Assessment of near-source air pollution at a fine spatial scale utilizing a mobile measurement platform approach

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Use of mobile measurement platforms is an emerging strategy to characterize spatially and temporally variable air pollution in areas near sources. EPA's Geospatial Measurement of Air Pollution (GMAP) vehicle, an all-electric vehicle measuring real-time concentrations of particulate and gaseous pollutants, was utilized to map air pollution trends near the Port of Charleston in South Carolina. High-resolution measurements were made along driving routes near several port terminals and rail yard facilities, recording geospatial coordinates and measurements of pollutants including black carbon, size-resolved particle count ranging from ultrafine to coarse (6 nm to 20 µm), carbon monoxide, carbon dioxide, and nitrogen dioxide. Additionally, a portable meteorological station was used to characterize local meteorology. Port activity data was provided by the Port Authority of Charleston and includes counts of ships and trucks, and port service operations such as cranes and forklifts during the sampling time periods. Measurements are supplemented with modeling performed with AERMOD and RLINE in order to characterize the impact of the various terminals at the Port of Charleston on local air quality. Specifically, the data are used to determine the magnitude of the increase in local, near-port pollutant concentrations as well as the spatial extent to which concentration is elevated above background. These effects are studied in relation to a number of potentially significant factors such as 1) source emissions as characterized by port activity data, 2) time of day, 3) type of pollutant, and 4) local meteorological characteristics.