CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

S1215

Project Title

Using a More Sustainable Data Collection Method to Determine the Effects of the Pacific Decadal Oscillation on Particula

Abstract

Objectives/Goals

Our purpose this year is two-fold: investigating the role of the PDO (Pacific Decadal Oscillation) on atmospheric inversions and developing a lower cost, more sustainable method of collecting atmospheric data. Last year, we determined that the frequency and strength of atmospheric inversions in the San Lorenzo Valley were influenced by El Niño-caused sea surface temperature increases. This year, we are researching whether a longer term oceanic-atmospheric event, the PDO, affects the frequency of inversions and concentration of PM 2.5 (particulate matter less than 2.5 microns in diameter) which has a detrimental effect on human respiratory health. Every 20-30 years, when the PDO shifts from a warm phase (negative) to a cool phase (positive), we hypothesize that there will be a decrease in both the strength of inversions, and the number of days in which air quality standards for particulate matter are exceeded.

Methods/Materials

To support this hypothesis, we are correlating historical temperature data to the number of PM 2.5 exceedances in order to extend our data to include several oscillations of the PDO. Our second mission is to eliminate the need for expensive, consumable helium balloons and radiosondes, as well as modernize the data collection process. We have already re-engineered the data collection package, and are working on obtaining a drone to test as a launch vehicle. We are continuing to use the standard data collection and launch system to obtain our inversion measurements, until we have thoroughly tested and perfected our alternative method.

Conclusions/Discussion

We would like to thank Bob Nunes and Scott Norton from the Monterey Bay Unified Air Pollution Control District for their time and technical assistance.

Summary Statement

Identified a correlation through statistical analysis and extensive data collection between the PDO as well as PM 2.5 Concentrations

Help Received

We received logistical help from Jane Orbuch, a teacher at our highschool, but we also received data collection instruments from the MBUAPCD, all of the data we collected and analyzed is our own.