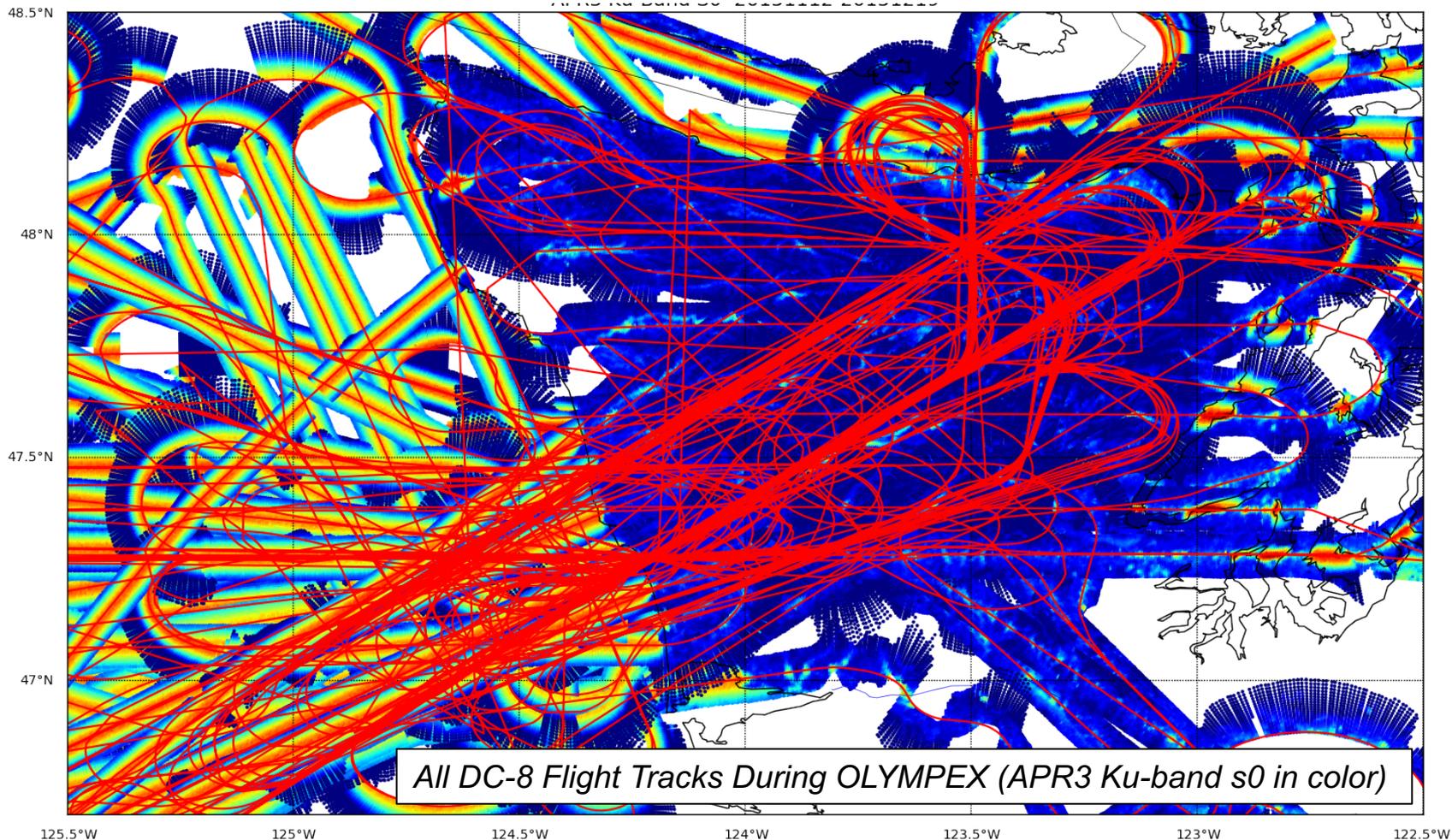


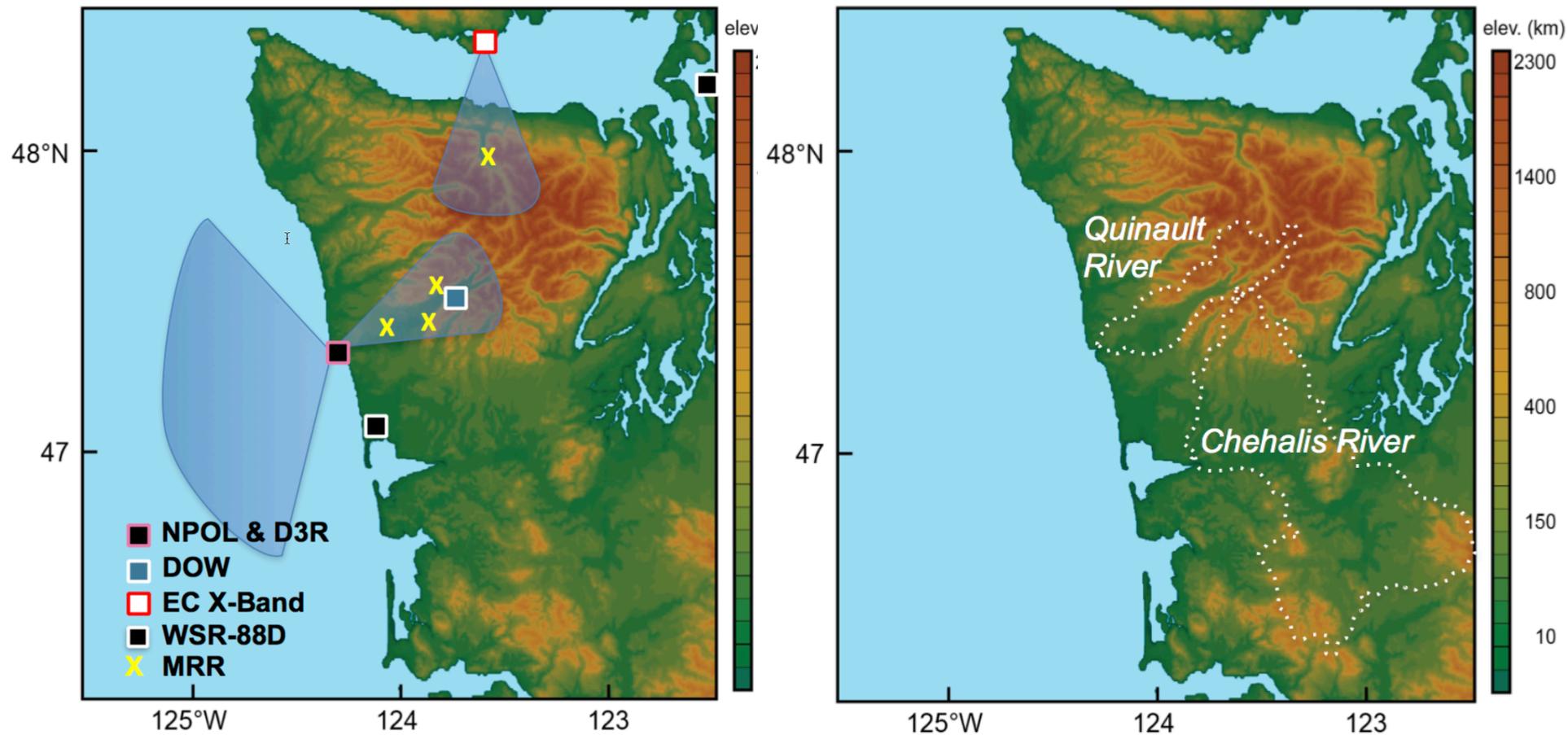
# Multi-Platform Analysis of APR3 and MW Radiometric Observations During OLYMPEX/RADEX

