

Jessica Constant

*Computer Modeling IV: A Particulate Dispersion Model Employing Real-Time Wind Calculations*

Computer modeling is used to predict complex systems such as environmental or atmospheric conditions. Over the past four years, I have been developing an atmospheric computer model. The goal of this year's project phase is to create a program capable of accurately modeling the dispersion of particulates in the atmosphere. To that end, I introduced real-time wind calculations, vertical advection and vertical diffusion to the model. These additions allow the model to behave realistically as wind patterns shift. My model is now able to show an accurate representation of pollution dispersion. Horizontal and vertical advection, diffusion, and temperature are influencing factors implemented via functions, allowing the effects of each to be seen either on their own or in conjunction with each other. I modified my model to employ an "A-Grid" which maintains the horizontal wind, pollution and temperature variables in the same location on the grid. I also incorporated concepts and ideas from both my Lagrangian and Eulerian models. The data produced by the model was analyzed in 2 and 3 dimensional plots made with Gnuplot and MATLAB. The graphs were used to visualize the results and to isolate programming errors during development. The amount of data necessary to analyze pollution dispersion requires a computer model and a graphical depiction of the model's output. My model can be used to predict and view the dispersion of pollution particulates released into the Atmosphere. The addition of real-time wind calculations has yielded a true atmospheric model.