EAGER: Exploring the Ground-level and Elevated Sources of New Particle Formation Using Aerosol Size- and Hygroscopicity-resolved Turbulent Flux Measurement Technique

This EAGER project is a "proof of concept" effort to evaluate a new method for assessing new particle formation events in the atmosphere. A method has been developed to distinguish between ground-based and elevated sources of ultrafine particles by measuring the vertical fluxes of size-resolved particles and their ability to absorb water. Understanding new particle formation is critical to estimating ground level particle concentrations and designing effective air quality control strategies in urban areas.

The objectives of the study are to evaluate if:

(1) measurements of eddy covariance and size-selected and hygroscopicity-resolved relaxed eddy accumulation (Hy-RES REA) vertical fluxes of particles can be used to separate ground-level and elevated sources of new particle formation

(2) residual layer new particle formation events can be unambiguously linked to observed Class B nucleation events (during Class B events the smallest detected particle diameters are larger than about 10 nm in size) detected at the surface. During May of 2020, measurements will be made of size- and hygroscopicity-resolved vertical turbulent aerosol fluxes during 4 different time periods over the day at the Department of Energy's Southern Great Plains (SGP) site in Oklahoma, where a wealth of ancillary data are available, including long-term statistics of the diurnal boundary layer dynamics and diurnal profiles of aerosol number and hygroscopicity.

Publications:

Zimmerman, A. M. D. Petters, **N. Meskhidze** (2020), Observations of new particle formation, modal growth rates, and direct emissions of sub-10 nm particles in an urban environment, *Atmospheric Environment*, https://doi.org/10.1016/j.atmosenv.2020.117835 <Full text PDF>