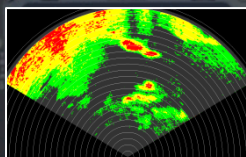




Radar Reflectivity Statistics Summary 2014 & 2015 HAIC-HIWC Flight Campaigns

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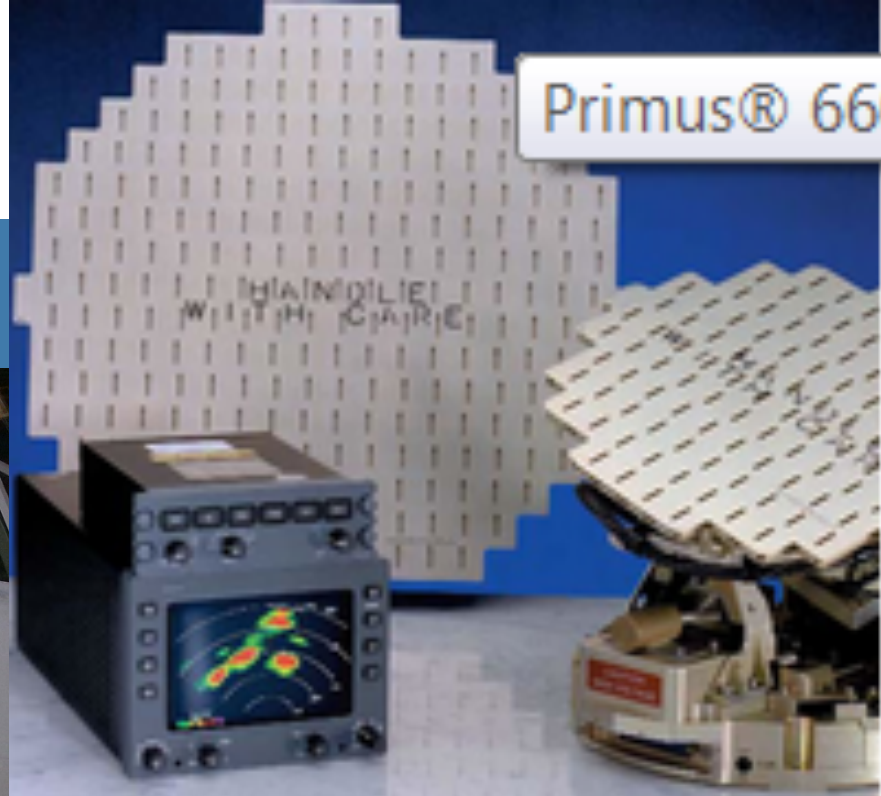
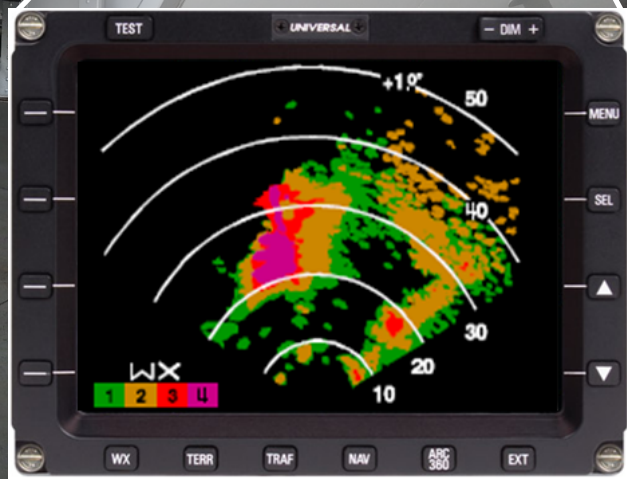
This information is provided by the HAIC-HIWC Science Team. The data was acquired during flight tests conducted and supported by numerous agencies and organizations, including:

- Australian, Canadian, EU, & USA Government Agencies and Research Organizations and*
- EU & USA aviation companies*

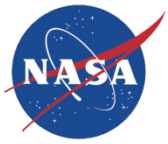
Use of this information is restricted to only those to whom it has been delivered and only for the purposes that have been agreed prior to its delivery. Please contact the HAIC-HIWC Science Team to expand the dissemination or use of this data.

2014 HAIC Flight Campaign

Radar Data is Recorded from Display Bus of Honeywell Primus 660 Weather Radar

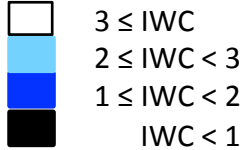


- Radar data consists of pilot's display only
- 5 color labels:
 - 53 ≤ magenta
 - 40 ≤ red < 53
 - 33 ≤ yellow < 40
 - 23 ≤ green < 33
 - black < 23 } dBZ
- Variable Gain
 - +3 to -15 dB
 - CAL setting (0 dB gain with gnd_filter)
- GPS time (1 Hz)
 - Used to synchronize all files

