



San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

Technical Evaluation of Sensor Technology (TEST) Program

*Dylos Sensor
2020 – 3rd 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 PM_{2.5} 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) PM_{2.5} analyzer. The data sets analyzed for this report compare PM_{2.5} 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 July 2020 through September 2020 (2020 – 3rd 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.

Three Dylos analyzers are installed at the Clovis AMS. Of the three, only one sensor, Dylos 2, was able to capture enough measurements to complete analysis against the FEM for this quarter. Dylos 1 and Dylos 3 sensors have intermittent data, which was not enough data to analyze for this report.

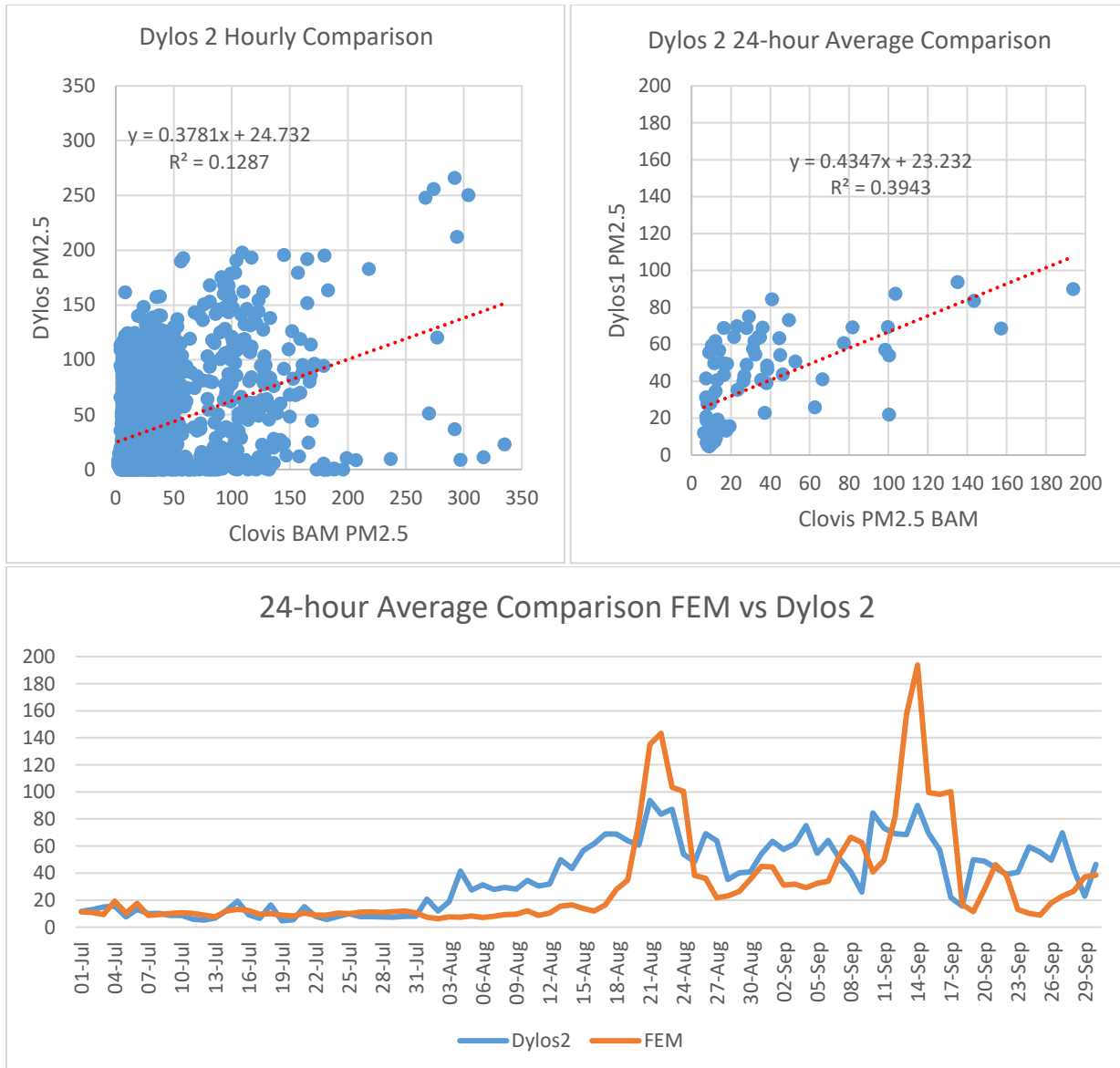
From July through September, dry weather prevailed across the region. Periods of gusty winds entered the District throughout the 3rd quarter as troughs moved through the area. Starting in mid-August, several wildfires across California caused dense smoke to settle in over the San Joaquin Valley. As such, August and September saw PM_{2.5} concentrations increase throughout the region.

Overall, the Dylos 2 sensor that operated during this time period had high bias results compared to the regulatory monitors. Data continues to be intermittent from the Dylos 1 and Dylos 3 sensors during this quarter.

Analysis of Clarity-Node Sensor Performance

Dylos 2

For the 24-hour average, Dylos data had a 5.5 $\mu\text{g}/\text{m}^3$ high bias during the July 2020 through September 2020 period. For the hourly average, Dylos data had a 5.3 $\mu\text{g}/\text{m}^3$ high bias over the same period.



Dylos 1 and Dylos 3

There were intermittent measurements from Dylos1 and Dylos3 sensors during this period. When data becomes more consistent, the sensors will be included in future reports.

Statistical Summary

The following table provides a statistical summary of the PM2.5 data collected during the analysis period of this report. Note the Dylos1 and Dylos3 sensors collected intermittent 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 1	---	---	---	---	---	---	---	---	---
Dylos 2	36.8	266.1	93.7	0.1287	0.3781	24.732	0.3943	0.4347	23.232
Dylos 3	---	---	---	---	---	---	---	---	---
FEM	31.3	335.0	193.8						