CAPE2015 Field Project

Citation Research Aircraft
(http://airborneresearch.atmos.und.edu/)
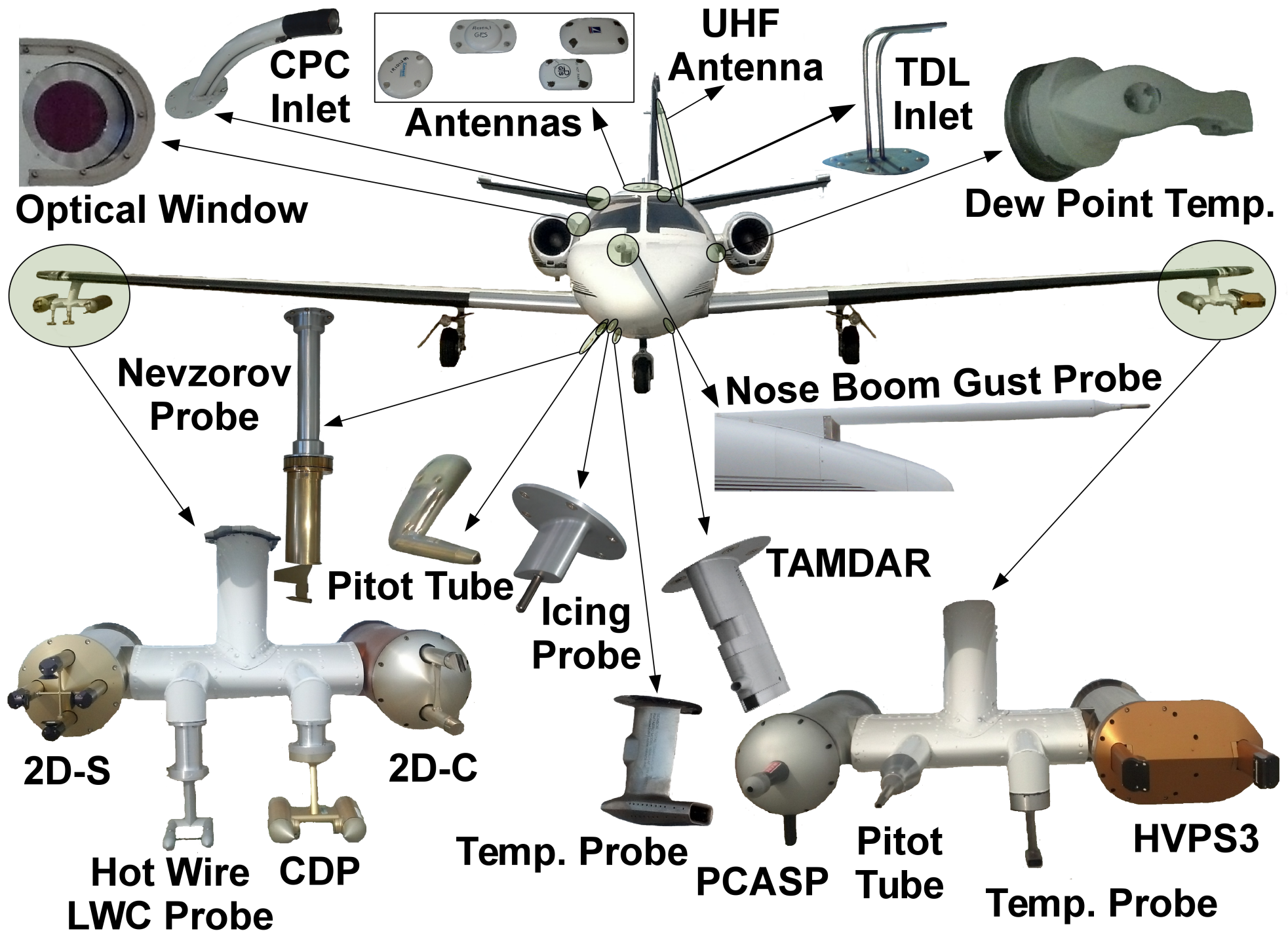

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Objectives

Obtain microphysical measurement concurrent with observation of the MCR Doppler radar to enable evaluation of microphysical properties of cirrus clouds.

