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Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of optical particulate matter sensors under realistic conditions of strong and mild urban pollution" *by* Adnan Masic et al.

Anonymous Referee #3

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The manuscript describes the evaluation of some optical particulate matter sensors in high and low pollution episodes. The topic of very limited novelty as some of the sensors have already been extensively tested in the peer reviewed literature. 2 of the sensors are already not commercially available anymore and follow-up models are being sold. Novelty and generalizable findings would need to be emphasized because right now, there appears little true scientific discussion on fundamentals that would easily be transposable to justify publication of the manuscript on essentially outdated sensors.

The authors should address the following issues

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Discussion paper

- What is the true novelty here and insights that were not already documented in the existing papers on the Grimm, the alphasense or the PMS?

- You use in the comparison figures linear regressions with non-zero intercepts, some of these intercepts are substantial! >10 ug/m3 for PM10 (figure 3) both positive and negative. This needs to be explained.

- Overall for all the comparison figures, why not indicate a 1:1 line and please do a deeper analysis. It looks like these figures mostly show non linearity with at low concentrations most data points above the lien and at high below or vice versa. There seems to be clear non linearity without any discussion, instead these weird linear regressions with intercepts that are not explained. Even weirder that the authors acknowledge in the text that there is non linearity likely.

- The Alphasense is now on version OPC-N3 and it is hard to find information on earlier version idem on the PMS5003, they are now at PMS7003. Could you comment if you expect the observations here to be transposable otherwise they are useless.

- The description of the PMS device seems very speculative? This is very weird when a simple google gives clear descriptions of the device (https://www.aqmd.gov/docs/default-source/aq-spec/resources-page/plantower-pms5003-manual_v2-3.pdf)

- The discussion of RH impacts is very cursory and given how big the issue is, it would be important to see how results of the sensors agree or disagree as a function of RH. Here it would be critical to discuss that the gravimetric measurements are done at a given RH but how does this RH compare to the sensor measurements.

- Can you comment that you are running the sensors close to their technical specs (95% RH) also at times you actually do run the Grimm D11 outside of specs as the Grimm specs say temperatures above 4 degC (although you also seem to heat the inlet) this is not very clear.

- The introduction needs serious revision. Particulate matter and aerosol is not the same thing. Please eliminate all discussion of aerosol as aerosol is the particles and the gases

- The introduction is very narrowly focused and does not discuss things like the use of TEOM in networks. Also some of the statements should clearly be supported by references

- You are very non quantitative and non rigorous in the text and very imprecise., This needs substantial improvement. E.g. L81: what is meant by extremely high? L85 you know exactly what your lower size limit is, so please state it, L 166 what is mean by a “good” correlation?

- The statistical discussion totally lack rigor. L 262 “the correlations for hourly, daily and monthly average values of PM2.5 are 0.919, 0.980 and 0.998, respectively” what does this mean? Followed by “with absolute values overestimated by 20% on average “ how was this obtained? Where is the data? This is not obvious from Fig 8 at all?

- the abstract should not read like an experiential section with study dates etc. These details should not go there instead it should contain quantitative results form the paper.

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