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NESL's Atmospheric Chemistry Division Seminar

Atmospheric organics, ultrafine aerosols, CCN and climate

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Monday, April 1st, 3:30 p.m.

3:00 p.m. – Refreshments & Socializing
3:30 p.m. - Seminar

Foothills Lab 2, Room 1022

Abstract

Organic aerosol is responsible for a significant fraction of atmospheric aerosol mass, yet the impact of these organics on the climate effects of aerosols is still uncertain. In this talk, we will explore two questions relevant to organics and the climate impacts of aerosols: (1) How does the condensational behavior (i.e. stick irreversibly to the surface area vs. partition thermodynamically to the aerosol mass) and the total amount of secondary organic aerosol (SOA) impact aerosol size distribution and CCN predictions? Using a combination aerosol size-distribution measurements and modelling, we are able to constrain both the condensational behavior and the total amount of SOA mass formed. We find that during strong ultrafine-particle growth events, the newly formed SOA must be sticking irreversibly to the particles. We also find that an "anthropogenically influenced" source of ~100 Tg SOA yr^{-1} must be added to yield agreements with measured size distributions, similar to other recent estimates using different methods. (2) How do reactions between stabilized Criegee intermediates (CIs, reactive gas-phase zwitterion formed from the ozonolysis of alkenes) with SO_2 affect CCN predictions? Recently, the rate constant of the reaction of CIs+SO_2 to form sulfuric acid (which contributes to aerosol nucleation and growth) has been found to be significantly faster than previously thought. This discovery has been accompanied by much speculation as the to potential climate importance of this reaction. Upon inclusion of this mechanism into our global aerosol model, we find that the CIs+SO_2 reaction has a very weak impact on the aerosol climate effects globally, but over the Amazon the effect was found to be much stronger.