Name(s)	Project Number
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Project Title

The Pollution Solution: Why Ozone Levels May Thwart the Governor's Plan to Reduce Air Pollution in San Joaquin Valley

Abstract

Objectives/Goals

This project is a second-year study of an investigation initiated to develop basic methods of prediction for ozone concentrations. This year, we applied our new methods to one of Governor Schwarzenegger's plans. California will lose federal highway funds if it does not cut total air pollution in half by the year 2010; Governor Arnold Schwarzenegger has created a plan to help California meet its goal. We wanted to find out if ground ozone levels were entirely dependent on humans. We hypotheszied that ozone concentrations follow a natural cycle and can be predicted.

Methods/Materials

In our first method, we created three equations based on temperature and ozone readings from an air quality station in Bakersfield. Our second method was the "type curve" method; we found a direct correlation between temperature, time of year, time of day, and ozone levels, and we were able to create a graph that showed this. Both the first and second methods allowed us to predict ozone on a day-to-day basis. Our thid method was based on the sine curve pattern of ozone concentrations over 20 years. This method allowed us to ignore temperature data and predict ozone trends for up to ten years.

Results

Both the "equation" and "type curve" methods helped us prove one of our main hypotheses correct: The recommendation to abstain from exercise between hours of nine a.m. and six p.m. is not necessarily correct or applicable to all areas at all times of the year.

Using method three, we found that ozone levels will be centering around a higher average in years to come. This proved that ground ozone levels aren#t entirely dependent on humans; natural cycles influence these levels greatly.

When it came to our thoughts about global warming, however, we were wrong. By simply doing a few calculations on a TI-83 calculator, we were able to find that the temperature would only increase by a tiny fraction by 2010, and thus not affect the ozone levels significantly.

Conclusions/Discussion

The resulting amplitude, frequency, and center that we found helped us plot a sine curve, which showed us how ozone levels followed a natural cycle. Though ozone does depend on factors such as temperature and traffic counts, it is possible to predict levels over a period of several years based entirely on the natural cycle of ozone.

Summary Statement

Based on temperature data, we were able to predict future ozone concentrations; an analysis of ozone trends from 1980-2001 led us to conclude that ozone levels follow a natural cycle.

Help Received

Dr. Deborah Dreschler gave us ozone readings in the San Joaquin Valley; representative of Caltrans helped us learned about Governor Arnold Schwarzenegger's plan to create a #Hydrogen Highway;# Phiroze Patel helped us with any problems we had with Microsoft Excel.