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## In situ ground based measurements of low level clouds during 10 years of Pallas cloud experiments.

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Clouds and their interaction with aerosols are considered one of the major factors that are connected with uncertainties in predictions of climate change and are highly associated with earth radiative balance. Semi long term in-situ measurements of Arctic low-level clouds have been conducted during last 10 year (2009 - 2019) autumns at Sammaltunturi station (67°58' N, 24°07' E, and 560 m a.s.l.), the part of Pallas Atmosphere - Ecosystem Supersite and Global Atmosphere Watch (GAW) programme. During these years a unique data set of continuous and detailed ground-based cloud observations over the sub-Arctic area was obtained. The in-situ cloud measurements were made using two cloud probes that were installed on the roof of the station: the Cloud, Aerosol and Precipitation Spectrometer probe (CAPS) and the Forward Scattering Spectrometer Probe (FSSP), both made by droplet measurement technologies (DMT, Longmont, CO, USA). CAPS includes three instruments: the Cloud Imaging Probe (CIP, 12.5  $\mu\text{m}$ -1.55 mm), the Cloud and Aerosol Spectrometer (CAS-DPOL, 0.51-50  $\mu\text{m}$ ) with depolarization feature and the Hotwire Liquid Water Content Sensor (Hotwire LWC, 0 - 3  $\text{g}/\text{m}^3$ ). Vaisala FD12P weather sensor was used to measure all the meteorological data. The essential cloud microphysical parameters we investigated during this work were the size distributions, the total number concentrations, the effective radius of cloud droplets and the cloud liquid water content. The year to year comparison and correlations among semi long term in situ cloud measurements and meteorology are presented.