

CapeEx19 Field Project Citation Research Aircraft

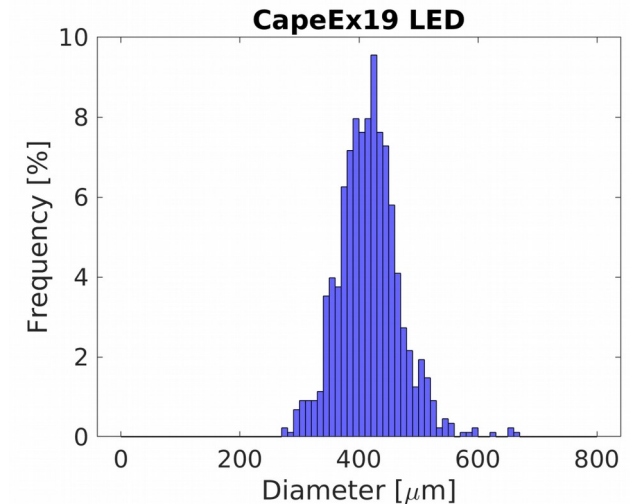
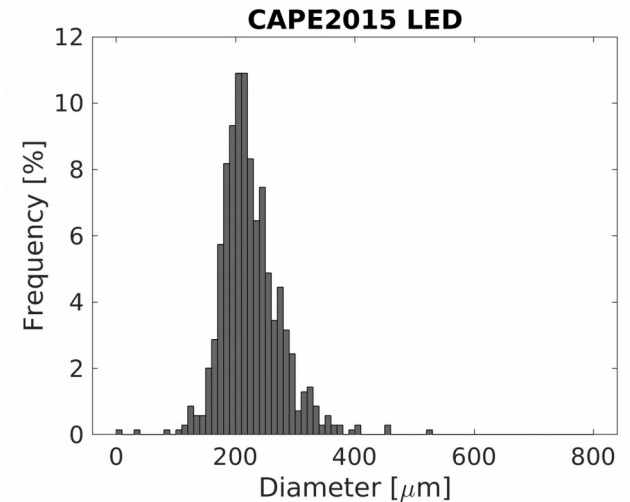
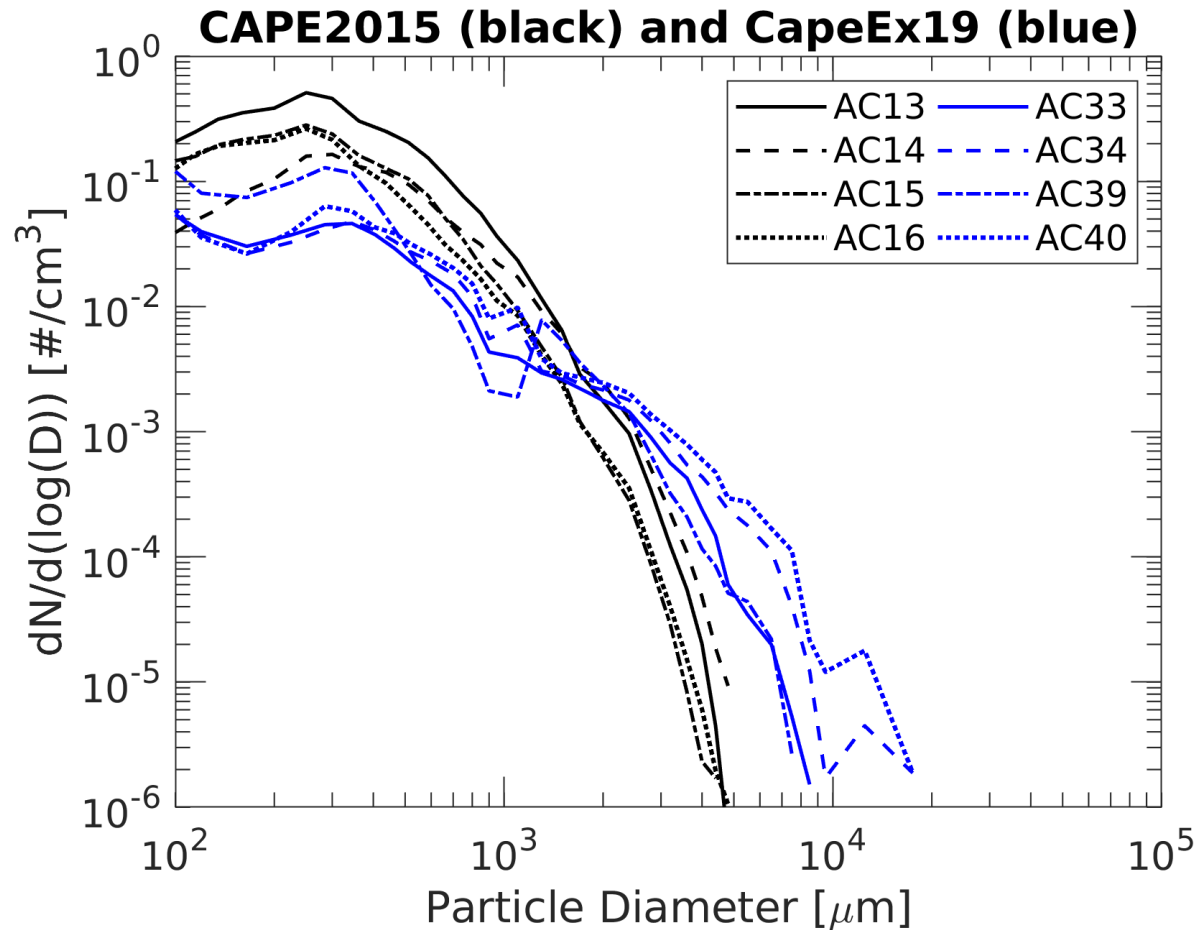
David Delene