F.J. Turk<sup>1</sup>, S. Tanelli<sup>1</sup>, F. Tridon<sup>2</sup>, A. Battaglia<sup>2</sup>, R. Kroodsma<sup>3</sup>, S. Padmanabhan<sup>1</sup>, T. Lang<sup>4</sup>  
<sup>1</sup>JPL/Caltech, Pasadena, CA    <sup>2</sup>Univ. of Leicester, UK    <sup>3</sup>ESSIC/GSFC, MD    <sup>4</sup>MSFC, AL

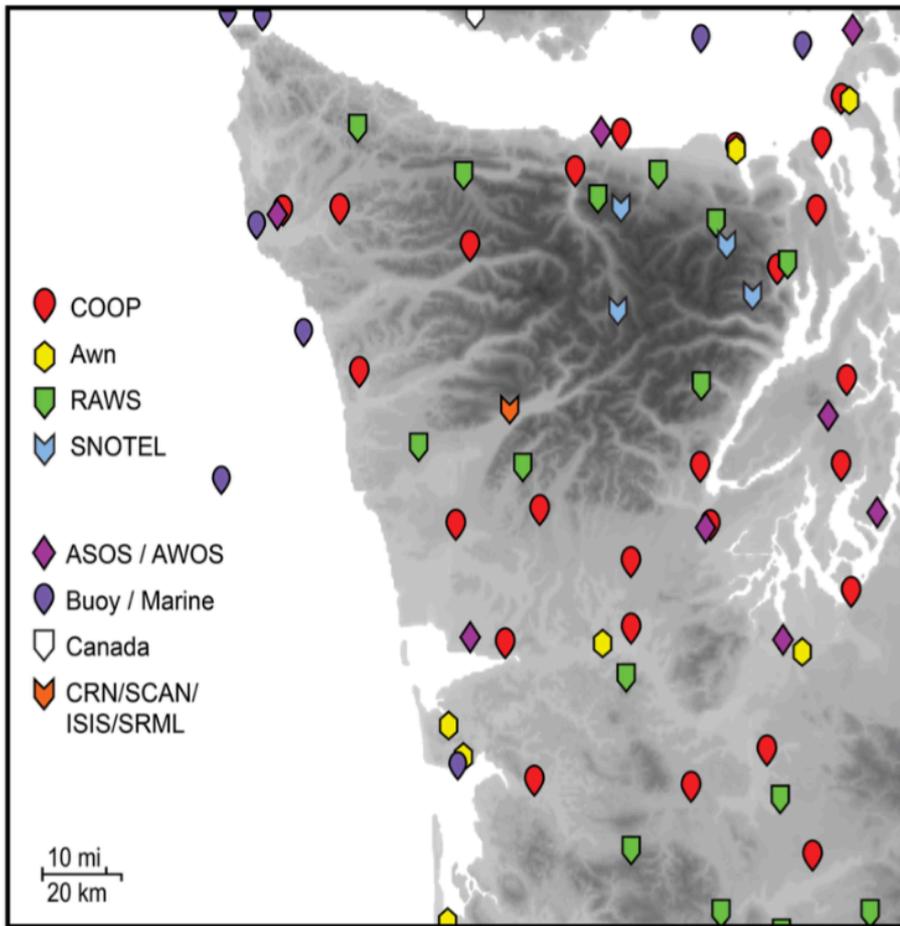


**OLYMPEX Science Meeting, 21-23 March 2017, Univ. of Washington, Seattle**

This work was performed at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with NASA. Support from NASA Grant NNH14ZDA001N-PMM is gratefully acknowledged. Copyright 2017. All Rights Reserved.



**Figure 14:** Locations of all the available ground radars for OLYMPEX and the RHI scanning regions for NPOL and EC X-band.



**Figure 7:** The existing network of surface observations in and around the Olympic Peninsula. ASOS, SNOTEL, RAWS, Buoy, CRN and Canadian sites all report various meteorological parameters hourly, the COOP sites report precipitation once a day.

<http://olympex.atmos.washington.edu>



**Figure 6:** Idealized depiction of the three sectors of a typical midlatitude cyclone. Cloud outlines as seen from satellite imagery shown in blue, standard frontal symbols shown in blue (cold front) and purple (occluded front): Prefrontal (top), Frontal (middle) and Post Frontal (bottom).