2015 Aircraft Instrumentation

CPC Inlet

UHF Antenna

Antennas

TDL Inlet

Optical Window

Dew Point Temp.

Nevzorov Probe

Nose Boom Gust Probe

Pitot Tube

Icing Probe

TAMDAR

2D-S

2D-C

Hot Wire LWC Probe

CDP

Temp. Probe

PCASP

Pitot Tube

Temp. Probe

HVPS3

Flight Paths: CAPE2015

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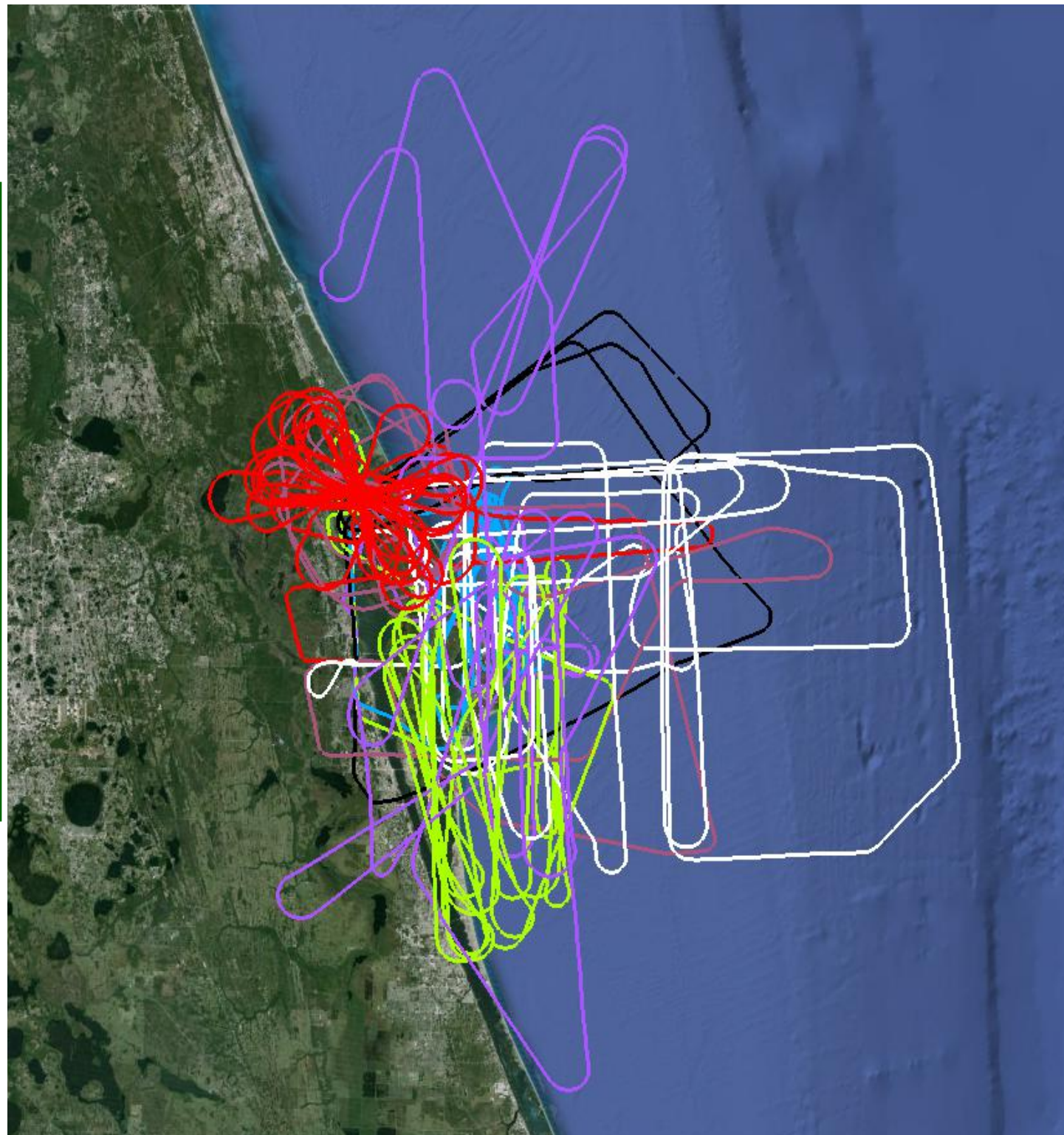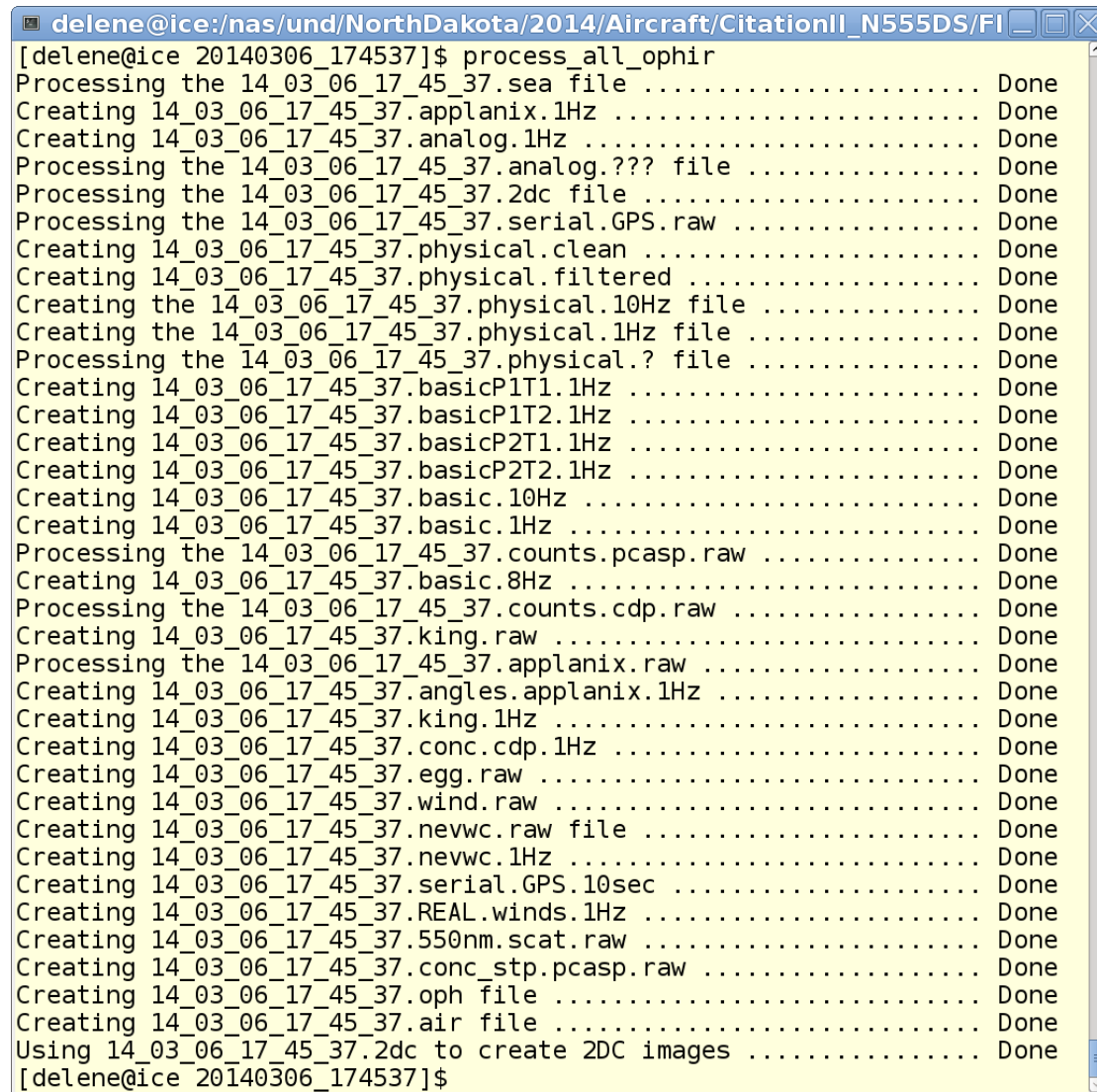July 31
August 1-a
August 1-b
August 2
August 8

