

# **Does Car Exhaust Affect Air Quality?**

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## **Abstract**

For our project we tested if air quality would change because of a car exhaust. To measure the air quality (aerosoles) we used Calitoos and a Purple Air on loan from NASA. We compared the Calitoo's, which measures AOT, to the Purple Air, which measures PM2.5 but we didn't find that the car exhaust had any affect on the air quality. In conclusion, we didn't find a difference in air quality with the car exhaust and without it.

## **Research Question**

We are trying to figure out if car exhaust can affect air quality because car exhaust can affect the amount of PM2.5 in the air. Car exhaust can cause PM2.5 which can affect the air you breath. We are using the Purple Air to figure out how the air quality is affected.

## **Introduction**

For our project we want to find out if car exhaust will affect the air quality with the Purple Air instrument. Purple Air is a PM 2.5 monitor that measures air quality by calculating how many PM2.5 particles are in the air. We wanted to do this experiment because last year we did a project measuring the air during carpool with a Calitoo sun photometer and our question wasn't completely answered. We got some measurements where the exhaust didn't seem to affect the

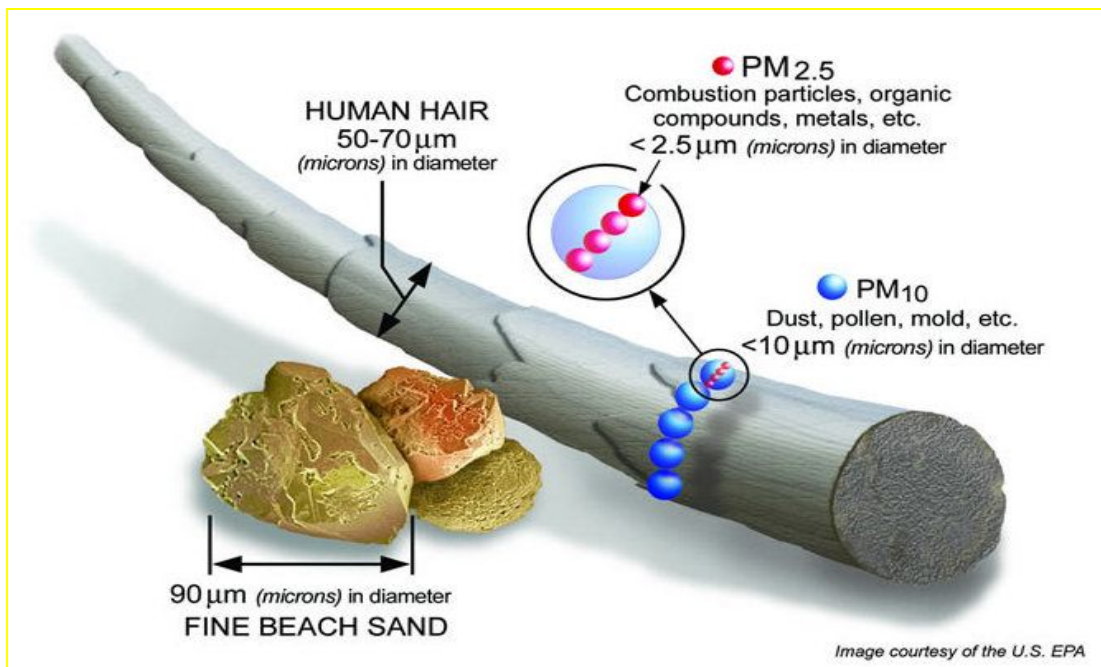
data and other measurements where it did seem to affect it. Air quality is important because it is a major source of oxygen for cellular respiration for living things. If the air quality is bad it can cause many breathing problems and cause the water to become harmful to animals. Because of our last experiment we thought it might be better to try an instrument that measures closer to the ground and not in a column going up to the sun.



### **Research Methods**

We are using the GLOBE Aerosol Protocol. We are also going to use the Purple Air instrument on loan from NASA. We are measuring between 12:45pm to 1:00pm and between

3:00pm to 3:15pm. The Calitoos we use are calibrated at NASA and the Purple Air at our school is also on loan from NASA. Tuesdays we have taken some measurements around 3-4. We will then compare our Calitoo data to our Purple Air data. We used the Purple Air and Calitoos to measure the amount of aerosols in the air. We took data with a Calitoo in the school's parking lot. We have taken several days worth of data, with a Calitoo. Bryce and Frank took all of the measurements and data during recess every school day with the calitoos we went into an open area where the sun can clearly hit the Calitoo's sensor and took a measurement. Frank and Bryce both took measurements.



### Globe Badges

#### ***Be a Collaborator***

Eliza, Matthew, and Frank worked on this project. We all helped collect the data. Matthew wrote the research methods. Frank wrote the background research and wrote all the data down. Eliza wrote the introduction.

### ***Be a Data Scientist***

Our project is based off our project we did before about car exhaust pollution during carpool. We are now taking measurements with a Calitoo and comparing it to our Purple Air's measurements to see if car exhaust really does affect the aerosols in the air.

### ***Be a STEM Professional***

Dr. Margaret Pippin helped us to collect the Purple Air data and make our data graphs. She also explained to us how the graphs work and how the different wavelengths have different measurements. Marile Colon-Robles also explained to us how to tell clouds apart and how to identify the different colors of the sky.

