

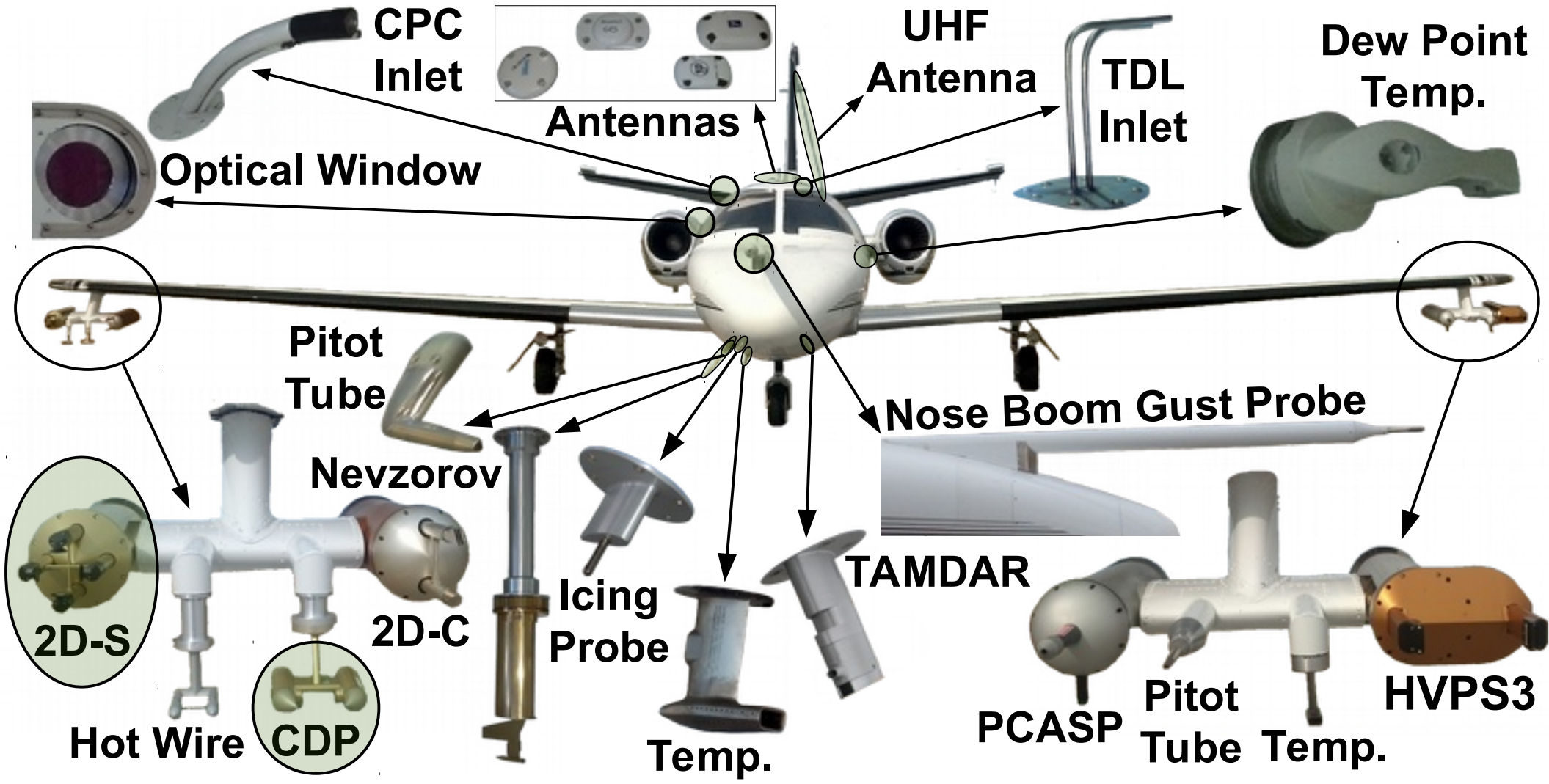
CAPE2015 Research Aircraft Measurements

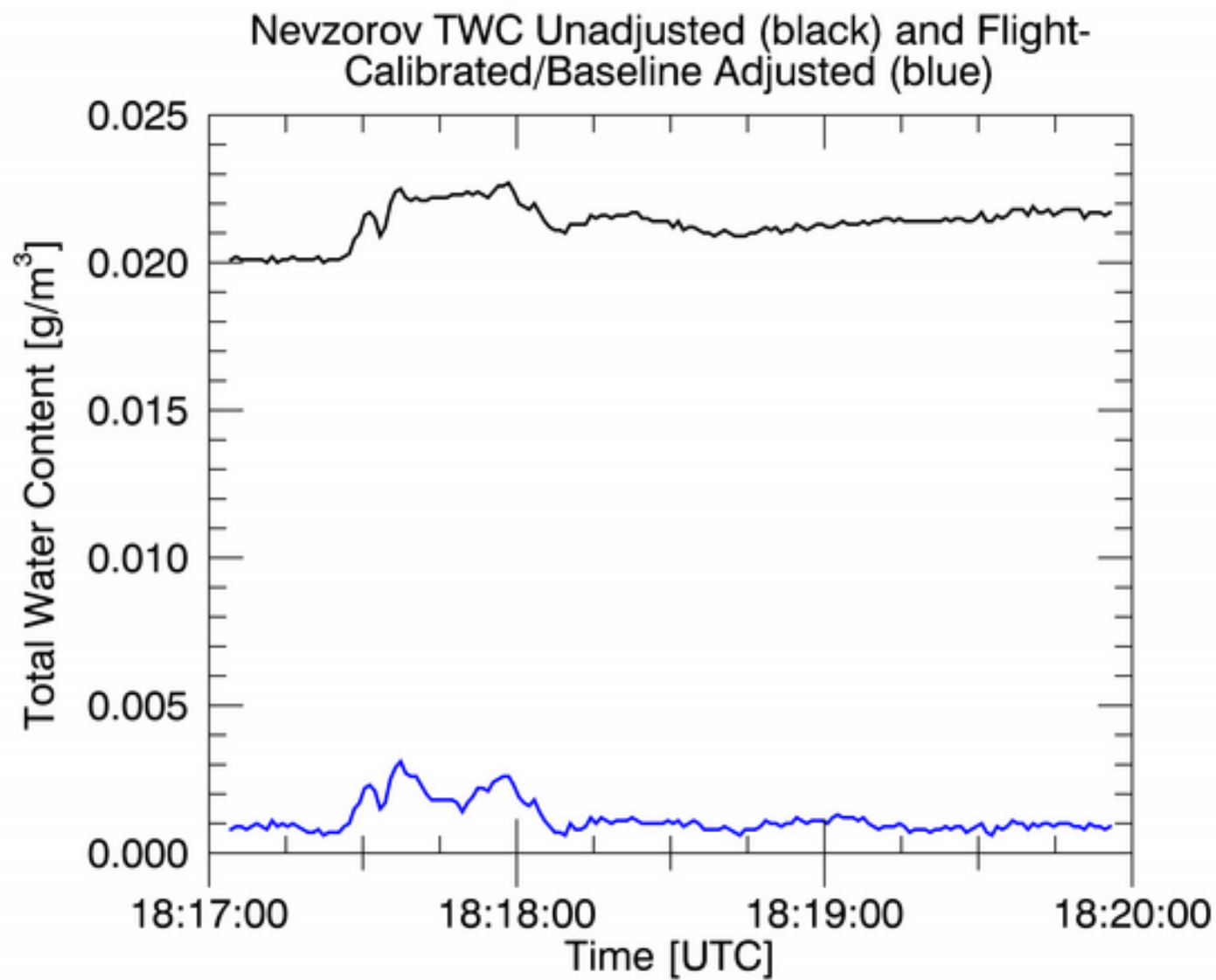


David Delene