## DC-8 Instruments

APR-3 (Heritage Ku/Ka-band APR-2, with the added W-band)  
9-km swath at 10-km flight altitude

MASC (Microwave Atmospheric Sounder on Cubesat) (8-ch)  
183.31±1, 183.31±3, 183.31±7, 183.31±8, 118.75±1, 118.75±2, 118.75±7,  
118.75±8

COSMIR (Conically Scanning Millimeter Wave Imaging Radiometer) (9-ch)  
50.3, 52.8, 89V, 89H, 165V, 165H, 183.31±1, 183.31±3, 183.31±7

Dropsondes (over ocean), 3-4 per flight

Many flight segments well-coordinated with ER-2 and near-coincident  
Advanced Microwave Precipitation Radiometer (AMPR) (8-ch) observations

APR-3 surface backscatter over ocean and land

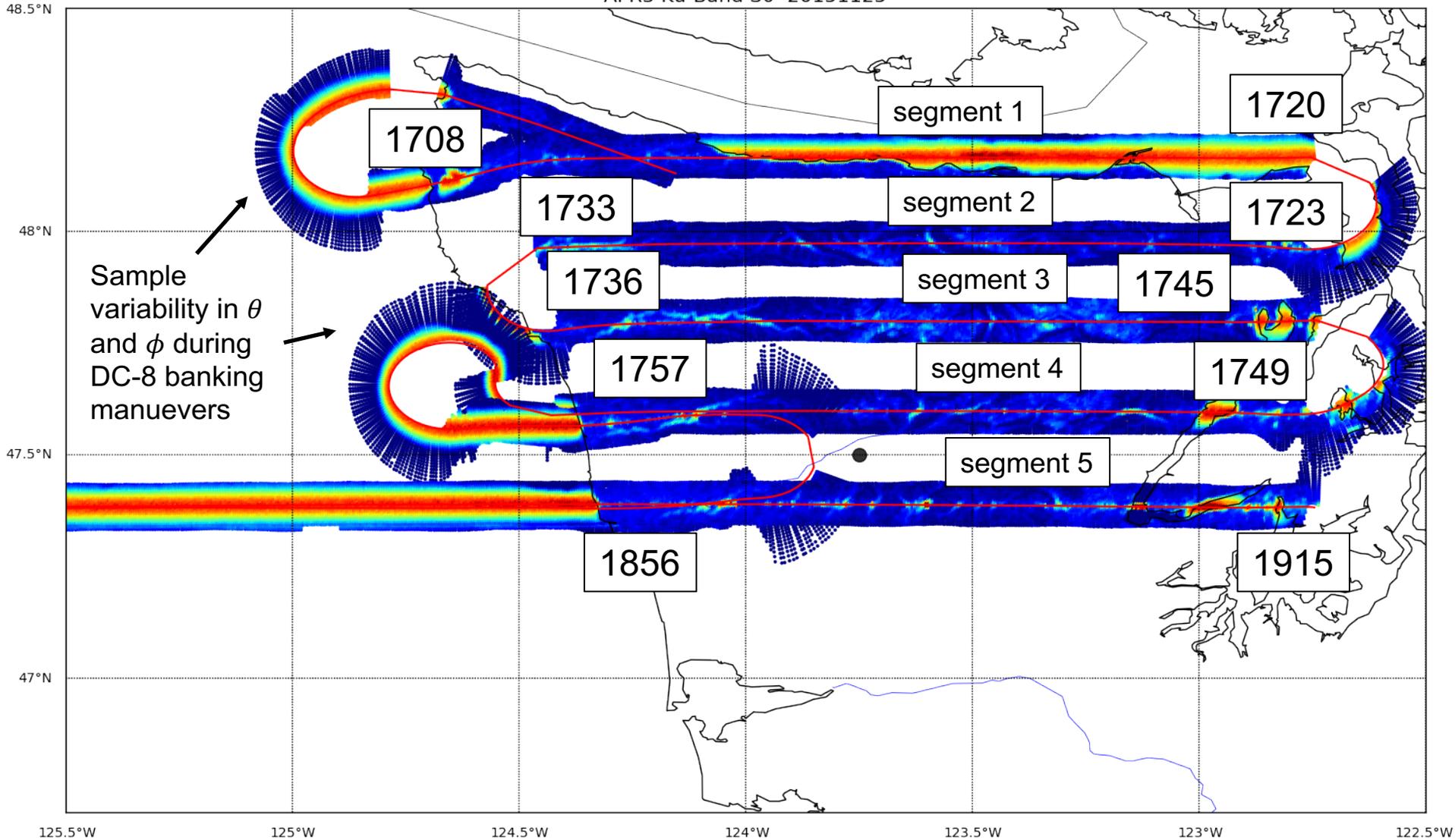
<http://olympex.atmos.washington.edu>