Atmospheric Sciences Department
University of North Dakota

Objective (Improving Radar)

Concurrent Radar & Aircraft Observations



Objective (Improving Modeling)

Understanding the process that results in chain aggregates.

- Determine the location of chain aggregates.
- Relate to cloud microphysical and electrical properties.



20190803 (016341)

UI Figure

Choose Folder for PHIPS Data Save

PHIPS Data Folder

C1

C2

Selection

Previous Next ☐ Skip Not Classified ☐ Skip Droplets

Classified as:

Aggregate ☐ Rimed ☐ Pristine ☐

Image /

Aggregate?

Rimed?

Pristine?

2019 12 Flights

2019/7/22

2019/7/24

2019/7/25

2019/7/26

2019/7/29

2019/7/30

2019/7/31

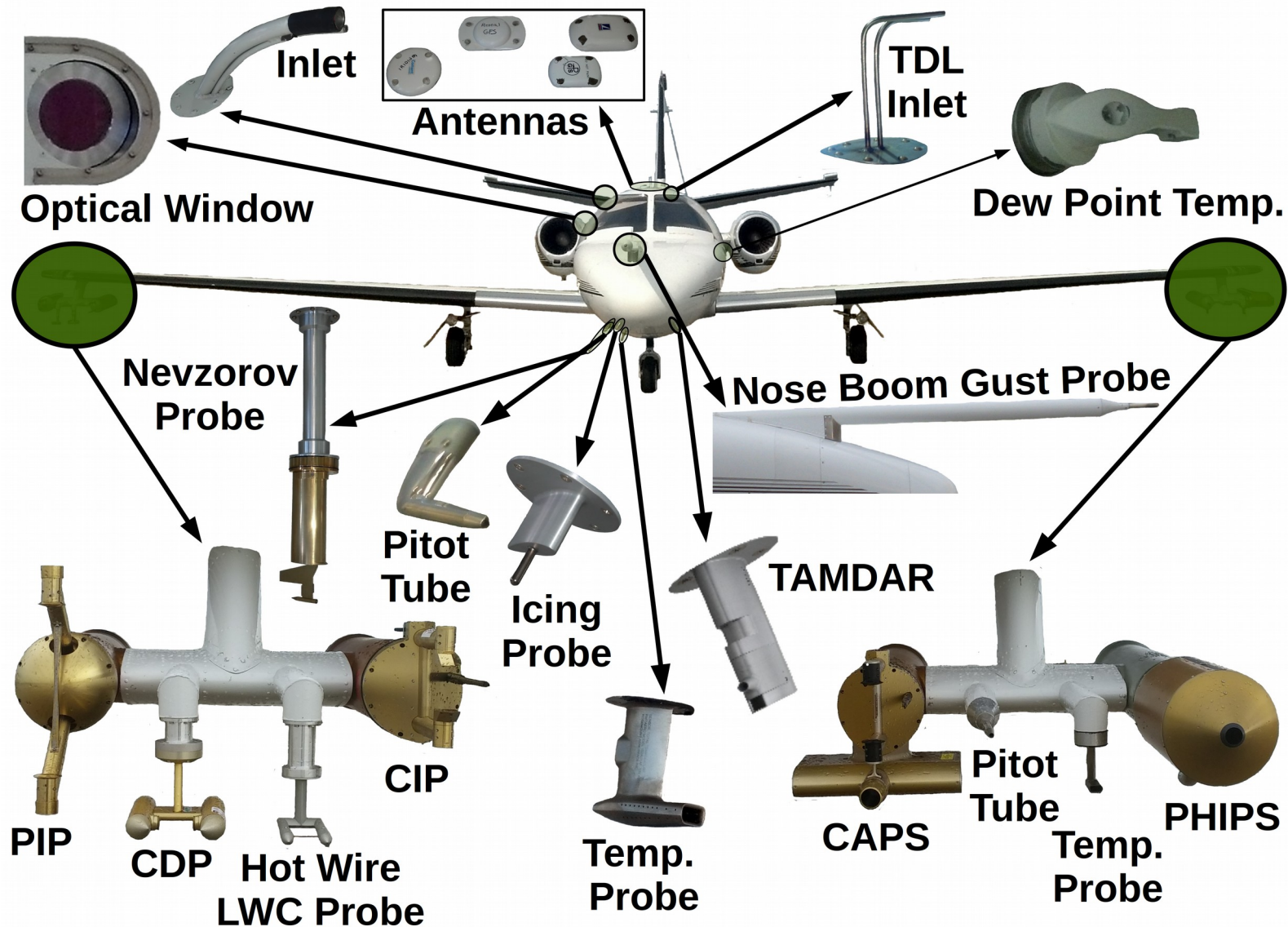
2019/8/01

2019/8/2a

2019/8/2b

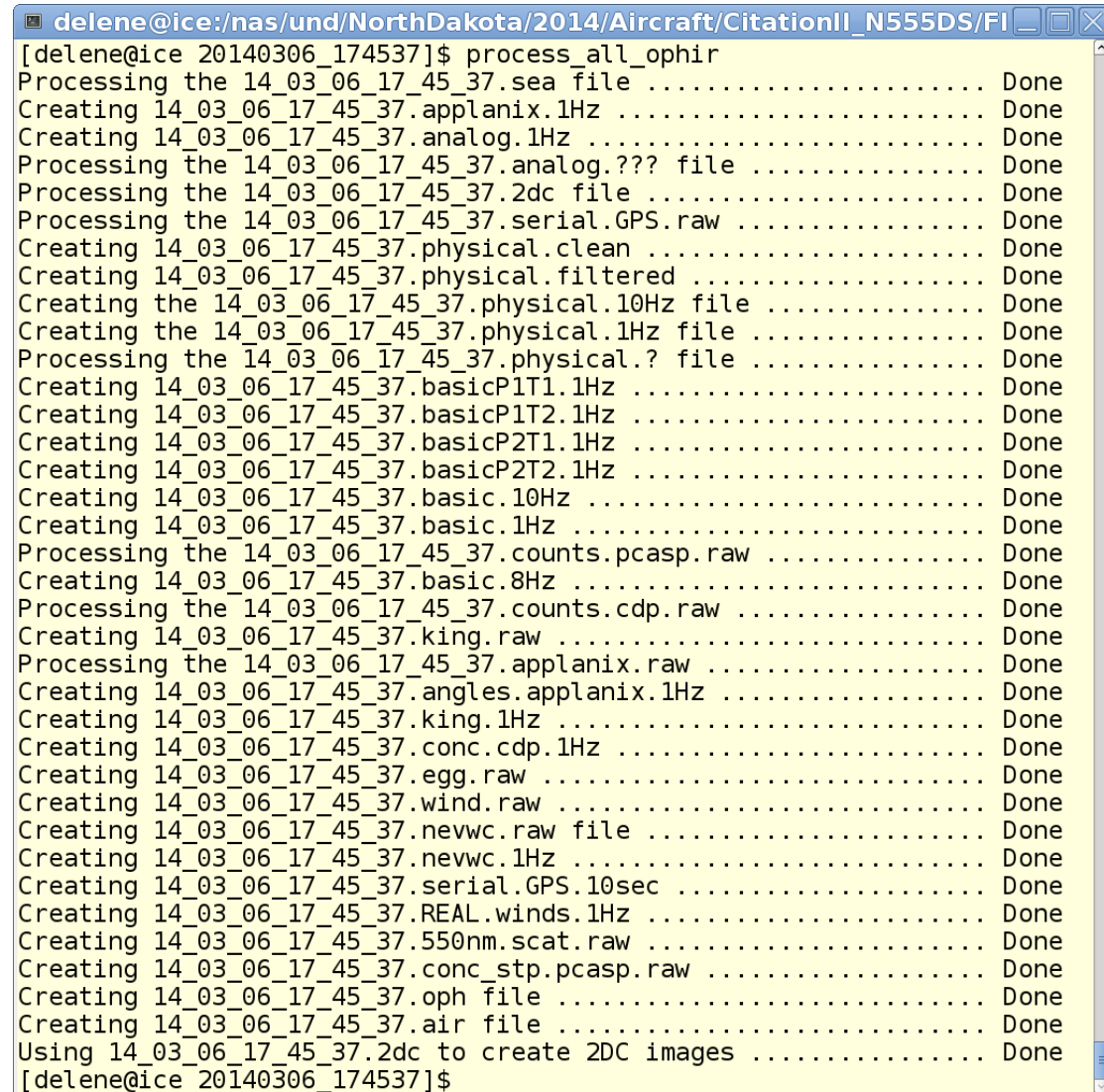