**Atmospheric Sciences Department
University of North Dakota**

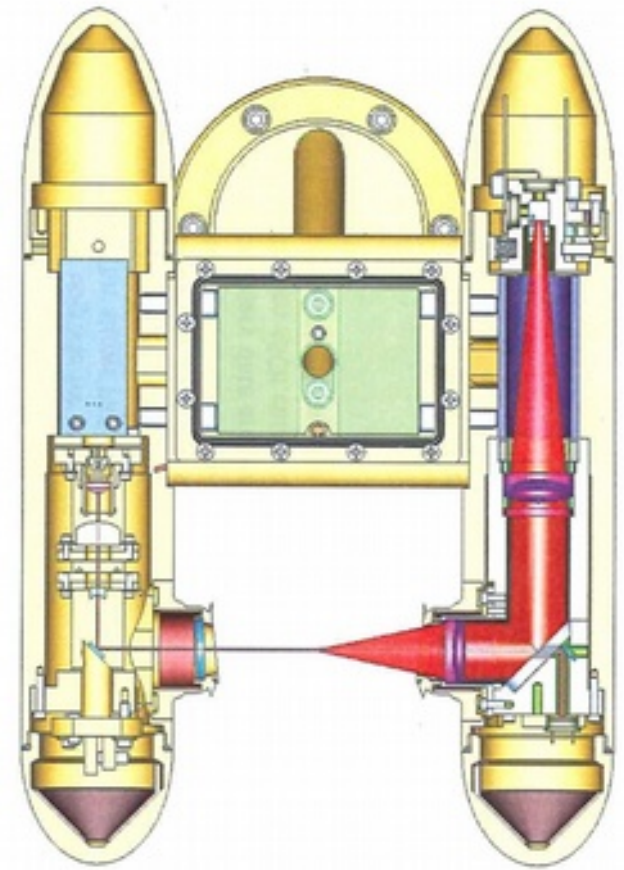
CAPE2015: Cirrus Anvils, Florida, 8 Flights





