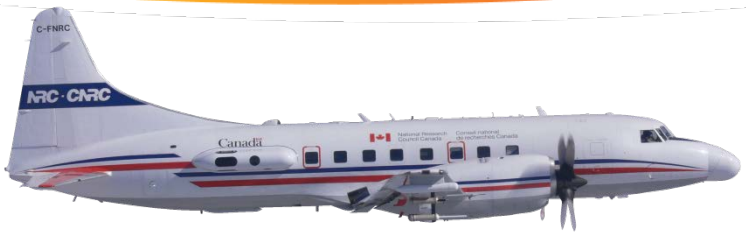

Cayenne-2015 Data set status, NRC CV580 – Lidar and GVR

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1 - National Research Council Canada
2 - Environment Canada

HAIC-HIWC Science Team Meeting, 9-12-November-2015

Environment Canada Environnement Canada

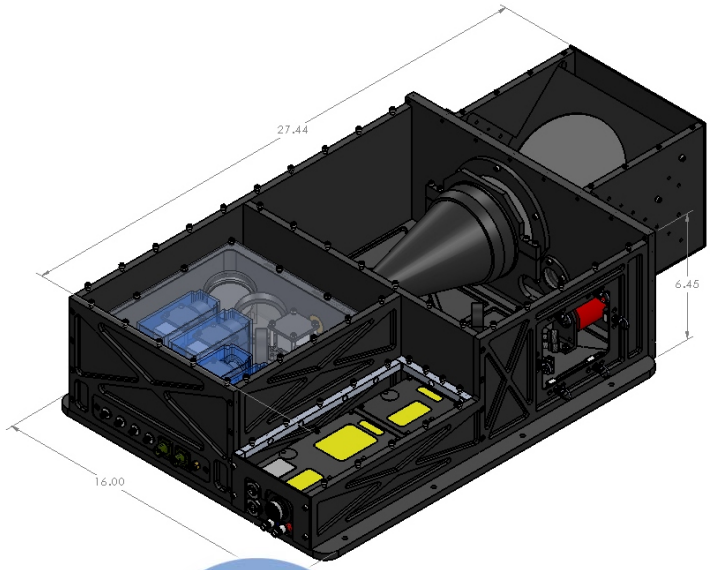
Outline

- Basic Systems Info
  - Lidars
  - G-band (183 GHz) Water Vapor Radiometer (GVR)
- Systems' field Performance
- Sample Data
- Timeline – Processing and Analysis

Lidar and GVR Data

Date May	10	12	14	15	16	16	20	23	23	25	26	26	27
Flt #	7	8	9	10	11	12	13	14	15	16	17	18	19
Lidar_Z													
Lidar_N													
GVR													

Convair Lidars



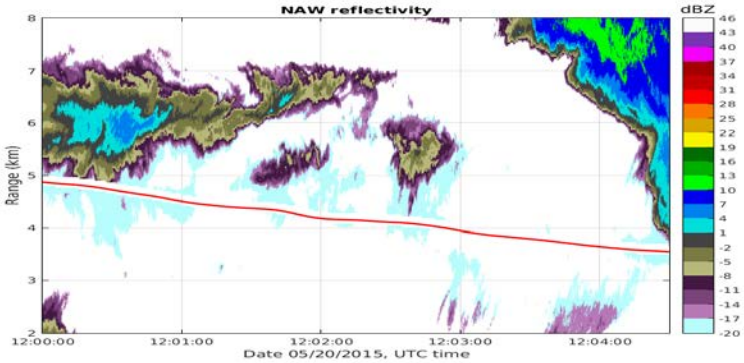
ALPENGLOW INSTRUMENTS

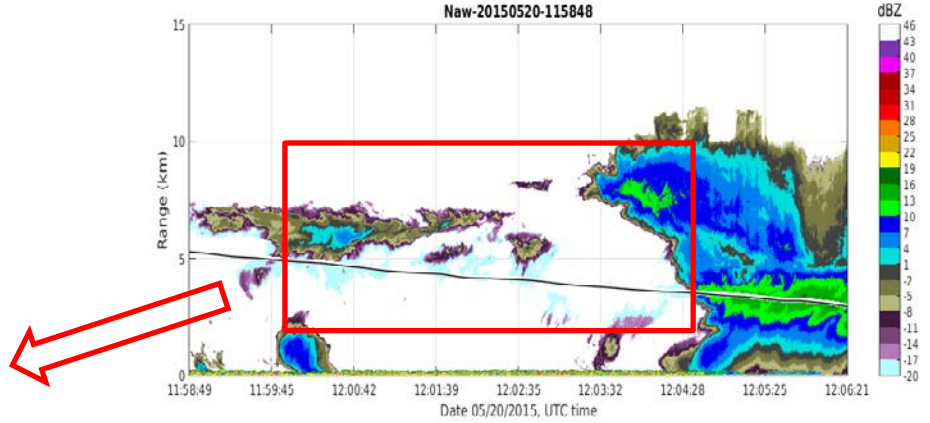
- Wavelength: 355 nm, for eye safe operation.
- Horizontal resolution: 20 profile per second.
- Vertical resolution: up to 0.75 m (200MHz sampling rate).
- Depolarization measurements: supercooled water and ice separation.
- High and low gain channels to avoid in cloud signal saturation.
- Measurements extend close to aircraft.

