# HCR calibration

- Engineering calibration in the lab
- Antenna, reflector, and radome characterization with outside vendor
- Temperature-dependent receiver gain correction

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HCR calibration

Reflectivity calibration monitoring using sea surface backscatter

- Perform sea surface cals: scan to 20° cross track on each side in clear conditions
- Calculate normalized ocean surface cross-section
- Compare with model calculations

(b) OTREC 2019-08-18 13:36:00

SST: 29 C
Surf. wind speed: 6.7 m s^{-1}

sigma$_0$ (dB)

Incidence angle (deg)

- Rot angle <= 180 deg
- Rot angle > 180 deg
- FV model
- Wu model
- CM model
- Data fit

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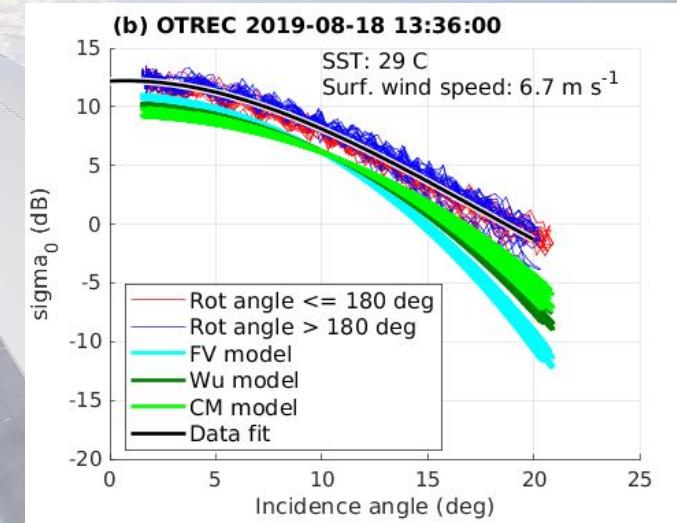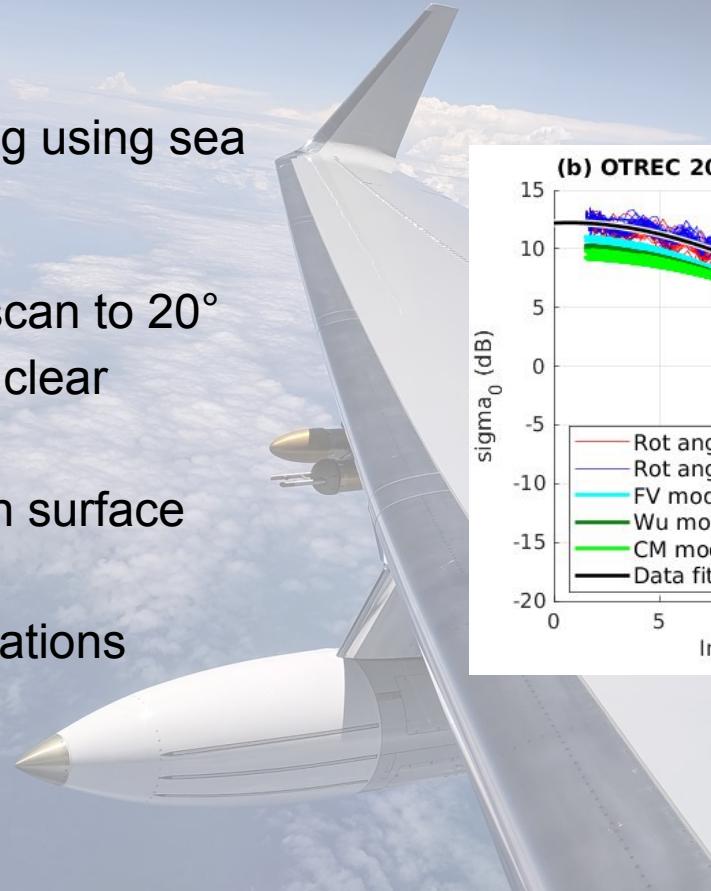
HCR calibration