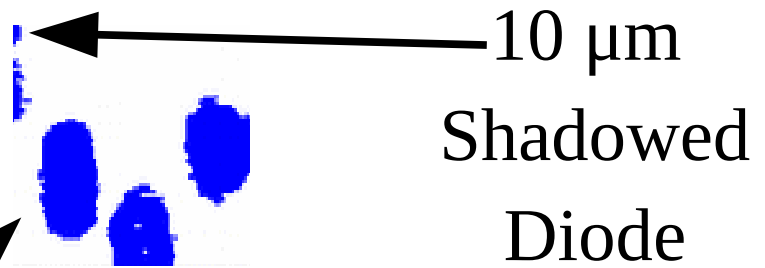
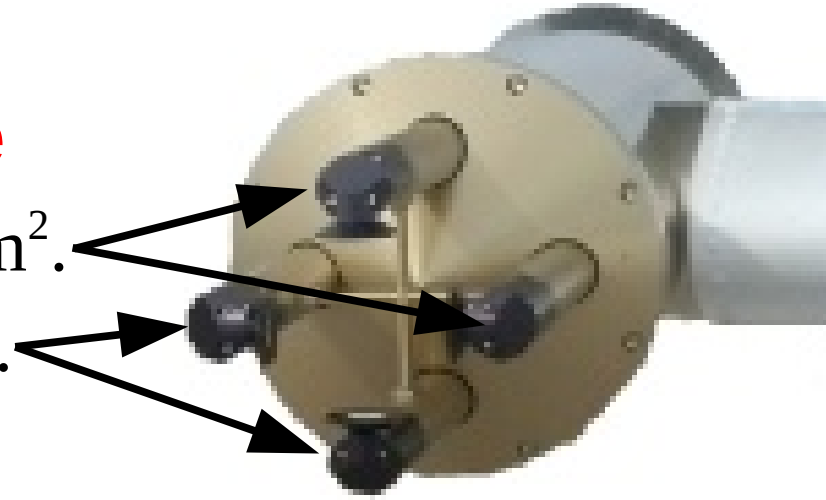
Cloud Droplet Probe

- Measurement of the cloud droplet spectrum in 30 channels between 2 and 50 μm diameter.
- Forward scattering between 3 - 12⁰
- Uses Mie scattering to determine particle diameter by assuming Spherical water droplets.
- 10 Hz sampling frequency with particle-by-particle information on first 256 particles per sampling interval.
- 24 cm³ sample Volume ($0.024 \text{ cm}^2 * 100 \text{ m/s} * 0.1 \text{ s}$)



Two-Dimensional Stereographic (2D-S) Probe

- Orthogonal laser light sheet $\sim 0.793 \text{ cm}^2$.
- Arrays of 128 diodes which are $10 \text{ }\mu\text{m}$.
- Captures shadow images of particles.
 - Data post-processing uses 29 size bins, 10 to $2,000 \text{ }\mu\text{m}$ in diameter.
 - Use one second-averaged data.



Spatial Distribution of Cloud Particles

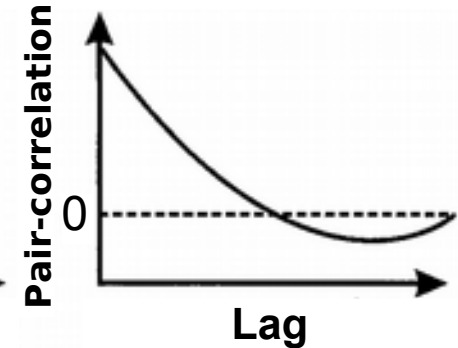
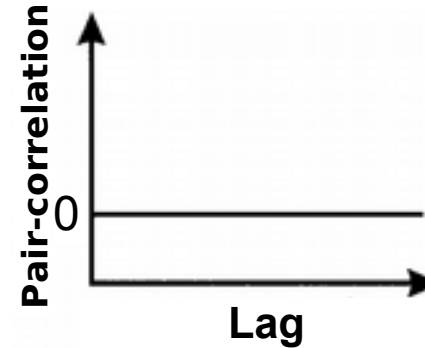
POISSON

PATCHY

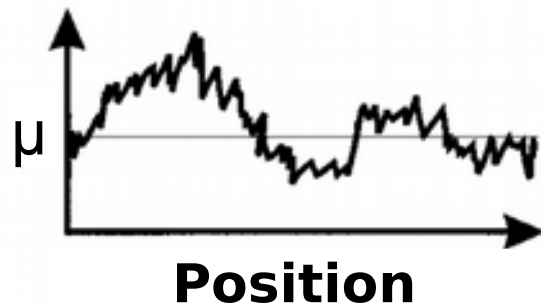
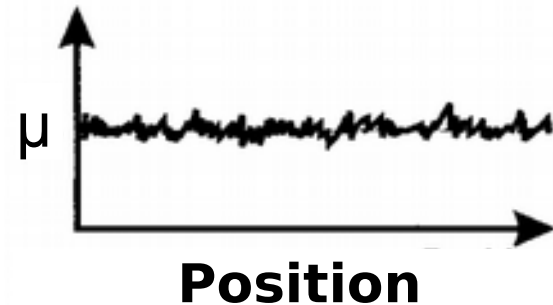
Clouds