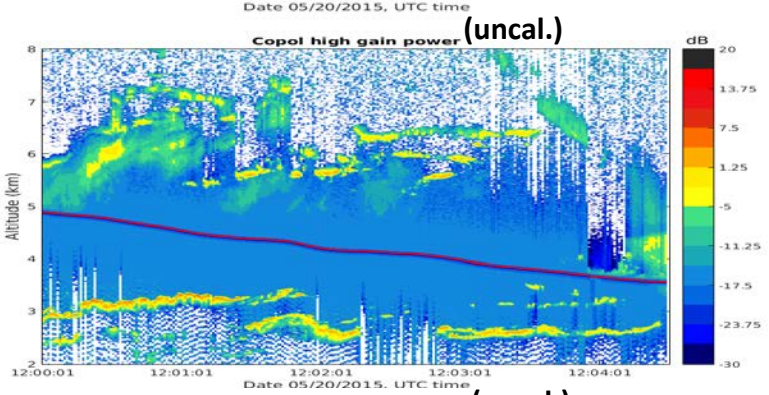
- Zenith and Nadir-looking
- Two independent systems

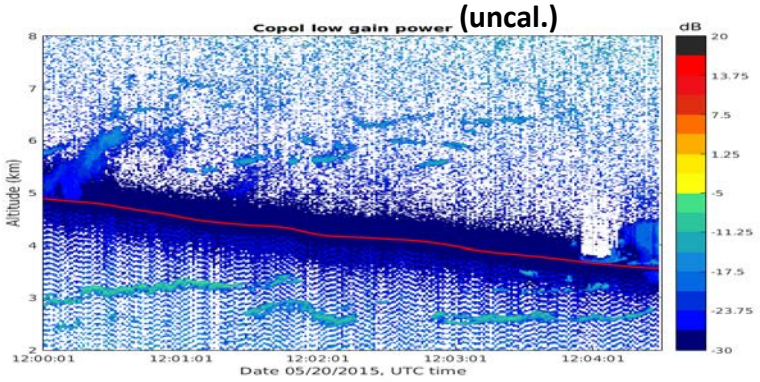
Cayenne Lidar Examples

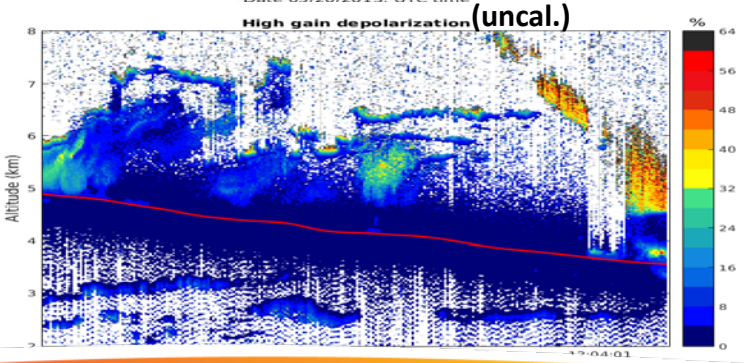
May 20, 2015 case: 12:00:00 – 12:04:30 UTC