Reflectivity calibration monitoring using sea surface backscatter

- HCR reflectivity and power show a bias of ~1-2 dB
- Bias varies between different sea surface cal events
- We do not apply an overall correction

c) OTREC

f)

FV: mean 1.7 dB, st. dev. 2.1 dB
Wu: mean 1.2 dB, st. dev. 2 dB
CM: mean 1.4 dB, st. dev. 2.6 dB

FV model
Wu model
CM model

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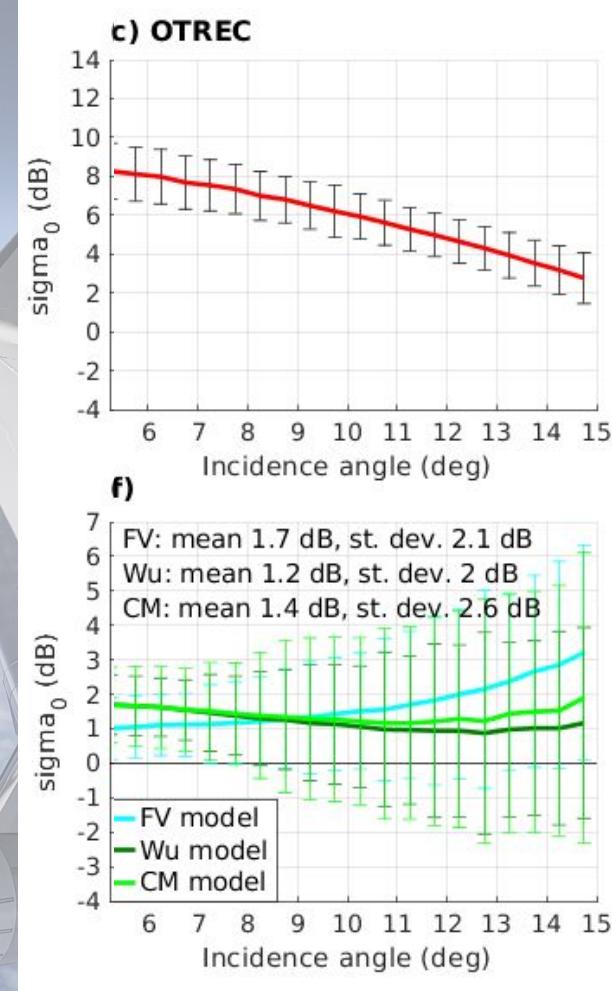
Correction of Doppler fields

Spectrum width is corrected for platform motion effects.

