Author's Response

This is a very timely study demonstrating the microscale snow particle motion associated with an understudied snow bedform "Cornice", which is believed closely related to snow avalanches. The methods used in this paper is sound, the experiment settings were carefully tuned, which leads trustworthy experiment results. However, I think there are some minor issues in this manuscript and hopefully the authors can address them during the revision.
Response: Thanks for your time and positive feedback. We will revise it according to your suggestions.

1. The title mentioned the cornice formation, however, the discussion is also related to cornice growth, suggesting the title can change to Snow particle motion during cornice development
Response: Thanks for your comments. We prefer to use “growth” instead of “development” because this word has a bit more of a dynamic and specifically emphasizes the ongoing increase in size and volume of the cornice.

2. It is great to identify the four major adhering patterns, but it will be nice to link the force analysis with these four patterns
Response: Thanks for your suggestions. The four major adhering patterns are classified based on the dynamic analysis of particle movement. However, the static force analysis is carried out after the particle dynamic movement, which is the same for all the deposited particles. The dynamic force analysis would be the focus of future work.

3. It will be nice to discuss the limitations of the study, e.g. wind speed, humidity and temperature impact on cornice development. The implications for this study should be also discussed, e.g. how this research helps the understanding of the mechanisms of snow avalanches.
Response: Thanks for your suggestions. The effects of wind speed on cornice growth have been extensively studied in recent work by Yu et al. (2023). The effects of humidity and air temperature on cornice growth have been tested and will be published in our next paper. In this work, we controlled the air temperature as a constant to isolate the environmental variables. In the static force analysis (Section 3.2), we indicated that the air temperature has an impact on the cornice angle by changing the bond cohesion force between snow particles.

This work helps deepen our understanding of cornice growth from a micro-view, it not only provides a new perspective for setting up the parameterizations for splash functions of snow particles but also provides a theoretical basis for avalanche predictions. We will add the above discussion to the next version of the manuscript after revision.

References:

Yu, H., Li, G., Walter, B., Lehning, M., Zhang, J., and Huang, N.: Wind conditions for snow cornice formation in a wind tunnel, The Cryosphere, 17, 639–651,

https://doi.org/10.5194/tc-17-639-2023, 2023.