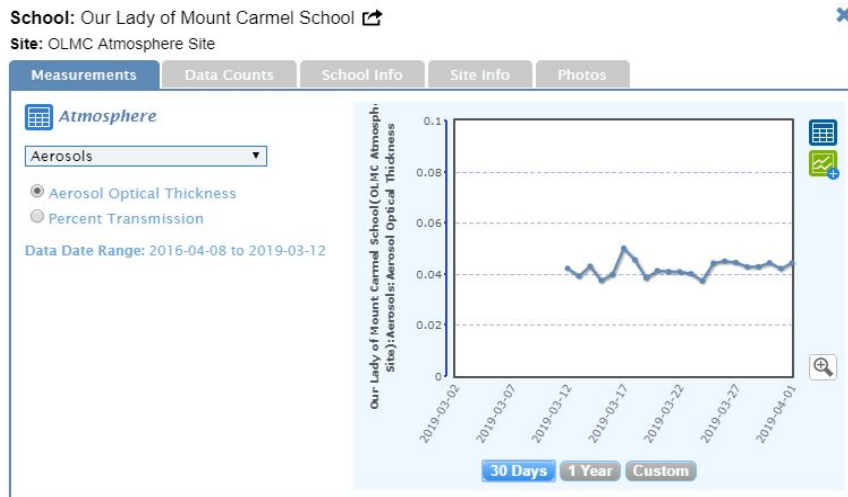


### **Analyzing Data**

The research question we used; “Does car exhaust affect air quality.” We compared



Calitoo AOT data and the Purple Air which measures PM2.5 data. The data in our graphs shows that the air was mostly clean and that the car exhaust didn't seem to affect our measurements.

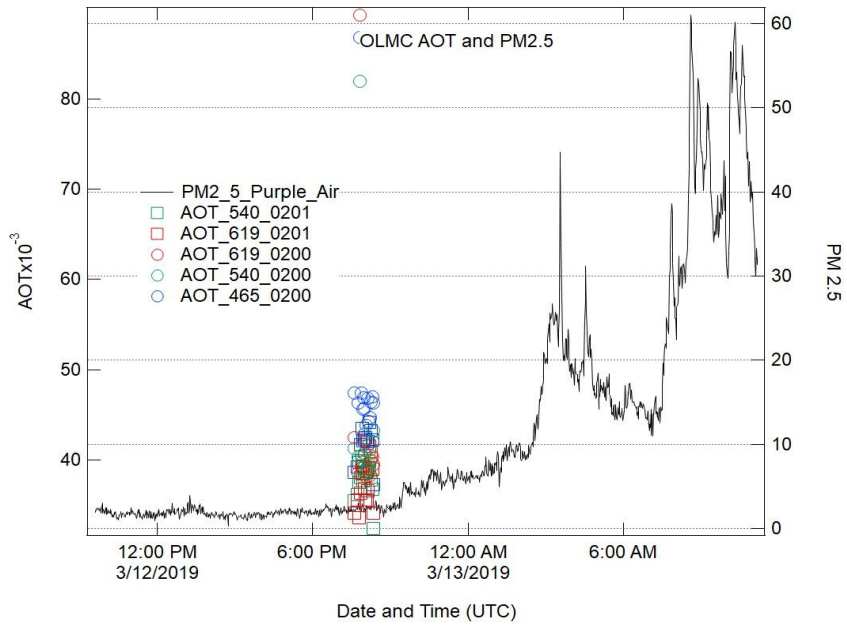


## Discussion

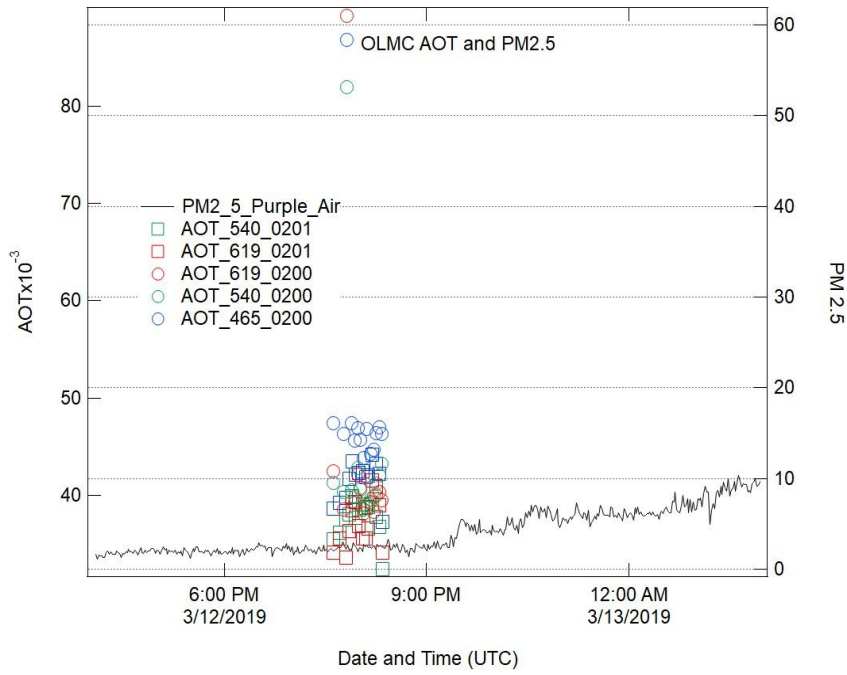
For our experiment we took measurements with a calitoo and compared them to the measurements of our school's Purple Air. We then graphed the data and didn't really find any information that would indicate that the car exhaust affected the air quality. We think we didn't find anything because the calitoo only measures from the place where you are holding it up into the atmosphere in a straight column. We also think we should try to take measurements where tons of cars are putting out exhaust.

Figure #1 & #2 shows the measurements the Calitoos took (left axis in AOT). The right axis is showing the measurements the Purple Air recorded (PM2.5 or microgram per cubic meter).

**Figure#1**



**Figure#2**



## Conclusion

We never found a conclusion to our research question. Our data showed that the air quality was not affected by the car exhaust. In the future we hope to take measurements closer to the ground and where more cars are running.

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