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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 #2

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General comments: This paper focuses on the performance of 3 OPS devices in a highly polluted area. I think this paper will be helpful to the sensor/air monitoring community as it is at higher ambient concentrations than much previous work with a suite of collocated reference measurements. The authors present a highly valuable dataset. Overall, this is a nice paper with scientific significance, good presentation quality and a few changes to statistical methods/discussion and discussion of previous work will strengthen the scientific quality.

Specific comments:

Line 114: Can you provide any justification as to why you used the AE

channel? The two channels have a nonlinear relationship (Tryner 2020 https://doi.org/10.1016/j.atmosenv.2019.117067) and I wonder if this is some of the reason you have underestimation at high concentration (Figure 3).

The authors have a heavy reliance on R2 throughout this paper even though it is well known that this is not the best comparison between measurement methods (Bland & Altman "STATISTICAL METHODS FOR ASSESSING AGREEMENT BETWEEN TWO METHODS OF CLINICAL MEASUREMENT" Lancet, 1986; i: 307-310). They do also discuss bias (% difference) but I think it would also be helpful to not rely so heavily on discussion of R2 and add another metric of scatter MAE (or RMSE or another metric the authors prefer).

Line 159-161: I don't think this paragraph provides enough details to understand how you calculated this. I'm guessing this is 3 standard deviations but of what? Just zero concentration experienced in the field? Please elaborate as I think these results will be particularly of interest to the field. It seems like the Bulot paper reports LOD from a bunch of previous work with LCS not just PMS5003/N-2 it might be helpful to strengthen the discussion here. More recent work has also explored the LLOD of PMS5003 sensors (e.g. Magi 2019 https://doi.org/10.1080/02786826.2019.1619915). Also did you want to provide any details on what you do with data below the LLOD (throw out, replace, etc)?

Line 177: Also see recent paper on PMS5003 and large particles that may be helpful (Kosmopoulos 2020 https://doi.org/10.1016/j.scitotenv.2020.141396)

The discussion of previous work appears fairly limited. It would be helpful to discuss how the high bias of the PMS5003 and low bias of the OPC-N2 and overall performance compare to studies in other locations as both these devices have been studied fairly extensively.

Section 3.3: You only discuss the Humidity influence on the Grimm it would be helpful to discuss the influences on the PMS5003 and OPC-N2 as well

It seems like you also have the opportunity to discuss the influence of particle size distribution on the performance of the OPC-N2 and PMS5003 but you have limited your discussion to the Grimm. You mention this briefly in lines 245-249 but it seems like instead of just commenting that small particles could be an issue you can look to see of the OPC-N2 is specifically underestimating more because more of the particles are too small. In addition, both the OPC-N2 and PMS5003 have binned data that could be discussed.

Technical corrections:

Line 30: grammatical error “equipped with BAMs” and you should probably spell out what BAM stands for the first time you use it.

Line 123,221: missing m on Grimm

Line 181: It may be helpful to mention the figure earlier on in the paragraph before discussing the results so that readers can look at the figure and follow along.

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