

The manuscript presents a multi-year, multi-seasonal analysis of Doppler lidar derived vertical aerosol fluxes in an urban environment, examining their variability with season, diurnal cycle and altitude.

The study is scientifically relevant and generally well structured. However, several aspects of the manuscript require clarification before it can be considered for publication. More specifically, the research gap and the novelty of the study should be better established in relation to previous work. Furthermore, some methodological choices and physical interpretations of the derived aerosol fluxes require further justification and certain statements regarding aerosol transport processes and the interpretation of the results should be more carefully aligned with the evidence presented.

Major comments:

- Lines 29-36: The first paragraph contains some repetition regarding the influence of aerosol properties and vertical distribution on radiative forcing, cloud fraction, and air quality. Please consider consolidating these statements to make the introduction more concise.
- Lines 42-47: The discussion of aerosol vertical and horizontal transport in lines 42-47 requires clarification. Sedimentation is a downward process and does not lift aerosol particles to higher altitudes, as implied in lines 42-44. Although the distinction between upward and downward transport is clarified later (lines 124-124), it would be helpful to make this distinction at this point as well to avoid confusion.
- Lines 98-103: OTT Parsivel HydroMet is described, maybe the authors could include some brief description regarding the measurements derived relevant to the study (e.g., precipitation flags, which are mentioned later in the methodology section, in line 131), as in the case of the other two instruments.
- Lines 105-106: The authors clearly state that the study focuses on continuous multi-year observations. However, if there were any periods of instrument downtime, maintenance, quality control filtering or any other gaps, these should be mentioned along with a brief comment on how they have been treated in the analysis.
- Lines 112-113: The authors appropriately cite the reference describing the in-house algorithm used to calculate aerosol fluxes. However, a brief introduction to the algorithm would further enhance the clarity of the methodology and help readers better follow the approach adopted in the study.
- Line 130: The authors state that the algorithm is applied both within the ABL and at altitudes up to 1995 m a.g.l. Could the authors comment briefly on the selection of the specific altitude?

- Lines 204-205: The authors state that filtering for advection effects and gravity waves was bypassed because these processes were not predominant in the dataset and that such sporadic events would not significantly affect the results. However, advective effects, particularly horizontal transport, are not necessarily sporadic. Could the authors explain this assumption?
- Lines 274-281: The discussion describes the occurrence of aerosol fluxes alongside RH filtering, cloud presence and precipitation. Further discussion of whether and how these factors relate to the observed aerosol flux patterns would help strengthen the physical interpretation of the results.
- Lines 300-311: The description generally reflects the patterns shown in Fig. 10. However, some statements appear stronger than what is directly illustrated in the figure. More precisely, the statement that JJA transitions from dominant resuspension to strong sedimentation at higher altitudes should be qualified, as significant sedimentation becomes more frequent, but does not consistently exceed resuspension.
- Line 319: Please explain the reason for selecting the 67% threshold to classify a transport direction as dominant.

Minor comments:

- Line 29: Please ensure consistent citation formatting by adding a comma between the author's name and the year of publication ("Sorbjan, 1989"). Similarly in line 35, for "Mishra and Shibata, 2012".
- Line 73: Please check the longitude coordinate for typographical errors ("20.°58' E").
- Lines 74-75: The abbreviation ACTRIS has already been mentioned in line 67. Please ensure that all abbreviations are introduced consistently at first mention in the manuscript, with their full names provided where appropriate.
- Line 102: Please check the notation of the time unit ("30 mn") and use "30 min" if minutes are intended and ensure consistent unit notation throughout the manuscript.
- Line 129: Abbreviation "ABLH" shall be introduced.
- Fig.2: Please check the figure title for grammatical errors and possible typos (e.g., "differences"). In addition, "and" might be unnecessary.
- Line 171: A space is missing between "and" and " $v_f > 5 \text{ cm/s}$ " and a full stop at the end of the sentence.
- Line 182: Please remove the unnecessary parenthesis around the citation "(Abril-Gago et al., 2025)".
- Fig. 4: Please check the phrasing of the caption and consider revising the wording "On the right, zoom on the most common velocity ranges" for clarity.

- Line 212: Please replace “on” with “in”.