

Field, Laboratory, and Theoretical Study of Soot Aerosol

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This project addresses the complexity of atmospheric soot particles, which are important light-absorbing particles and therefore of great interest for understanding climate forcing. Individual soot particles will be studied by electron tomography with transmission electron microscopy (TEM), which will provide information on 3-dimensional shapes, surface areas, volumes, and densities of the particles. As part of the project, the electron tomography method will be developed and refined with the goal of obtaining quantitative 3-D measurements of individual aerosol particles. Atmospheric particles will be collected during the MIRAGE (Megacity Impacts on Regional and Global Environment) field campaign in Mexico from research aircraft in collaboration with other project participants.

The goal of this research is to characterize the chemical and physical transformations and the ultimate fate of pollutants exported from urban areas. This project also includes laboratory studies of synthetic soot prepared under controlled conditions and its transformations under the influence of pollutants or physical processes, and theoretical calculations of radiative effects. This work will help improve our understanding of the role of aerosols in climate and air quality, and contribute to the education of undergraduate, graduate, and post-doctoral students.