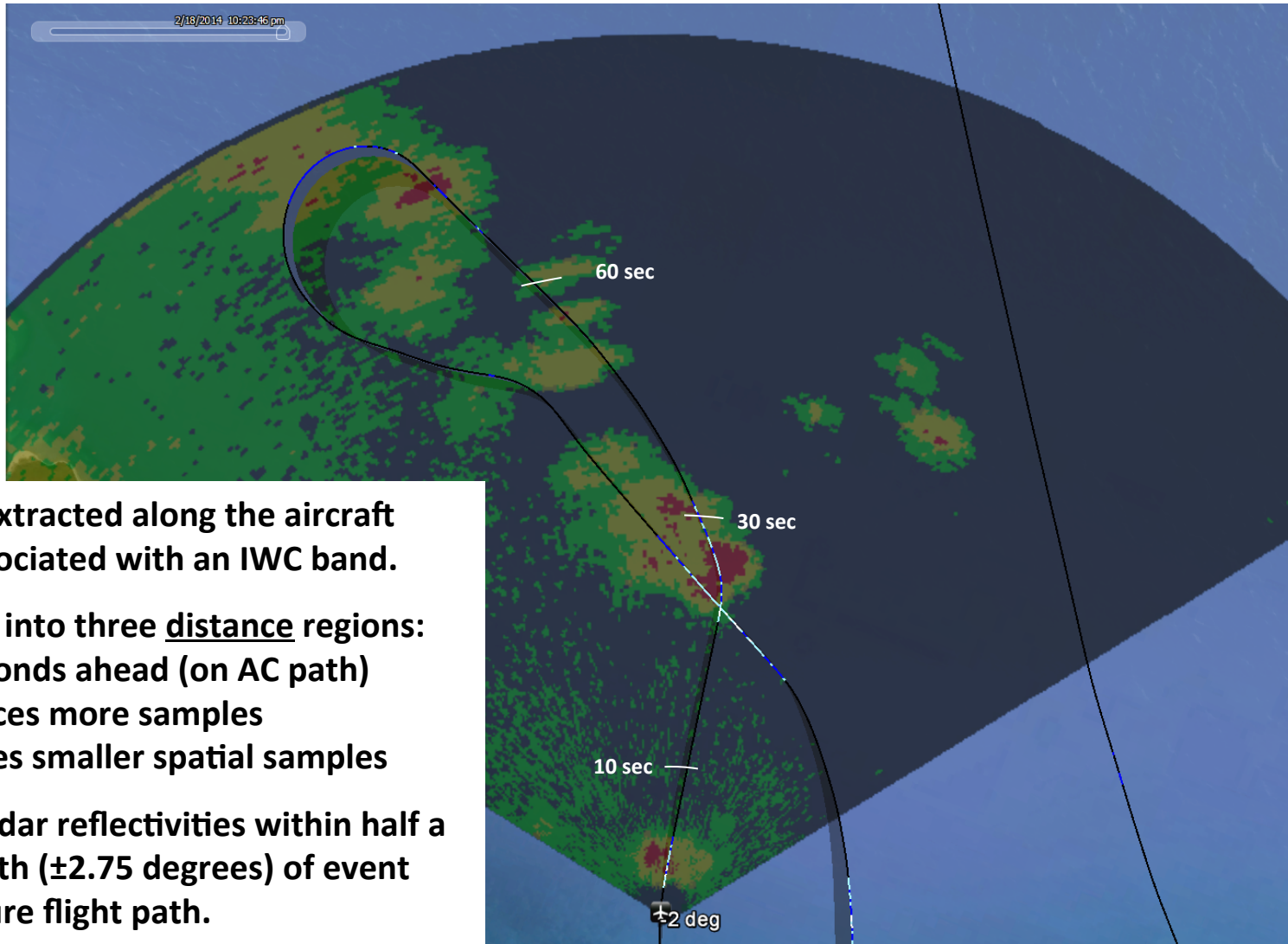
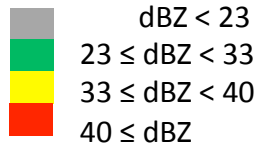


Gathering the Statistics

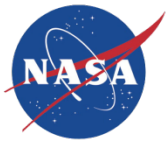
IKP Data (g/m^3)