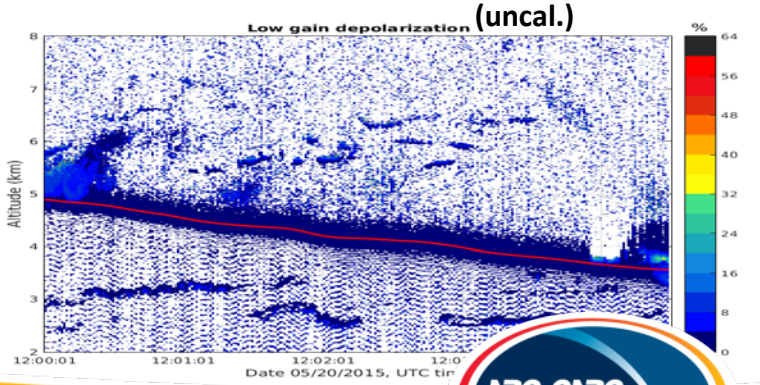






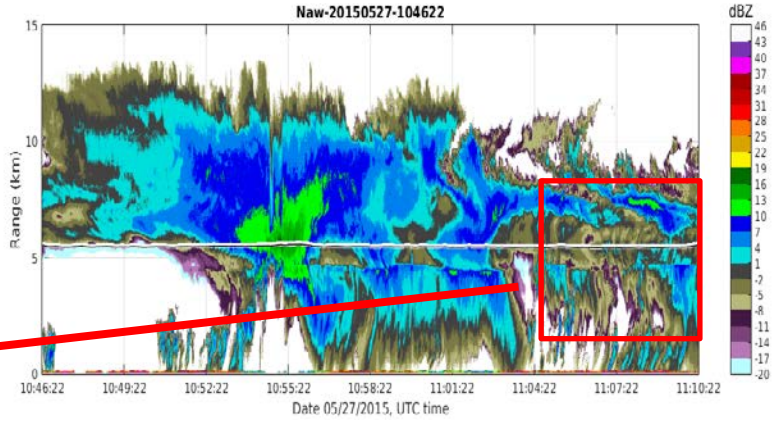


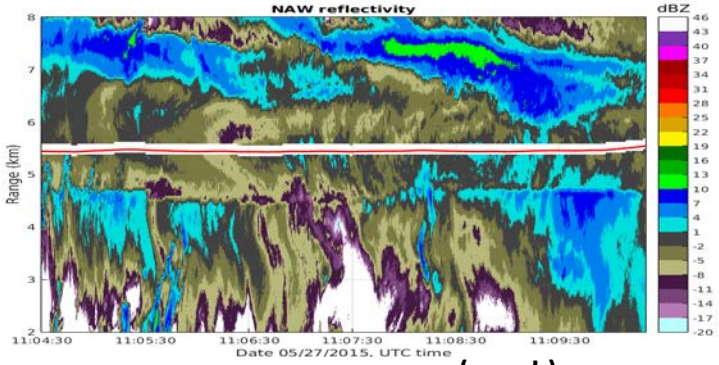


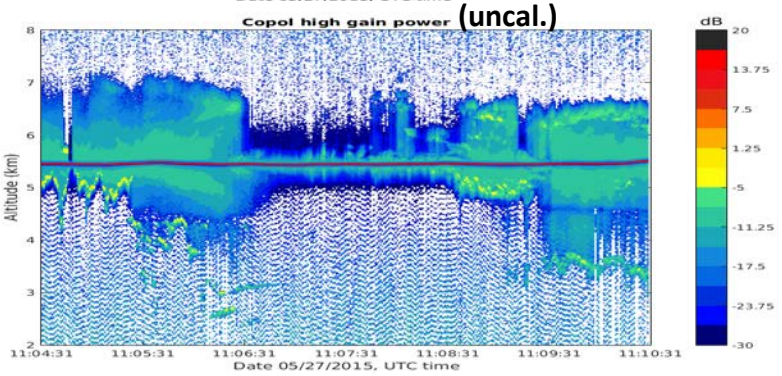


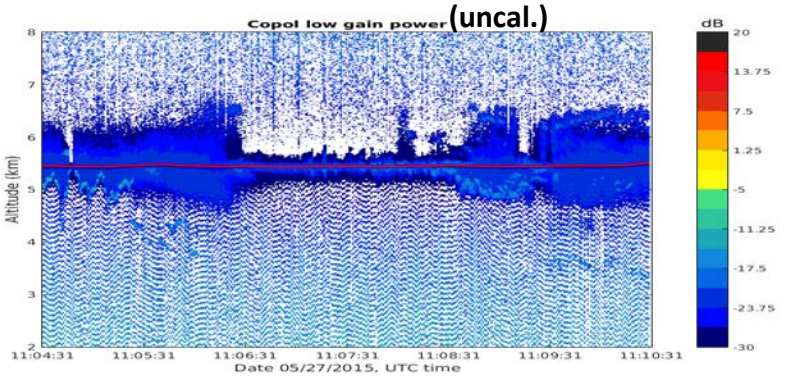
Parallel and Perpendicular Pol arization – low and high gain

