

# Selected topics

- Scattering mechanisms
- Phenomenology: sheets, layers, gravity waves, KHI
- Vertical-velocity biases
- Computational investigations using LES and DNS
- Imaging

# Scattering mechanisms

## **Bragg scatter:**

The echo intensity of a monochromatic test wave with radar wave number  $k$  is proportional to  $\Phi_n(2k \mathbf{n})$ , where

- $\Phi_n(\mathbf{k})$  is the 3D refractive-index spectrum
- $\mathbf{k}_B = 2k \mathbf{n}$  is the radial Bragg wave vector.

## **Fresnel scatter:**

Echoes from thin interfaces or turbulent layers, such that the beam-transverse correlation length of the Bragg wave vector component of the refractive-index field is large compared to the Fresnel length.

**Note:** Fresnel scatter is a special case of Bragg scatter.

**Note:** Fresnel scatter is aspect sensitive.

## **Rough-interface scatter:**

Echoes from thin interfaces whose roughness (at horizontal scales comparable to the Fresnel length) is large compared to  $1/8$  of the radar wavelength (Rayleigh criterion).

**Note:** Rough-interface scatter is also a special case of Bragg scatter.