**25 November 2015 Clear-Sky Day (No ER-2)**



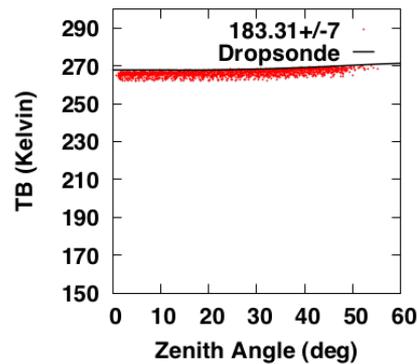
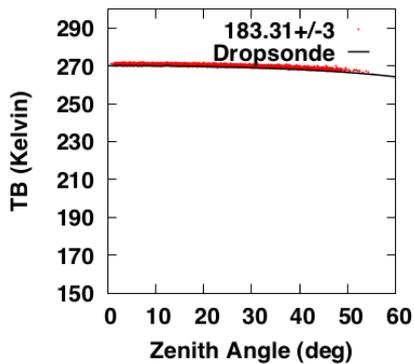
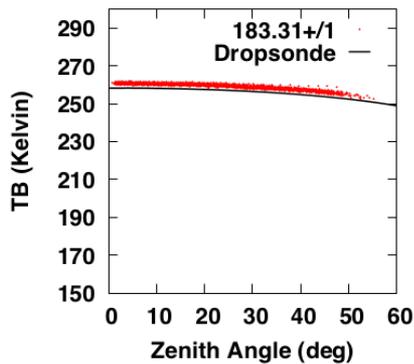
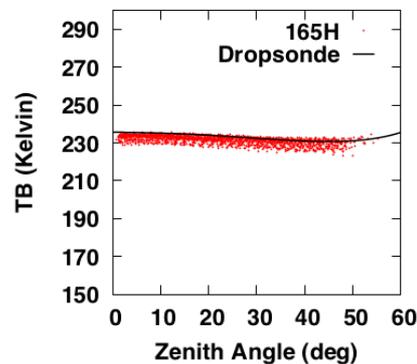
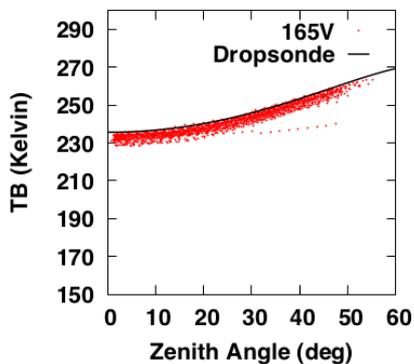
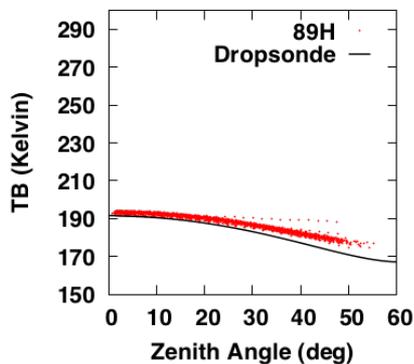
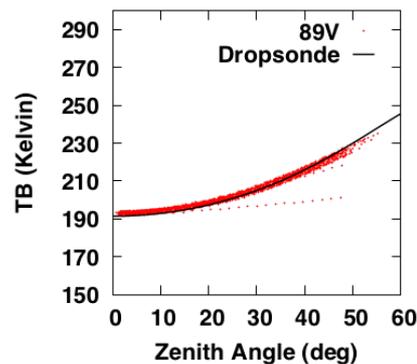
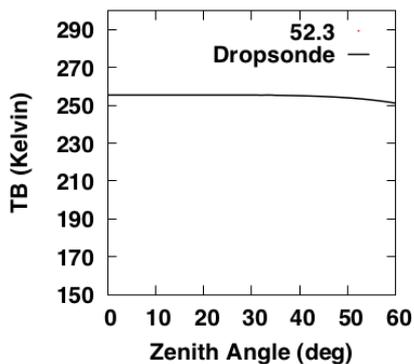
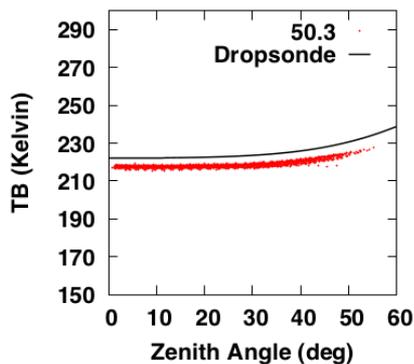
# 25 November 2015 Clear-Sky Day (No ER-2) Lawn Mower Patterns

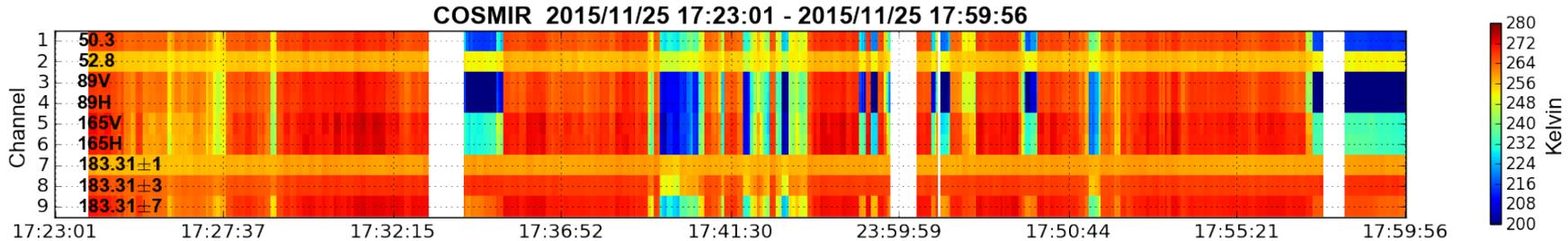
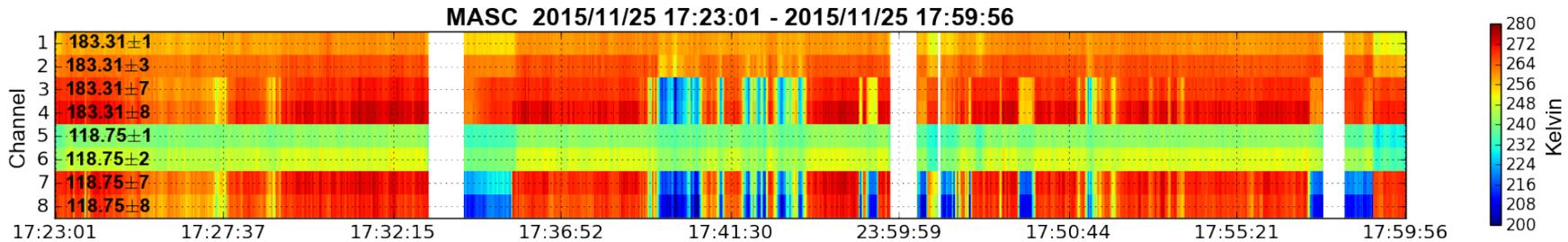
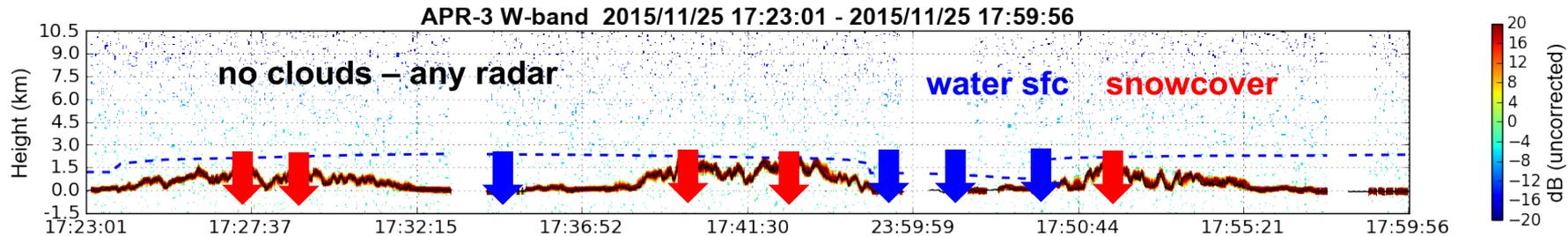
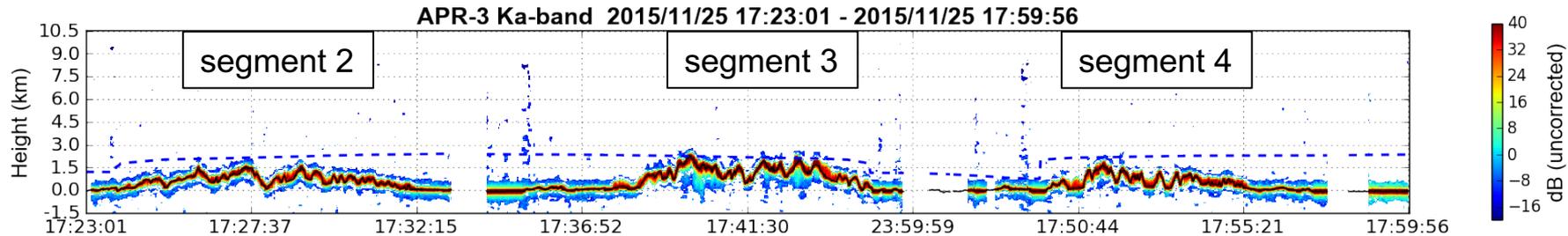
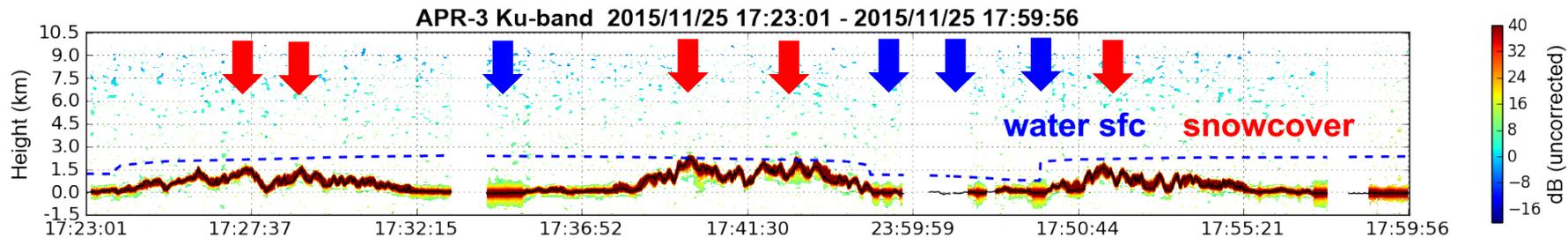
APR3 Ku-Band S0 20151125