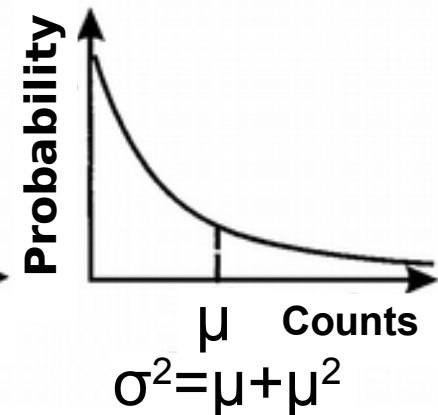
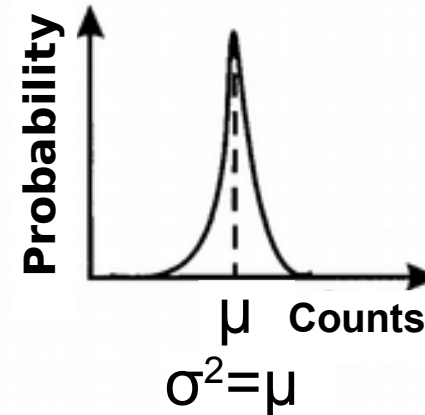
Pair-correlation Function



Counts

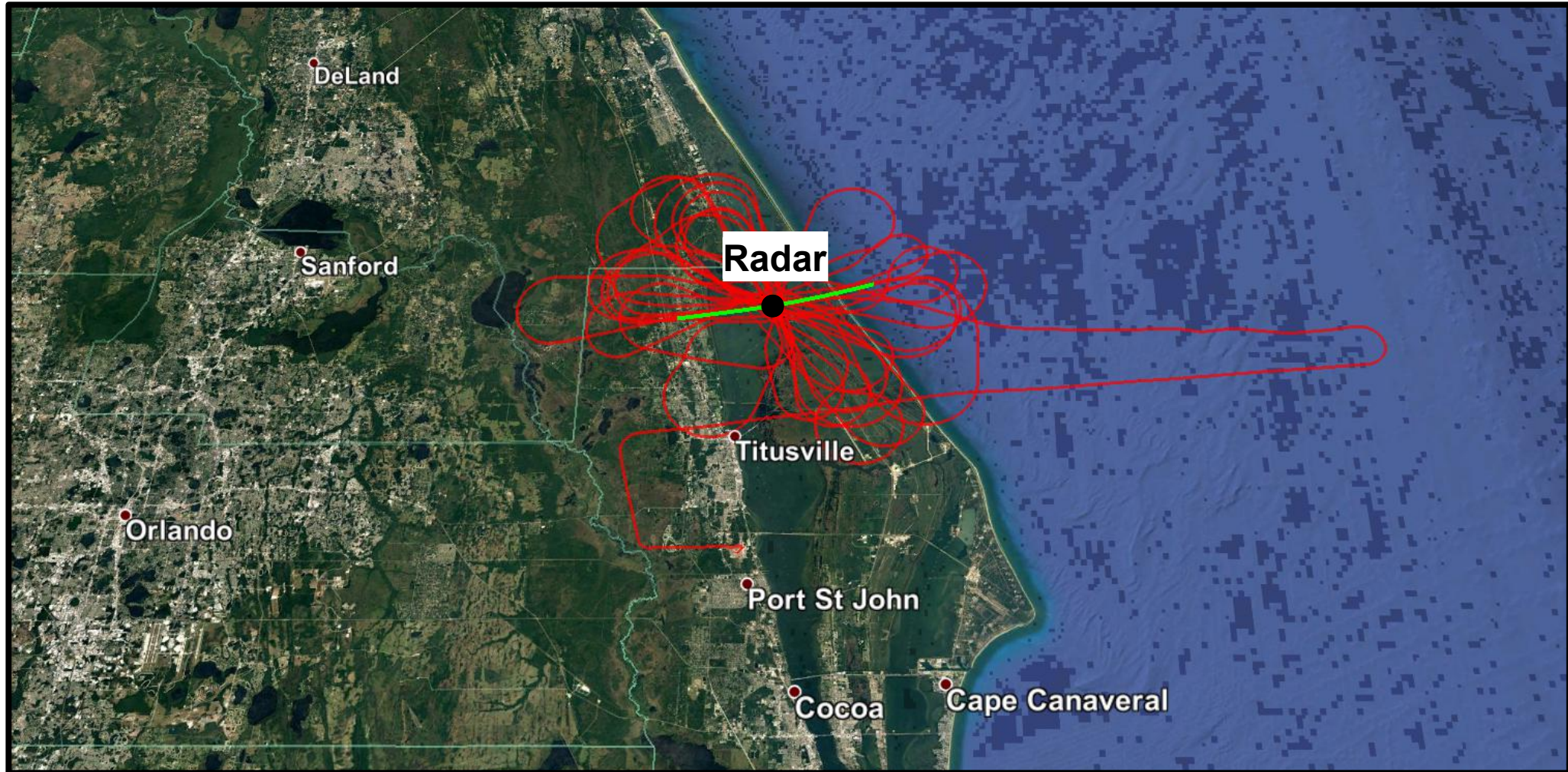


Probability Densities

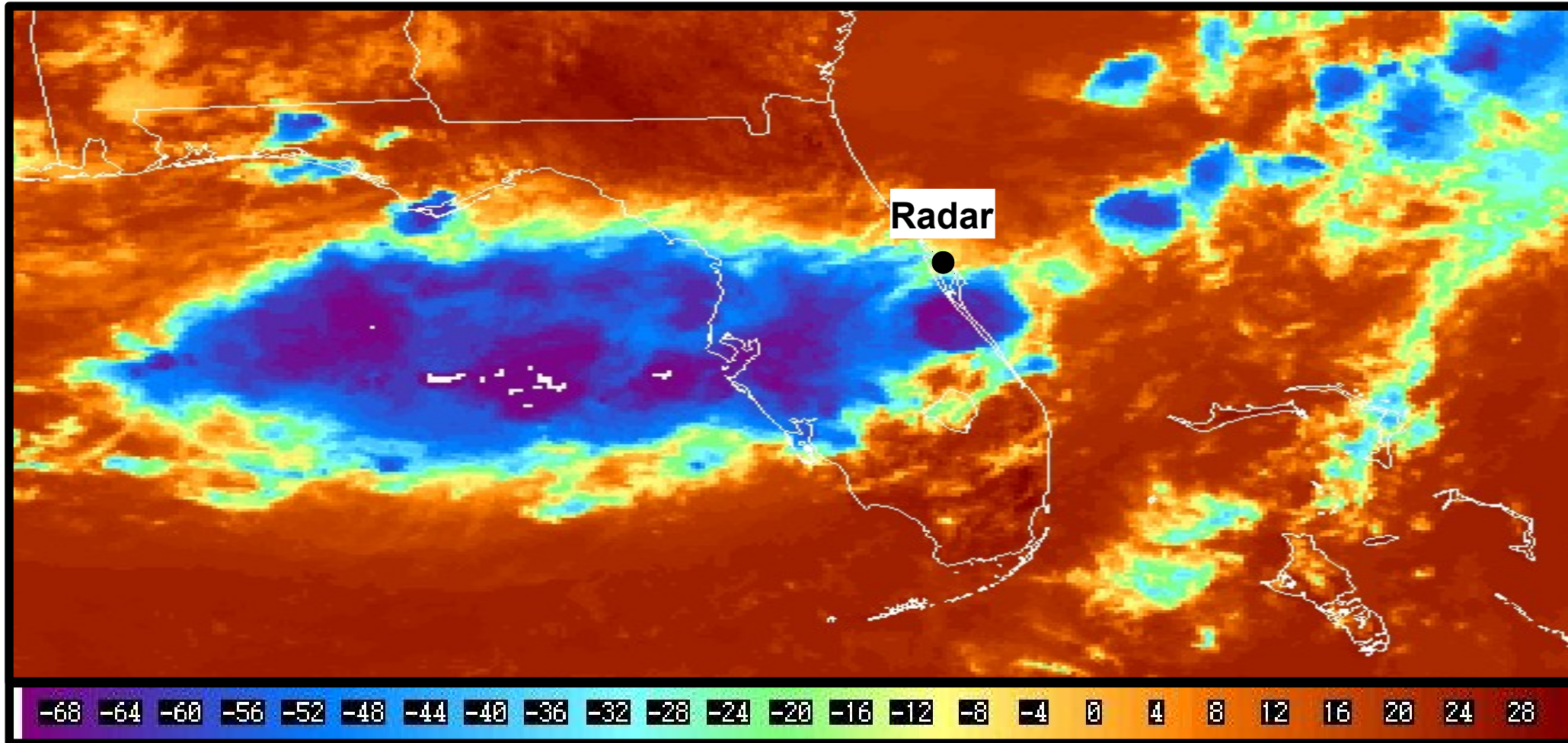


Adapted from Figure 1 of Kostinski and Jameson, 2000