Radar Data

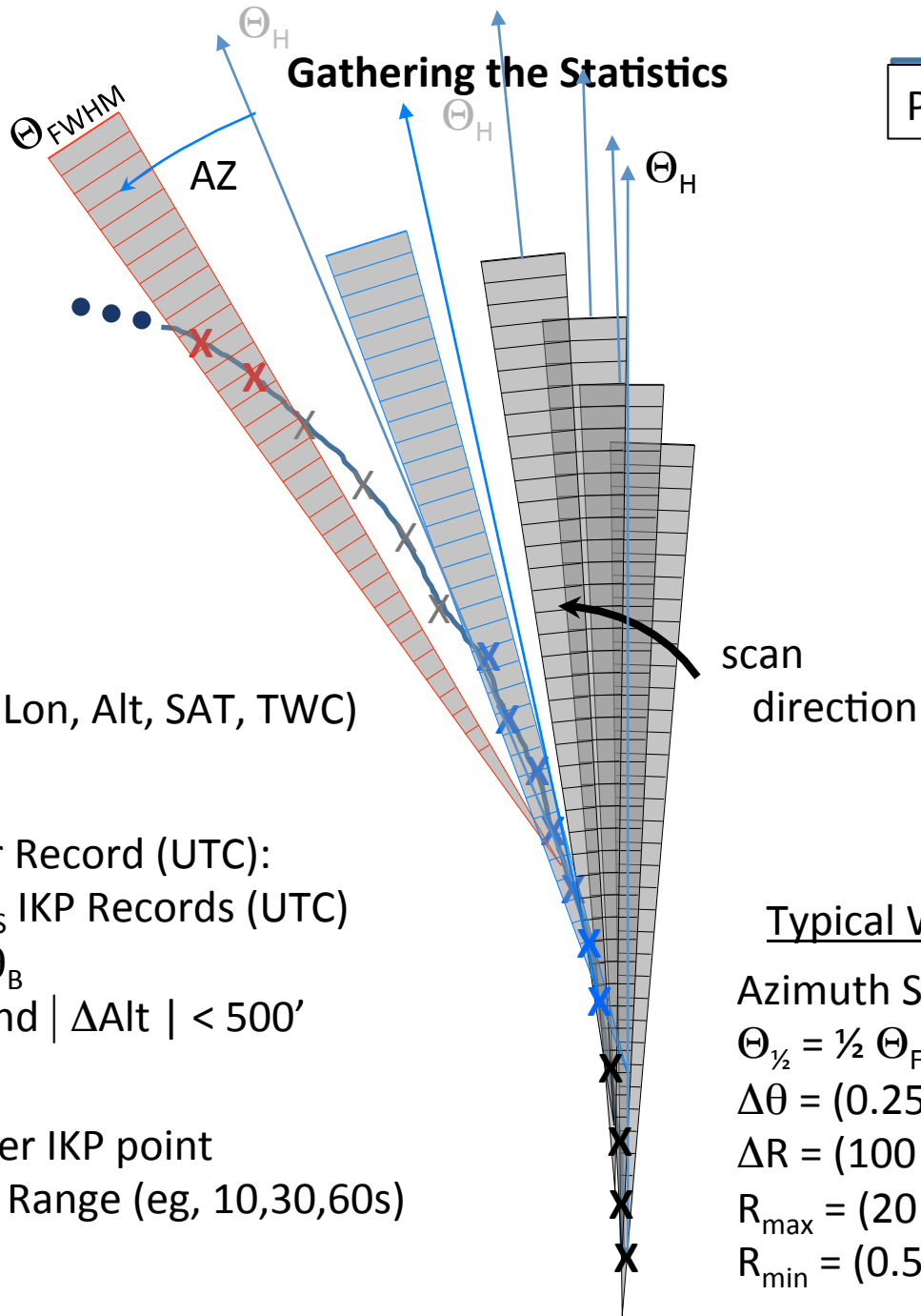


- Reflectivities are extracted along the aircraft flight path and associated with an IWC band.
- Data is segregated into three distance regions: 60, 30, and 10 seconds ahead (on AC path)
 - farther: produces more samples
 - closer: produces smaller spatial samples
- Extract multiple radar reflectivities within half a azimuth beam width (± 2.75 degrees) of event position along future flight path.
- Altitude of radar bin must be within $\pm 500'$ of IKP altitude



Gathering the Statistics

Post Flight Analysis ONLY



IKP Record (X)
- 1 Hz (UTC, Lat, Lon, Alt, SAT, TWC)

For each Radar Record (UTC):
Identify next T_s IKP Records (UTC)
Calculate R & θ_B
IF $|\theta_B| < \Theta_{\frac{1}{2}}$ and $|\Delta Alt| < 500'$

