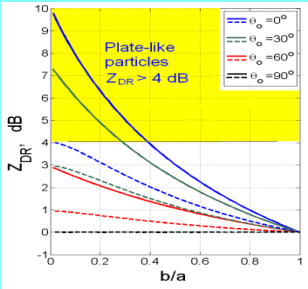
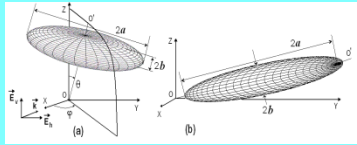


How to identify plate-like ice particles in clouds ?



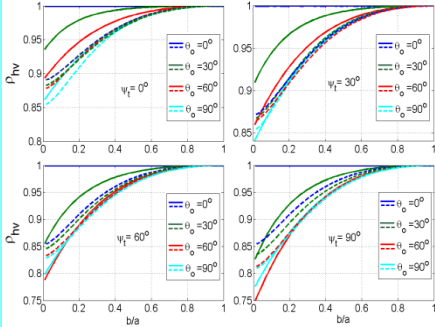
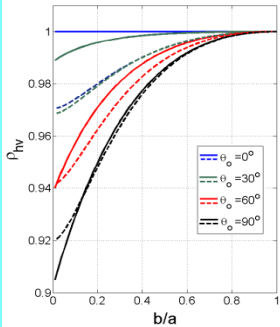
Geometry of scattering for (a) plate-like and (b) column-like particles.

If measured $Z_{DR} > 4$ dB, then particles have plate-like shapes

Z_{DR} as a function of b/a for plate-like (solid lines) and column-like (dashed lines) particles. Particles flatter in the air; θ_0 is the maximal flatter angle.

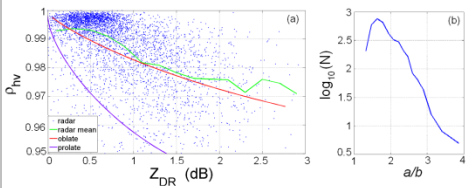
Additional information on particles' shapes can be obtained from ρ_{hv}

Alternate transmission Simultaneous transmission



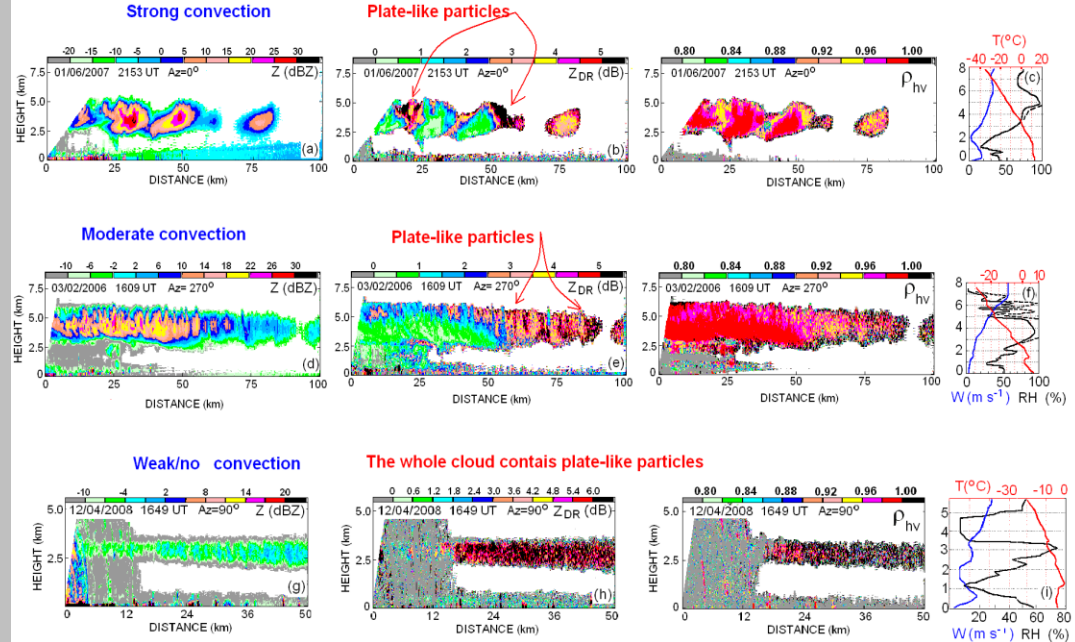
Copolar correlation coefficient ρ_{hv} as a function of b/a . For the alternate transmission, ρ_{hv} is always larger than 0.90. For the simultaneous transmission, ρ_{hv} can be as low as 0.75 and depends on the differential phase upon transmission ψ_t .

Radar observations with WSR-88D KOUN 27 Jan 2009

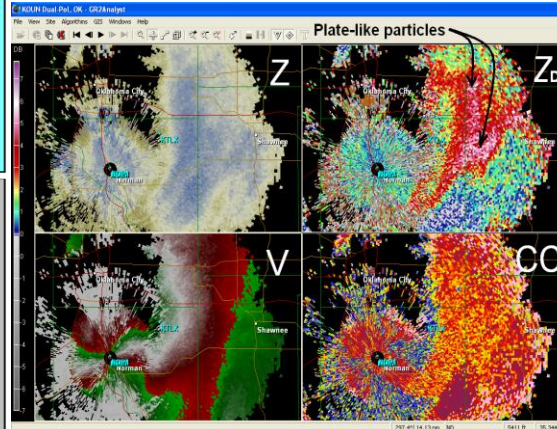


$Z_{DR} - \rho_{hv}$ scatter-plot allows obtaining distributions $N(b/a)$ of particles on the aspect ratios, i.e. b/a . The radar phase upon transmission should be known (measured)

Radar observations with the dual-polarization WSR-88D KOUN



Vertical cross sections of Z , Z_{DR} , and ρ_{hv} . The right column represents corresponding rawinsonde data: the wind speed (W), temperature (T), and relative humidity (RH). Areas with $Z_{DR} > 4$ dB contain plate-like ice particles.



CONCLUSIONS:

- Areas with $Z_{DR} > 4$ dB contain plate-like ice particles. Such areas are observed in clouds with strong and weak convection.
- The copolar correlation coefficient ρ_{hv} in icy cloud areas is larger than 0.90 for the alternate transmission mode. In the simultaneous transmission mode ρ_{hv} can be as low as 0.75 and depends on the differential phase upon transmission.
- $Z_{DR} - \rho_{hv}$ scatter-plots allow obtaining the aspect ratio distributions, i.e., $N(a/b)$. The system phase upon transmission should be measured.