

Peer Review Report

Review Report on Spatiotemporal heterogeneity of lung-deposited surface area (LDSA) in Zurich Switzerland: LDSA as a new routine metric for ambient particle monitoring

Original Article, Int J Public Health

Reviewer: Reviewer 1

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EVALUATION

Q 1 Please summarize the main findings of the study.

The authors deployed 10 lung deposit surface area (LDSA) sensors in a city area. They provided mainly descriptive analyses of heterogeneity over space and time. They relate heterogeneity to factors like local sources and weather. The main takeaway seems to be that there were not a lot of issues (e.g. breaking) with the sensors and that there was a lot of heterogeneity. However, with only 10 locations the conclusions are very limited.

Q 2 Please highlight the limitations and strengths.

There were a lot of limitations. The authors recognized them. They include:

- Missing weather data and using weather data from other stations to impute
- Data below limit of detection and above the upper limit of detection
- Equipment failure (breaking, clogging etc).

The major limitation is they only have 10 locations. This is very small. One larger comment I have is that the results would be strengthened by a statistical analysis that quantifies the relationship between factors like local sources and LDSA. However, this is not feasible with only 10 locations. I therefore do not make that suggestion to the authors.

Q 3 Please provide your detailed review report to the authors. The editors prefer to receive your review structured in major and minor comments. Please consider in your review the methods (statistical methods valid and correctly applied (e.g. sample size, choice of test), is the study replicable based on the method description?), results, data interpretation and references. If there are any objective errors, or if the conclusions are not supported, you should detail your concerns.

Overall, the paper is limited mostly to descriptive results. I am not exactly sure what the takeaway is beyond there is a lot of heterogeneity. Can the authors provide guidance for future studies? Can we learn anything about sampler network locations to get more useful data? This seems like a great idea but with only 10 sampling locations I am not sure what we can really learn from the paper.

Abstract: Part of the objective is "testing the long-term performance of a prototype of low-cost-low-maintenance LDSA sensor." How was it tested? The authors used the sensor but there is no testing in the sense of validation. In the conclusions of the abstract they say the "devices generated sound data." How was it verified the data is sure? It appears the only test of quality done is verifying that there were only a small number of issues (breaking, clogged fans, etc). Even those results are fairly descriptive. I do not feel that this objective was met or this conclusion justified.

Line 138 and Figure 1, The results are presented as hourly averages. The previous paragraph notes that some observations at one station were above the 20,000 limit of detection. The highest hourly average is 317 at that station. Does this mean there are spikes that go super high that are very short? If so, why look at hourly

averages instead of exposure on a finer time scale. Those fine scale spikes seem important given the paper goals of describing spatiotemporal heterogeneity. Those spikes also seem potentially important to health studies. I would encourage the authors to explore this.

Line 147, I don't understand the interpretation of this results. Are high concentrations associated with both high and low wind speeds but not middle wind speeds? How do we see local sources on this figure?

MINOR

Line 68: Is Partector 2 also a A-LDSA sensor? Please clarify for those not familiar with the technology.

Line 77, should this be Partector 2? I think the 2 is missing.

line 76: should SMPS be defined and naneos be capitalized? Can you comment on the accuracy of this instrument. It is being used for calibration so the quality of the A-LDSA depends on the quality of the SMPS.

Line 78, The 2021–202 campaign is referenced here but that campaign is not introduced until later in the text. It makes it hard to know what this sentence is communicated without that later knowledge.

Line 88, please be more specific about what you mean by “little drift” and what the standard deviations are for.

Section starting on line 81: This would benefit from a little more description. How many stations were in the 2021–2022 campaign that is the focus of the paper? It would be helpful to better describe the station locations in the text. For example, how many are urban vs rural? How many are near a major roadway? etc.

Line 82: Here the authors refer to LDSA devices. I think it should be A-LDSA. There are several other places where LDSA should probably be A-LDSA.

Line 89, Why only focus on the second campaign?

Line 132, What percent of the data were below LOR or above the upper limit of detection?

PLEASE COMMENT

Q 4 Is the title appropriate, concise, attractive?

Yes

Q 5 Are the keywords appropriate?

yes

Q 6 Is the English language of sufficient quality?

The English is fine but the overall grammar and attention to detail could be improved.

Q 7 Is the quality of the figures and tables satisfactory?

Yes.

Q 8 Does the reference list cover the relevant literature adequately and in an unbiased manner?)

I do not have a great knowledge of the specific literature and cannot assess well, but I did not have any concerns. All main points include citations.

QUALITY ASSESSMENT

Q 9 Originality

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Q 10 Rigor

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Q 11 Significance to the field

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Q 12 Interest to a general audience

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Q 13 Quality of the writing

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Q 14 Overall scientific quality of the study

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REVISION LEVEL

Q 15 Please make a recommendation based on your comments:

Reject.