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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.

Anonymous Referee #4

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This work built an IoT based low cost particle sensor equipment to collected long-term PM2.5 data to compare with a co-located US EPA FEM monitor, and then focused on using machine learning technologies to calibrate this low cost particle sensor.

The topic and method in this work is not new, many team did similar work using different sensors and calibration method. However, the team did some differentiate work comparing to others: 1. Use long-term data crossing 5 months to evaluate and calibrate the sensor over various RH and temperatures. 2. Low cost sensor is co-located with a US EPA FEM monitor, and the FEM monitor's data is used as the target to supervise the machine learning process 3. Evaluated several calibration methods including SLR,

MLR, XGBoost and NN with random searched hyperparameters.

The study result shows a convincing result that with feedforward NN calibration method, low cost sensor's test results and results of FEM monitor are not statistically significantly different. This may enable to build high spatial- and temporal-resolution PM monitoring networks to support public exposure and health effects studies that are related to PM.

There are several works could be addressed: 1. 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. 2. Expand the temperature range to a warm condition, such as 30âĎČ - 38âĎČ to evaluation RH with higher temperature's effect on low cost sensor and calibration method.

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