Atmospheric
Measurement
Techniques

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Discussions

Interactive comment on "An improved low power measurement of ambient NO$_2$ and O$_3$ combining electrochemical sensor clusters and machine learning" *by* Kate R. Smith et al.

Anonymous Referee #2

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Comments

Low cost sensors (LCS) playing an emerging role in the urban environmental monitoring with respect to the possibility of setting up a densely populated gridded network. Nevertheless, the detection limit, the stability and the real-time calibration were in general of question or with difficulty to overcome. In this study, the authors try to use the machine learning (ML) method to enhance of the data quality of LCS which is in general fit the effort of the community to improve the data quality of LCS. The paper is within the scope of AMT and I have the following comments for the authors to consider before publication.

1. The machine learning method is used to improve the data quality of the LCS. The improvement is clear but still without in-depth explanations. The scientific paper shall not be looks like simply magic. I will be convinced if the authors can provide much more examples as the authors also wrote in their conclusions. Moreover, I did see much better comparison results from LCS (the Cambridge group for the same campaign) with the CAPS instrument on NO2 and other parameters like O3, CO, etc. So, I wonder if the results presented in this paper can be improved further.

2. Sect. 3.2: during the training period, what kind of regression method is used to calibrate the sensors? According to Cantrell, 2008(Cantrell, C. A.: Technical Note: Review of methods for linear least-squares fitting of data and application to atmospheric chemistry problems, Atmos. Chem. Phys., 8, 5477–5487, 2008.), bivariate regression algorithm is required to retrieve the robust slope.

3. Figure 4, Panel A is with linear scale, Panel B-D is with logarithmic scale. Why the authors want to have two different scales?

4. Figure 5 is a nice way to explain the advantage from the ML method. Can the authors do the same for the other ML processing?

5. The ML corrected LCS signal still significantly smaller than those measured by the reference instruments especially for the peak values of Ox? Could the authors provide more discussions on this aspect and what could be the possible improvements on LCS or ML.

Technical comments:

In most cases, the multi-citations were not correctly implemented. For example, page 2 line 8, (Caron et al., 2016),(Jiao et al., 2016) should be (Caron et al., 2016; Jiao et al., 2016). This shall be revised throughout the paper. Figure 3 is not cited in the main text which I assume should appear somewhere in Sect. 3.2.