2019/8/3a

2019/8/3b



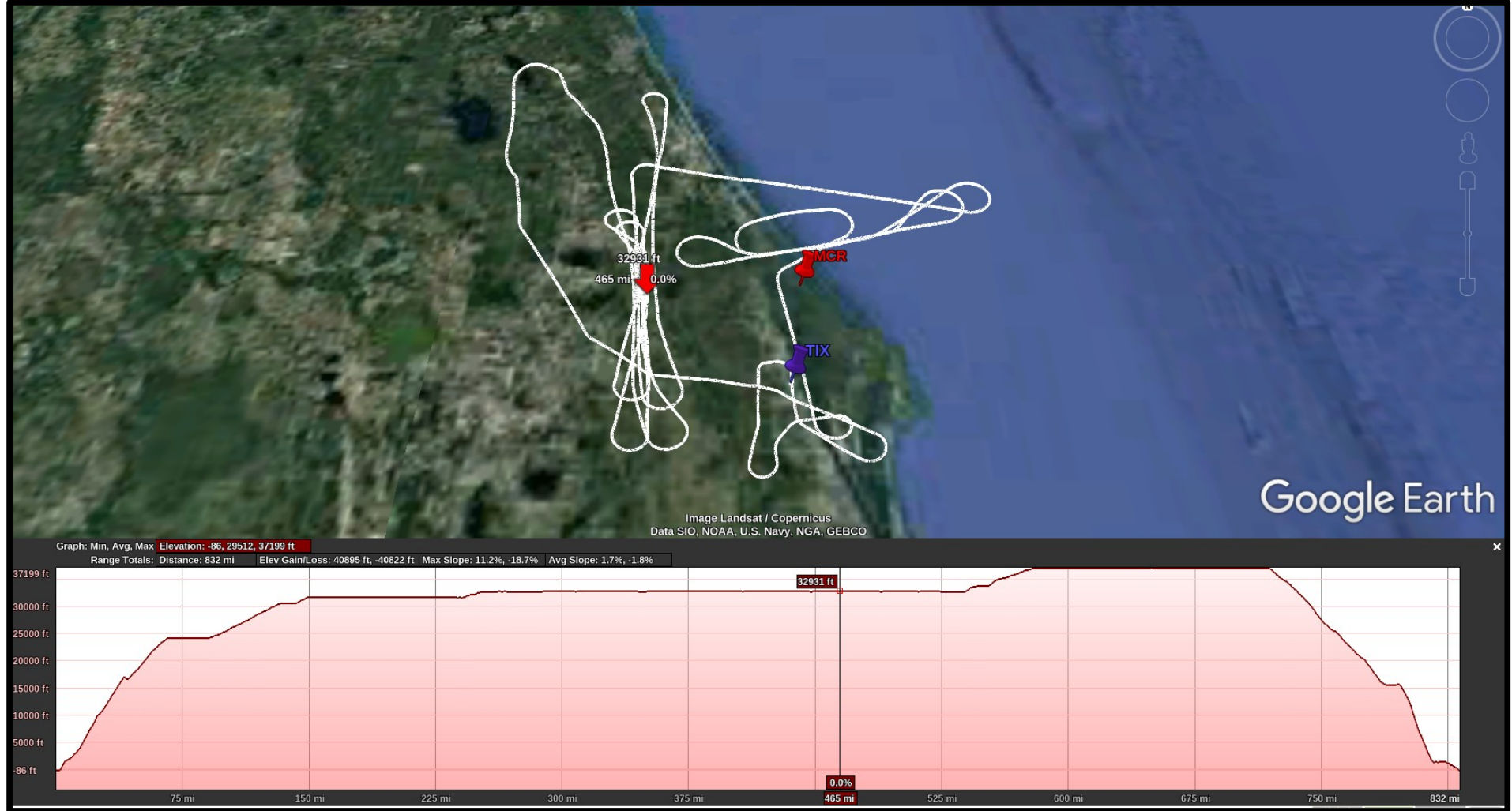
Data Processing

- Data Quality Control
 - Performance Checks
- Data Missing Values Codes
- Levels of Data Processing
 - Raw Recorded Data
 - Engineering to Physical Units
 - Single Instrument Data Files
 - Combined Data Files
- Data Quality Assurance
 - Scientific Data Review
 - Automated Checks

