Review of “Understanding Snow Bedform Formation by Adding Sintering to a cellular Automata Model” by V. Sharm, L. Braud, and M. Lehning.

This article presents the use of two coupled cellular automata models to simulate the snow bedform formation under different wind conditions and different initial snowpack depths. The authors focused on the impact of sintering (through a simple sintering model) on the shape and characteristics of snow bedforms. It was showed that sintering has an important impact on snow bedforms for larger snow dunes and little impacted the motion of smaller dunes. This article does not present any validation of the model but shows realistic results.
I find this paper well written and well structured. Despite the lack of validation of the model, I believe this paper is well suited for publication in The Cryosphere.

I am not familiar with the cellular automata model but the authors made a good effort in describing all of the components of the two CA models and all the simulations done.
I only have minor comments that I hope will make some sections of this interesting paper a bit clearer.

P.1 L.20: “a year”

P.2 L.7-9: I don’t find this sentence very clear.

P.3 L.5: “is the fact that”

P.3 L.7: “time-scales of snow transport are much shorter”

P.5 L.15: I understand the reason to use a finer grid in the vertical resolution than in the horizontal resolution. Could the other explain the choice of a ratio of 5 or talk about the potential impact of this ratio on model results?

P.5 L.19: “known”

Please correct the added spaces before and after parentheses.

P.5 L.26: you are introducing the transition-rate parameters here and then taking again about them again in P.7 L.33 (and Table 1, P.8). Please introduce the notation Λ for the transition-rate parameter in the last paragraph of page 5.

P.5 L.10 and P.7 L.3: I would change the names of the subsections to make them more descriptive. For instance, Section 2.1 could be named “Description of the CA model for snow transport” and the Section 2.2 could be “Description of the LGCA model for snow surface evolution”.

Section 2.1: For a reader not familiar to CA modelling, it is difficult to understand how the transitions happen for the doublets. Fig. 1a is not helping to explain these transitions and the meaning of the variables Λ, b, and δ is not explained until later in the text.

P.7. L.14: Please specify that the direction and number of particles are represented by the arrows in Fig 1b.

P.7 L.14: "collision rules". What are these rules? At least a citation describing these rules would be needed.

P.9 L.11: "Fig. 1d"

Fig. 1d needs a better description. What do the boxes mean? In addition, the variable t_s should be introduced in P.9, first paragraph, when introducing the 24h sintering time.

In all graphs expressing time, the unit showed by the authors is $[t/t_s]$. I believe it should be "[-]" (or "[s/s]") and the label in the x-axis should state "Normalized time (t/t_s) [-]".

Similar comment about the units as above for the variables in Fig. 2.

P.10 L.8: What is the meaning of the threshold velocity? The velocity at which erosion starts?

Section 3.1: Please make it clear in the first paragraph if sintering is turned on or not.

End of P. 13 + Fig. 4a + P. 14: I believe Fig. 4 shows the speed of the dune vs. time for different dune heights (see caption of Fig. 4a). In the text and in the legend of the figure, it is not clear that this graph presents results for different dune heights. Indeed, the legend of the figure shows the length of the dune "L" and not "H". In the text, the authors talk about "dune length" (P.13 L.13) and "dune size" (P. 14 L.7).

P.16 L.11: "the dune is deposited as a non-erodible layer"

P.17 L.7: "this behaviour becomes clear"

P.17 L.25: "These simulations allow us to identify"

Fig. 7: It is hard to see the legend of the color bars of the left graphs.

For all the simulations, I could not find any information on the initial conditions for the wind speed. Is it initially 0 m/s and then the left boundary condition is where the wind speed is set or is the wind speed initially set to the chosen value over the whole area?

There is no information about the snow properties (e.g. snow density and grain size) used for the simulations. How do they impact the snow bedform formation?

I do not understand how dunes form in the simulations presented in Section 4. If the snow surface is initially flat and the wind speed is constant, how do the first snow dunes form? It seems to me that some sort of heterogeneity would be needed for the first dunes to form and then propagate.