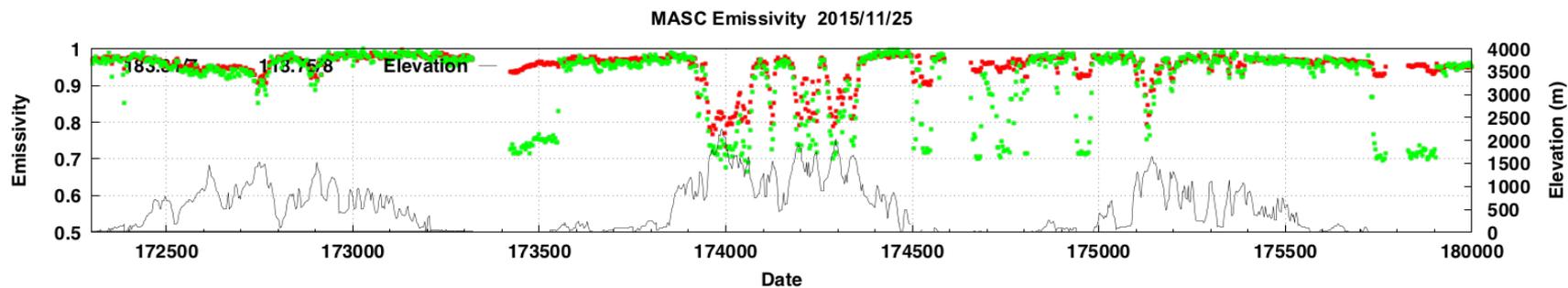
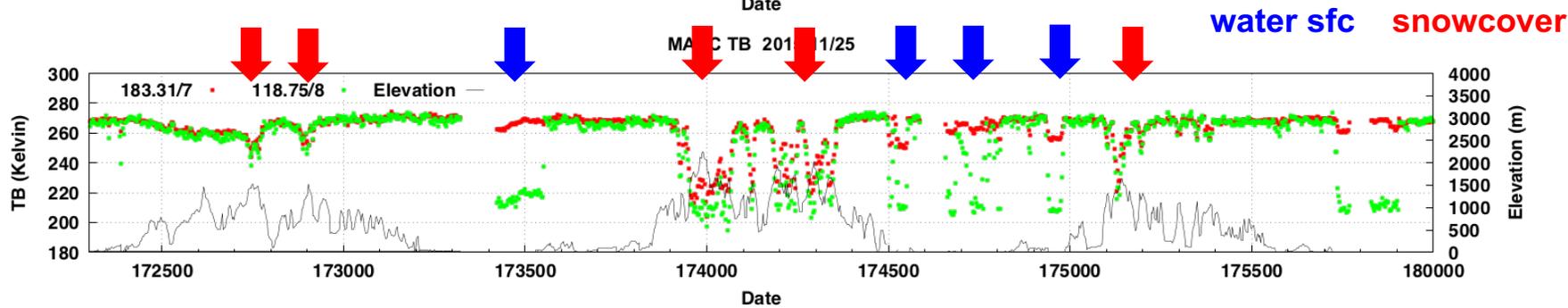
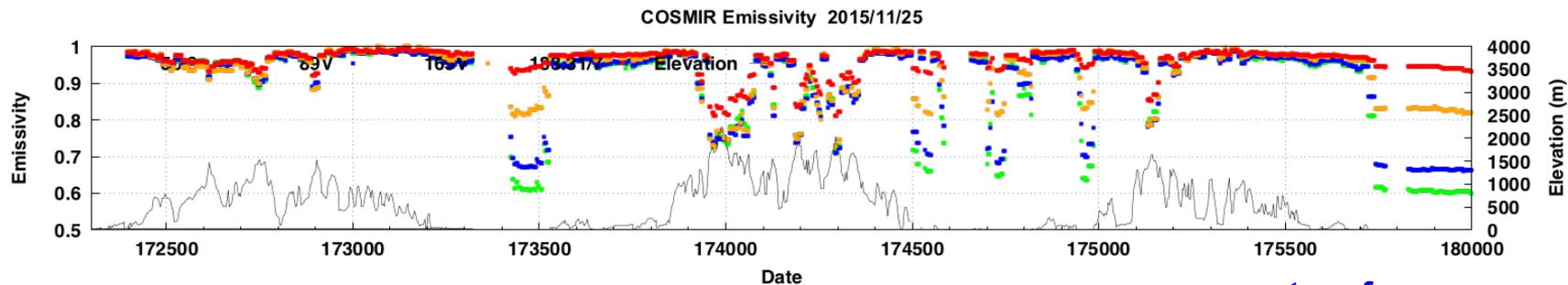
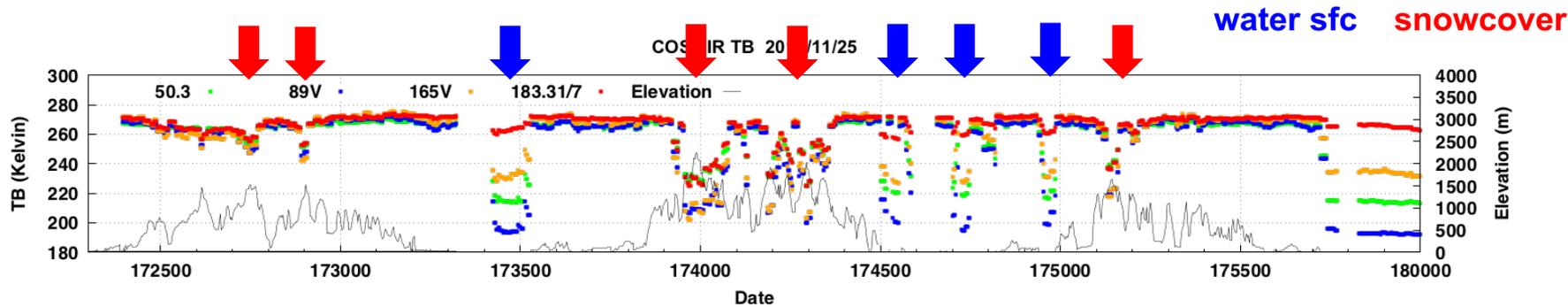


