San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

Technical Evaluation of Sensor Technology (TEST) Program

Dylos Sensor
2020 – 2nd Quarter

Introduction and Sensor Profile

This analysis report is focused on assessing the performance of the Dylos DC1100 sensor as a part of the District's Technical Evaluation of Sensor Technology (TEST) Program. The Dylos sensor uses optical laser-based particle counting methodology to estimate the concentration of PM2.5 and PM10. The Dylos sensor counts and measures the size of the individual particles to calculate a mass concentration.

Background and Approach of Evaluation Test

In May 2019, the District installed three Dylos sensors at the Clovis-Villa air monitoring station for the purpose of testing the Dylos sensors in the San Joaquin Valley and comparing the performance of the collocated Dylos sensors to the Federal Equivalent Method (FEM) PM2.5 analyzer. The data sets analyzed for this report compare PM2.5 data collected from the Dylos sensors and the MetOne BAM-1020 FEM monitor collocated at the regulatory air monitoring site. The scatter plots and time series graphs below show how the datasets compare for both hourly values and the 24-hour average.

Overview of Analysis Findings from Current Period

The analysis for this report covers the time period of April 2020 through June 2020 (2020 – 2nd quarter). During this period, hourly data was removed from the calculation of bias when either the Dylos sensor or regulatory monitor did not have a valid hourly sample. For the 24-hour averages, only days with 18 or more valid hourly samples (75% or greater completeness) are included.

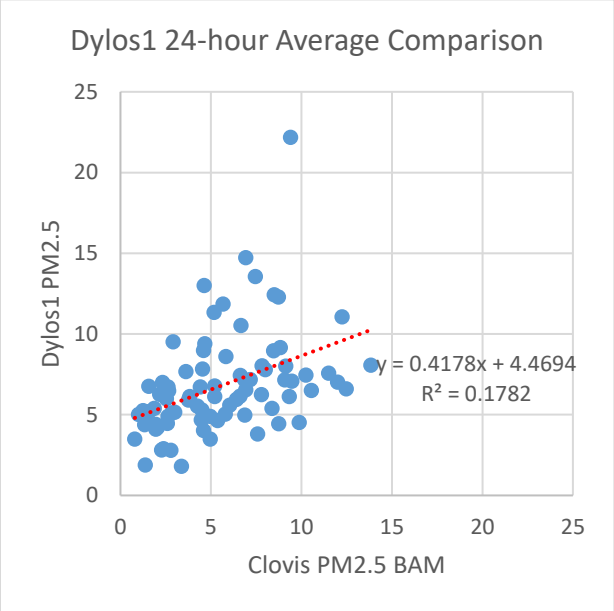
April 2020 saw several low pressure systems enter the region with significant rainfall. By May, the low pressure systems brought several gusty wind events to the Valley, but did not cause significant blowing dust due to moisture in the atmosphere from previous storms. June was marked by high pressure systems that brought an increase in temperatures, and a low pressure system did bring blowing dust to the region during this month.

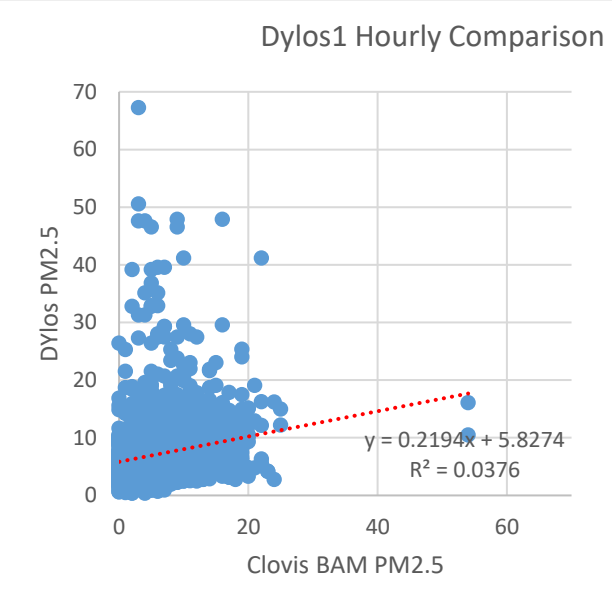
During this period, only Dylos1 sensor reported any measured PM2.5 data. Overall, concentrations increased from the beginning of this period through the end of this period. Dylos1 generally had high results compared to the regulatory monitor.