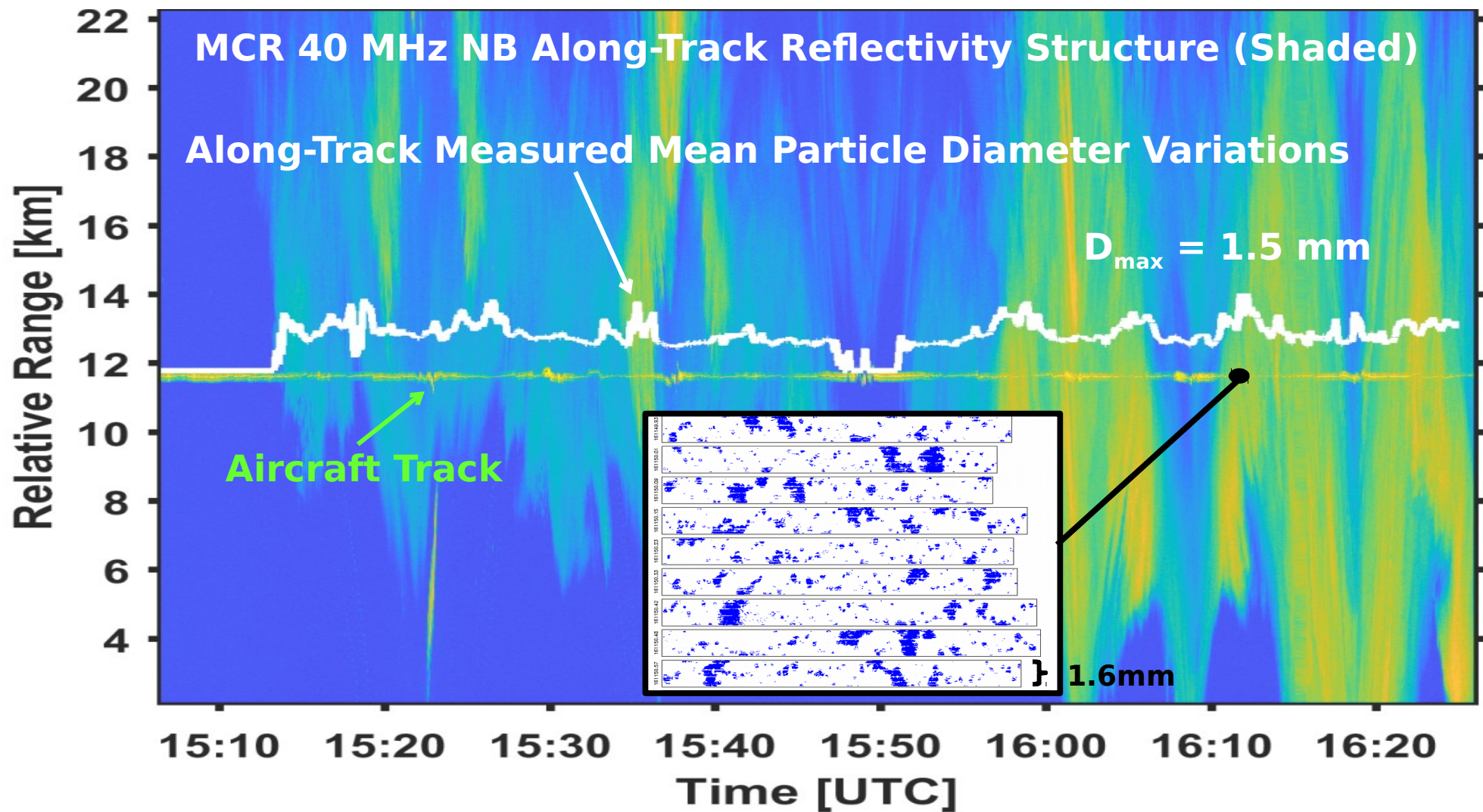
A terminal window titled 'delene@ice:/nas/und/NorthDakota/2014/Aircraft/CitationII_N555DS/Fl...' displays a series of commands and their outputs. The commands are executed in a loop, processing various data files for a specific aircraft. Each command is followed by a status message, either 'Processing' or 'Creating', and the file name. The status messages are followed by a series of dots and the word 'Done', indicating successful completion. The files being processed include sea files, analog files, 2dc files, serial GPS raw files, physical clean and filtered files, physical 10Hz and 1Hz files, basic P1T1, P1T2, P2T1, and P2T2 files, basic 10Hz and 1Hz files, counts pcasp raw and 8Hz files, counts cdp raw files, king raw files, applanix raw files, angles applanix 1Hz files, king 1Hz files, conc cdp 1Hz files, egg raw files, wind raw files, newwc raw files, newwc 1Hz files, serial GPS 10sec files, REAL winds 1Hz files, 550nm scat raw files, conc stp pcasp raw files, oph files, and air files. The final command is 'Using 14_03_06_17_45_37.2dc to create 2DC images', which also results in 'Done'. The terminal window has a standard Linux-style interface with a title bar and window controls.

```
delene@ice:/nas/und/NorthDakota/2014/Aircraft/CitationII_N555DS/Fl...
[delene@ice 20140306_174537]$ process_all_ophir
Processing the 14_03_06_17_45_37.sea file ..... Done
Creating 14_03_06_17_45_37.applanix.1Hz ..... Done
Creating 14_03_06_17_45_37.analog.1Hz ..... Done
Processing the 14_03_06_17_45_37.analog.??? file ..... Done
Processing the 14_03_06_17_45_37.2dc file ..... Done
