This document contains the response to the minor review of `Intermediate-complexity Parameterisation of Blowing Snow in the ICOLMDZ AGCM: development and first applications in Antarctica' submitted to EGUSPHERE for possible publication in Geoscientific Model Development.

Comments from the Reviewer are in black and responses are in blue.

Review of the revised version of egusphere-2025-2871: 'Intermediate-complexity Parameterisation of Blowing Snow in the ICOLMDZ AGCM: development and first applications in Antarctica' by Vignon et al.

I thank the authors for thoroughly addressing my comments and answering my questions. I still think that the vertical extrapolation of the FlowCapt measurements is highly uncertain and the associated uncertainties should be stated more clearly (see comment 2 below). Additionally, I have some other minor comments but recommend publication after they are addressed. The line numbers below refer to the revised manuscript (not the track-changes version).

We sincerely thank the Reviewer for the second thorough review of our manuscript. Please find below our detailed responses to each comment.

(1) l. 340: "between 0 and 1 m a.g.l. or between 1 and 2 m a.g.l.": Here (and in other instances, e.g., caption of Fig. 3), I suggest to add the word "approximately" or "roughly" as the values change with time when the sensor gets more and more buried in the snow.

We agree and the word 'approximately' has been added everywhere necessary in the manusript.

(2) l. 346-347: "which results in an overall exponential decay of the flux with increasing height (Mann et al., 2000; Gordon et al., 2009; Sigmund et al., 2025)": This statement does not apply to the suspension layer and should be modified. The cited studies suggest an exponential mass flux profile in the saltation layer only. In the suspension layer, however, the blowing snow concentration (and similarly the mass flux) is expected to be close to a power-law profile of height (the flux decreases less strongly with height, compared to the exponential profile of the saltation layer). This difference between the saltation layer and suspension layer is supported by most mass flux profiles measured by Nishimura and Nemoto (2005) (their Figure 9). As the lower FlowCapt sensor averages over both the saltation layer and a part of the suspension layer, it is difficult to predict which profile function would be most suitable for extrapolation of the FlowCapt measurements. This uncertainty should be mentioned.

Thank you for this comment, we totally agree. Following your suggestions, the text has been modified as follows :
'One possibility for the D47 site is to compute a mean value over the first model layer depth after a vertical extrapolation of the flux from the measurements of the two superimposed 2G-FlowCaptTM The vertical profile of the particle mass flux follows an exponential decay in the saltation layer (Martin et al. 2017, Melo et al. 2024) which results in an overall exponential decay of the flux with increasing height (Mann et al. 2000, Gordon et al. 2009, Sigmund et al. 2025) In the suspension layer however, the blowing snow concentration and the blowing snow mass flux are expected to be close to a power-law profile of height (Nishimura & Nino 2005). As the lower FlowCapt sensor averages over both the saltation layer and a part of the suspension layer, it is difficult to predict which profile function would be most suitable for extrapolation of the FlowCapt measurements. Although uncertain, an exponential extrapolation of the form Fb(z)=Fb0 exp(-z/Hb) is used here as a first approach, …...'

(3) l. 355: “local flux measurements at 1 and 2 m”: The wording is misleading as it sounds like point measurements at heights of 1 and 2 m. Maybe write: “local flux measurements of both sensors in the lowest 2 m”.

Corrected.

(4) caption of Fig. 3: “measurements between 0 and 1 m”: To avoid misunderstandings, consider writing: „measurements between 0 and ~1 m after correcting for the partial burial of the sensor“

Corrected.

(5) l. 413: The underestimated increase of the mass flux with wind speed in the model might also be due to simplifications in the saltation model of Pomeroy (1989), affecting the predicted relationship between the blowing snow concentration at the top of the saltation layer and friction velocity (Eq. 7).

We have added in the text :
‘The underestimated increase of the mass flux with wind speed might also be explained by the overly simple saltation model of \citet{Pomeroy_1989} considered here, which can affect the predicted relationship between the blowing snow concentration at the top of the saltation layer and the friction velocity.’

(6) l. 501: „Their amplitude is also fairly well reproduced“: Given the considerable uncertainties, especially due to the vertical extrapolation of the measurements, I suggest to write: „The order of magnitude of this flux is also fairly well reproduced.“

Corrected.

Technical corrections:
(7) l. 91: “studies complex terrains areas” should probably be “studies in complex terrain areas”
Corrected

(8) l. 95: “at a regional and continental scales” should be “at regional and continental scales.”
Corrected

(9) l. 108: “does” should be “do”.
Corrected

(10) l. 125: “ans” should be “and”.
Corrected

(11) l. 311: “a underestimation” should be “an underestimation”.
Corrected

(12) l. 311: “0.072 g m-2 s-1” should probably be “0.140 g m-2 s-1” as in the previous sentence, where it was changed during revision.
Corrected

(13) l. 570: DOI is missing

Corrected

References (apart from those listed in the manuscript):
Nishimura, K., & Nemoto, M. (2005). Blowing snow at Mizuho station, Antarctica. Phil. Trans. R. Soc. A. 363, 1647–1662. https://doi.org/10.1098/rsta.2005.1599