Drizzle rates derived from the Phase Doppler Interferometer onboard the Twin Otter

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1-100Hz size distributions of drop concentration, surface area, volume, terminal velocity, mass, etc. can be derived.

Fundamentally measures cloud drop size and velocity.

Phase Doppler Interferometer (PDI)
LWC Comparison with Gerber Probe

- PDI LWC
- Gerber LWC
- PDI corrected to Gerber LWC

Seconds Since 00Z

LWC (g/m$^3$)
Drizzle Rate

\[ dR_i = \frac{\pi}{6} D_i^3 \left( \frac{dN}{d \log d} \right)_i (\Delta \log D_i) w_T (D_i) \]
## TO Flights

<table>
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<th>RF#</th>
<th>Date</th>
<th>PCASP (Sub)</th>
<th>Cloud top z</th>
<th>PDI R</th>
<th>Wind speed</th>
<th>SST</th>
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<th>Approx. LWP</th>
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RF8: 10/27

- CB, R=0.02 mm/day
- MC, R=0.05 mm/day
- CT, R=0.09 mm/day

Log of Drop Diameter vs. $dR/d(\log \phi)$
RF10:10/30

- CB, $R=0.06$ mm/day
- MC, $R=0.11$ mm/day
- CT, $R=0.13$ mm/day
MASE

July 16, 2005

- Cloud Top, $R=0.57$ mm/day
- Mid-Cloud, $R=0.49$ mm/day
- Cloud Base, $R=0.15$ mm/day

$dR/d(\log D_p)$ vs. Drop Diameter (µm)

Range: 7 to 100 µm
Mid Cu, \( R=0.02 \) mm/day
Between, \( R=0.05 \) mm/day
CB, \( R=0.14 \) mm/day
MC, \( R=0.28 \) mm/day
CT, \( R=1.10 \) mm/day
RF12:11/02

\[ 50 \times 10^{-3} \]

Drop Diameter (\( \mu m \))

- CB, \( R = 0.07 \) mm/day
- MC, \( R = 0.37 \) mm/day
- CT, \( R = 0.78 \) mm/day
Mid

- 27, R=0.05 mm/day
- 30, R=0.11 mm/day
- 01, R=0.28 mm/day
- 02, R=0.37 mm/day

Drop Diameter (μm)
Base

-  27, $R=0.02$ mm/day
-  30, $R=0.06$ mm/day
-  01, $R=0.14$ mm/day
-  02, $R=0.07$ mm/day
Conclusion

• In terms of drizzle, clouds at Point Alpha are generally not well-developed
• Exceptions are Nov 1\textsuperscript{st} and 2\textsuperscript{nd}