Prediction of ambient nano-particles in the Eastern U. S.

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ENVIRON starts environmental consultancy since 1982 starting from only two places in U. S. - Arlington, VA and Princeton, NJ. Now it is an international corporate scattered all over the world – North and South America, Europe, Australia, and Asia. About 1250 employees are working in more than 70 offices on the globe. We help our clients to resolve their environmental and human health issues in general. To meet the goals, we collaborate across countries responding to existing challenges, evaluating opportunities to improve performance, or seeking to reduce future liabilities.

Among many environmental aspects, the office in Novato, CA has helped air related works mostly. To consult more efficiently and more accurately, the Novato office has developed a computational model which can simulate air pollutant levels in a regional area scale since 1996. The model is the Comprehensive Air quality Model with extensions (CAMx). This CAMx model can predict major pollutants such as Particulate Matter (PM) and ozone as well as trace gases including mercury and toxics.

PMCAMx uses a frame work of CAMx with more detailed processes related with Particulate Matter. This PMCAMx has been mostly developed by Carnegie Mellon University, and it is used to answer how scientific findings in laboratory scale could affect to regional scale area. As these science findings resolve many existing problems related with fine particles, people become to be interested in ultrafine particles (here, defined by nano-particles) due to their potentially danger health effects than fine particles. PMCAMx-UF is a modified version of PMCAMx to approach research of nano-particle in the atmosphere.

The three dimensional chemical transport model (PMCAMx-UF) is developed incorporating the TwO-Moment Aerosol Sectional (TOMAS) algorithm. Applying the ternary nucleation theory scaled by a constant nucleation tuner, the model simulates seventeen days in July, 2001 in the Eastern U. S. The predicted frequent nucleation events cover 100s to 1000s km mainly in the Ohio River Valley but also in a lot of areas in the Midwest and and the Southeast US. The predicted maximum and average number concentration above 3 nm over the whole domain are 67,000 and 8,700 cm^{-3}, respectively. The comparison of model predictions against Pittsburgh Air Quality Study (PAQS) measurements is encouraging.