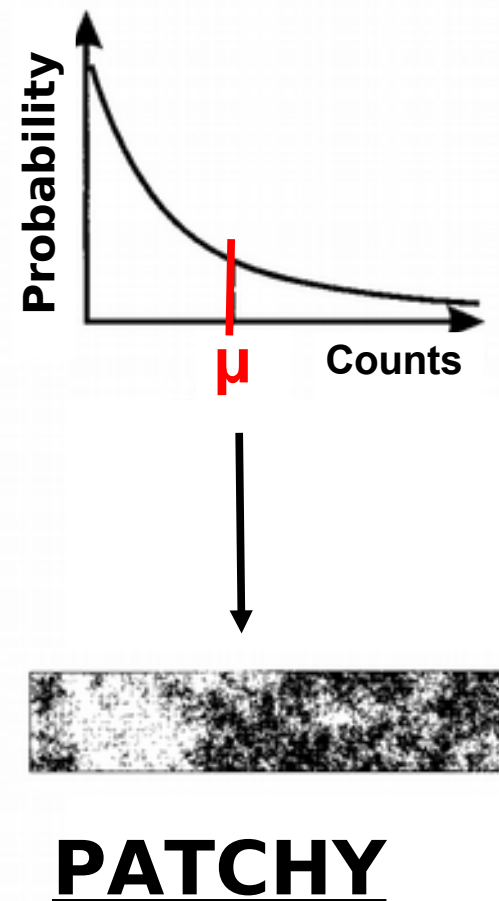
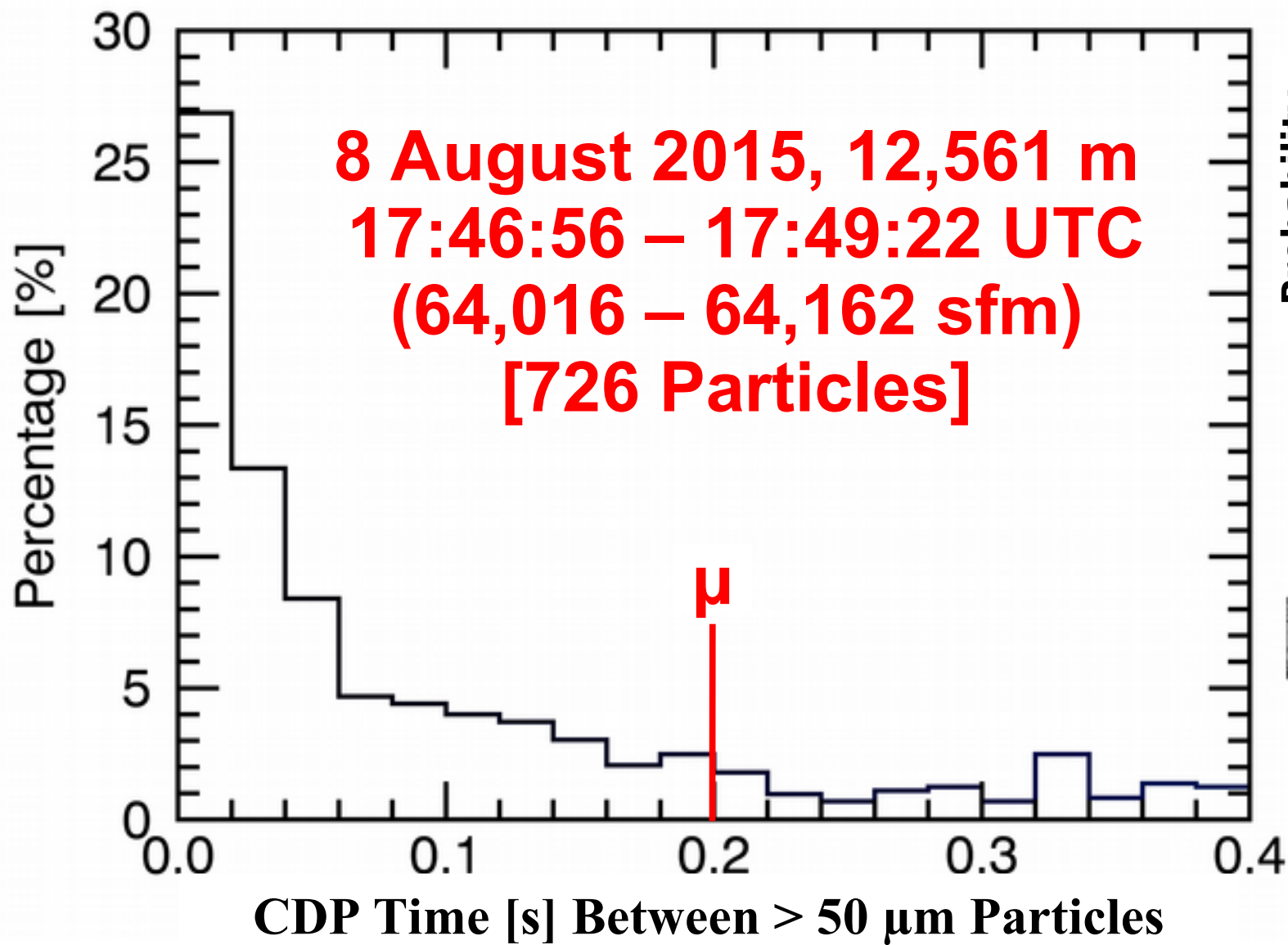
8 August 2015 Flight: 17:46:56 - 17:49:22

