Rate of attenuation

- Loss of power as the pulse passes from the antenna to the target and back.

- Gases, water vapor and oxygen, act as absobers, re radiate in random direction. Effect small when λ greater than a few cm.

- Large snowflakes and rain both scatter and absorb.

- Rate depending on λ and precipitation intensity

Radar reflectivity factor and rain gauge

$$Z = \frac{1}{\Delta V} \sum_{i=1}^{N} D_i^6 = \int_0^\infty N(D) D^6 \, dD \qquad \text{RECEIVED POWER} \quad \sigma_{RAYLEIGH} \sim D^6$$

number of drops with diameter D $\sim m^{-3}$

$$R = \frac{\pi \rho}{6} \int_0^\infty D^3 N(D) V_t(D) \, dD \quad [mm/h]$$

terminal velocity for drop with diameter D

$$Z = A R^b \qquad A, b \text{ must be estimated}$$

For stratiform precipitation $Z = 200 R^{1.6}$