

Correction for PurpleAir PM_{2.5} Data in the NYC area

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PurpleAir, a recently available but worldwide deployed low-cost air quality monitor with approximately 10,000 units globally that feed data into a near-real time global map of air pollution, can monitor fine particulates (PM) of size <1,2.5 and 10um simultaneously and has all the data publicly available, accessible through its website. This rapid growing network of PurpleAir sensors has provided numerous continuous PM monitoring data and great opportunities for enhancing the public exposure research. The current calibration methods for PurpleAir data have focused on PM_{2.5} and are typically through comparison with co-located reference monitoring sites in developed countries. Very few studies have utilized the real-time particle counts at 0.3, 0.5, 1.0, 2.5, 5, 10 um size fractions from PurpleAir, as well as short-term data in minute intervals compared to daily averages. In this study, we conducted collocated experiments of PurpleAir with real-time monitors including MicroPEM (personal PM monitor, from RTI) with a filter in the urban greater NYC areas in both indoor and outdoor settings. Linear regression models will be performed to improve the correct methods for PurpleAir PM_{2.5} using temperature, humidity, pressure, and particle size counts and ratios in various size fractions. A combination of these factors are seen to be effective in improving the data quality of the PurpleAir PM_{2.5} data; a linear regression model with temperature, relative humidity and pressure in outdoor data is seen to improve raw PurpleAir values from an R² value of 0.20 to 0.61. This pilot investigation can improve PurpleAir PM data quality and contribute to the development of large scale PurpleAir PM data calculation and correction algorithms.

