

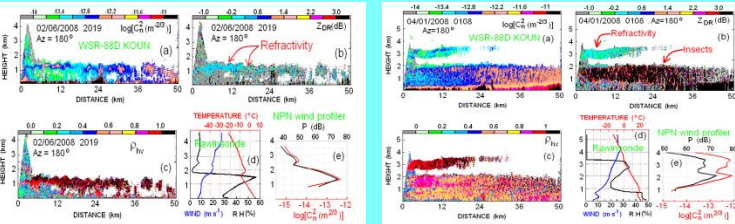


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## Radar observations in clear air

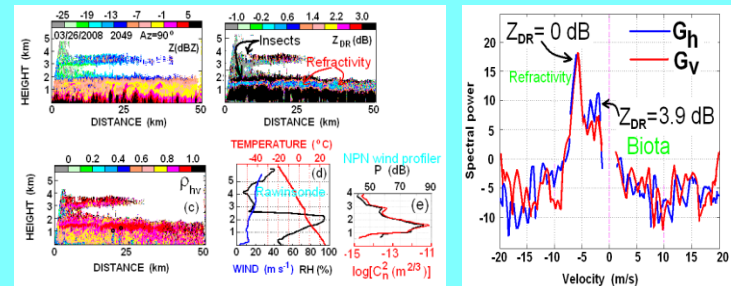
### Clear air, no insects

### Refractivity above insects



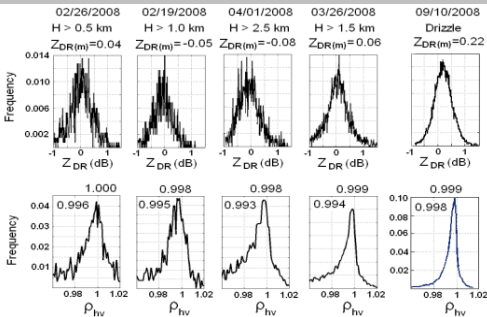
Refractivity echoes exhibit  $Z_{DR} \approx 0$  dB and  $\rho_{hv} \approx 1.0$ . Rawinsonde and wind profiler data support identification of echoes as Bragg scatter.  $C_n$  is the refractive structure index parameter,  $W$  is the wind speed,  $T$  is temperature,  $RH$  is relative humidity, and  $P$  is the signal power from the wind profiler.

### Mixture of refractivity and insects



Polarimetric spectral analysis allows distinguishing refractivity and biota echoes: refractivity echoes have  $Z_{DR} \approx 0$  dB. The right panel is the Doppler spectra at horizontal ( $G_h$ ) and vertical ( $G_v$ ) polarizations. Note different  $Z_{DR}$  at the peaks.

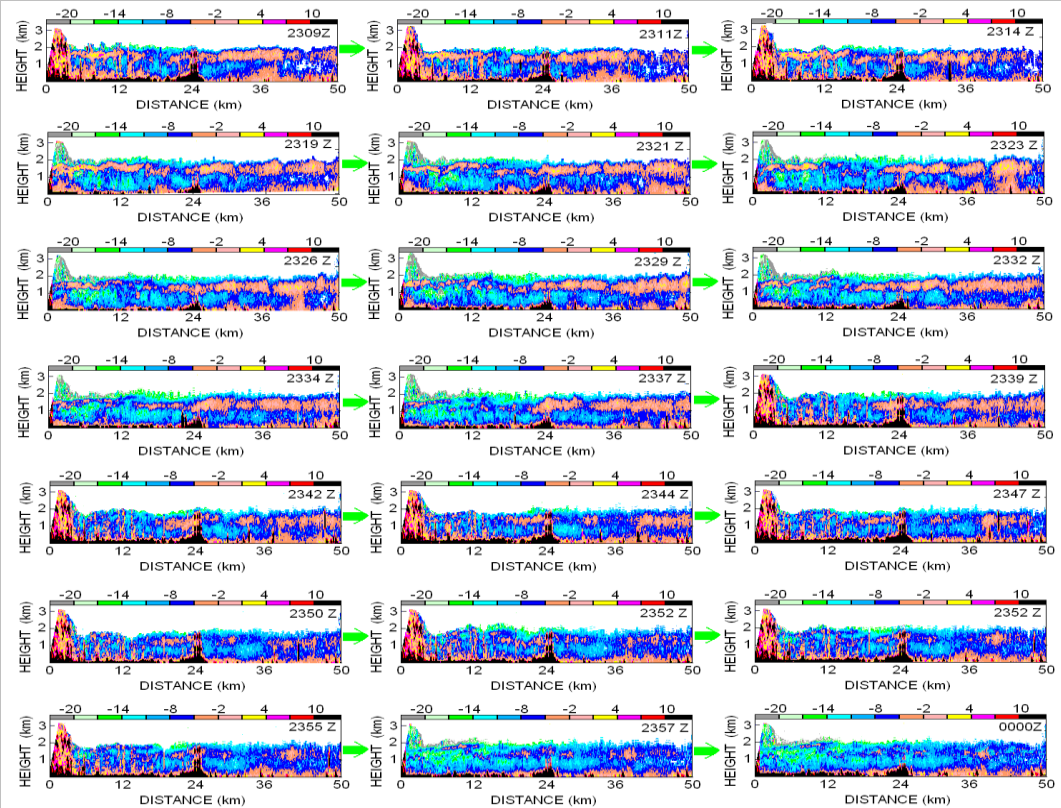
## Polarimetric properties of Bragg scatterers



Measured  $Z_{DR}$  and  $\rho_{hv}$  for Bragg scatterers:  
 $-0.08 < Z_{DR} < 0.06$  dB  
 median  $\rho_{hv} > 0.993$ .

$Z_{DR} = 0$  dB from refractivity can be used to verify radar calibration

## Time evolution of refractivity fields



Vertical cross sections of Bragg scatterers 1 March 2008 at  $Az = 180$ . Cooling down of the CBL 'soup' in the local evening.

- CONCLUSIONS:**
- $Z_{DR}$  of refractivity is about 0 dB. This can be used to identify echoes from Bragg scatterers.  $Z_{DR} = 0$  dB can be used to verify  $Z_{DR}$  radar calibration.
- Polarimetric spectral analysis allows distinguishing between echoes from Bragg scatterers and active biota fliers in the same volume. The spectral peak from refractivity has  $Z_{DR} = 0$  dB whereas active biota possesses significantly larger  $Z_{DR}$ .
- Radar observations of refractivity allow obtaining the top of the convective boundary layer and can be used to monitor convection.