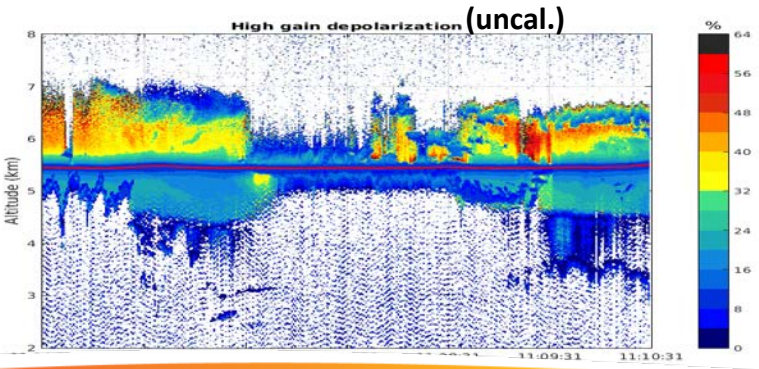
May 27, 2015 case: 11:04:30 – 11:10:30 UTC

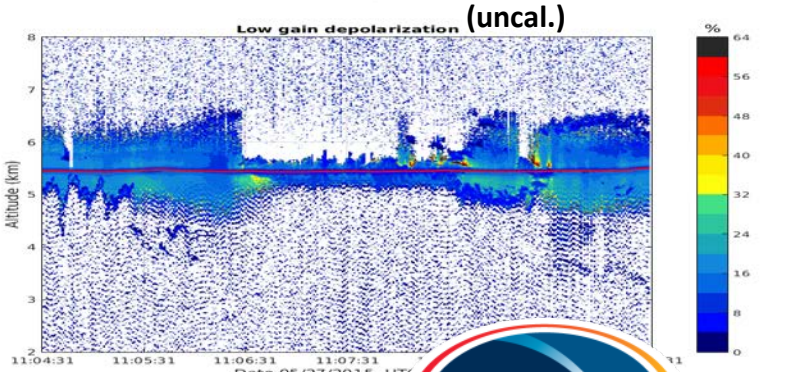












Fine scale structure, polarization, attenuation

G-band (183 GHz) water Vapor Radiometer (GVR)

- Developed by ProSensing Inc. and first airborne installation on Convair in 2007 (Pazmany & Wolde, 2009)
- Measures brightness temperature at 183.31 ±1, ±3, ±7 and ± 14 GHz
- **Neural Network Retrievals of PWV and LWP from GVR brightness temperature (Pazmany, 2009; Cadeddu et. al., 2009)**