Processing the 14_03_06_17_45_37.serial.GPS.raw ..... Done
Creating 14_03_06_17_45_37.physical.clean ..... Done
Creating 14_03_06_17_45_37.physical.filtered ..... Done
Creating the 14_03_06_17_45_37.physical.10Hz file ..... Done
Creating the 14_03_06_17_45_37.physical.1Hz file ..... Done
Processing the 14_03_06_17_45_37.physical.? file ..... Done
Creating 14_03_06_17_45_37.basicP1T1.1Hz ..... Done
Creating 14_03_06_17_45_37.basicP1T2.1Hz ..... Done
Creating 14_03_06_17_45_37.basicP2T1.1Hz ..... Done
Creating 14_03_06_17_45_37.basicP2T2.1Hz ..... Done
Creating 14_03_06_17_45_37.basic.10Hz ..... Done
Creating 14_03_06_17_45_37.basic.1Hz ..... Done
Processing the 14_03_06_17_45_37.counts.pcasp.raw ..... Done
Creating 14_03_06_17_45_37.basic.8Hz ..... Done
Processing the 14_03_06_17_45_37.counts.cdp.raw ..... Done
Creating 14_03_06_17_45_37.king.raw ..... Done
Processing the 14_03_06_17_45_37.applanix.raw ..... Done
Creating 14_03_06_17_45_37.angles.applanix.1Hz ..... Done
Creating 14_03_06_17_45_37.king.1Hz ..... Done
Creating 14_03_06_17_45_37.conc.cdp.1Hz ..... Done
Creating 14_03_06_17_45_37.egg.raw ..... Done
Creating 14_03_06_17_45_37.wind.raw ..... Done
Creating 14_03_06_17_45_37.newwc.raw file ..... Done
Creating 14_03_06_17_45_37.newwc.1Hz ..... Done
Creating 14_03_06_17_45_37.serial.GPS.10sec ..... Done
Creating 14_03_06_17_45_37.REAL.winds.1Hz ..... Done
Creating 14_03_06_17_45_37.550nm.scat.raw ..... Done
Creating 14_03_06_17_45_37.conc_stp.pcasp.raw ..... Done
Creating 14_03_06_17_45_37.oph file ..... Done
Creating 14_03_06_17_45_37.air file ..... Done
Using 14_03_06_17_45_37.2dc to create 2DC images ..... Done
[delene@ice 20140306_174537]$
```

