

Interactive comment on “The significance of vertical moisture diffusion on drifting Snow sublimation near snow surface” by Ning Huang and Guanglei Shi

Anonymous Referee #2

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This work deals with an important topic, and is one of the few studies that deal with the blowing snow sublimation over near-surface region. The results show that the sublimation will still exist in near-surface region in the fully developed blowing snow, and the mass of sublimation in near-surface region could account for even more than half of the total. The manuscript is laid out in a clear and straightforward manner and adds something new to the physical understanding of the behavior of the snow distribution and transport of snow in the polar, glacier and snowfields etc.. This kind of manuscript is very rare and always of interest, and should be published. However, there are a few points that the authors might consider.

C1

Major points (1) Does the snow sublimation in near-surface region have an impact on the mass and movement of snow particles? That is, Does the change in m also go into equations (4)- (6)? (2) According to the authors, the blowing snow sublimation will reduce the air temperature. It is not clear how the effects of temperature change and the flow field are related in your simulation. (3) Usually the snow particles in the air are divided into suspension and saltation particles, and you seems to distinguish them simply by height. Please explain the reason. (4) Fig. 12 shows that snow sublimation occurs mainly in the near-surface region. It seems contradictory that in Fig. 13 the water vapor flux in the upper air is larger than that in the near-surface region. (5) All the results in Figure 4 don't include the results of saltation particles sublimation, but why the results of this paper is larger than that of xiao et al.. (6) This manuscript refers that there is a negative feedback effect in the blowing snow sublimation. Actually Figure 9 shows that the saltation particles sublimation does have a significant negative feedback effect, but you did not take into consideration of the feedback effect of sublimation of the suspended snow particles? (7) The writing proficiency of this manuscript need to improve because there are some writing errors in this paper. For example, the friction wind speeds in Figure 7 and Figure 8 are not expressed by the same symbol. In the first sentence of the abstract “Drifting snow sublimation is a physical process containing phase change and heat change. . .”, the words “of the drifting snow” should be deleted.

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C2