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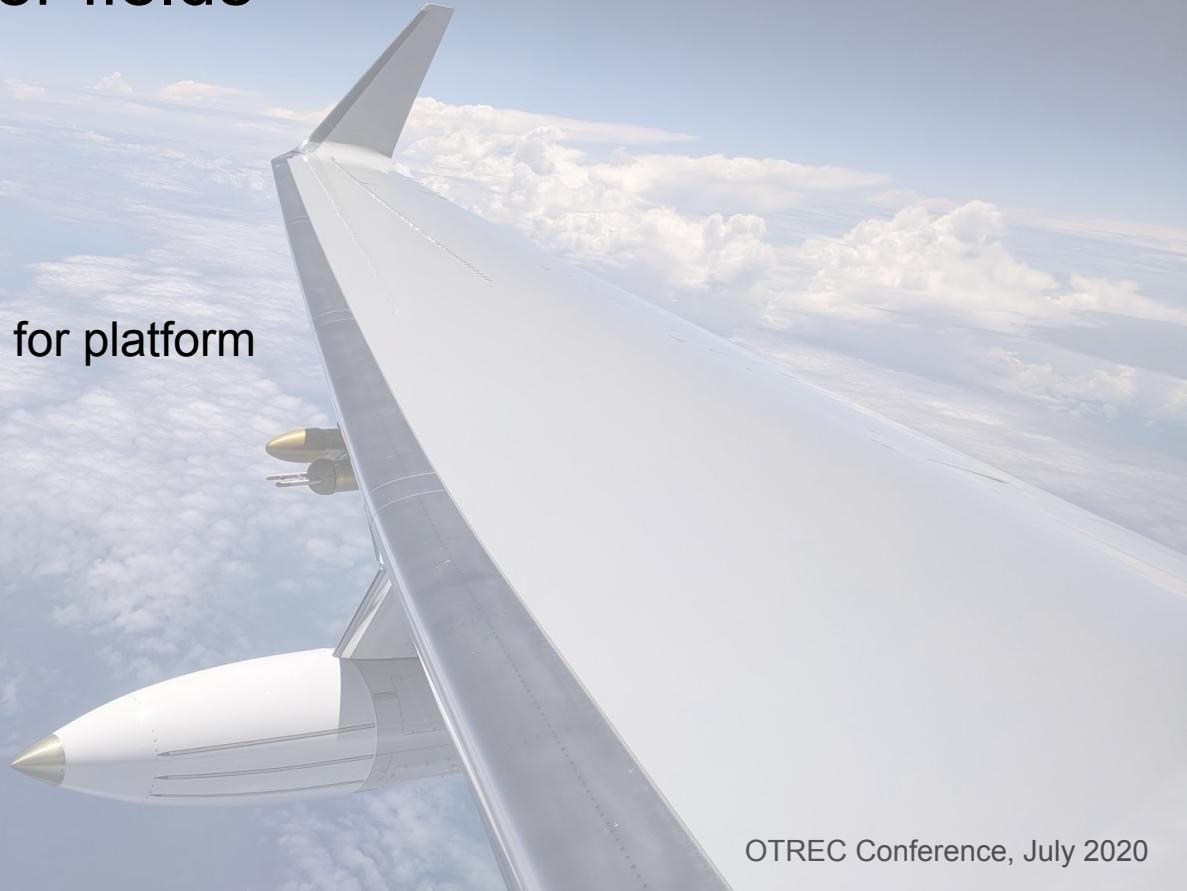
Correction of Doppler fields

Radial velocity correction

- Correct for vertical and horizontal platform motion (nadir and zenith pointing)
- Correct remaining bias by assuming that the ocean/land surface is stationary (nadir pointing only)