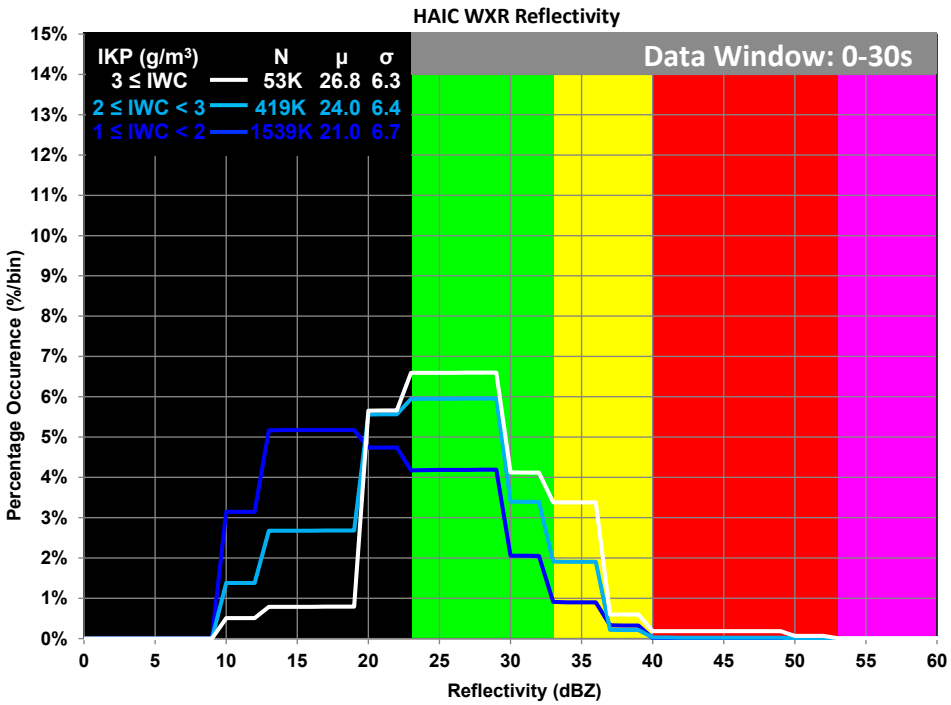
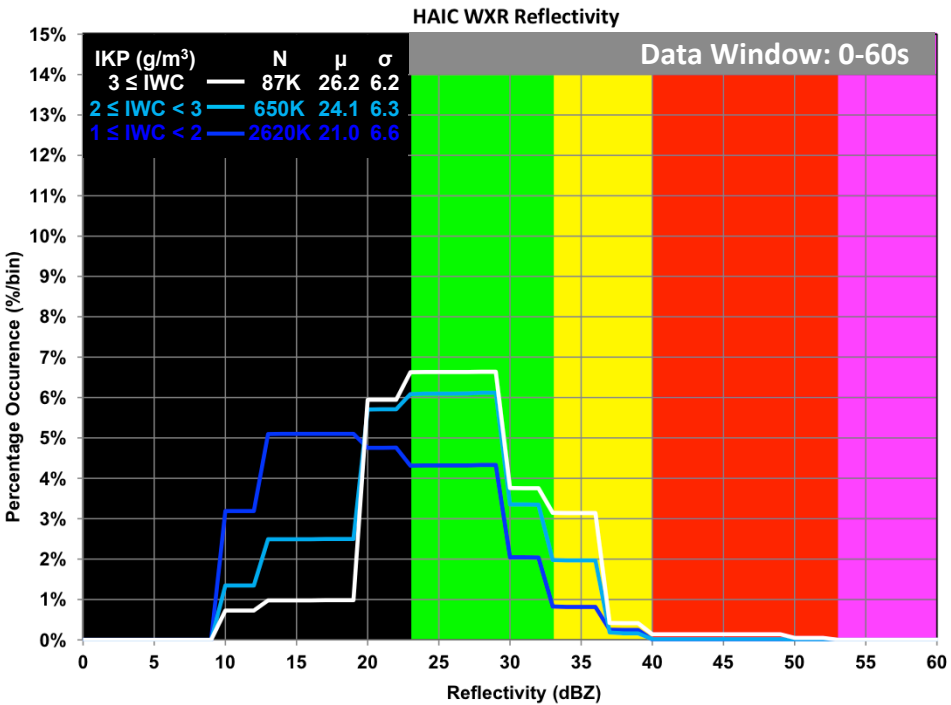
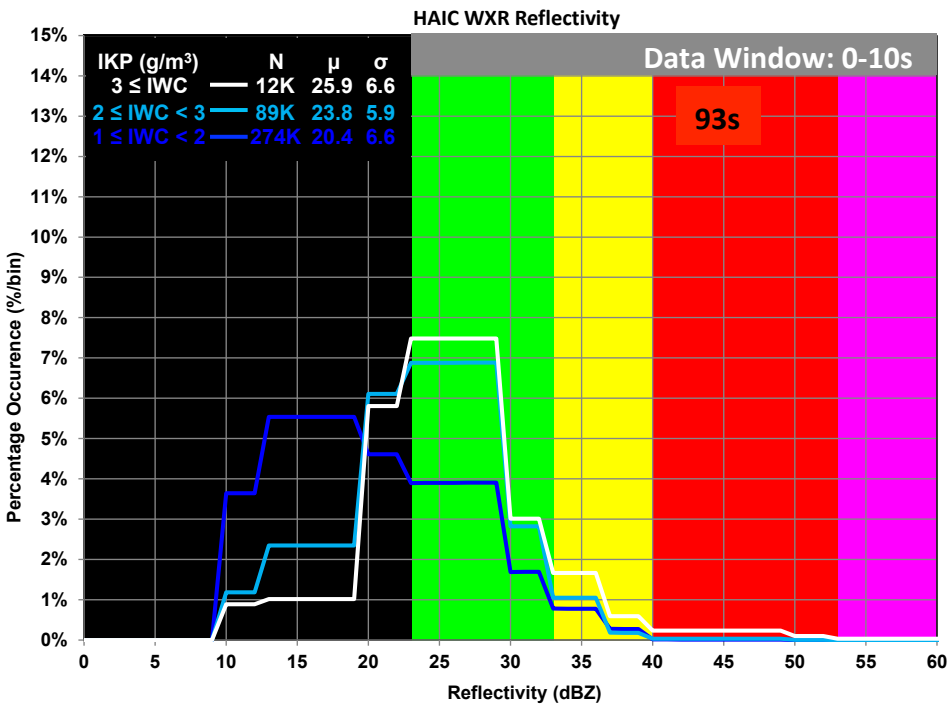
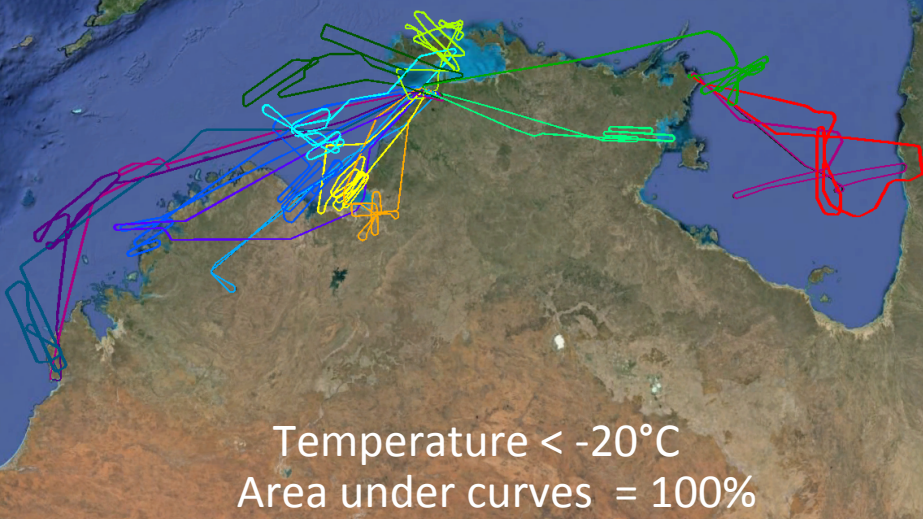
Multiple RRF per IKP point
Must Limit the Range (eg, 10,30,60s)

