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Properties of Arctic liquid and mixed-phase clouds from shipborne Cloudnet observations during ACSE 2014

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This supplementary material presents two case studies (Figures S1 and S2) regarding situations in which a cloud system (i) extends through the inversion and (ii) precipitates ice versus liquid water. The figures display the cloud radar reflectivity together with the height of the main and secondary inversions, the Cloudnet target mask, and the cloud-top temperature as well as the classification of a cloud profile into mixed, liquid, or ice.

We also present scaled in-cloud profiles of temperature, LWC, and IWC for warm and cold single-layer mixed phase clouds during summer and autumn (Figure S3) analogous to the in-situ aircraft profiles in Figures 3, 4c, and 5c in *Mioche et al.* (2017). We followed the description in *Mioche et al.* (2017) to focus on single-layer mixed phase clouds. The observations were separated into clouds with a top temperature in the range from -8°C to -15°C (warm clouds) and with a top temperature in the range from -15°C to -22°C (cold clouds). Note that the airborne in-situ measurements shown in *Mioche et al.* (2017) took place in March, April, and May around the Svalbard archipelago while ACSE observations cover July, August, and September as well as a different region.

Mioche, G., Jourdan, O., Delanoë, J., Gourbeyre, C., Febvre, G., Dupuy, R., Monier, M., Szczap, F., Schwarzenboeck, A., and Gayet, J.-F.: Vertical distribution of microphysical properties of Arctic springtime low-level mixed-phase clouds over the Greenland and Norwegian seas, Atmos. Chem. Phys., 17, 12845–12869, https://doi.org/10.5194/acp-17-12845-2017, 2017.

Case study of a cloud system that extends through the inversion

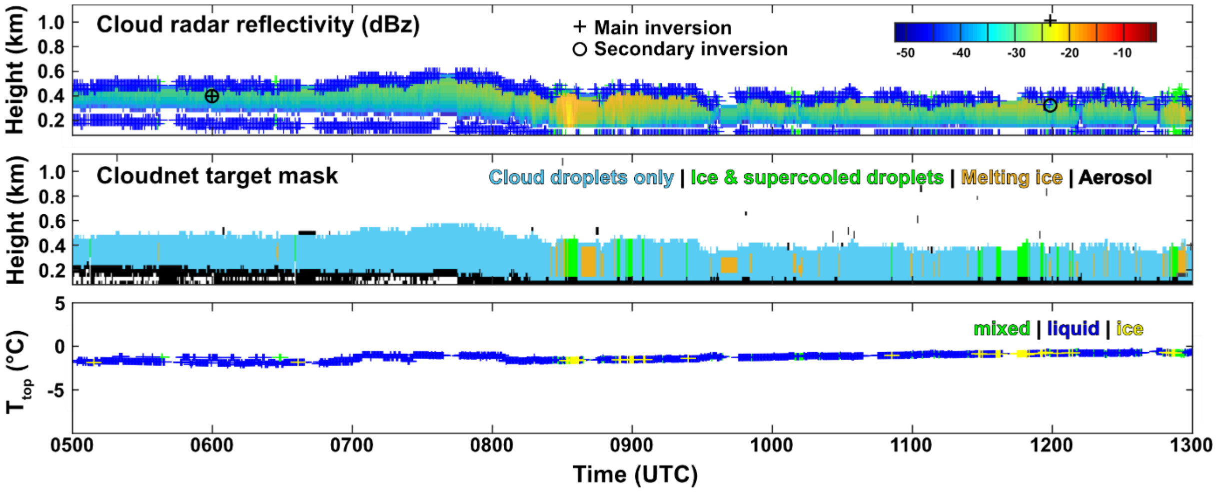

Figure S1: Time series of cloud radar reflectivity, Cloudnet target mask, cloud-top temperature, and cloud base and top height for the time period from 0500 to 1300 UTC on 24 July 2014. Crosses and circles mark the location of the main and secondary inversion, respectively.