August 3, 2019 Flight Path (142455)



2019/08/03 Tracking Along-Track Narrow Band Reflectivity



Chain Aggregates (20190803_142455)

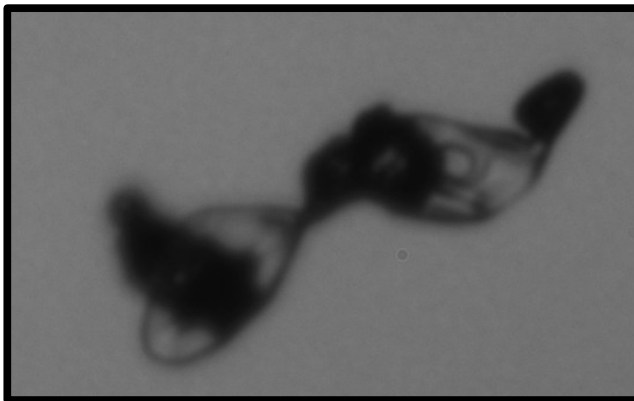
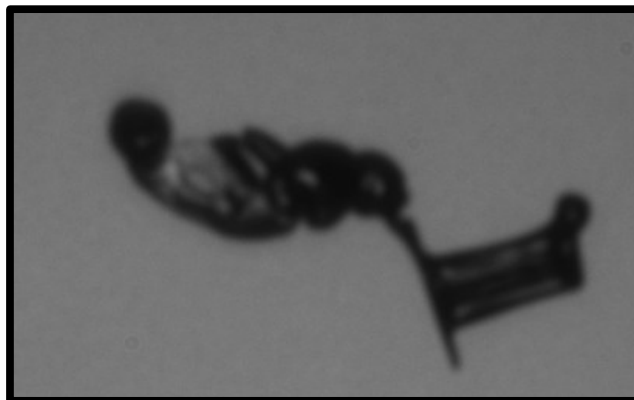
016341



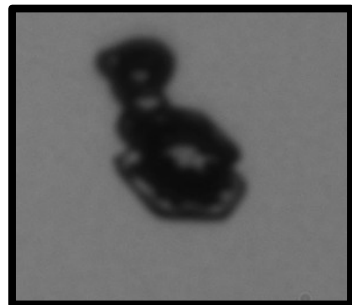
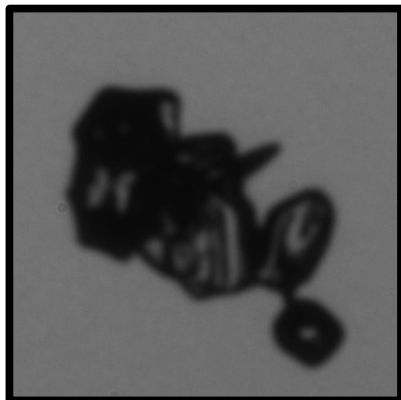
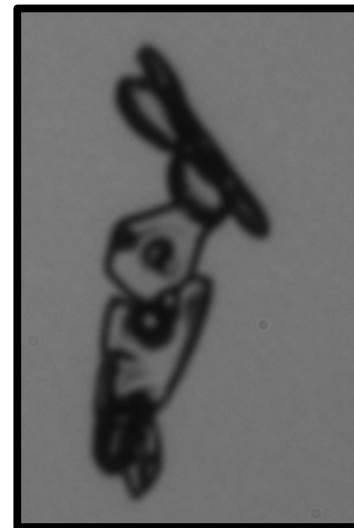
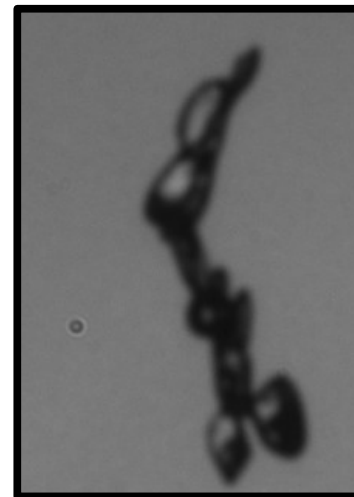
016358



