

## **Response to reviewers' comments:**

### **Reviewer #1:**

We thank Farah Khosrawi for her additional comments. In the following we list our answers to specific suggestions and comments by the reviewer.

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#### **Authors' answers to comments was not uploaded:**

Apologies! We obviously messed up here. For what it's worth, the response is uploaded now and should be possible to find on the discussion page.

#### **Specific comments:**

- 10 – P1, L4: We changed the sentence. It now reads: 'The statistical analysis demonstrates that nearly half of all observed PSCs consisted of nitric acid trihydrate (NAT) particles while ice clouds accounted only for a small fraction and the remainder consisted of supercooled ternary solution (STS) and mixtures of different compositions.'
- P1, L14: We changed the sentence as suggested by the reviewer.
- P1, L15: We replaced 'in' with 'by'.
- 15 – P4, L113: We deleted 'is'.
- P5, L158: We understand that this sentence would benefit from an extended discussion of the value and the shortcomings of a visual PSC statistic. However, this is beyond the aim of this study, which intends to focus on lidar measurements. We therefore removed the sentence.
- P7, L192: 'as' was added.
- 20 – P11, Figure 4 caption: 'in' was replaced with 'on'.
- P13, L284: 'Arctic' was corrected.
- P14, L303: Sentence was corrected and now reads '... by large numbers of ...'.
- P19, L336: 'affect' was replaced with 'effect'.
- P19, L341: 'to' was added.
- 25 – P19, L352: The sentence was changed and reads now: '... while ice clouds accounted only for a small fraction and the remainder consisted of STS and mixtures of different compositions.'

### **Reviewer #2:**

We thank reviewer #2 for their additional comments. In the following we list our answers to specific suggestions by the reviewer (line numbers from the Tracked Changes version, as listed by the reviewer).

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- Line 202: We added 'as'.

- Line 221: The boundaries of our PSC classification are based on Blum et al. (2005) and similar to theirs but were adapted for the specifications of our lidar. This clarification has been included both in the text and in the caption for Figure 2.
- 35 – Line 242: We extended the sentence based on the suggestions of the reviewer. It reads now: '... from a single location that frequently is situated downwind of a major orographic obstacle, the Scandinavian Mountains.'
- Line 245: Changed to frequently
- Line 278: We extended this part in order to, hopefully, make it appear less hand-wavy. We added sentences that stressed (a) that only a small portion of all observed PSCs were found at these altitudes since temperatures are most often too warm for PSCs to exist, (b) that, when PSCs can exist, temperatures are often sufficiently low for Ice PSCs to exist, and (c) that this could be an effect of mountain lee waves.
- 40 – Line 300: Was corrected.
- Line 332: The sentence reads now: 'Ice clouds accounted for about 1/6 ...'.
- Line 343: The sentence was corrected.

## References

- 45 Blum, U., Fricke, K. H., Müller, K. P., Siebert, J., and Baumgarten, G.: Long-term lidar observations of polar stratospheric clouds at Esrange in northern Sweden, *Tellus B*, 57, 412–422, <https://doi.org/10.3402/tellusb.v57i5.16562>, 2005.