PROSENSING

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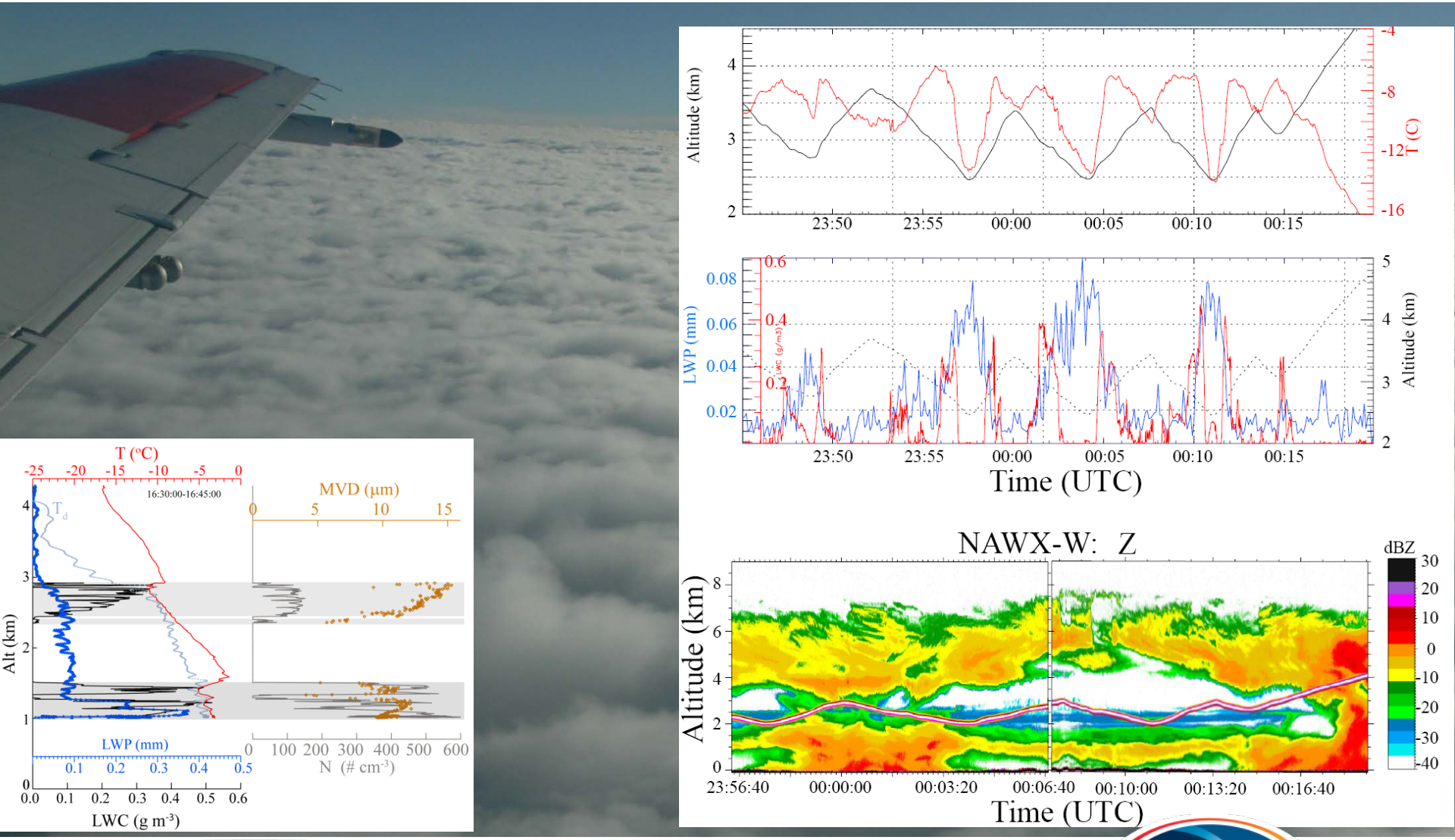
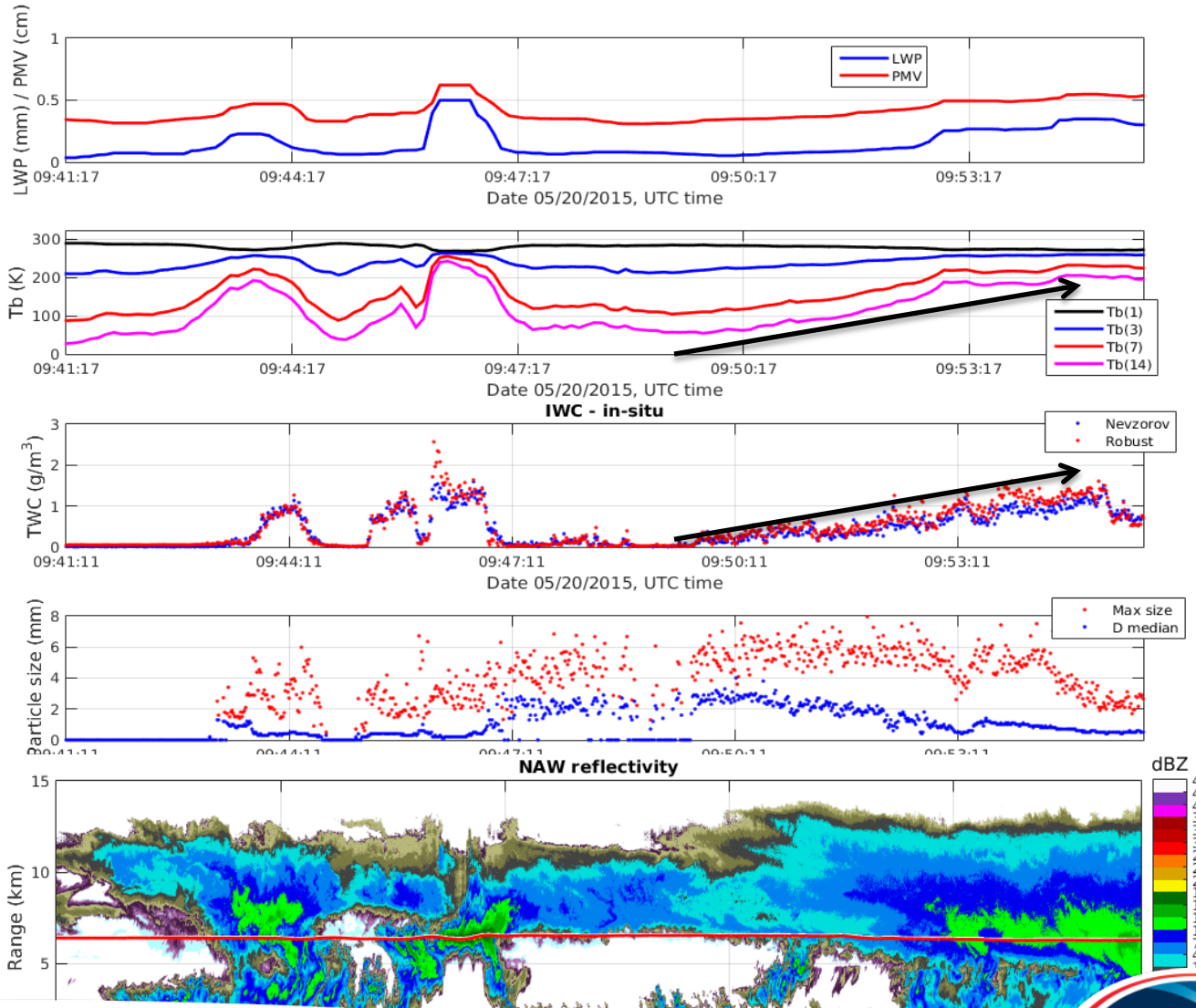
G-band (183 GHz) water Vapor Radiometer



