北極における雲微物理特性の季節変化：ニーオルソンにおける通年直接観測

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Seasonal variation of Arctic cloud microphysical properties: One-year in situ measurements at Ny-Alesund

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Clouds over the Arctic potentially play important role on Arctic warming by affecting radiation budget. Aerosols are considered to perturb cloud microphysics and macrophysical properties in numerous ways. To study climatology of Arctic clouds and possible importance of aerosol effects, continuous in situ measurement of cloud microphysical properties was started at Mt. Zeppelin station, Ny-Alesund, Svalbard in November 2013 as a part of the GRENE Arcitc Research Project. Ny-Alesund is situated within the region of active transports of moisture and aerosols from lower latitudes. Therefore, it is the ideal place to study behaviors of Arctic clouds. In situ cloud measurements at Zeppelin were started also aiming at validaing the new 95 GHz Doppler cloud radar (Falcon-A), which as installed in Ny-Alesund village as a part of the GRENE project. The cloud radar can then be used to validate EarthCare satellite measurements of Arctic clouds. By linking the in situ measurements to satellite measurements, which cover the entire Arctic region, roles of clouds in the Arctic climate are expected to be studied.

At the Zeppelin observatory, forward scattering intensity of individual cloud particles with radii between 1.5 and 25 um were recorded using a fog-monitor instrument (DMT Inc., FM120). From this data, cloud size distribution and cloud liquid water content can be calculated. One-year data have been successfully obtained although measurement was ocasionally stopped due to observatory building reconstruction and instrumental troubles. Calibration of particle size measurement was repeatedly made by introducing standard glass beads with known size and refractive index.

In this paper we present preliminary results of one-year cloud measurements. We also present preliminary results of in situ measurement of precipitating particles (rain and snow) obtained with another instrument (DMT Inc., MPS) since July 2014.