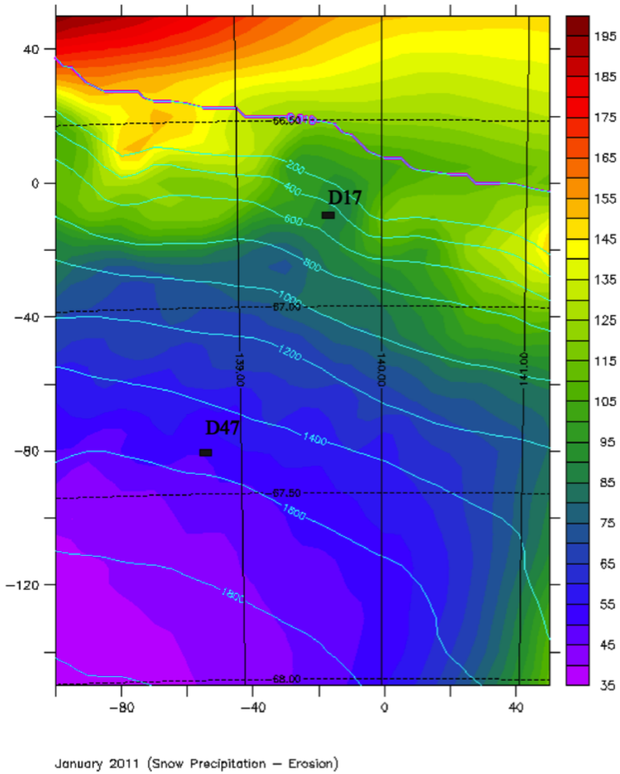

D17 wind speed (m.s-1)
Day since January 1st 2011
D47 wind speed (m.s-1)
Day since January 1st 2011
D17 temp (°C)
Day since January 1st 2011
D47 temp (°C)
Day since January 1st 2011

Fig. 1.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D17
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January 2011 (Snow Precipitation – Erosion)

Fig. 2.

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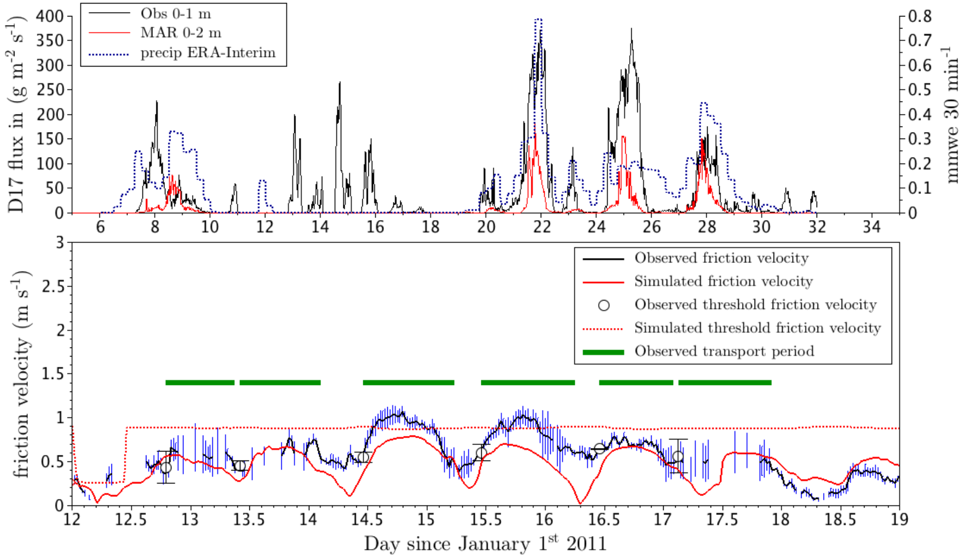

Fig. 3.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

	D17	D47
Location	66.7°S, 139.9°E	67.4°S, 138.7°E
Altitude (m)	450	1560
Distance from the coast (km)	10	110
Period of observation	Since February 2010	January 2010 to December 2012
Atmospheric measurements	Wind speed, temperature and hygrometry at 6 levels	Wind speed, temperature and hygrometry at 2 m
Aeolian transport measurements	Second generation FlowCapt™ from 0 to 1 m	Second generation FlowCapt™ from 0 to 1 m and 1 to 2 m

Fig. 4.

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Calibrated z_0 (median value, mm)	Wind Speed	Snow Mass Flux	Relative Humidity
3	0.37	-0.06	-4.77
0.5	0.8	0.2	-0.14
0.2	0.86	0.26	-0.01
0.1	0.89	0.32	0.16

Fig. 5.

TCD
8, C3224–C3243, 2015