Typical WX Radar Parameters

- Azimuth Scan Rate = $(25 - 50)^\circ/s$
- $\Theta_{\frac{1}{2}} = \frac{1}{2} \Theta_{FWHM} = (1.5-3.0)^\circ$
- $\Delta\theta = (0.25 - 1.0)^\circ$
- $\Delta R = (100 - 2000)m$
- $R_{max} = (20 - 200)km$
- $R_{min} = (0.5 - 1.0)km$

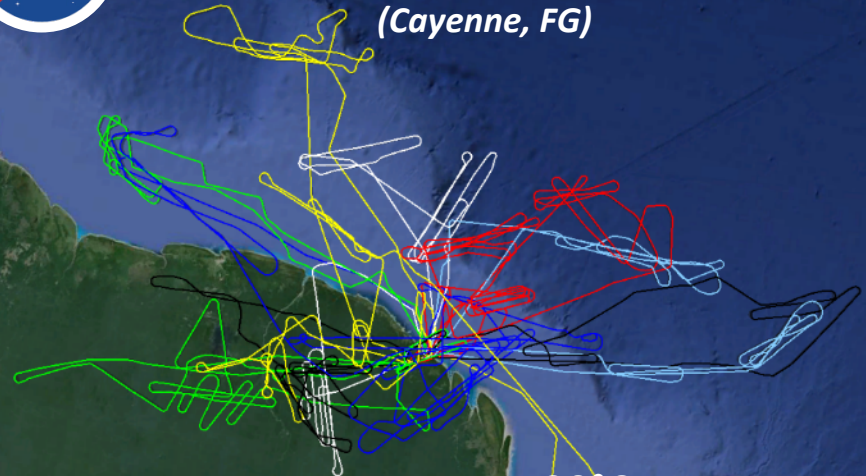


2014 HAIC Flight Campaign Summary of all Flights (Darwin, Australia)

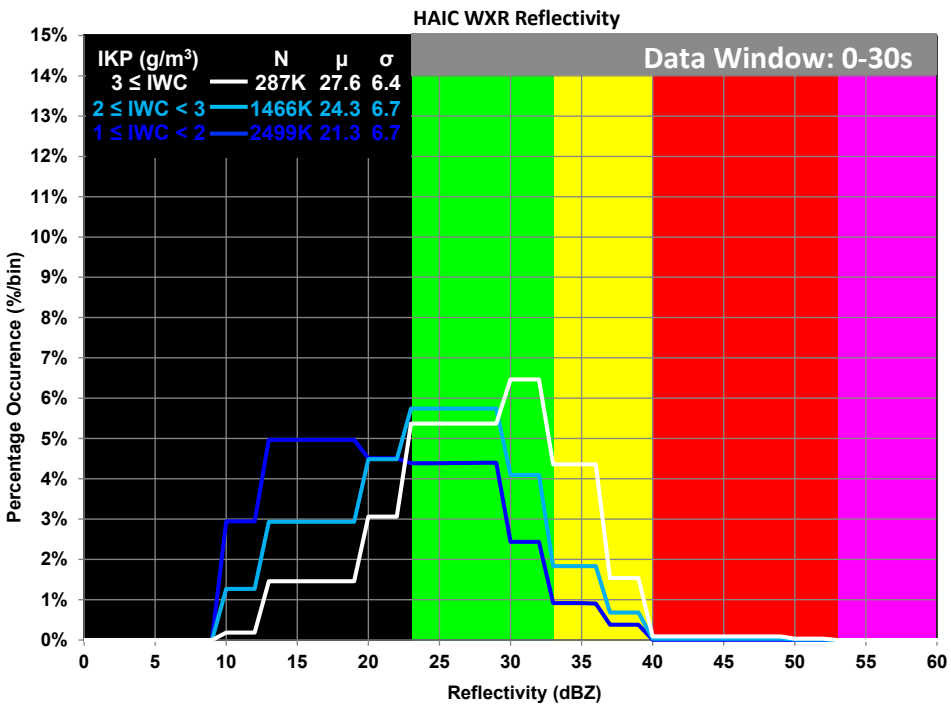
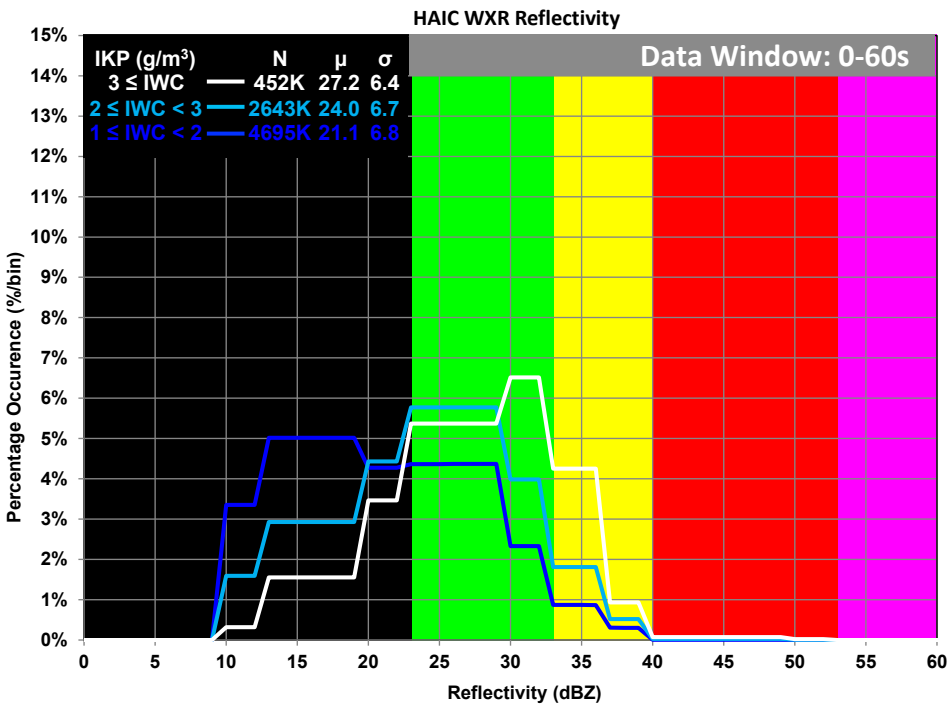
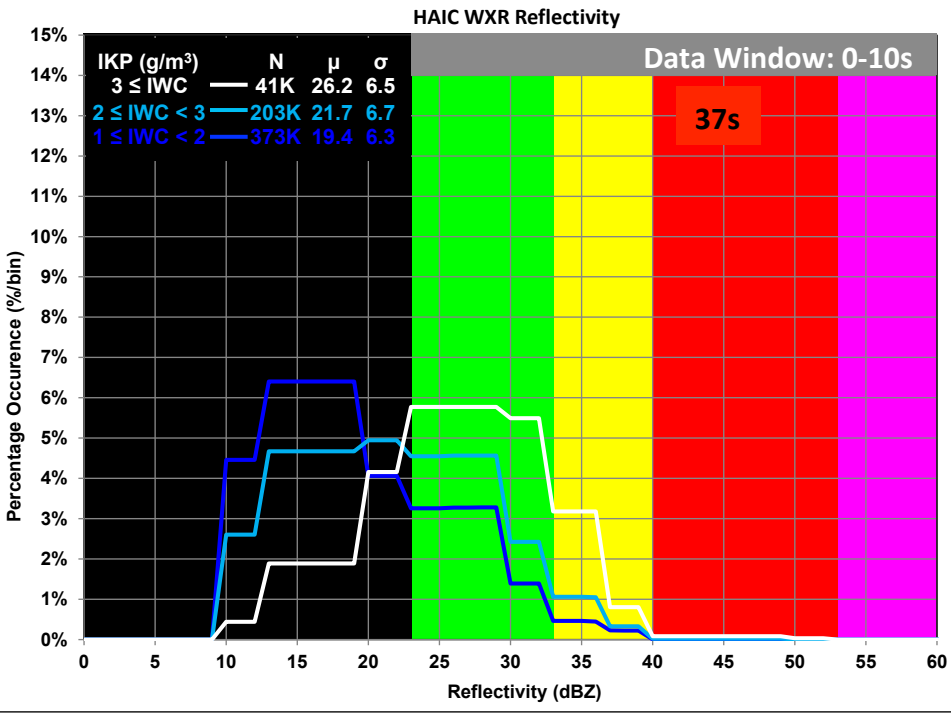


