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Abstract

Boreal forests, situated in a circumpolar belt in the Northern latitudes throughout the United States, Canada, Russia and Scandinavia, are, of all biomes, among the most active areas of atmospheric aerosol formation. The formation of aerosol particles and their growth to cloud condensation nuclei sizes in these areas are associated with biogenic volatile organic emissions from vegetation and soil.

One of the world's most comprehensive observation sites in a boreal forest environment, measuring atmospheric aerosols, biogenic emissions and an extensive suite of relevant atmosphere-biosphere parameters, is SMEAR-II (Station for Measuring Forest Ecosystem-Atmosphere Relations, Hari and Kulmala (2005)) in Hyytiälä, Finland. To capture the vertical and spatial variability of aerosol particles and clouds, the U.S. DoE's Atmospheric Radiation Measurement (ARM) Program operated ARM Mobile Facility 2 (AMF2) in Hyytiälä. "The Biogenic Aerosols - Effects on Clouds and Climate (BAECC) experiment (Petäjä, 2013) lasted for 8.5 months in 2014.

The BAECC provides a bridge from an 18-year long SMEAR-II observation record to the impact of biogenic aerosol on clouds, precipitation and climate. This will be achieved by simultaneous observations of precursor vapor emission, aerosol, cloud, and precipitation microstructure. With this dataset we: (1) link precursor emissions and aerosol, (2) link aerosol at the surface to aerosol in the mixing layer and free troposphere, (3) investigate the aerosol indirect effects on clouds and precipitation.