# COSMIR Forward Simulations Using 1822-1837 UTC Dropsonde

**!! very preliminary, nowhere final, still checking absorption in RT code !!**







## **Analysis of Land Surface Radar Backscatter from OLYMPEX**

APR3 data were only used when the maximum  $Z_{ku}$  and  $Z_{ka} < 20$  dB anywhere in the column (crude no-precipitation screen)

The APR3 zenith angle is the incidence angle that each APR3 beam makes with the surface. Since the DC-8 often banked rather tightly during OLYMPEX, this angle can exceed 50 degrees, but it never gets much below 3-degrees given the radar mounting and the typical aircraft pitch. I only show up to 17-degrees to match with DPR.

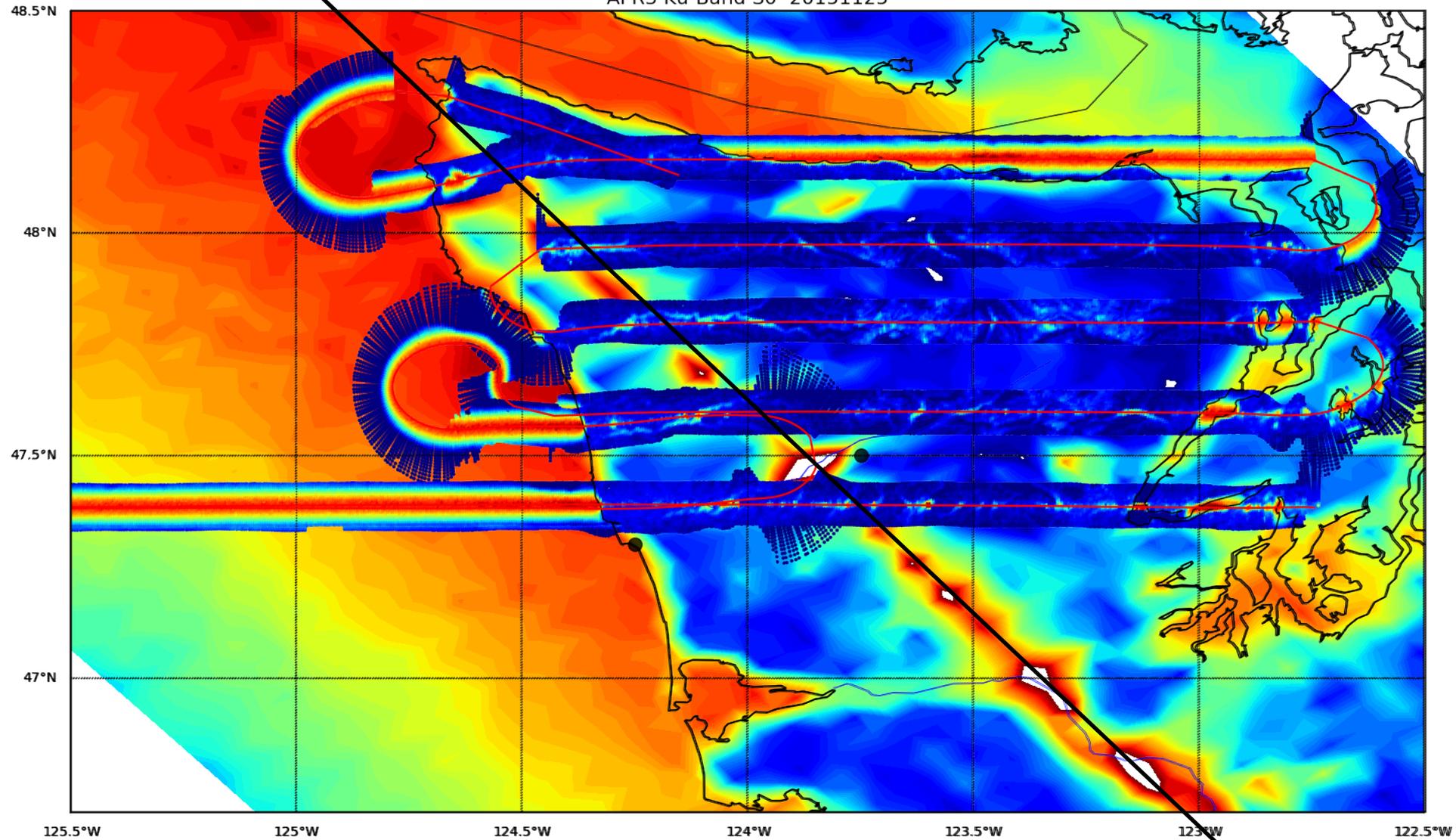
The boxplots show 10, 25, 50, 75, 90 percent quintiles for each angle bin