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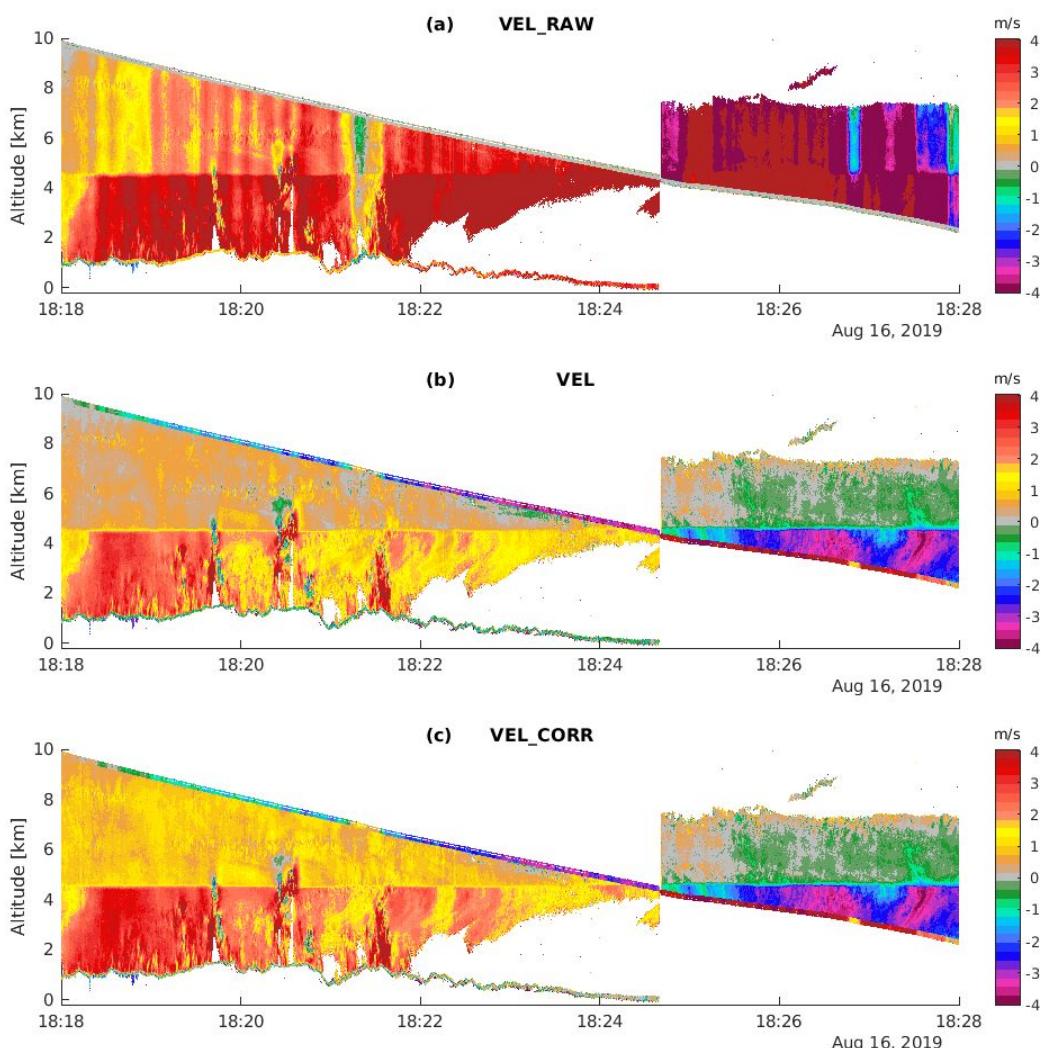
Data

| Variable	Dimensions	Unit	Long Name	
DBZ	time, range	dBZ	Reflectivity	
DBZ_MASKED	time, range	dBZ	Reflectivity of cloud echo only (DBZ(FLAG>1)=NAN)	
VEL_RAW	time, range	m/s	Raw measured Doppler velocity	
VEL	time, range	m/s	Motion corrected Doppler velocity (see Sect. 5.2)	
VEL_CORR	time, range	m/s	Motion and bias corrected Doppler velocity (see Sect. 5.2)	
WIDTH_RAW	time, range	m/s	Raw measured spectrum width	
WIDTH	time, range	m/s	Spectrum width corrected for aircraft motion (see Sect. 5)	
SNR	time, range	dB	Signal to noise ratio	
DBMVC	time, range	dBm	Log co-polar power, v transmit, v receive	**Radar variables**
DBMHX	time, range	dBm	Log cross-polar power, v transmit, h receive	
NCP	time, range		Normalized coherent power	
LDR	time, range	dB	Linear depolarization ratio (V/H)	
PRESS	time, range	mb	Air pressure	
TEMP	time, range	˚C	Air temperature	
RH	time, range	%	Relative humidity	**ERA5 reanalysis**
SST	time	˚C	Sea surface temperature	
U_SURF	time	m/s	Surface u wind component	
V_SURF	time	m/s	Surface v wind component	
TOPO	time	m	Terrain elevation above mean sea level	
FLAG	time, range		Flag field to classify reflectivity	**Metadata**
ANTFLAG	time		Flag field to indicate the status of the antenna	

