

LRAPA PurpleAir Monitor Correction Factor History

In 2017 [Lane Regional Air Protection Agency](#) (LRAPA) began investigating the idea of using low-cost particulate matter (PM) sensors to supplement our PM2.5 monitoring network and as a possible tool for use by citizens concerned about the PM levels in their neighborhood. Using the testing and evaluation information available at the [SCAQMD](#) (South Coast Air Quality Management District) [AQ-SPEC website](#) LRAPA decided to purchase two PurpleAir PM monitors.

In August of 2017 the airshed that LRAPA serves was inundated by smoke from nearby wildfires. The University of Oregon (UO) reached out to us for help in determining the levels of the wildfire smoke at their practice facilities. We deployed two PurpleAir monitors on the UO campus to help them in making decisions about practice and other outdoor activities. During this wildfire event it became apparent to LRAPA that the PurpleAir monitors could be a valuable tool for use as a supplement to our monitoring network during the wildfire smoke episodes. It also gave us some experience with installation and use of the PurpleAir monitor.

After the wildfire season we were able to look at the data that was collected and we were encouraged with the comparison to the closest permanent PM2.5 monitoring station to the UO practice facilities. The initial data showed that while there was a significant difference in the PM2.5 levels between the PurpleAir monitor, and our reference PM2.5 monitor, there was very good correlation between the two. This gave us the confidence to do further testing.

In the fall of 2017, LRAPA purchased more PurpleAir monitors and installed them at all seven of our permanent monitoring sites and at the homes of some LRAPA employees. This allowed LRAPA to do side by side comparisons with our reference PM2.5 monitoring equipment, at four of the permanent sites, and fill in some areas that were not currently covered by a PM2.5 monitor. It also allowed for some real-world testing of reliability and ease of use of the PurpleAir monitors.

During the winter of 2017-2018 LRAPA collected data and compared the PurpleAir monitors data to the data from reference monitors located at the four of the seven LRAPA sites. While the PurpleAir monitors showed low accuracy in our airshed, when compared to our reference monitors, they showed high precision and a repeatable bias. The correlation of the PurpleAir to the reference monitors at the four sites (see table below) shows the excellent precision and high bias. In general, the PurpleAir data was consistently 2x higher than the data collected by our reference monitors.

Monitoring Site	Slope	Intercept	R ²
Amazon Park	0.52	-0.32	0.99
Cottage Grove	0.50	-2.50	0.94
HWY 99	0.49	-0.10	0.98
Oakridge	0.48	0.26	0.98
Average	0.50	-0.66	0.97

With the correlated data, from winter of 2017-2018, LRAPA asked PurpleAir to add the average correction factor we developed for our airshed to their map. This has allowed the public to correct the data to levels that are more accurate for our area. While the data collected from the PurpleAir monitors will not be used by LRAPA for regulatory decisions, LRAPA is confident that the corrected data better represents the levels of PM2.5 in the LRAPA airshed. LRAPA also feels comfortable using the corrected data to supplement our reference monitors and validate their current locations.

LRAPA acknowledges that the correction factor developed by LRAPA will not necessarily transfer to other airsheds. The PM2.5 levels in our area are primarily driven by winter time wood smoke from home wood heating. The correction factor is likely heavily dependent on the makeup of PM2.5 aerosol in our area.