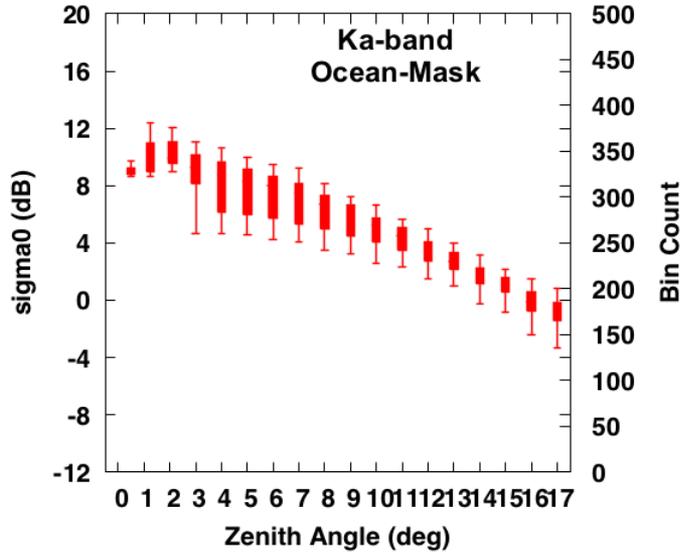
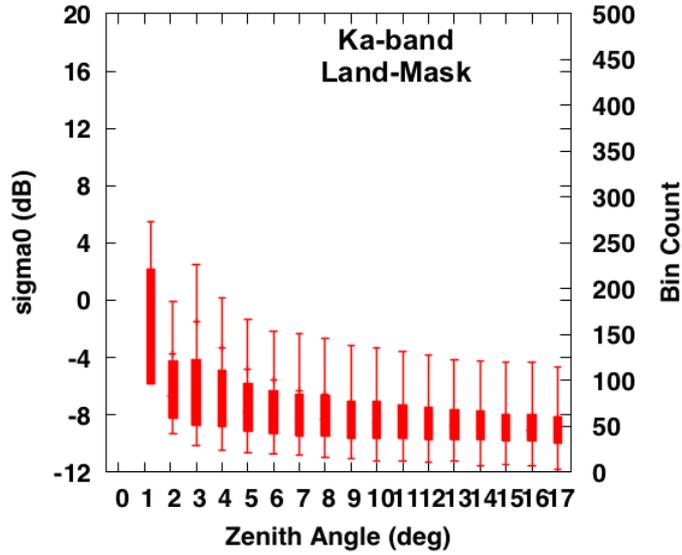
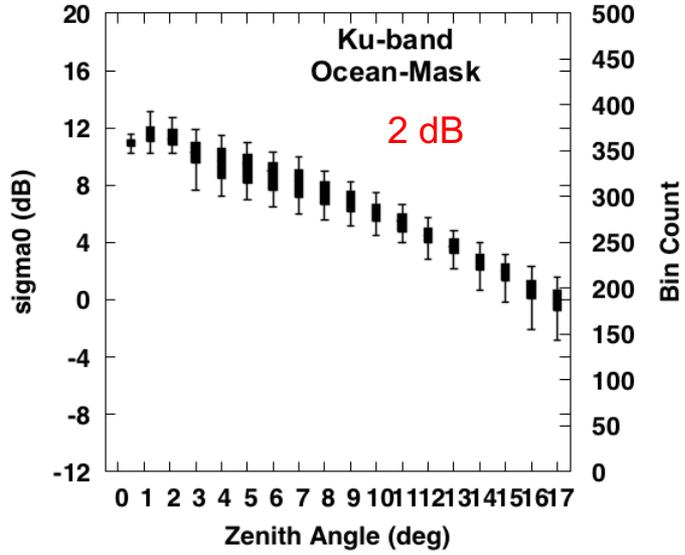
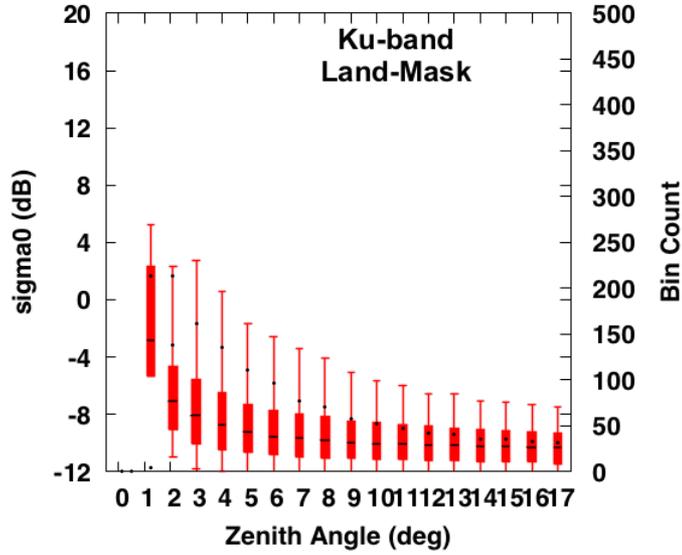
All GPM DPR data collected during Nov-Dec 2015 used for comparison, within the domain 46.9-48.5 latitude, -125.2 to -122.7 longitude region (1.5 deg x 2.5 degree box). Data with either the NS and MS precip flags set were excluded.

