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THE DEPARTMENT OF ENERGY'S TROPOSPHERIC AEROSOL PROGRAM (TAP): AN EXAMINATION OF AEROSOL PROCESSES AND PROPERTIES

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Fine particles (diameter <2.5 μm) exhibit elevated concentrations in industrialized and surrounding regions as a result of emissions of particles and of precursor gases followed by gas-to-particle conversion in the atmosphere. Many of the responsible emissions are associated with energy related activities. Fine particles are thought to be harmful to human health and deleterious to the environment through visibility reduction and deposition of acids and other substances to the surface. Fine particles are thought also to influence climate through light scattering and modification of cloud properties. Although many features of the aerosol life cycle are understood in a general way, much understanding is lacking of the details of the processes governing the mass loading, composition, and microphysical properties of aerosols, understanding that is necessary to develop effective strategies to reduce their adverse environmental effects efficiently from an energy and economic standpoint. A major new research program, the Tropospheric Aerosol Program (TAP, http://www.tap.bnl.gov) is being designed by the Department of Energy and the scientific community to provide such understanding. TAP will consist of four closely linked components: 1) Field measurement campaigns, typically within 200 km of major source regions, focusing on aerosol composition as a function of size and the processes that govern the evolution of size and composition; 2) Development and application of next-generation instrumentation for characterization of aerosols and precursor gases; 3) Laboratory and theoretical investigations focusing on aerosol transformation mechanisms; and 4) modeling of the atmospheric evolution of aerosol chemical and microphysical properties, and model evaluation making use of data from the field measurement campaigns. TAP is viewed as a component of a larger national aerosol program, contributing to and leveraging aerosol research efforts in other federal and state agencies, industry, and academia. This talk outlines the TAP objectives and approach.

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