



Aerosol-Cloud Interactions During Puijo Cloud Experiments

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The Puijo measurement station has provided continuous data on aerosol-cloud interactions since summer 2006. The station is located on top of the Puijo observation tower (306 m a.s.l, 224 m above the surrounding lake level) near the town of Kuopio in Finland. The top of the tower is covered by cloud about 15 % of the time, offering perfect conditions for studying aerosol-cloud interactions. With a special inlet setup (total and interstitial inlets) and a switching valve system we are able to separate the activated particles from the interstitial (non-activated) particles. The continuous twin-inlet measurements include aerosol size distribution, scattering and absorption. Activation properties of these parameters are retrieved continuously. In addition cloud droplet number and size distribution are measured continuously with weather parameters.

This work summarizes the two latest intensive campaigns, Puijo Cloud Experiments (PuCE) 2010 & 2011, held at the tower. During the campaigns the twin-inlet system was additionally equipped with aerosol mass spectrometer (AMS) and Single Particle Soot Photometer (SP-2). This way we were able to define the differences in chemical composition of the activated and non-activated particles. Other additional measurements included Hygroscopic Tandem Differential Mobility Analyzer (HTDMA) for particle hygroscopicity. Potential cloud condensation nuclei (CCN) in different supersaturations were measured with two CCN counters (CCNC). The other CCNC was operated with a Differential Mobility Analyzer (DMA) to obtain size selected CCN spectra. Additionally the valuable vertical wind profiles (updraft velocities) are available from Halo Doppler lidar during the 2011 campaign. Cloud properties (droplet number and effective radius) from MODIS instrument onboard Terra and Aqua satellites were retrieved and compared with the measured values. The full usage of this special data set will provide new information on the properties and differences of activating and non-activating aerosol particles.