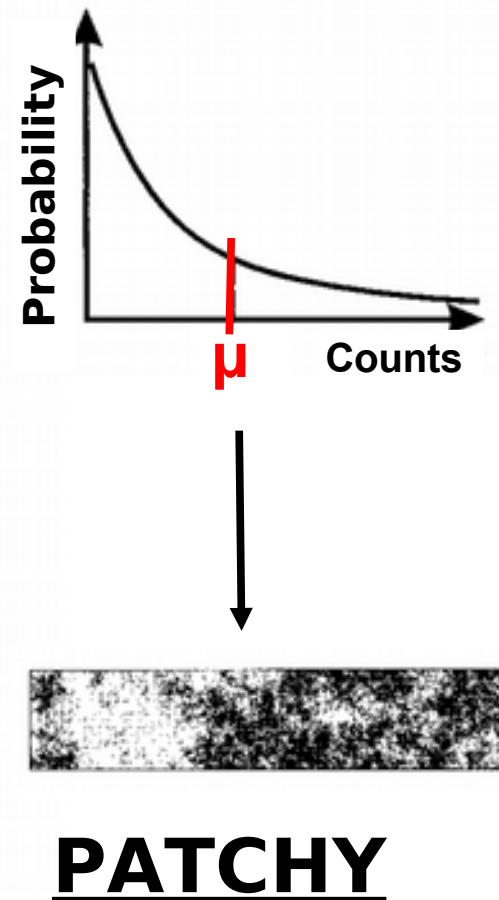
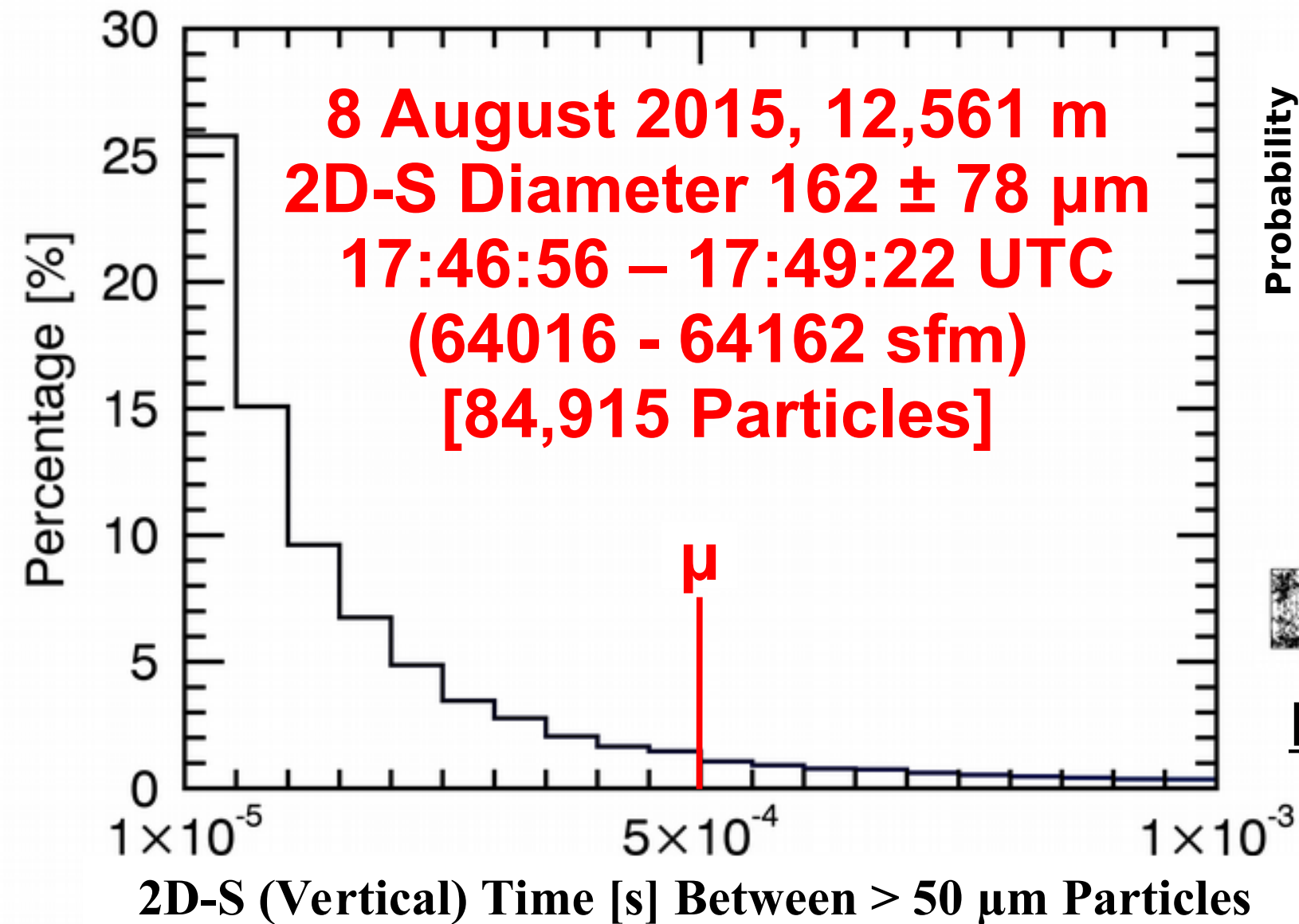


