7AG.3

Investigating the Regional Scale Impacts of Amine-Sulfuric Acid New Particle Formation. JAN JULIN, Benjamin Murphy, Tinja Olenius, Oona Kupiainen-Määttä, Lars Ahlm, Saeed Falahat, David Patoulias, Christos Fountoukis, Hanna Vehkamäki, Spyros Pandis, Ilona Riipinen, *Stockholm University*

New particle formation (NPF) is an important contributor to atmospheric particle number concentration, and therefore an accurate description of the NPF process is essential for large-scale models to be able to correctly predict atmospheric particle number and its sensitivity to available gas phase species. Sulfuric acid is a central compound involved in atmospheric NPF, but to account for observed formation rates other compounds such as ammonia or dimethylamine are needed. Since both ammonia and amines are base compounds, they act to stabilize the sulfuric acid containing clusters and thus to enhance nucleation rates. Agricultural activities, specifically animal husbandry, are an important emission source of both ammonia and methylamines. While atmospheric amine concentrations are much smaller than the ammonia concentration, the role of amines in atmospheric NPF cannot be neglected as they have been shown to enhance formation rates over thousand-fold compared to ammonia.

PMCAMx-UF is a three-dimensional regional chemical transport model, which includes detailed aerosol microphysics and simulates both number and mass/composition size distributions. Thus far PMCAMx-UF has included two NPF pathways: ternary sulfuric acid-ammonia-water and binary sulfuric acid-water. For the present work we have updated PMCAMx-UF to include amines. As a central feature the updated version now also includes the sulfuric acid-dimethylamine NPF pathway in addition to the two aforementioned NPF mechanisms. The model has previously used a semi-empirical description for the ammonia NPF pathway, but in the updated version we treat both the ammonia and dimethylamine NPF pathways with an approach based on first-principles theory. The implemented NPF schemes are based on formation rate data produced by the Atmospheric Cluster Dynamics Code, which utilizes state-of-the-art quantum chemistry results to calculate cluster evaporation rates. We will present results where the updated version of PMCAMx-UF is applied to the European domain to assess the impacts of sulfuric acid-dimethylamine NPF.

7AG.4

Inhalable Particle Exposures in Northern Colorado Dairies. KIMBERLY ANDERSON, Josh Scaeffer, John Mehaffy, Jessy Tryon, Amanda VanDyke, Mary Bradford, Stephen Reynolds, T. Renee Anthony, Darrah Sleeth, John Volckens, *Colorado State University*

Exposure to bioaerosols is associated with adverse health effects such as cross-shift and longitudinal lung function decline, asthma, chronic bronchitis, wheeze, and cough. Agricultural workers are at particularly high risk of exposure to bioaerosols. Traditional methods to assess exposure to particles rely on the 37-mm closed faced cassette (CFC) sampler. However, the CFC undersamples particles >20 microns. The Personal Inhalable High-Flow Sampling Head (PHISH) sampler is a new low-cost, disposable inhalable sampler that operates at 10 L/min. This study evaluated worker exposures in four dairy parlors using PHISH and 37-mm CFC samplers. Sampling was conducted over the winter and spring. Samples were analyzed gravimetrically and compared between the PHISH and CFC. Mass concentrations for the PHISH sampler were on average 2.5 times higher than those observed for the CFC. Ratios between the PHISH and CFC sampler ranged from 0.54 to 3.39. Mass concentrations from area samples using the PHISH sampler were 1.4 times higher compared to the CFC samplers. Size distribution data collected during several of these field visits confirmed the presence of large airborne particles (> 20 microns aerodynamic diameter). This work highlights the importance of large particle exposures in several Colorado dairies and the need for improved exposure assessment (and control) technologies in agricultural settings.