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Data - ERA5 reanalysis

Dropsonde data
was assimilated
into ERA5 for
OTREC!
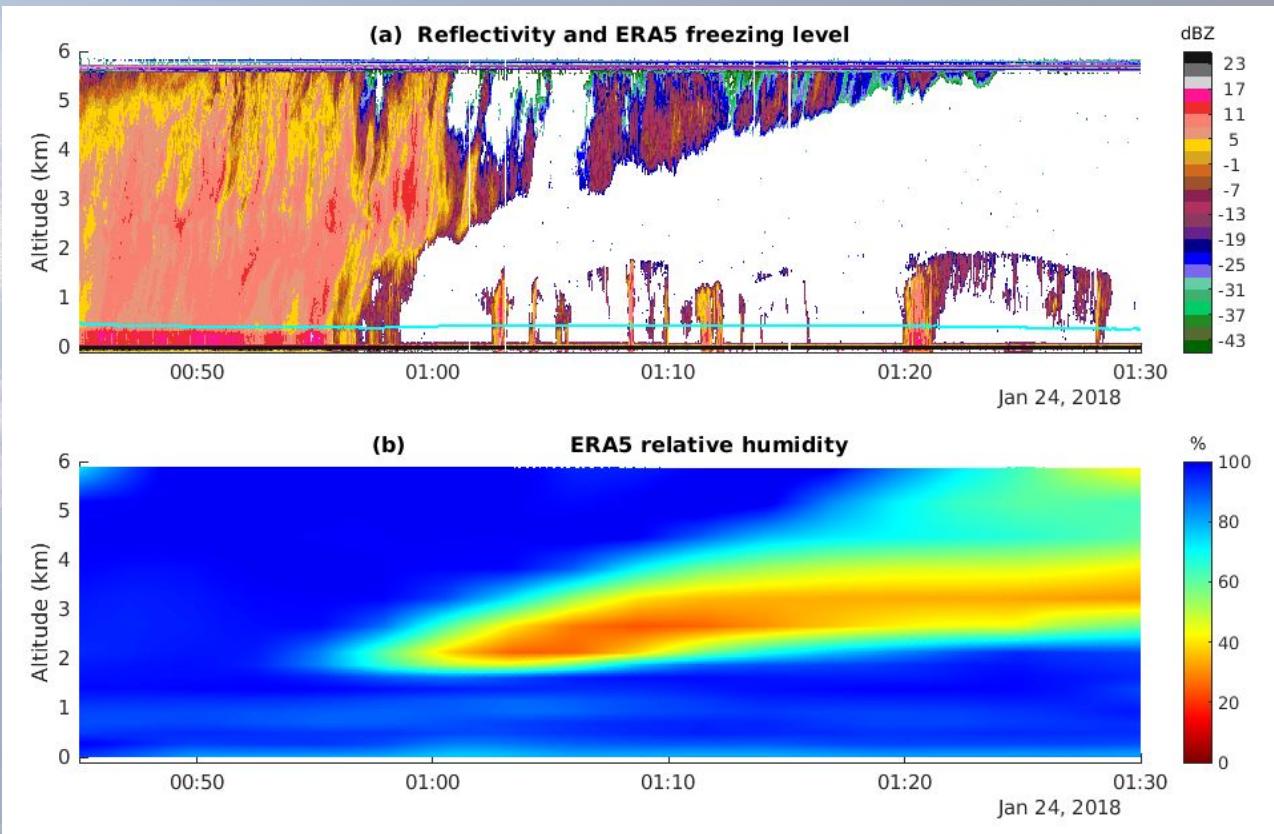
Data
FLAG field