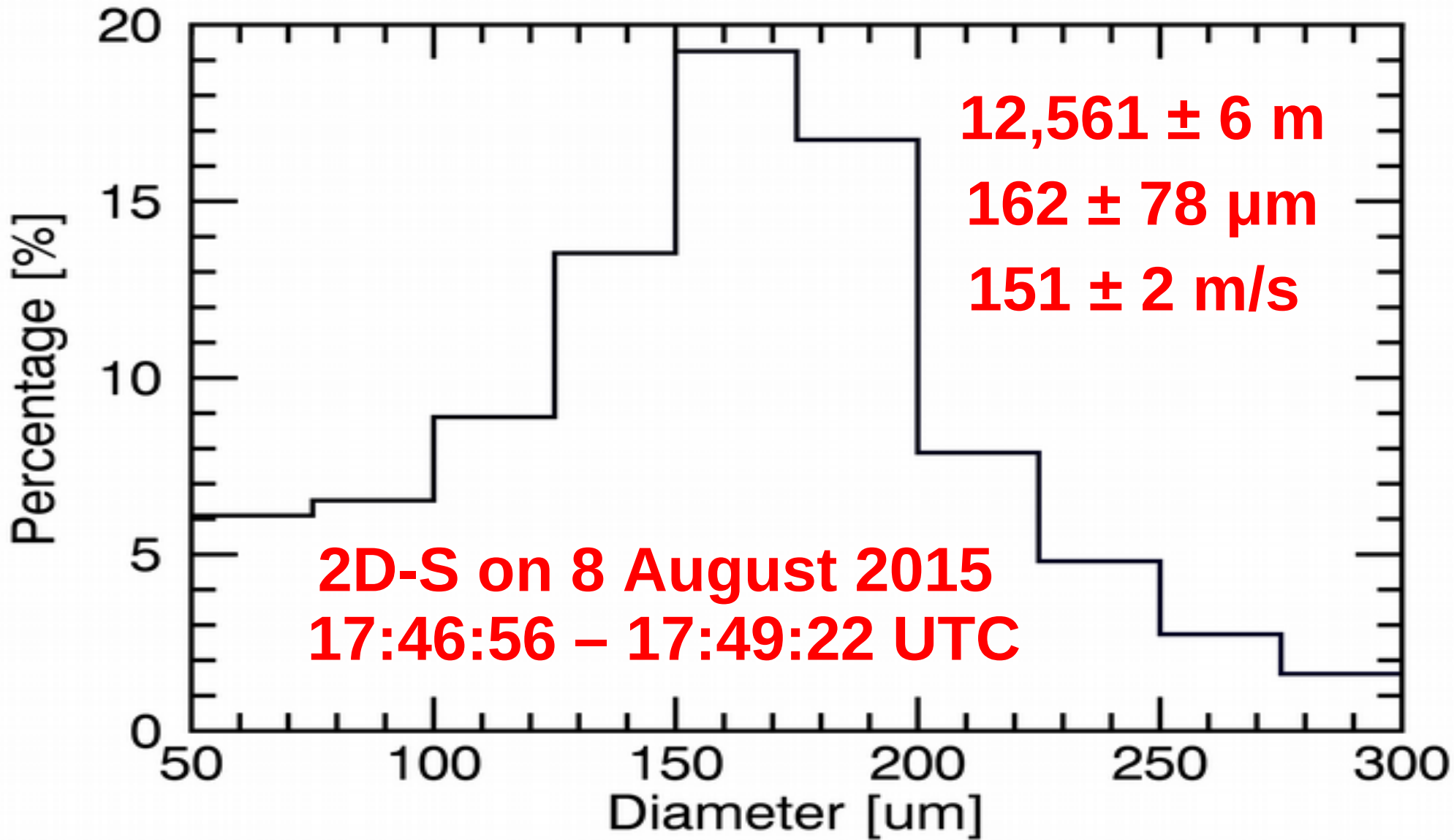
GOES 13 IR – 8 August 2015, 17:45:00 UTC



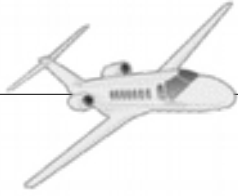
Brightness Temperature [C]



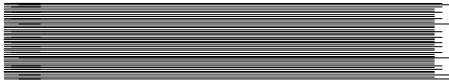




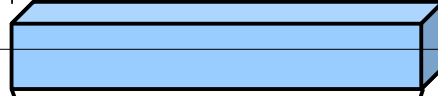
Sample Volumes



TAS - 151 m/s



**$0.793 \text{ cm}^2 * 151 \text{ m/s} * 146 \text{ s}$
 1.75 m^3 2D-S Volume**



Altitude – 12,561 m



**$25.1 \text{ m} * 25.0 \text{ m} * 2.0 \text{ m}$
 $1,256 \text{ m}^3$ Radar Volume**

