Aerosol feedbacks on chemistry and climate at urban and regional scales

A fully-coupled meteorology-chemistry-aerosol model (WRF-Chem) is used to assess the impacts of BC and other aerosols on radiative forcing, weather and atmospheric chemistry. A series of simulations from different aerosol - cloud environments ranging from heavily polluted cities in East (Beijing) and South (Delhi) Asia to relatively clean coastal areas with permanent cloud cover (VOCALS experiment off the west coast of Chile/Peru) are simulated. The results are further analyzed using adjoint sensitivities of meteorological and cloud parameters calculated using a new adjoint model of WRF-Chem. We will also present new results testing a data assimilation technique to constrain modeled aerosol concentrations using satellite retrievals of cloud optical depth (COD) and liquid water path (LWP).