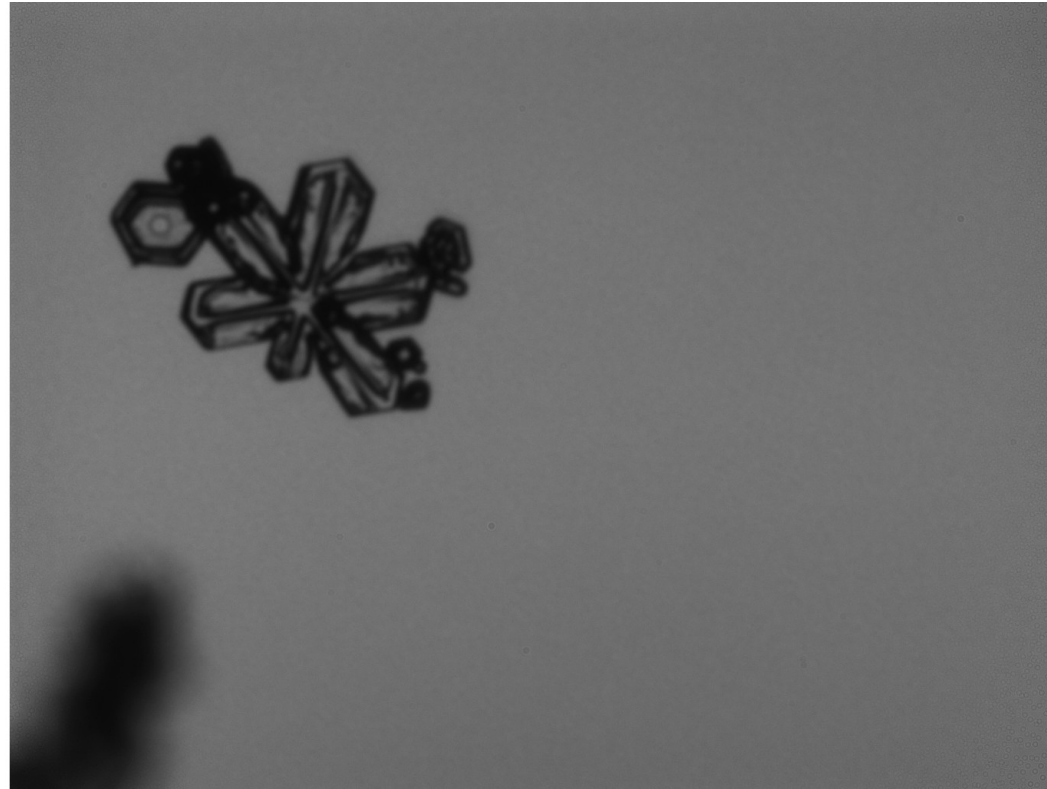
016370



016385



Chain Plate Aggregates (20190803_142455 ID 016076)



Chain Plate Aggregates (20190803_142455 ID 016136)



Chain Plate Aggregates (20190803_142455 ID 016146)



Chain Plate Aggregates

(20190803_142455 ID 016146)

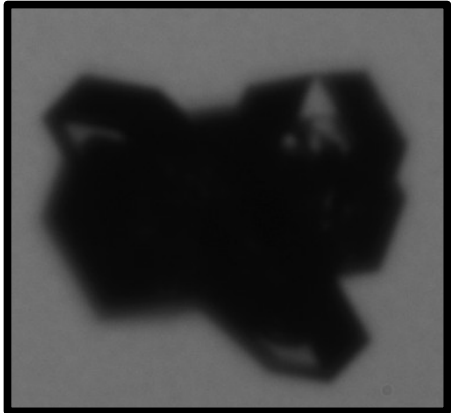
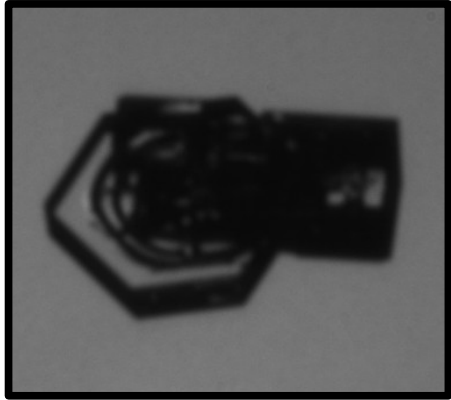


Chain Plate Aggregates (20190803_142455 ID 017033)



Aggregates 1-Plate, 1-Column (20190803_142455)

016052



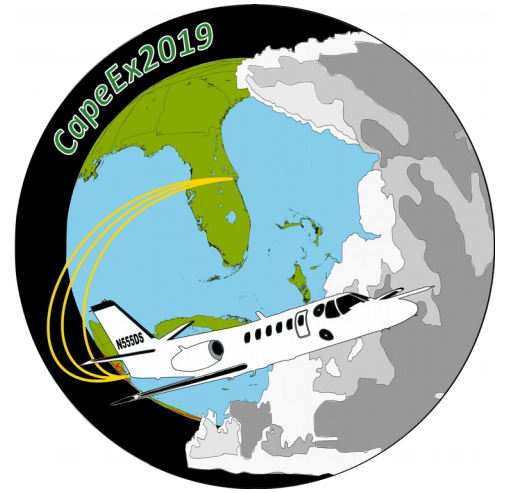
Conclusions

- Data set has been processed and Nevzorov Probe data quality assured.
- Electric Field Measurements have been processed.



Current / Future Work

- Bacteria Analysis
 - Harrison , Undergrad, 2020 AMS Poster Presentation
- Radar / Aircraft Comparison
 - Nicholas Gapp, UND Master Thesis, AMS Presentation
- Non-constant Crystal Particle Density
 - Christian N., New UND Master Student
- Crystal Classification – Chain Aggregates
 - Emma, NCAR PostDoc



2015 7 Flights

July 29
July 30
July 31
August 1-a
August 1-b
August 2
August 8

