Microphysical properties of clouds and comparison of cloud probes' performance during the Pallas Cloud Experiments (PaCE).

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Atmospheric clouds are complicated systems which play a significant role in climate. Interactions between clouds and aerosols are associated with some of the largest uncertainties in predictions of climate change. Many of the climatically important cloud properties (e.g. albedo, precipitation rate and lifetime) depend, amongst other factors, on the number concentration of aerosol particles and on their chemical composition (Komppula, 2005; Lihavainen, 2008).

Continuous, semi-long term, ground based, in-situ cloud measurements were conducted during the last three intensive Pallas Cloud Experiments (PaCE) in autumns of years: 2012, 2013 and 2015. The campaigns were focusing on cloud and aerosols physico – chemical properties and their interactions. The measurements were conducted in Finnish sub-Arctic region at Sammaltunturi station (67˚58´N, 24˚07´E, 560 m a.s.l.), the part of Pallas Sodankyla - Global Atmosphere Watch (GAW) programme.

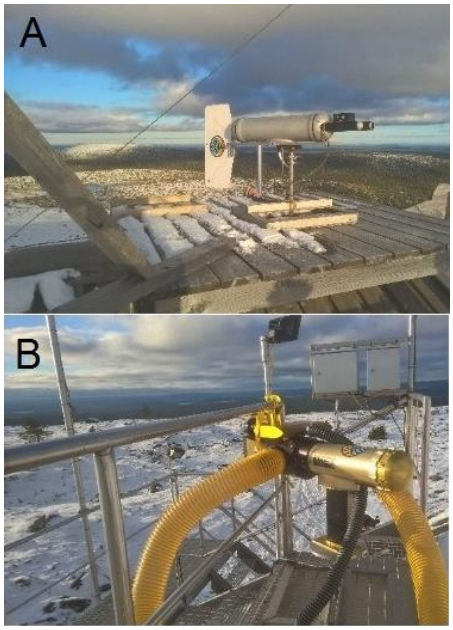

Figure 1. A) The FSSP probe and B) the CAPS probe, both as they were installed on Sammaltunturi station during PaCE 2015.

We made a detailed analysis of all measured cloud microphysical properties and how they were influenced by meteorology. Furthermore, we mutually compared and benchmarked performance of three cloud probes: the Cloud, Aerosol and Precipitation Spectrometer probe (CAPS), the Cloud Droplet Probe (CDP) and the Forward Scattering Spectrometer Probe **(**FSSP-100**),** all three made by DMT, Boulder, CO, USA. The FSSP and CDP were placed on a rotating platform, so that the inlet was always against the wind direction. The CAPS probe was fixed and heading the main wind direction at the station (NW) (see Fig.1).

The station is occasionally inside a cloud which allows direct measurements in aerosol-cloud interactions. Measurements were conducted during autumn because the probability of the station to be inside a cloud is higher than the rest of the year. According to long term measurements which were conducted during the last ten years (2015-2015), Sammaltunturi station is inside a cloud for about half of the time during October and November (Kivekäs, 2016).

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