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Microphysical properties of low level clouds during four Pallas cloud experiments.

Konstantinos Doulgeris and David Brus
Finnish Meteorological Institute, Helsinki, Finland (konstantinos.doulgeris@fmi.fi)

Interactions between clouds and aerosols are associated with some of the largest uncertainties in predictions of climate change. Low level clouds in the Arctic influence the energy budget of the region. Continuous, semi-long term, ground based, in-situ measurements of low level clouds were conducted during the intensive Pallas Cloud Experiments (PaCE) in autumn of 2012, 2013, 2015 and 2017 in Finnish sub-Arctic region at Pallas-Sodankylä Global Atmosphere Watch (GAW) station. During each campaign the station was about 60 % of the time inside a cloud. Our main motivation during those campaigns was to investigate aerosol-cloud interactions using in-situ measurements techniques. Cloud microphysical properties were measured using two cloud probes that were installed on the roof of the main station: the Cloud, Aerosol and Precipitation Spectrometer probe (CAPS) and the Forward Scattering Spectrometer Probe (FSSP), both made by droplet measurement technologies (DMT), Boulder, CO, USA. CAPS in¬cludes three instruments: the Cloud Imaging Probe (CIP, 12.5 μm-1.55 mm), the Cloud and Aerosol Spectrometer (CAS-DPOL, 0.51-50 μm) with depolarization feature and the Hotwire Liquid Water Content Sensor (Hotwire LWC, 0 - 3 g/m3). The CAPS probe was fixed and heading to the main wind direction of the station. The FSSP probe was placed on a rotating platform, so that the inlet was always against the wind direction. All meteorological data were measured from Vaisala FD12P weather sensor. A detailed analysis of how all measured cloud microphysical properties were correlated with meteorological parameters was made.