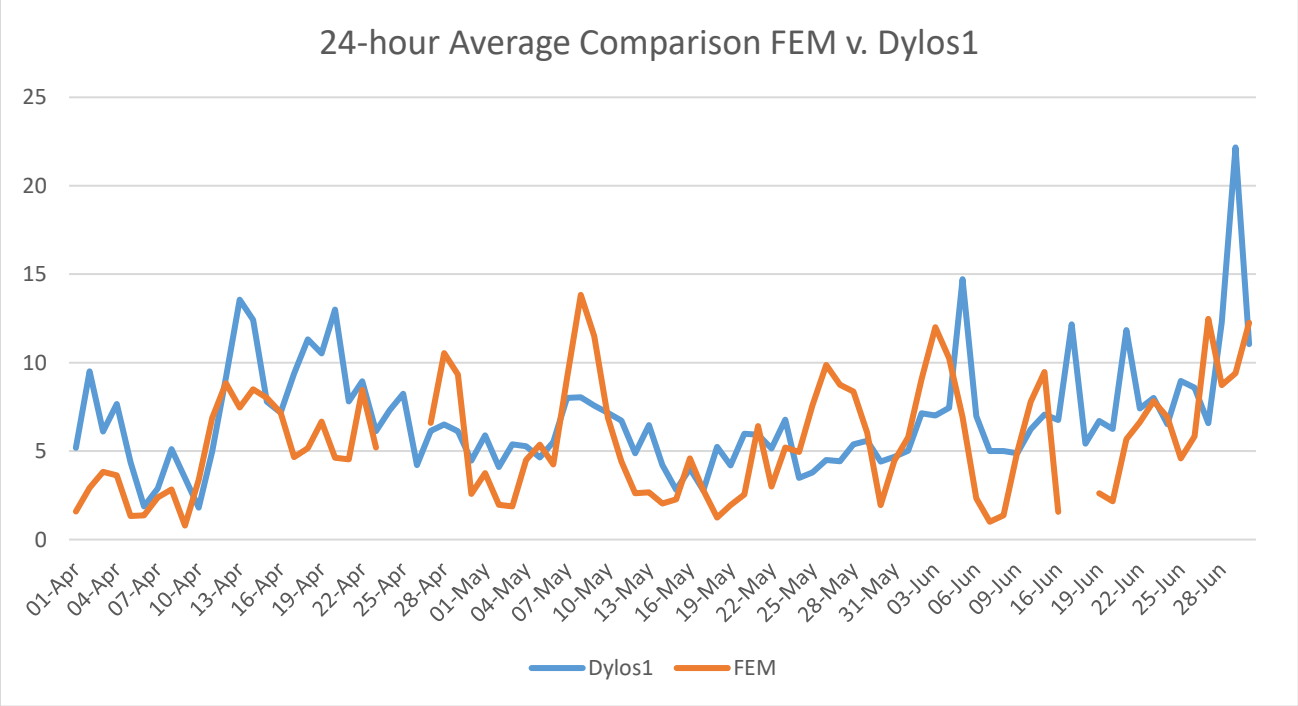
Analysis of Clarity-Node Sensor Performance

Dylos1

For the 24-hour average, Dylos data had a 1.61 µg/m^3 high bias during the January 2020 through March 2020 period. For the hourly average, Dylos data had a 1.29 µg/m^3 high bias over the same period.







Dylos0 and Dylos2

There were no measurements from either Dylos0 or Dylos2 sensors during this period. These non-reporting sensors will be included in future reports is they are able to report PM2.5 data.

Statistical Summary

The following table provides a statistical summary of the PM2.5 data collected during the analysis period of this report. Note the Dylos0 and Dylos2 sensors collected no data during this period.

Clovis-Villa	Average 24-hr	Max 1-hr	Max 24-hr	1-hr R2	1-hr Slope	1-hr Intercept	24-hr R2	24-hr Slope	24-hr Intercept
Dylos 0	---	---	---	---	---	---	---	---	---
Dylos 1	6.82	67.26	22.17	0.04	0.22	5.83	0.18	0.42	4.5
Dylos 2	---	---	---	---	---	---	---	---	---
FEM	5.53	54.00	13.83						