

Response of tropospheric aerosols to changes in anthropogenic emissions over Europe during the 1990-2009 period – a regional air quality study with COSMO-ART

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3:00 p.m. – Refreshments & Socializing

3:30 p.m. – Seminar

Foothills Lab 2, Room 1001

Abstract

Aerosols are of major concern for both human health and the climate system. Man-made emissions are a major contributor to this kind of pollution, but devising efficient strategies to reduce particulate matter concentrations is not straightforward: measurements show that most of the aerosol mass is secondary, it is the result mainly of oxidation processes on various trace gas precursors. Within the atmosphere, these interactions are complex and sometimes non-linear: while particulate sulfate over Europe responded to sulfur dioxide emission reductions as expected, measurements of wet deposition of nitrate over the last decades showed that reductions in particulate nitrate were often lower than decreases of its precursor emissions (nitrogen oxides), or even not observed at all. We present a comprehensive modeling study employing the regional chemistry-transport model COSMO-ART to investigate the reasons for this unexpected behavior. First, a detailed model evaluation is presented. Then, the inclusion of a wet-scavenging and aqueous-phase chemistry scheme is discussed. Finally, selected results of simulations with past (1990) and current (2009) emission amounts are shown in an effort to understand the response of secondary aerosol components to changes in precursor emissions.