- Use

FIELD(FLAG>1)=NAN

- Pay attention to
  "Extinct" flag

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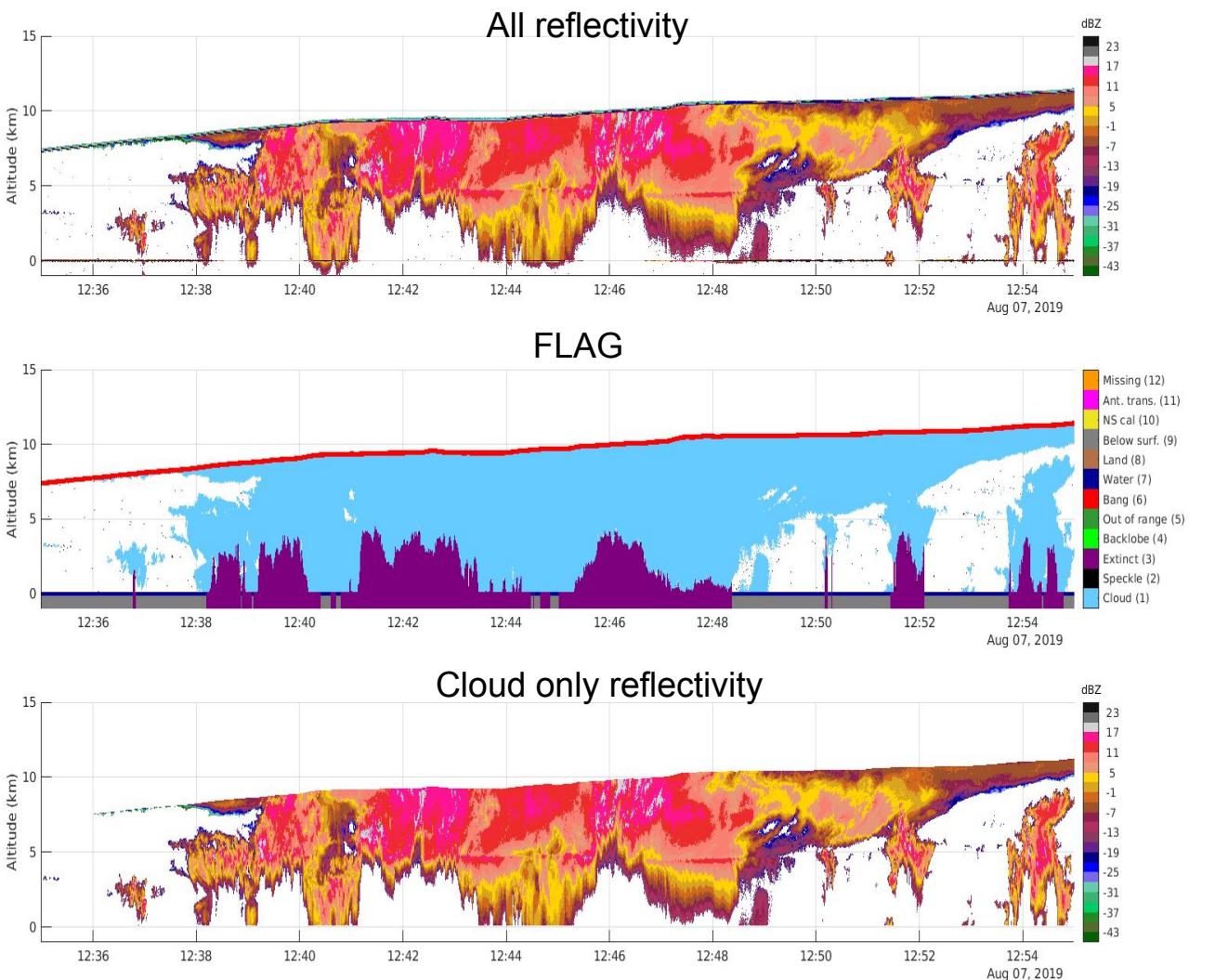
Future work - Melting layer detection

