

Dear Reviewer

First, we would like to thank you and the reviewers for your effort and the time spent to evaluate the manuscript entitled “**Ozone Downward Flux Revealed by High-Resolution Differential Absorption Lidar over Tibet during Stratosphere-Troposphere Exchange**” (egusphere-2026-3261)” We are sure that their valuable comments will improve the quality of our research work. We also would like to thank the editorial board for his guidance to proceed further. Following the reviewers’ suggestions, we have revised this manuscript and highlighted the modifications in the revision. The point to point response to the comments are given below.

Response to Reviewer :

We would like to thank the reviewer for the efforts and time and appreciate the encouraging review. Thank you for pointing out our mistakes. We really believe that your feedback has helped us to improve the presentation of our manuscript and the quality of our paper.

General Remarks

Because of unique terrain and atmospheric circulation, the Tibetan Plateau is a hotspot for studying troposphere-stratosphere exchange. Observation data from spaceborne sensors and reanalysis data were employed in the studying of troposphere-stratosphere exchange over the Tibetan Plateau, however, observation data with high spatial and temporal resolutions are still very lack, which are essential for studying troposphere-stratosphere exchange.

This article presents ozone measurements from a mobile ozone lidar located in the Tibetan Plateau, and study the troposphere-stratosphere exchange by using ozone as a tracer. Due to the high altitude, there are few lidar operated in the Tibetan Plateau. The lidar employed in the article has a capability of profiling ozone and temperature in the troposphere and stratosphere synchronously with high spatial and temporal resolutions, and the lidar data are very valuable for the atmospheric studying over the Tibetan Plateau. The job in the article is a good attempt to study the troposphere-stratosphere exchange by using ozone lidar data in the Tibetan Plateau. The consistency of the lidar measurements and ERA5 data indicated the reasonable of the ERA5 data over the Tibetan Plateau, and more details could be found in the lidar data, and these details could provide more information of the troposphere-stratosphere exchange.

The article could be accepted and published.

Our Response:

We sincerely thank the reviewer for the positive assessment of our manuscript and for recognizing the scientific value of the simultaneous high-resolution ozone and temperature lidar observations over the Tibetan Plateau. We also appreciate the reviewer’s recognition that the lidar data provide fine-scale information complementary to satellite and ERA5 datasets. Following the reviewer’s comments, we have carefully revised the manuscript to improve its methodological description, physical interpretation, uncertainty discussion, and overall clarity. We are grateful for the constructive suggestions and recommendation for publication.

Comments and Suggestions #1

1. Line 126, “USTC Ozone lidar shows good consistency the ERA5”, however, in the figure 3(b),

the peak value of the ozone concentration profile from ERA5 is obviously larger than the peak value from lidar.

Our Response:

Thank you very much for your helpful comment and suggestion. Our interpretation is as follows. ERA5 is a gridded reanalysis product that represents an analyzed atmospheric state over a finite horizontal grid cell, model level, and temporal sampling interval. Therefore, even after the ERA5 data are interpolated to the lidar site and to an altitude of 25 km, the ERA5 and lidar results do not represent strictly identical quantities because of their different spatial, vertical, and temporal representativeness.

Another possible explanation is that the ozone retrievals over approximately 20-32 km are based on the N₂ Raman backscatter signals. The reduced effective vertical resolution at these altitudes, together with the smoothing applied during the retrieval, may attenuate sharp ozone maxima and produce a smoothing-induced reduction in peak amplitude. Nevertheless, the main focus of the present study is the tropopause region between approximately 14 and 17 km, where the retrieved ozone profiles show no apparent abnormal behavior.

Changes in the manuscript:

We have revised the corresponding description in Lines 181-183 of the manuscript as follows:

“Overall, the ozone profiles retrieved from the USTC Ozone Lidar exhibit ... robust and complementary constraints.” The corresponding revisions are highlighted in blue in the revised manuscript.

Comments and Suggestions #2

2. Line 171, the vertical resolution of the temperature profile from ERA5 for tropopause determination should be given.

Our Response:

Thank you very much for your helpful comment and suggestion. For the PV-based dynamical-tropopause diagnosis, the ERA5 fields were treated in pressure coordinates and vertically interpolated at uniform intervals of 0.5 hPa. For the initial ERA5-based screening of the event, however, the thermodynamic tropopause was identified using the height and temperature information corresponding to each interpolated pressure level, following the WMO lapse-rate criterion.

Changes in the manuscript:

We have clarified this procedure in Lines 238-239 of the revised manuscript as follows:

“For the initial ERA5-based screening of the event, the ERA5 fields were vertically interpolated at uniform 0.5-hPa intervals, and the thermodynamic tropopause was then identified from the corresponding height and temperature profiles according to the WMO lapse-rate criterion.”

The corresponding revision is highlighted in blue in the revised manuscript.

Comments and Suggestions #3

3. The time in the article is the local time or UTC?

Our Response and changes in the manuscript:

Thank you for this question. All times reported in the manuscript are given in Coordinated Universal Time (UTC), rather than local time. We have clarified this time convention in the revised manuscript.

After the modification, we found the reviewer's comments are quite helpful. Once again, we appreciate for your warm work earnestly, and hope that the correction will meet your standards.

Best Regards.

Yours Sincerely,

All authors