

Dear editor,

Thank you very much for processing and considering our manuscript "[No.: egusphere-2025-6302] Vertical Structure and Driving Mechanism of PM_{2.5} and PM₁₀ Aerosols in Hefei Based on LiDAR Observations (2021–2023)".

We highly appreciate all the feedback from the editor. We have carefully revised the manuscript in accordance with all comments, and we believe these revisions have significantly enhanced the clarity and quality of the paper. Beyond addressing all comments in detail, we have also carefully proofread the entire manuscript to correct typos, standardize terminology, verify equations, and ensure consistency throughout. Both the revised and clean versions of the manuscript are included in this resubmission. We look forward to hearing from you soon.

We have addressed all the comments and provided a detailed explanation of our changes as attached below:

Black: Comments from the editor

Blue: Responses from the authors

Green: Changes in the main text

Comments from Editor:

Comments to the Author

The valuable comments from the reviewers have been well taken into account.

Some last corrections should be implemented in the manuscript before it can be published (line numbers are in the track-changes-version).

Response: Thank you very much for your positive comments and valuable suggestions on our manuscript. We have addressed all the concerns in the following responses and manuscript.

Specific comments

1. L. 146-147: I do not agree with removing the other two wavelengths in the description of the lidar system that was used. Please keep this sentence. Since you mention now explicitly that you only use 532 nm for the aerosol profile information, this is not confusing and is factually correct.

Response: change applied. Thank you for your valuable comment. We have restored the full description of the lidar system, including all three wavelengths, in the revised manuscript. This full description provides complete and factually correct information without causing confusion. We have revised the text as below:

Line 143-144: “The LGJ-05 aerosol LiDAR combines traditional radar technology and modern laser technology, with 355 nm, 532 nm, and 1064 nm as detection light sources.”

2. L. 332: 535 nm > 532 nm.

Response: change applied. We have revised the expression “aerosol stratification” to “aerosol vertical properties at different heights” in the manuscript, as the analysis corresponds to Figure 9, which presents continuous vertical variations of aerosols rather than distinct stratified layers.

Line 321: “The extinction coefficients at 532 nm exhibited clear differences between polluted and clean days for both PM_{2.5} and PM₁₀, with strong vertical and diurnal variation (Fig. 5)”

3. L. 494: Please write out VWS in full here, since this is the first time the acronym is used since several pages.

Response: change applied. Thank you for your careful comment. We have checked line 494 and did not find the acronym “VWS” there. However, we have carefully reviewed the full manuscript and ensured that the full term ‘**Vertical wind shear (VWS)**’ is written out at its first occurrence in the text, as suggested. In addition, both the full definition and the acronym of vertical wind shear have been clearly introduced in **Section 2.6.2** of the methodology part, to help readers follow the subsequent discussion without confusion.

Line 232: “The vertical wind shear (VWS) is a crucial factor in characterizing the change in wind velocity with height. It is defined as the variation of wind vector across atmospheric layers, quantified by the magnitude of the difference between upper and lower levels. The VWS can be calculated using the following formula:

$$VWS = \frac{\sqrt{(u_t - u_l)^2 + (v_t - v_l)^2}}{(z_t - z_l)} \times 1000 \quad (1)$$

Where VWS is measured in units of m/s.km⁻¹. u_t and u_l denote the zonal wind components at the upper z_t and lower z_l levels, respectively, while v_t and v_l represent the corresponding meridional wind components. This calculation aids in quantifying the vertical dynamic forces that may impact the dispersion and transportation of pollutants.”

Line 515: “The vertical wind shear (VWS) is a key dynamic factor affecting pollutant dispersion, as it influences mechanical turbulence and vertical mixing within the boundary layer (Deng et al., 2023).”