

Response to Reviewer 2 Comments on Manuscript ar-2024-39 “Impact of Sampling Frequency on Low-Cost PM Sensor Performance”

The authors would like to thank the editor and reviewers for their valuable feedback on the manuscript. In this document, we present our responses to the reviewer comments and suitable changes will be made in the revised version of the manuscript addressing these comments. For the reviewers’ convenience, the reviewer comments are shown in **black**, and our response to these comments are shown in **blue**

Reviewer 2

Reviewer 2.1 — The paper presents a field study in which a Low Cost Sensor measurement station for PM_{2.5} is designed and operated during one month on the roof of a building of Indian Institute of Technology (New Delhi campus). The data are analyzed and compared to reference measurement obtained by BAM Beta attenuation mass monitor through different sampling frequencies by the Low Cost Sensor Station. The general context of the study is interesting, it deals with configuration of sampling frequency of Low Cost Sensors regarding power consumption especially for remote deployments and what is it possible to characterize with in term of short pollution event. The precise objectives of the paper are clearly described. The paper is well written, and results are clearly presented. It is in line with topics of Aerosol Research. Nevertheless, some important points have to be accounted to improve the paper and avoid any misinterpretation.

Reply: Thank you for your summary and valuable feedback. We address your detailed comments below.

General Comments

Reviewer 2.2 — The main comment I have on the paper is to clarify the definition of the sampling frequency/sampling interval and related discussion on the effect of this parameter on the results. It is not clear to what correspond exactly LCS sampling frequencies named 5, 10, 15, 30, 60 min and how they are obtained.

Reply: Thank you for your comment regarding the clarification of sampling frequency and its impact on the results. To clarify, the LCS data is collected/sampled every 15 seconds. The sampling intervals of 5, 10, 15, 30, and 60 minutes refer to the time intervals at which a single sample was extracted from the midpoint of each duration. For example, 5-minute sampling means that if a sample was taken at 2.5 minutes, the next one would be taken at 7.5 minutes, and so on. Hourly averages for each sampling interval were calculated by averaging all the samples collected within that hour. We will ensure this explanation is clearly and concisely included in the revised manuscript.

Reviewer 2.3 — As it is written it let thinking that data corresponding to such frequencies are obtained by doing periodic average on the raw measurements done by LCS working at an effective sampling frequency of 15 seconds. This means that sampling frequency of the LCS is not changed

during experiments. This as to be clarified in the paper and the title of the paper should be adapted. In fact, if the frequency studied by the authors is a periodic average obtained by post-treatment it has no relationship with LCS intrinsic performance. The title should avoid such misunderstanding.

Reply: Thank you for your comment. During the experiment, the LCS is operated at a fixed sampling interval of 15 seconds, and the data for the other sampling intervals (5, 10, 15, 30, and 60 minutes) is obtained by taking the sample at the middle of each sampling period. This procedure was adopted only for the ease of carrying out the experiment and the analysis across sampling frequencies. We will clarify this in the revised manuscript to avoid any misunderstanding.

Reviewer 2.4 — The authors should improve the paper by better describing how the LCS data are acquired: if it is always active sampling during one month or if there sleep mode periods between measurements periods?

Reply: Thank you for the comment. The low-cost sensors were continuously sampling throughout the experiment, with no sleep modes implemented during the measurement period. We will revise the manuscript to explicitly describe the data acquisition process to ensure clarity.

Specific comments

Reviewer 2.5 — Page 3, line 80 Precise/confirm that BAM unit is equipped with PM10 Inlet + PM2.5 Cyclone (which model VSCC or URG?)

Reply: Thank you for the comment. The BAM unit used in this study is equipped with a PM2.5 Very Sharp Cut Cyclone (VSCC). We will add this information to the manuscript for better clarity.

Reviewer 2.6 — Page 5, lines 106-107 Give additional information to explain the difference between data aggregated on 60 min interval and the hourly average.

Reply: Thank you for your comment. The 60-minute sampling interval refers to a single sample taken at the midpoint of each hour (e.g., at 30 minutes), while the hourly average is calculated by averaging all samples collected within that hour (e.g., all the 15-second samples from 00:00 to 00:59). We will include this explanation in the revised manuscript for better clarity.

Reviewer 2.7 — Page 11, fig. 7 Improve readability of titles

Reply: Thank you for your feedback. We will revise Figure 7 by improving the clarity, font size, and formatting of the titles to ensure they are legible and visually consistent.

Reviewer 2.8 — Page 11, lines 168-171 The conclusion of the paper should be adapted to avoid misunderstanding about energy consumption minimization of LCS according to finding of this study. Energy consumption is not directly studied here and no evidence are given that operation of LCS with lower energy consumption due to lower effective sampling frequency provide comparable measurements.

Reply: Thank you for the feedback. To address this concern, we will include data that directly correlates sampling frequency with energy consumption, helping readers better understand the relationship between

these parameters. Additionally, we will revise the conclusion to clearly state our findings regarding energy consumption based on the available data.