

Biomass Burning and its Effect on PM₁₀ and PM_{2.5} Concentrations in Southeast Kansas

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ABSTRACT

This project combines the use of satellite imagery and field data to investigate the impact of biomass fires in an area of Southeast Kansas. PM₁₀ and PM_{2.5} data were collected during the years of 1999 and 2000 using portable mini-VOL particulate samplers. In addition to the gravimetric analysis performed on the samples, the amount of potassium (potassium is a signature element of biomass burning) was determined. Data were collected for five days during the month of April 1999 and nine days during the months of March and April 2000. Satellite imagery showing visible, 4-micron, 11-micron, and the difference between the 4 and the 11-micron (referred to as reflectivity product) were used to detect open fires in an area of Southeast Kansas. Trajectory and dispersion models were then run to identify the area influenced by the fires. An influence of open fires on the sampling area could not be established for the days analyzed based on model output. Data analysis showed that the relationship between concentration and sampling day was statistically significant at an $\alpha = 0.05$ for both PM₁₀ and PM_{2.5} during 1999, and for PM_{2.5} during 2000. The potassium analysis did not reveal any statistical significance for either the spatial or temporal factor. Therefore, it was concluded that although particulate concentrations exhibit temporal variance in the area, the incidence of open fires in the area was not a significant contributor to this variance, based on the data collected during this study.