Case study of a cloud system that is precipitating ice versus liquid

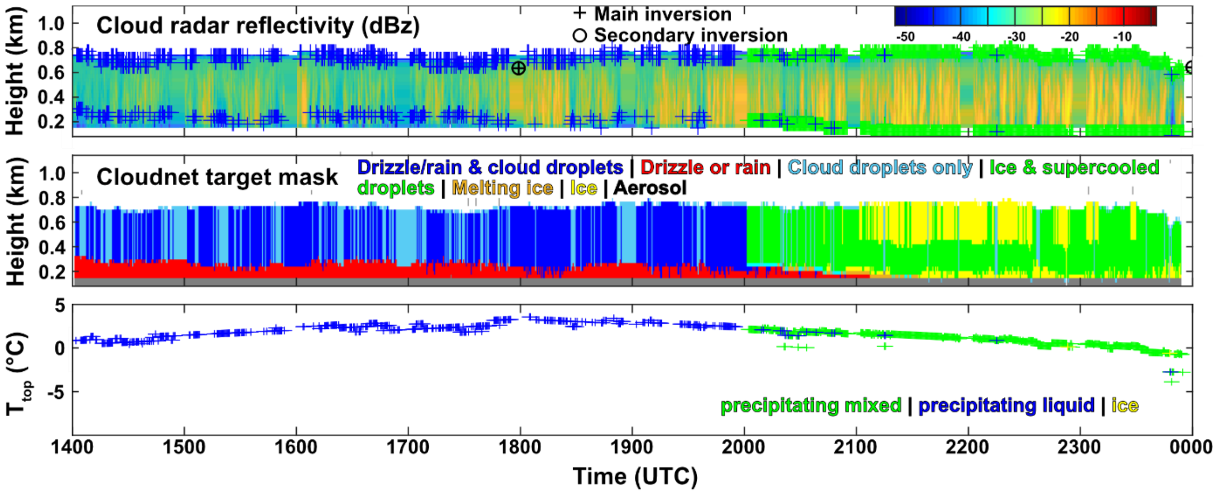

Figure S2: Time series of cloud radar reflectivity, Cloudnet target mask, cloud-top temperature, and cloud base and top height for the time period from 1400 to 0000 UTC on 25 August 2014. Crosses and circles mark the location of the main and secondary inversion, respectively.

Comparison to scaled profiles in Mioche et al. (2017)

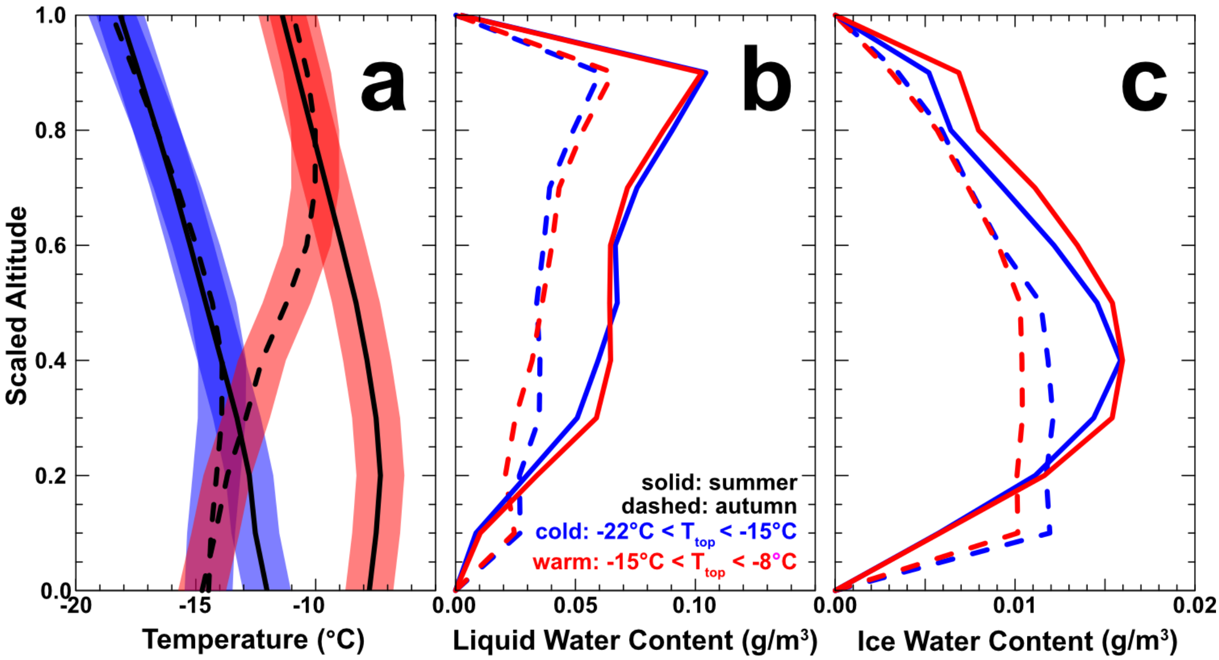

Figure S3: Scaled in-cloud profiles of temperature, LWC, and IWC during summer (solid lines) and autumn (dashed lines) for single-layer mixed-phase clouds sorted into the warm and cold categories analogous to *Mioche et al.* (2017).