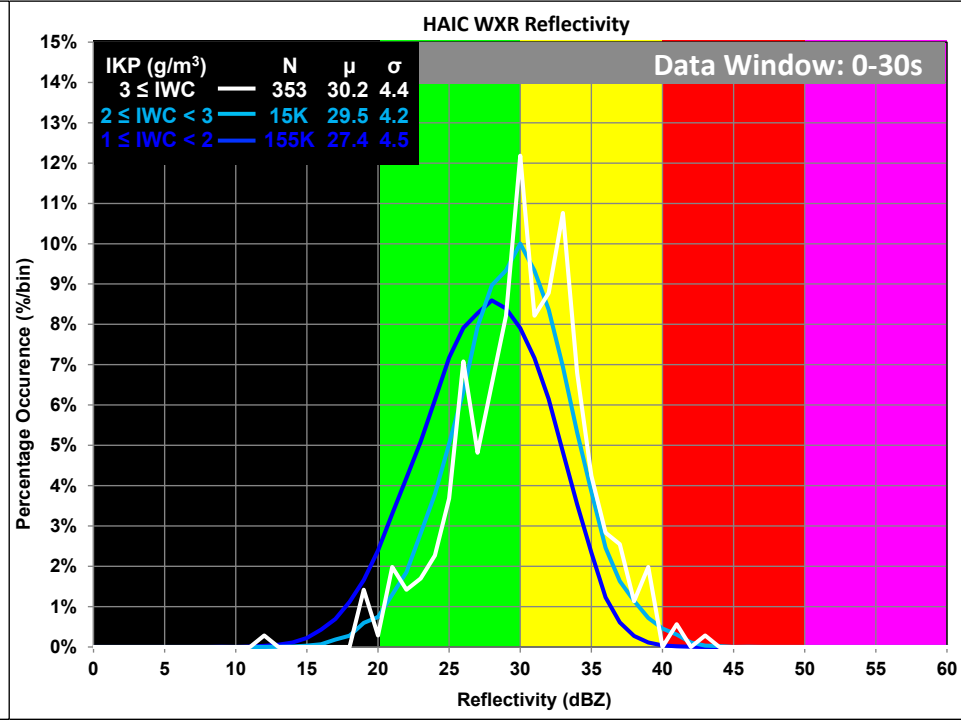
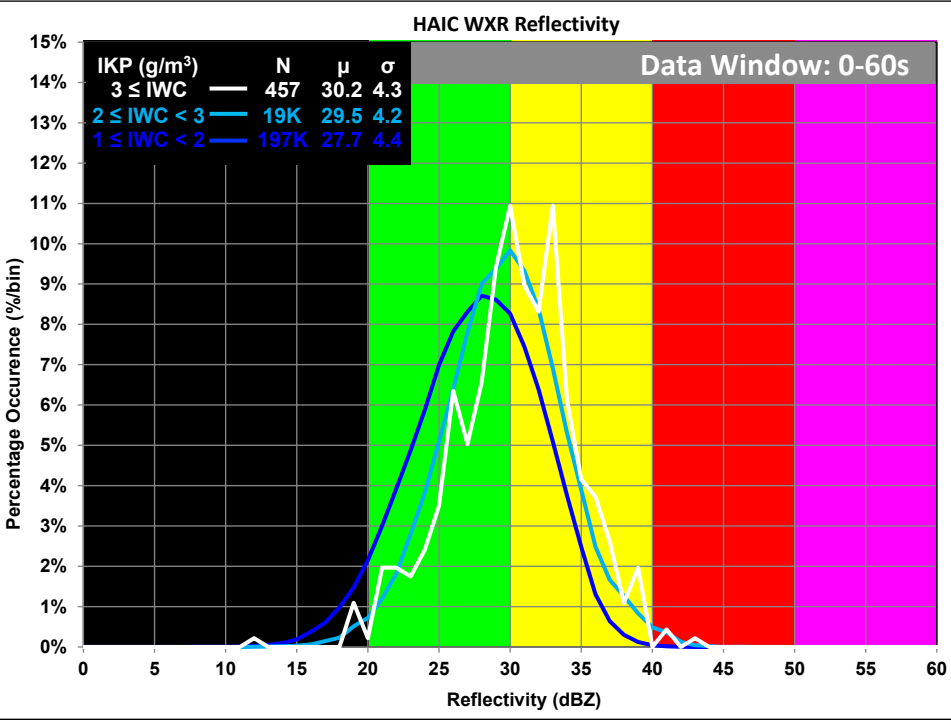