Flight 17, otrec, 13:10 to 14:10
DBZ and freezing level

Sep 25, 2019

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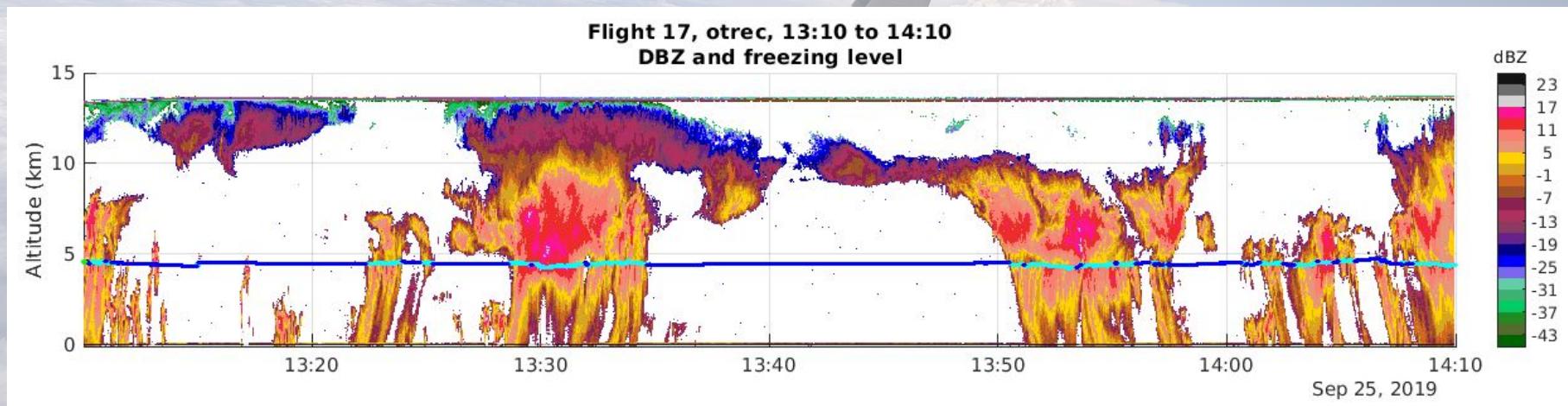
Future work - Stratiform/convective partitioning
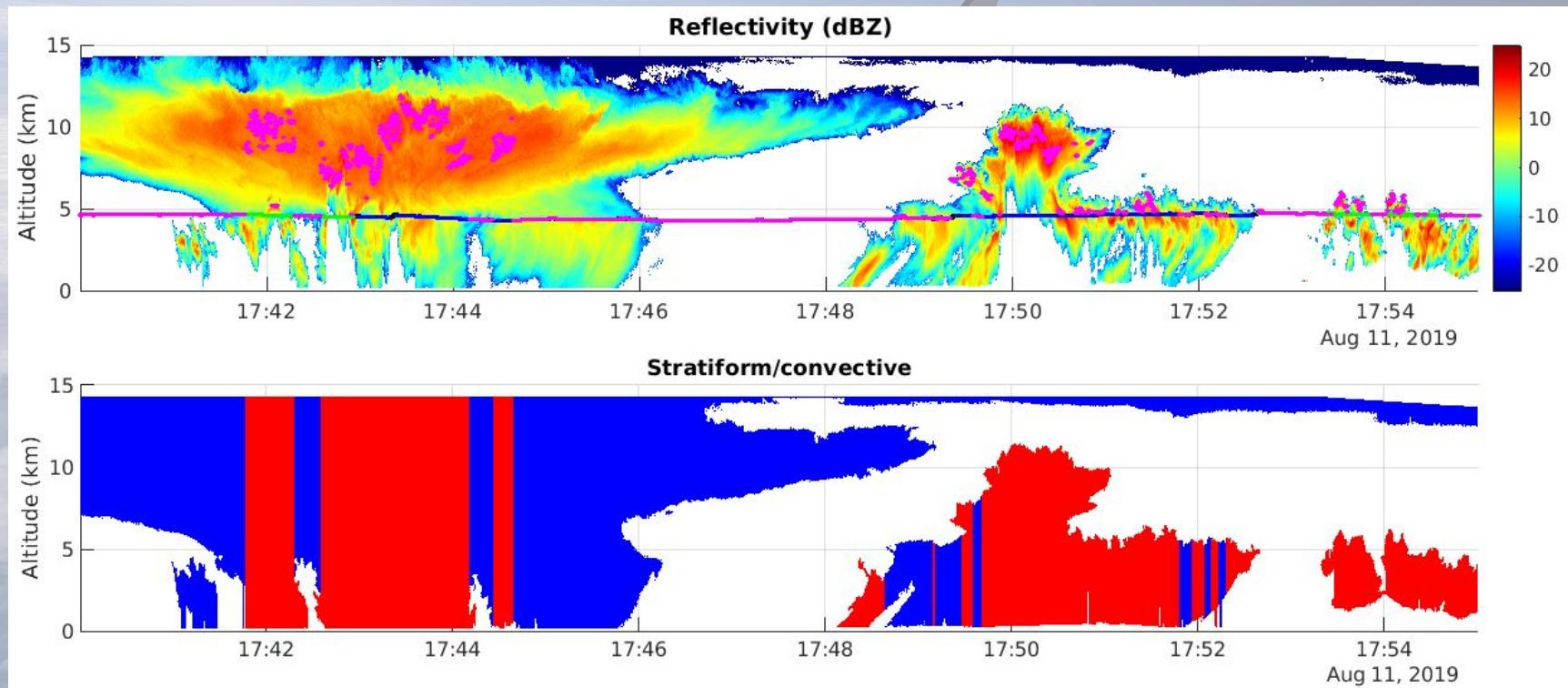
Future work - Liquid water content and particle size

