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Microphysical cloud parameters of optically thin clouds in the Arctic in summer 2017

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As a precursor of the current MOSAiC campaign, the PASCAL campaign took place in summer 2017 around Svalbard [1]. In the scope of the project (AC)3, infrared radiation emitted by clouds was measured using a calibrated Fourier Transform Infrared Spectrometer (EM-FTIR). EM-FTIR can be used for different purposes, like the observation of trace gases or microphysical cloud parameters (MCP) like cloud optical depths and cloud effective droplet radii. In the observation of MCP, EM-FTIR can be used to measure optically thin clouds with very low amounts of liquid water paths below 30 gm-2, where microwave radiometer face problems because of their larger measuring uncertainty.

The retrieval of the MCP is performed using the newly introduced retrieval code CLARRA [2]. CLARRA shows a high accuracy in the retrieval of MCP from low-level clouds, which were often observed during the measurements.

The measurements were performed between June 2017 and August 2017 around Svalbard and include measurements of clouds over sea ice and open water. The spatial distribution of the MCP around Svalbard and a comparison to model results will be shown. This dataset can later serve as a reference for the question, how representative the measurements in Ny-Alesund on Spitzbergen are for the nearby arctic region.

[1] Wendisch et al., 2019: The Arctic Cloud Puzzle: Using ACLOUD/PASCAL Multi-Platform Observations to Unravel the Role of Clouds and Aerosol Particles in Arctic Amplification, Bull. Amer. Meteor. Soc., 100 (5), 841–871, doi:10.1175/BAMS-D-18-0072.1
[2] Rowe et al., 2019: Toward autonomous surface-based infrared remote sensing of polar clouds: retrievals of cloud optical and microphysical properties, Atmos. Meas. Tech., 12, 5071–5086, https://doi.org/10.5194/amt-12-5071-2019