

## **Atmospheric Aerosol Measurement over Iowa**

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Measurements of aerosol optical depth (AOD) from NASA's MODerate resolution Imaging Spectroradiometer (MODIS) were compared to surface monitor data of particulate matter with aerodynamic diameter less than 2.5 micron (PM<sub>2.5</sub>) over Iowa during the 2000-2003 growing and harvesting seasons. Several notable episodes of elevated particulate concentration (i.e., relatively high values of particulate matter concentration/AOD) were identified and examined in more detail. The NOAA/ARL HYSPLIT -4 model was used to investigate the pathway of air masses reaching Iowa during several pollution episodes. Analysis of particulate matter (PM) speciation data files was conducted. Meteorological conditions associated with elevated aerosol levels were also analyzed. The usefulness of atmospheric mixed layer depth as a predictor of surface particulate concentration was evaluated. Particulate matter measurements near local corn and soybean fields were taken in October 2004 in order to investigate the influence of agricultural activities on atmospheric aerosol concentrations. Results of the limited field study showed that particle concentrations were generally lower than the National Ambient Air Quality Standard (NAAQS) for PM.

The correlation coefficients between AOD and PM<sub>2.5</sub> mass concentration were found to be near the low end but within the range of correlation coefficients reported in the literature. For each year of the study, elevated aerosol levels tended to occur from late June through early September. Backward trajectory transport forecasts are examined and underscore the importance of evaluating aerosol transport from upwind locations.

Speciation data analyses suggest that particulate matter over Iowa most likely originates from power generation and agricultural activities.

Vertical profiles of pollutant concentration and mixed layer depth displayed an inverse relationship. Analysis of weather patterns associated with elevated aerosol concentration emphasized the primary importance of meteorological information in air quality assessment.

The results of this study will be useful to researchers working in air pollution meteorology and other scientists involved in air quality monitoring, control and regulation.