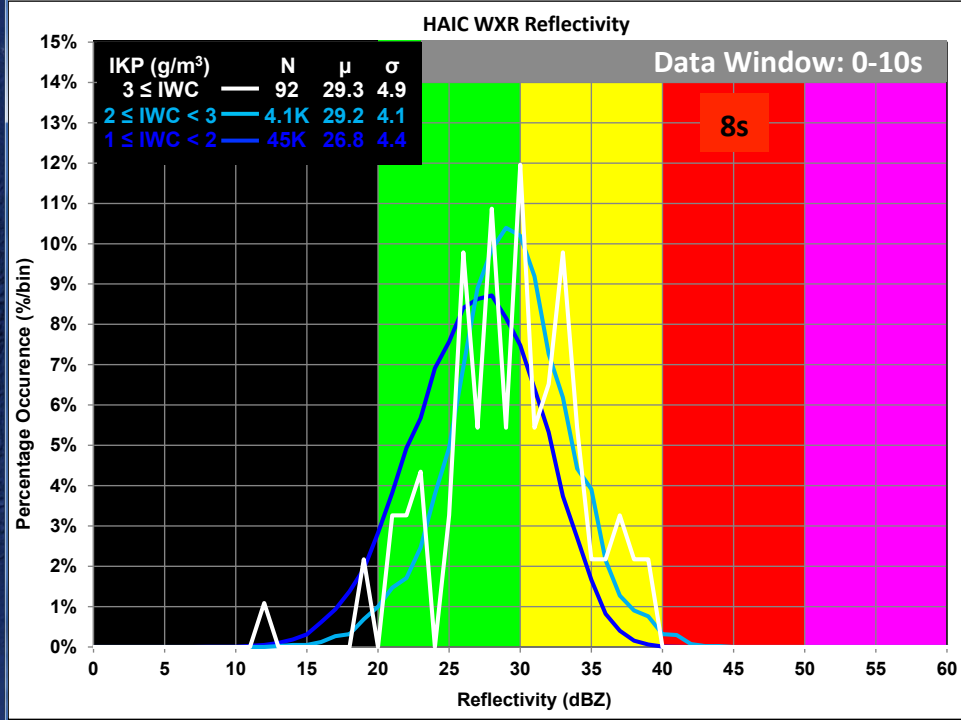
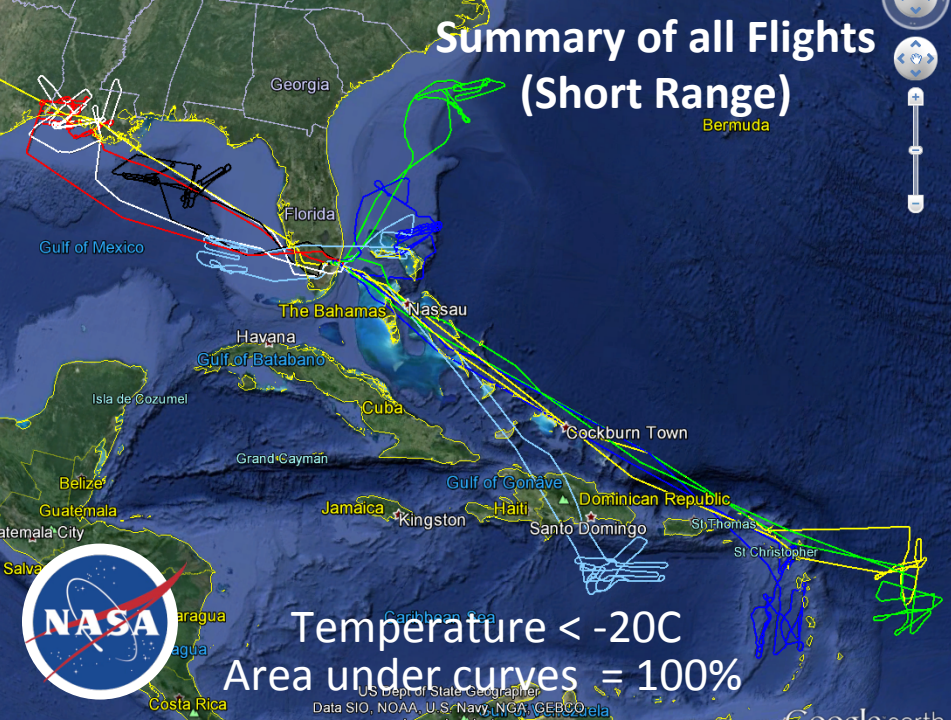