Liquid water content (g m^{-3})
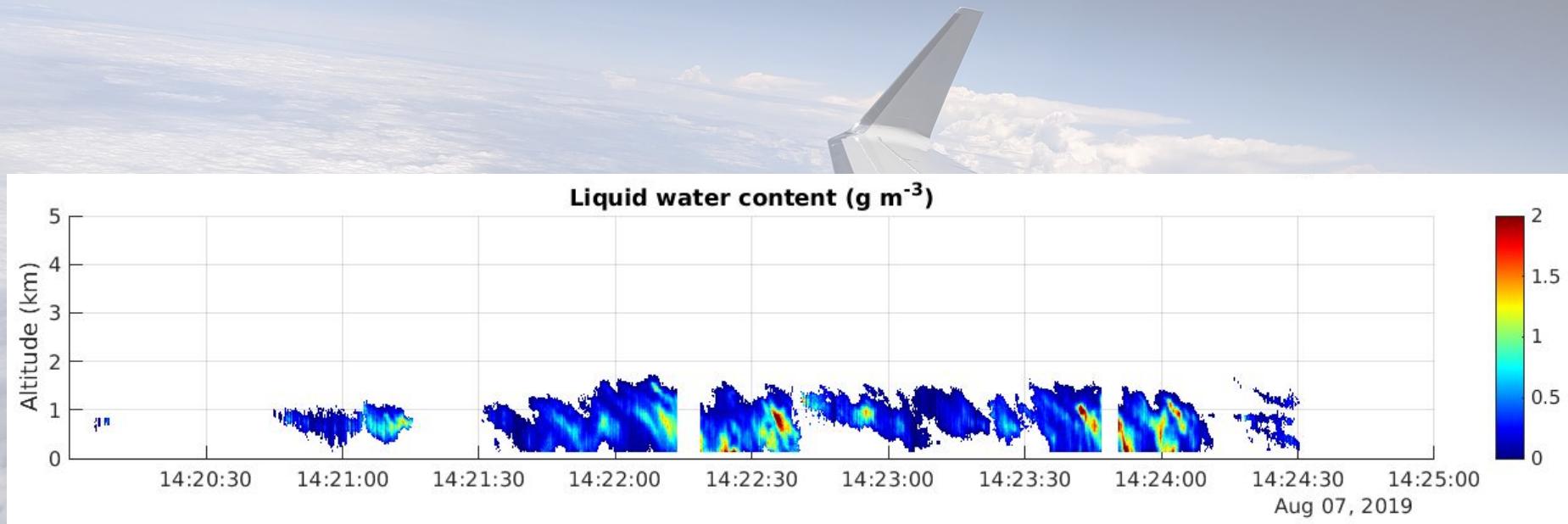
Questions ???
Comments ???
Suggestions ???

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