Matrix Measurement Technique

Backscattered signal is recorded on all three channels as QWP rotates. This provides full coverage of the backscatter matrix parameter space. Data shown is from a rain storm containing large (flattened) raindrops on July 16, 2012 in Boulder, CO.

Polarization and Lidar

Randomly Oriented

Depolarization Ratio

\[ d_r = \frac{d_{||}}{d_{\perp}} \]

Backscatter Matrix

\[
F_{\text{Random}} = \begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & -1
\end{bmatrix}
\]

Oriented

Additional Polarization Data Products

- Horizontal/Vertical Depolarization
- Circular Depolarization
- Diattenuation
- Retardance

Oriented Ice Crystal Observations

Ground based observations over Boulder, CO with the lidar tilted 30° off zenith.

June 23, 2012 19:00 MDT
-17°C at oriented crystal altitude
Observed Oriented Duration: 40 min

June 30, 2012 23:00 MDT
-12°C at oriented crystal altitude
Observed Oriented Duration: 3 min

July 2, 2012 07:00 MDT
-11°C at oriented crystal altitude
Observed Oriented Duration: 50 min

Observed Oriented Duration: 40 min - June 23, 2012 19:00 MDT
-17°C at oriented crystal altitude
Observed Oriented Duration: 40 min

Observed Oriented Duration: 3 min - June 30, 2012 23:00 MDT
-12°C at oriented crystal altitude
Observed Oriented Duration: 3 min

Observed Oriented Duration: 50 min - July 2, 2012 07:00 MDT
-11°C at oriented crystal altitude
Observed Oriented Duration: 50 min