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Computer Modeling V: A Predictive Model of Tracer Dispersion in the Atmosphere

Computer modeling is used to predict and examine complex systems such as environmental or atmospheric conditions. Over the past five years, I have developed a predictive atmospheric computer model.

The goal of this year's project is to complete and run a program capable of accurately modeling the dispersion of tracers in the atmosphere. This year I introduced new and more accurate equations to calculate wind speed and direction, temperature, the Coriolis Effect, diffusion, and the depth of the pollutant layer. With these additions, my model functions as an accurate prediction tool.

Each year in this project, I have focused on modeling single atmospheric conditions, such as temperature or wind, while using fixed values for the other variables. This year I combined these elements into a predictive program. The new program employs more complex equations which provide more accuracy. With these equations I reduced the margin of error in my program. Along with combining the existing elements, I added a new variable. This variable, h , represents the depth of the pollution layer.

To visualize my numerical data, I produced both two and three dimensional graphs using a variety of graphing methodologies. I used both Gnuplot and MATLAB to generate these graphs. These graphs were used to examine results and provided a more reasonable and accurate method for visualizing and isolating errors.

This year I have run real-world scenarios through my model. I ran the model in multiple simulations to show the impact of a pollution source on the surrounding community.