Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2019-393-AC2, 2020

Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation and Calibration of a Low-cost Particle Sensor in Ambient Conditions Using Machine Learning Technologies" *by* Minxing Si et al.

Minxing Si et al.

kddu@ucalgary.ca

Received and published: 29 February 2020

1. **Comment 1 from Referee No. 4**: Work with sensor vendor to find out the reason of high equipment disability rate and build a larger sensor network in an area to evaluate the calibration method crossing different sensors

   Author's response: We thank the reviewers' recommendation for our future work. We think it might be caused by water damage to the controller board. We planned to carry out Phase 2 of the study to work with the sensor vendors or may try different sensors to understand what might be the cause that sensors do not last long. In phase 2, we also plan to deploy multiple sensors at multiple

Printer-friendly version

Discussion paper

Alberta air monitoring stations for a longer time, such as 1 year, so we can test sensor precision and bias, as well as transferability of machine learning models.

Author's changes in manuscript Not applicable

2. **Comment 2 from Referee No. 4** Expand the temperature range to a warm condition, such as 30 C- 38 C to evaluation RH with higher temperature's effect on low-cost sensor and calibration method

   Author's response We thank the reviewers' recommendation for our future work. Because of sensor failure, the sensor we used did not last to summer. We plan to set up experiments in phase 2 to cover a wider range of weather conditions. We added a short discussion about season impacts as below.

   We assessed the seasonal impact on the low-cost sensor by comparing the mean of absolute differences of the daily average between the sensor values and the SHARP values in winter (December 2018 to February 2019) and spring (March 2019 to April 2019). A descriptive statistic is presented in Table 7.

   We used a two-sample t-test to assess if the mean of absolute differences for winter and spring were statistically significant. The p-value of the t-test was 0.754. Because $p = 0.754 > \alpha = 0.05$, we retained the null hypothesis. There was not sufficient evidence at the $\alpha = 0.05$ level to conclude that the means of absolute differences between the low-cost sensor and SHARP PM values were significantly different for the winter season and spring season.

   Author's changes in manuscript Added a section 3.5.2

   We assessed the seasonal impact on the low-cost sensor by comparing the mean of absolute differences of the daily average between the sensor values and the SHARP values in winter (December 2018 to February 2019) and spring (March 2019 to April 2019). A descriptive statistic is presented in Table 7.

   We used a two-sample t-test to assess if the mean of absolute differences for winter and spring were statistically significant. The p-value of the t-test was 0.754.

Because $p = 0.754 > \alpha = 0.05$, we retained the null hypothesis. There was not sufficient evidence at the $\alpha = 0.05$ level to conclude that the means of absolute differences between the low-cost sensor and SHARP PM values were significantly different for the winter season and spring season.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-393, 2019.

Printer-friendly version

Discussion paper