

263b Developments in Atmospheric Homogeneous Nucleation

Alicia J. Kalafut and Charles O. Stanier

The creation of new atmospheric particles via nucleation is an important source of atmospheric particles and may influence climate by altering the aerosol size distribution. While there are many theories to describe the process of nucleation, there are still significant gaps in the knowledge of new particle formation. We will report on a summer 2005 field study investigating the intensity, frequency, and temporal patterns of new particle formation at the Bondville Experimental Atmospheric Research Station in Bondville, IL. The goal of the field research is to better constrain new particle formation models based on the “ternary” ammonia-sulfuric acid-water system. We are particularly interested in quantifying the role of ammonia in enhancing new particle formation rates. A mobile laboratory for studying atmospheric new particle formation was constructed and tested. Using this setup, several weeks of simultaneous SO₂, NH₃, particle count and particle size distribution measurements were monitored at a Midwest sampling location to gauge the frequency, intensity and dependence of the nucleation events on NH₃ levels. Meteorology and aerosol chemistry data were monitored during the same period by colleagues. Measurements will be compared to simulations of ternary mechanism new particle formation for central Illinois showing that new particle formation should be frequent (due to high NH₃ levels), but that the growth of the particles should be limited due to relatively low SO₂ levels.