

Dear Authors,

Thank you for the revised submission. The manuscript has improved substantially, and most of the reviewers' comments have been implemented. Still, a minor revision is needed.

In particular, in line with the reviewers' comments, the paper should further moderate the claims regarding framing and novelty (R2 comments), clarify that the lidar comparison in Fig. 6 is qualitative because the panels are not shown in the same physical quantity, soften wording such as “unexpected”, “unprecedented”, “the same cloud layer”, and “complement each other well”, add further literature support in Section 4.2 for the known relationship between NLC occurrence and ambient temperature, and resolve a few remaining editorial points such as the raw URL in the main text and the unnecessary prominence of the infrasound experiment.

We are grateful to the Editor and two Reviewers for a comprehensive review of our article and for useful comments on our work. All changes in the revised manuscript are in yellow bold. Our replies are as follows.

In Introduction, we have already provided information on the motivation of the NLC experiment (lines 62-66). We believe that this is in line with the reviewers' comments, moderating the claims regarding framing and novelty of the present study.

We have moved the raw URL from the main text to Acknowledgments (line 622).

We have removed a single word “unexpected” from the revised manuscript (line 344).

We have removed a single word “unprecedented” from the revised manuscript (line 559).

In Section 3.1 (lidar measurements), we have clarified that the lidar comparison in Fig. 6 is qualitative (lines 271-272).

We have removed wording “the same NLC layer” from the revised manuscript (lines 266, 269-270).

In Section 4.2, we have added further literature support for the known relationship between NLC occurrence and ambient mesopause temperature (lines 448-469).

We have removed wording “complement each other well” from the revised manuscript (line 580-581).

Regarding “the unnecessary prominence of the infrasound experiment”, we have removed information on the infrasound experiment from Abstract (lines 20-22). At the same time, we keep this information in the main text (lines 126-128) as well as in Financial support (628-629).