

The significance of vertical moisture diffusion on drifting Snow sublimation near snow surface

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1) General comments

This paper presents a blowing snow model development. The model takes into account the saltation of snow during blowing snow events.

The objectives of the paper are clear. However the connections between equations are not always clear to the reader. Also, I understand the challenge of finding ground-based observations to validate simulation of the sublimation. But the limited number of observations used here weakens the conclusion made by the authors. In other words the lack of sufficient validation data makes it impossible to say for certain if this model constitute an improvement over the previous models. The paper can also benefit from a detailed review from a native English speaker.

2) Specific comments

Line 7 : instead of “drifting snow sublimation” the authors could clear state “sublimation of blowing snow” or “sublimation of transported snow particles”

Line 10: by “snow sublimation near surface ” Do the authors mean the sublimation during the saltation phase or the turbulent suspension phase of the blowing snow or both?

Line 10 -11: I would say that the statement is not exactly correct. There are a few models that take this sublimation of blowing snow into account (see for example Liston and Sturm, 1998, Essery et al., 1999)

Line 15: the sentence is not clear

Line 17: How small?

Line 20: this sentence need rewording

Line 42: need to cite references : “Many researchers....(references)”

Line 43: is “violently” the appropriate scientific word to use here?

Line 48: I would state this: “However, some researchers (references) found that humidity near surface not to reach saturation in the drifting snow in the field,”

Line 68: "But this model can not describe snow particles suspending in upper air." The sentence is awkward and need rewording.

Line 85: Authors should explain why use Flows equation instead of Blowing snow equation in for example Liston et Sturm, 1998.

Line 94: judging criterion?? Do the authors mean "Threshold"

Line 97: the authors should show the connection between this equation and the previous ones (eqs 1 and 2).

Line 121: Please add reference

Line 171: Which particles, please explain.

Line 185: This conclusion is based on only 4 observations of field is a little bit of a stretch. For example, there is no observations on the figures 2 a, b, c.

Line 189: What are those environmental conditions?

Can the authors explain why the difference

What is the difference between the authors approach and that of Schmidt?

Line 195: What are the difference between the 4 models apart from that they all neglect sublimation?

Lines 200: - 205: this section is not clear and need to be reworded

Line 206: "suspended particles versus various friction velocities" IT should be "for various ..." instead of "versus, ..."

Line 209: "reach steady" what does that mean? do you mean "plateau" = constant value?

Line 214-216: This sentence is incomprehensible

Line 219: Need rewording

Line 221: Need rewording too

Line 227: "reach steady" is not an appropriate phrase to use in my view.

Line 230: need rewording

Line 246: The sentence needs rewording

Line 270: I don't think this statement is true. Many models do take sublimation into account

Line 275: Pomeroy et al. (1992)??? Vionnet et al. (year???)

Line 284: Could the authors cite the study that neglected saltation?

Figure 13: The smaller figure is not readable

Line 307: "Bellowing snow" what does that need?