

Interactive comment on “Performance of NO, NO₂, low cost sensors and three calibration approaches within a real world application” by Alessandro Bigi et al.

Anonymous Referee #1

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This manuscript explores the performance of the low-cost sensor units with three different calibration algorithms within a realistic framework. The units are initially co-located at a regulatory monitoring site that encounters both clean and polluted air depending on the wind direction for calibration and subsequently deployed at two distant urban traffic and urban background sites for assessment. A classical statistical model and two machine learning algorithms are tested and compared within this realistic framework. Drift, uncertainty and bias of the sensor units is assessed. The manuscript is well written and presents a relevant contribution to the emerging literature on low-cost sensor calibration. I recommend publication after the following comments have been addressed.

C1

General Comments

â€¢ One issue the paper should address is the relationship between the manufacturers' specifications and in field performance. What is the same, what different?

â€¢ The field is very fast moving. I recognize that much of this work was done prior to Kim et al. (2018). However that paper was posted on AMT before submission of this one and it reports results that are relevant. For example, that the Alphasense NO2-B43F sensor has cross-sensitivity to CO2 and not to NO. They also report a measurement of temporal drift that could be a point of comparison.

Kim, J., Shusterman, A. A., Lieschke, K. J., Newman, C., and Cohen, R. C.: The BErkeley Atmospheric CO2 Observation Network: field calibration and evaluation of low-cost air quality sensors, *Atmos. Meas. Tech. Discuss.*, in review, 2018.

â€¢ The paper should describe an intrinsic noise level and how the authors prevent the methods from overfitting.

â€¢ The paper speaks to interurban gradients. Is the discussion any different than simply describing the detection limit of the sensors?

â€¢ In the conclusions, it would help if the authors offered some opinions about directions for use of this class of electrochemical sensors. Something in the form that synthesizes their results along with those that are in the overview presented in their introduction.

Minor Comments â€¢ P9 L19: the bracket has to be closed. â€¢ P11 L27, Figure 10 caption: “blue dots” should be replaced by “red dots.” â€¢ Appendix A, Equations A6: typographic errors.