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Atmospheric Measurement Techniques Discussions

Interactive comment on "Community Air Sensor Network (CAIRSENSE) project: Evaluation of low-cost sensor performance in a suburban environment in the southeastern United States" *by* Wan Jiao et al.

Anonymous Referee #1

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General: This paper discusses the performance of a low-cost sensor network deployed in a suburban area of the southeastern United States. Overall the study is well-designed, with results that provide useful contributions to the field. The correlations of the low-cost sensors described here with Federal Equivalent Methods (FEM) will be useful to anyone investigating the usefulness of some of the monitors in other studies. While much remains to be done with understanding the limitations of some of the monitors (for example, testing them in other environments), this represents a significant and well-executed first step. The work is well-explained, and the paper well-written and logically organized. Tables are useful as well. The authors do a good job

with presenting enough information about the wide variety of instruments which they incorporate into the study, without overwhelming the reader with unnecessary details.

Specific Comments: I have a concern with the particle size ranges measured by some of the instruments, which do not match the particle size range of the FEM (i.e., 2.5 um and below). For example, the Dylos data is shown as being counts either >1 um or >0.5 um, depending upon the model. It is problematic to try to correlate this to the FEM, because they are measuring two different size ranges of PM (>0.5 or >1.0 um vs <2.5 um of the FEM). This can be easily fixed. The Dylos DC1100 should also include a "large" channel that measures PM >2.5 um; thus, if you subtract the "large" (>2.5 um) counts from the "small" (>0.5 um) counts at each time step you will end up with a better approximation of PM2.5 (PM <2.5 um). Doing this might improve the correlations and comparison with FEM. I acknowledge that the total number of particles greater than 2.5 um may be rather small in comparison to those below, but this should still be done for completeness (or at least you should explain that those counts above 2.5 were negligible). [For further details on this and similar conversions of Dylos counts to mass concentration, see "Determining PM2.5 calibration curves for a low-cost particle monitor: common indoor residential aerosols," Environ. Sci: Processes Impacts, 2015, 17, 1959. DOI: 10.1039/c5em00365b].

In addition, the MetOne is reported as providing a wide variety of PM size data. The reader assumes that you are using the PM2.5 output to compare to the FEM, but it would be better to state that specifically.

Finally, it may be helpful to have a couple of representative plots of low-cost instruments vs FEM, perhaps one showing an instrument with very good correlation, and one with poor correlation. Doing so would enable the reader to better understand some of the relationships.

Technical corrections: Pg 1, line 27: add "the": " . . . over a surrounding ∼2 km area in THE Southeastern U.S." pg 2, line 29: change "utilizing" to "utilize"