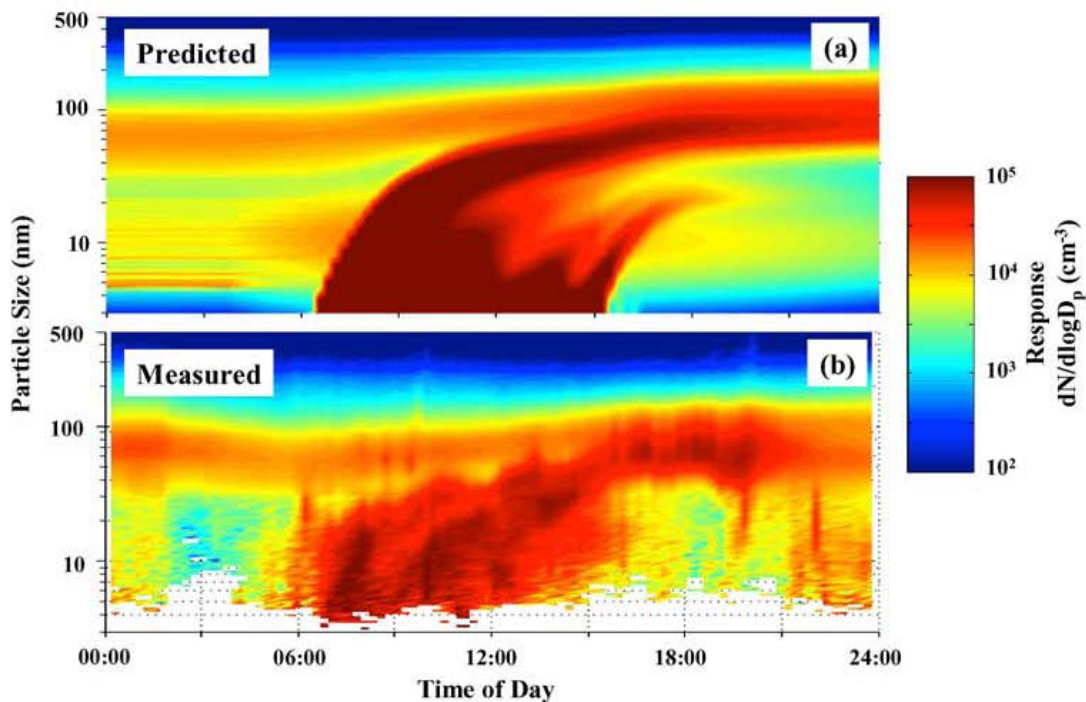


## Chapter 1: Project 10



The graph for Project 10 in Chapter 1 is taken from the publication Gaydos, T. M., C. O. Stanier, S.N. Pandis, “Modeling of in situ ultrafine atmospheric particle formation in the eastern United States,” in the Journal of Geophysical Research, Vol. 110 (2005), D07S12.

There the number of atmospheric aerosol particles (on the  $z$ -axis) is tracked as a function of time of day ( $x$ -axis), conditioned on particle size ( $y$ -axis). Top figure (a) shows the prediction of a computational model with aerosol physics and chemistry, while (b) plots the actual measurements at a surface site in Schenley Park, Pittsburgh PA on July 27, 2001. At the beginning of the time interval plotted, a stable mode centered on 80 nm is clearly visible while particles larger and smaller than  $\sim 80$  nm present in lower concentrations. From 4-6 AM, there

are small and intermittent increases in particle concentrations from 3-30 nm in size, probably the result of emissions from morning traffic. These traffic particles are measured but not modeled. At 6:30 AM, there is a large increase in the number of measured particles, and a sharp growth of small particles to larger sizes. This is caused by the formation of new particles at ~3 nm in size from the products of atmospheric chemical reactions, and their subsequent growth to larger sizes via condensation of photochemical reaction products. The model captures this behavior qualitatively but overestimates the number of new particles formed.