

Response to Reviewer #1

We sincerely thank the reviewer for the careful evaluation of our manuscript and for the constructive comments, which have helped us improve its quality. Our point-by-point responses are provided below.

General comment

We appreciate the reviewer's positive assessment of the relevance of the study, particularly the value of citizen science for assessing PM_{2.5} exposure in transport microenvironments where official monitoring data are unavailable. We have revised the manuscript accordingly to address the methodological, statistical, and interpretative issues raised.

1. Study design

Comment: *How were the sampling days selected?*

Response: Sampling days were selected randomly whenever members of the citizen science project were able to combine the measurements with their daily activities. All measurements were conducted on working days.

Comment: *Were meteorological conditions recorded?*

Response: Yes. Air temperature and relative humidity were recorded simultaneously during all measurement campaigns. This information has been added to the Methods section.

Comment: *Were traffic intensity and ventilation considered?*

Response: Traffic measurements in the road tunnel were conducted during both off-peak and peak traffic periods. Metro measurements were performed at different times of the day. Information on the ventilation systems of the road tunnel, metro platforms, and metro carriages was not available and therefore could not be included in the analysis. This limitation has been acknowledged in the revised manuscript.

2. Lines 133–135

Comment: *Indicate the corresponding Supplementary Information figures and standardize the PM_{2.5} notation.*

Response: All Supplementary Information figure references have been added using the requested format (Figure SI X), and the notation of PM_{2.5} has been standardized throughout the manuscript.

3. Lines 138–140

Comment: *Include scatter plots and/or time-series comparisons between AirBeam 3 and TEOM before and after calibration.*

Response: Additional calibration results, including the coefficient of determination (R^2), have been incorporated into the Results section. A more detailed presentation of the calibration analyses and graphical comparisons has also been included in the Supplementary Information.

4. Lines 142–149

Comment: *Clarify the statistical analyses.*

Response: The paragraph has been reorganized into separate sections describing each statistical method individually. The purpose of each analysis is now explicitly stated, while the more detailed statistical explanations have been moved to the Supplementary Information to improve readability.

5. Lines 152–155

Comment: *Show georeferenced transient data on a map.*

Response: A new figure has been added showing a map of the Municipality of Madrid together with the routes followed during the field measurements.

6. Lines 157–166

Comment: *Provide a detailed record of each field measurement.*

Response: A new table has been added to the Results section summarizing the requested information for the road tunnel measurements, including sampling date, time, route, tunnel section, duration, tunnel entry and exit times, and other relevant metadata.

7. Lines 168–174

Comment: *Indicate the corresponding figure or table.*

Response: The corresponding reference to Figure 1 has been added.

8. Lines 168–173

Comment: *Explain the ANOVA analysis.*

Response: This issue is closely related to the following comment concerning the division of the tunnel measurements into two phases.

9. Artificial division into Phase A and Phase B

Comment: *The division into two equal halves appears arbitrary.*

Response: We agree with the reviewer that the division is arbitrary. Its sole purpose was to illustrate the different behaviour of PM_{2.5} concentrations during the early and later stages of travel through the tunnel. The manuscript has been revised to clarify this

rationale and to avoid any implication that the division represents statistically defined change points.

10. Quality control criteria

Comment: *Explain the quality control criteria.*

Response: All measurements were subjected to quality control before analysis. Data showing isolated, abnormally high PM_{2.5} values over very short periods (typically lasting only a few minutes) were considered measurement artefacts and were excluded from the dataset. This quality control procedure has now been described in the Methods section.