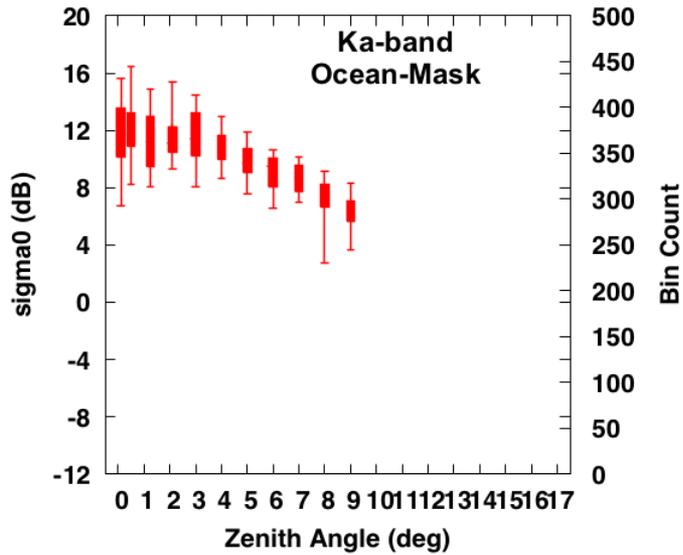
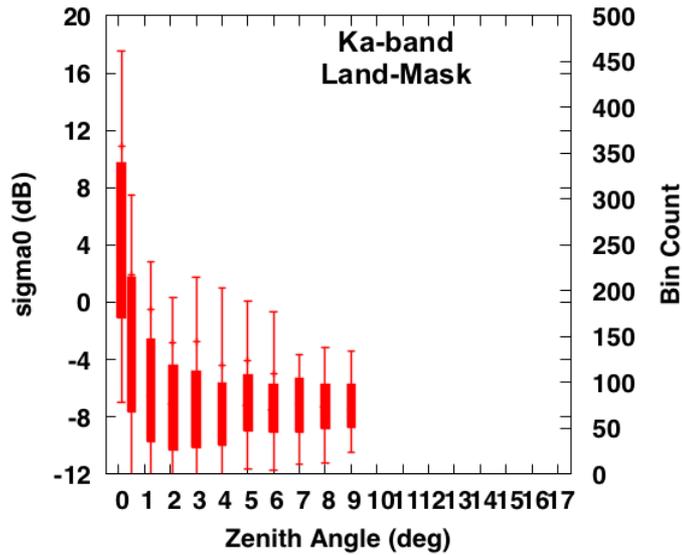
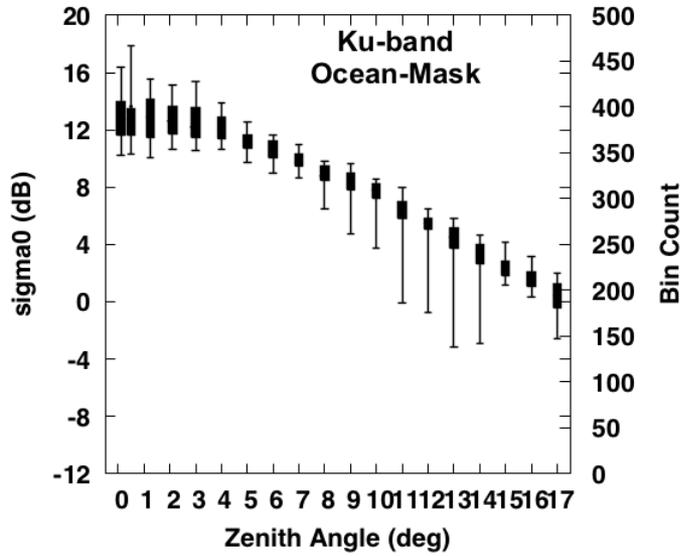
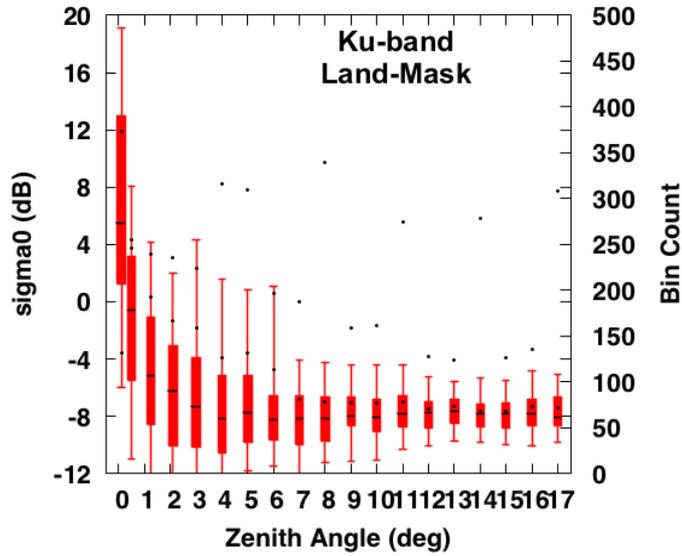
A common land/ocean mask was used for APR3 and DPR. The mask is coarse (0.05 minute resolution) and coastal regions were excluded. This allows the same land/ocean mask for each sensor, and forces the analysis to sample (almost) the same Earth surface regions.

# DPR subtrack (Example from the Nov 25 flights)

APR3 Ku-Band S0 20151125







# Six Days Later: 1 December 2015 (With ER-2)

APR3 Ku-Band S0 20151201