LWP from G-band Radiometer – C3VP (2007)

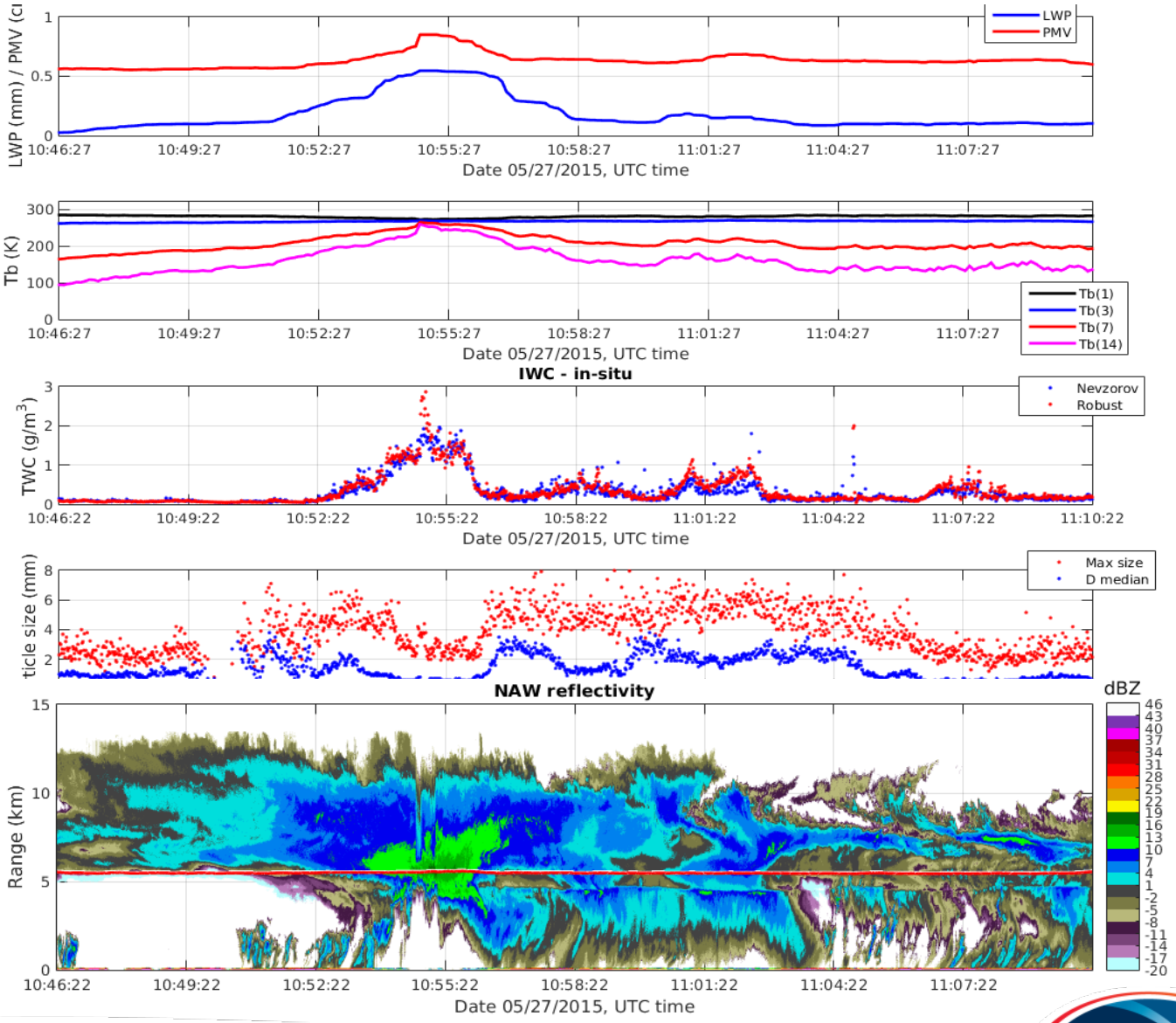
G-band (183 GHz) water Vapor Radiometer Cayenne Examples