2015 HAIC Flight Campaign Summary of all Flights (Cayenne, FG)



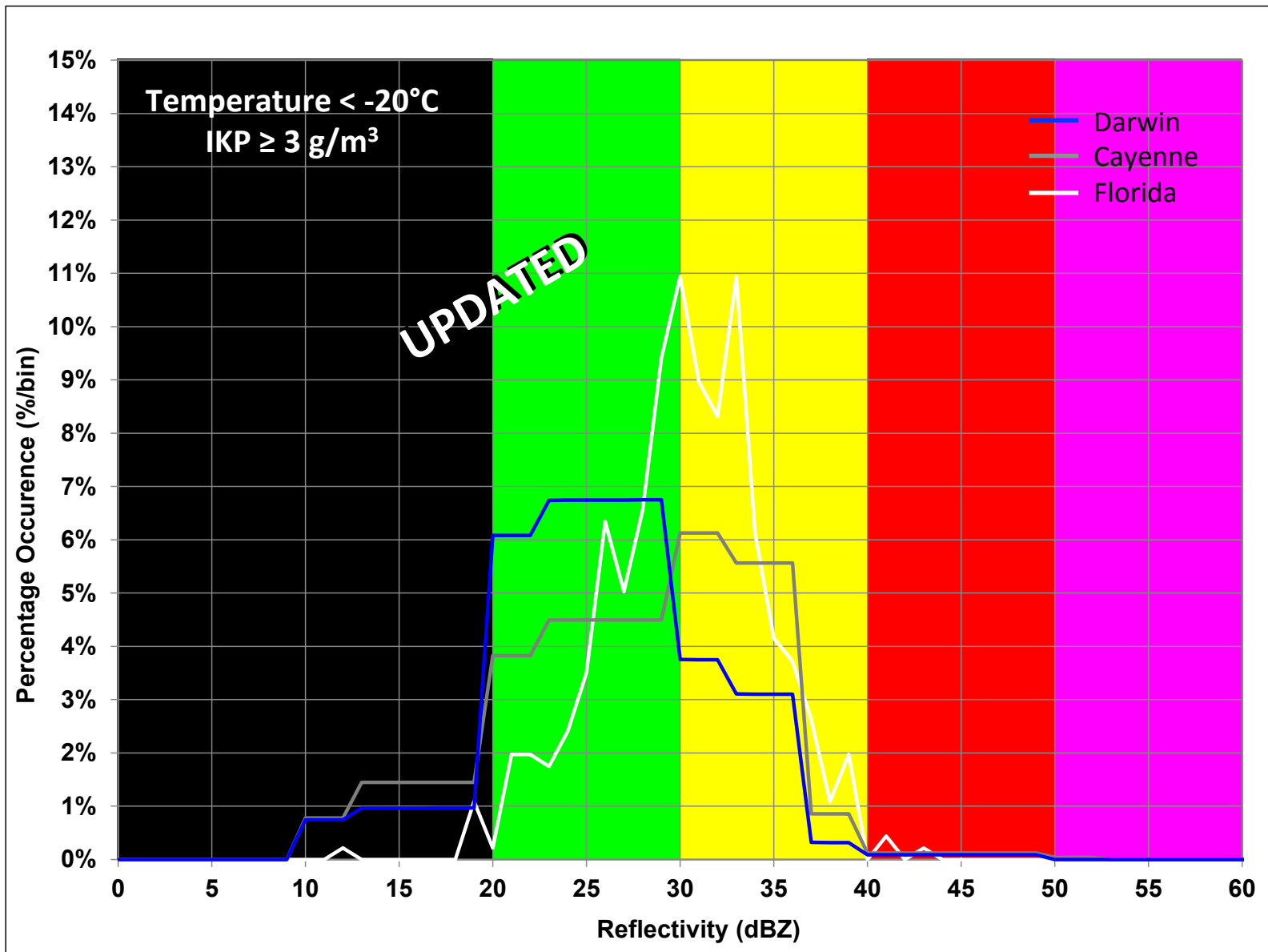
Temperature < -20°C
Area under curves = 100%







HIWC Radar Reflectivity Observed in HAIC-HIWC Flight Campaigns 0-60 second ahead of encounter



Note: Colors Scale Representative of Current WXR Display Standard