

## Research Highlight

Over the North Slope of Alaska, researchers used cloud radar Doppler velocity spectra, lidar backscattering coefficients and depolarization ratios, and aircraft in situ measurements to investigate microphysical processes occurring in a case of multilayered, mixed-phase clouds.

The observations suggest that strong cloud-top cooling was necessary to produce well-mixed cloud layers. Clouds shielded from radiative cooling by overlaying clouds more frequently existed in absolutely stable layers. The in situ measurements revealed that most liquid layers contained drizzle, which the radar and lidar measurement production process showed was interrupted only during heavier ice-precipitation events. Different layers interacted with one another by changing the radiative heating profile and by precipitation, which changed the growth paths available to cloud particles and even initiated new hydrometeor classes.

Precipitating arctic cloud systems frequently consist of multiple liquid-cloud layers at different altitudes. Physical processes in these clouds are complex, with different liquid cloud layers interacting through multiple processes.

## Reference(s)

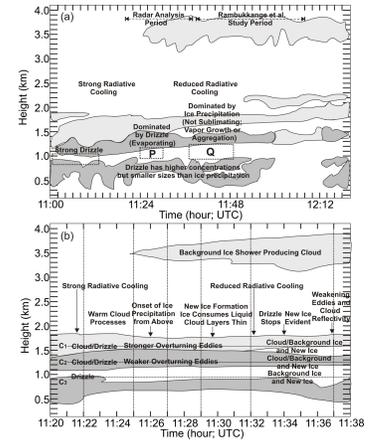
Verlinda J, MP Rambukkange, EE Clothiaux, GM McFarquhar, and EW Eloranta. 2013. "Arctic multilayered, mixed-phase cloud processes revealed in millimeter-wave cloud radar Doppler spectra." *Journal of Geophysical Research – Atmospheres*, 10.1002/2013JD020183. ACCEPTED.

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## Working Group(s)

Cloud Life Cycle



Summary diagrams of the cloud and precipitation features that emerged from the measurements from (a) 11:00–12:20 UTC and (b) 11:20–11:38 UTC on 6 October 2004. Regions P and Q in Figure 1a demarcate drizzle and ice-precipitation-dominated periods, respectively. Liquid-cloud layers in dark grey were those detected by the HSRL, while those in light grey were inferred from the smallest hydrometeor velocities in the Doppler spectra.