May 20, 2015 case: 09:41:17– 09:55:41 UTC

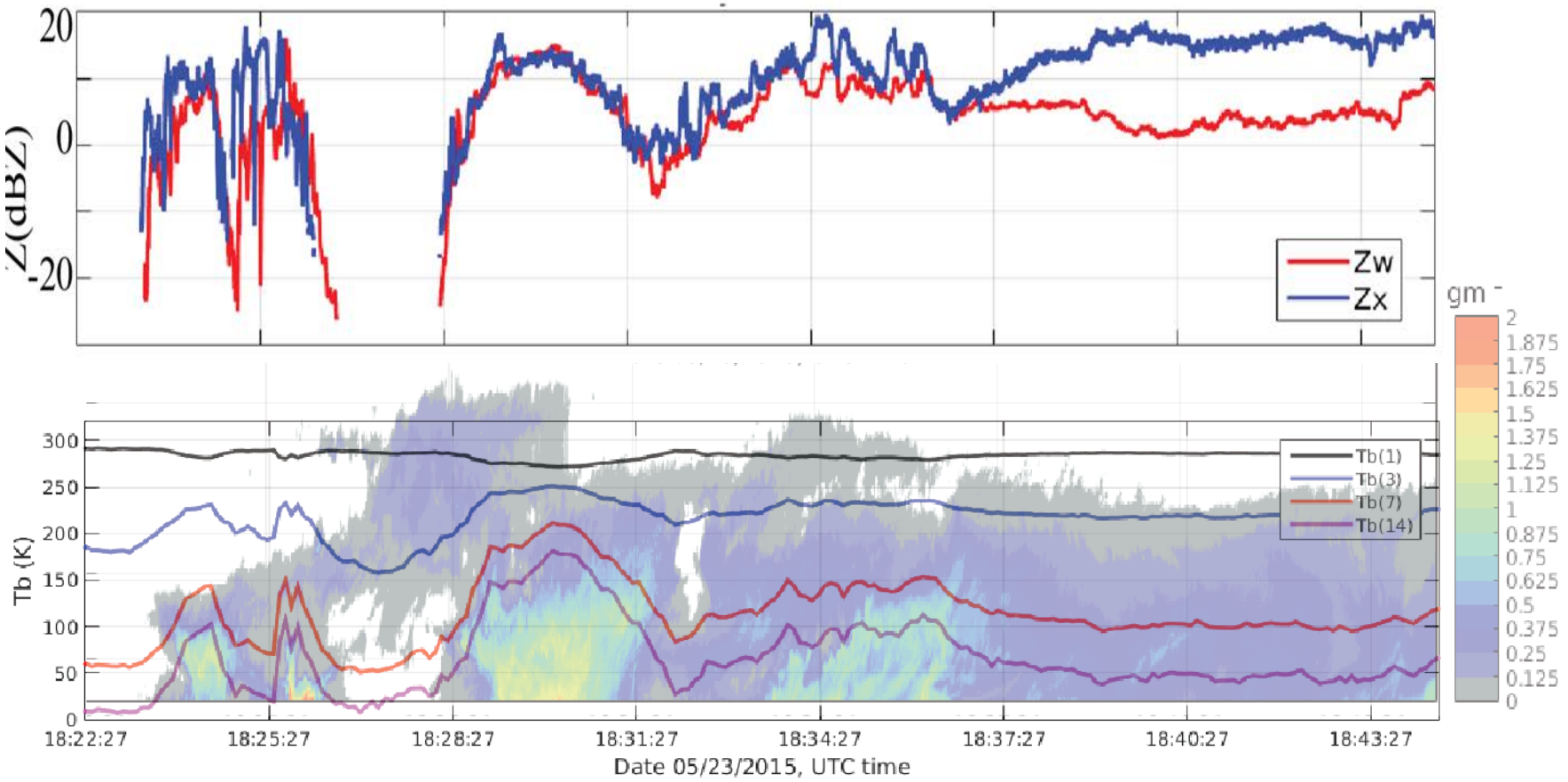


Strong Tb response to HIWC

May 27, 2015 case: 09:41:17– 09:55:41 UTC



G-band (183 GHz) water Vapor Radiometer



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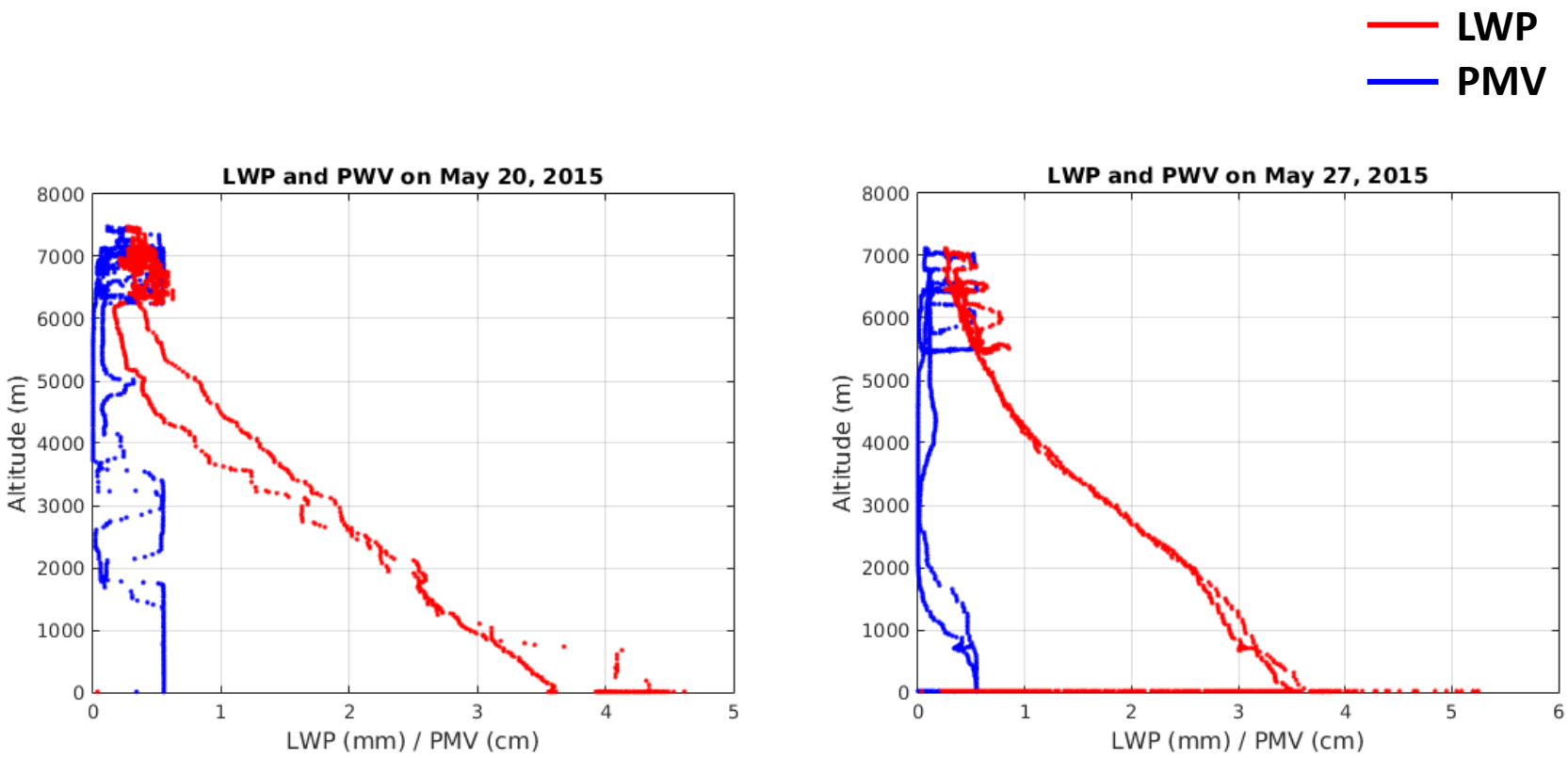
Tb response to HIWC region only

LWP/PMV as Functions of Altitude



- LIDAR
  - Calibration
  - Extinction
  - Retrieval
- G-band
  - IWP and PWV retrieval
- Remote sensing based microphysical retrievals – triple frequency radar, lidar and radiometer

High Ice Water Content (HIWC) Program