

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-718

Anonymous Referee #1

Referee comment on "Unveiling atmospheric transport and mixing mechanisms of ice-nucleating particles over the Alps" by Jörg Wieder et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-718-RC1>, 2021

The authors present the INP measurements from two sites. They find that INP concentrations at the mountaintop site are on average lower than high valley site. The authors discuss the importance of the orographic effect towards the INP concentrations. This is a unique study where the authors have analyzed the field INP data in the context of meteorology. I have the following minor comments, and after addressing these comments I recommend publication.

Line 13: Sentence needs to be revised. Maybe add Our results "show that" the local

Section 2.1: It is not clear why a heated inlet was used. Would this affect the composition of ambient aerosol? Do volatile components of these aerosol will be evaporated? On Line 110, can a special feature of the inlet design (that prevents snow sampling can be explained here? What is the cut size of this inlet?

Section 3.4: Equation 4, how height, h , is calculated?

Section 3.5: Did the vertical profiles of potential temperature were measured? In Figure 6 (line 262), it is mentioned: "the potential vertical mixing" – please elaborate. It is not clear whether vertical mixing occurred or not. If yes, how this is justified. It is not clear what test was used to confirm the vertical mixing.

Conclusions: To enhance the impact, how INP concentrations observed in this study compare with other field studies? Line 416, is this "absence of a relation" view supported

by other studies? Can APS (Figure 2e) data be shown here? On line 418, it is said that this relation does not hold for a temperature warmer than -20 degC. Is this temperature threshold based on the present study? Are experiments are performed at colder temperatures to conclude this statement?