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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterising low-cost sensors in highly portable platforms to quantify personal exposure in diverse environments" *by* Lia Chatzidiakou et al.

Anonymous Referee #1

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Chatzidiakou et al describe calibration of a low-cost sensor package, called the PAM, in both indoor and outdoor environments in the UK and China. Overall the paper is written well, technically competent, and topically suitable for AMT.

My main concern is about the novelty of this manuscript. At this point there is a robust literature on the calibration of low-cost electrochemical and metal oxide gas sensors for use in outdoor environments. It is not immediately clear how this manuscript makes a significant contribution on that front.

Furthermore, this manuscript seems to miss many important citations when it comes to the use of low-cost gas sensors in outdoor environments. Here are several I can think

of quickly (this is certainly not an exhaustive list): -Malings et al, AMT, 2019 -Masson et al, Sensors, 2015 -Piedrahita et al, AMT, 2014 -Spinelle et al, Sensors and Actuators B, 2015 and 2017 -Zimmerman et al, AMT, 2018

In my opinion, the indoor evaluation is the most novel part of the manuscript. Most of the existing literature deals with outdoor evaluations of these sensors. Most of the published calibrations are empirical (e.g., the linear models used in this manuscript, machine learning calibrations, etc), so it is no guarantee that calibrations developed in outdoor co-locations will work well indoors. This manuscript shows that outdoor calibrations can transfer to indoor environments, which I think is a significant contribution. However, the section on the indoor deployment (section 3.2) is short and could be expanded.

Other comments: (1) Page 5 Lines 25-32 - I am a bit unclear on the corrections used for the OPC. Specifically I don't understand where the density comes into play. Once the raw particle mass is adjusted for RH, it seems like the regression against the TEOM should nominally account for all size and density effects.

(2) Page 6, Line 7 - the PAMs were given to study participants in the UK for two years. Were there pre- and post-calibrations to look for drifts? Two years is around the expected working lifetime for the alphasense ECs.

(3) Does Figure 2 show raw data or calibrated data?

(4) Table 3 - (a) why is the China - June column in italics? -(b) Are the R^2 and RMSE for the calibration data or the testing data? -(c) How sensitive are the calibration results to the selection of the calibration period? E.g., in Figure 3, 5 days are selected for calibration, and those 5 days seem to work well because concentrations changed significantly over the calibration period. If the calibration period was ∼Jan 8-12, when concentrations were steadier (and lower), the calibration performance would presumably be poorer. How was the length of the calibration period determined?