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 Instrument Data File

- Data Quality Assurance

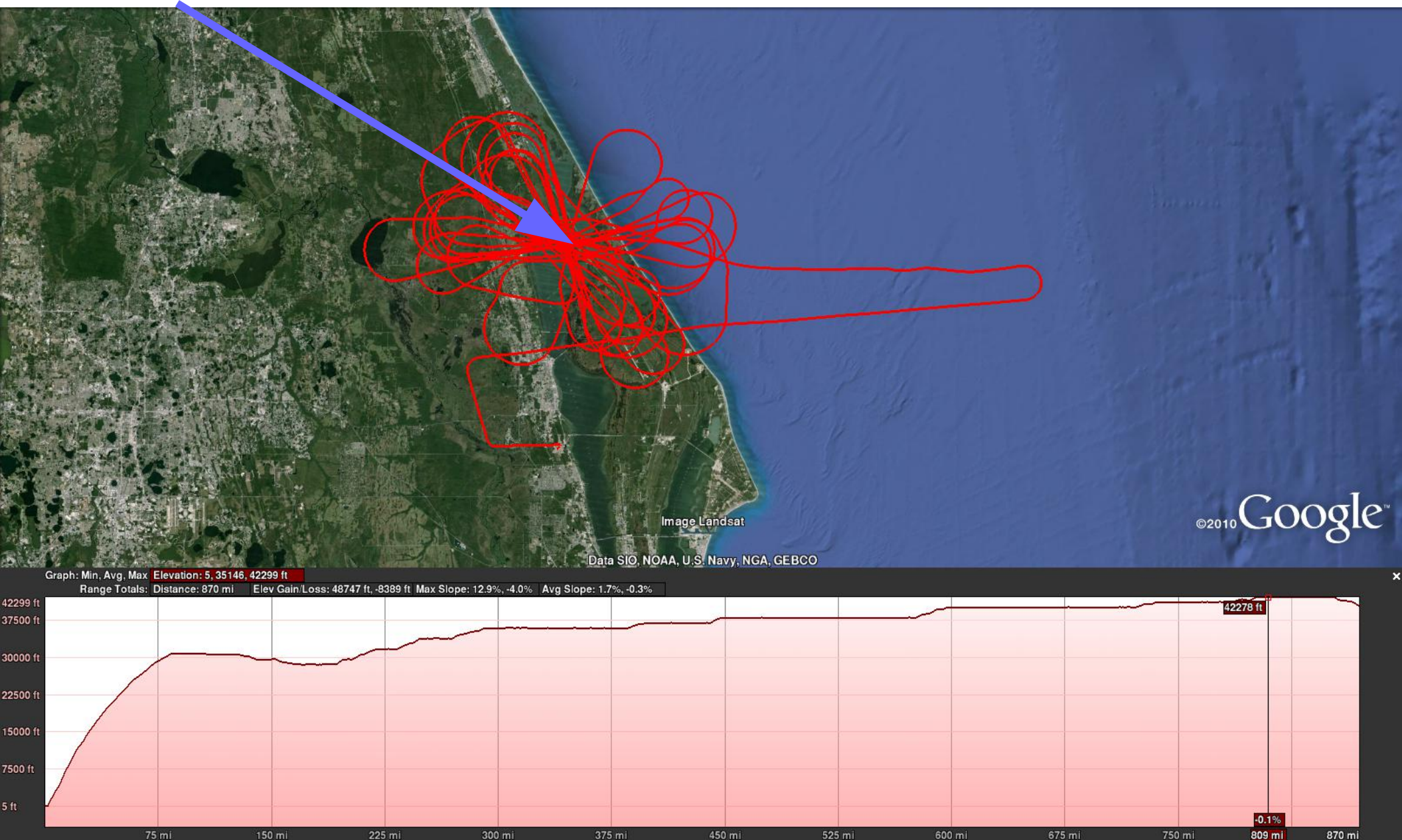 ─ Scientific Data Review

  ─ Scripts Search for Unrealistic Values

```
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.nevwc.raw file .................... Done
Creating 14_03_06_17_45_37.nevwc.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]$
```

Comments on Scientific Data Set

- Quick visualization of data is very important.
  - Create a preliminary version of the data using automated processing scripts.
  - Create a final data set after the project is over by applying manual edits to the "raw" data files which replace "bad" data with missing value codes.
- Archive the raw data and any editing files.
- Work with ASCII data as much as possible.
  - Compress ASCII files to reduce storage space.
- Use a standard data format, which includes Meta data.
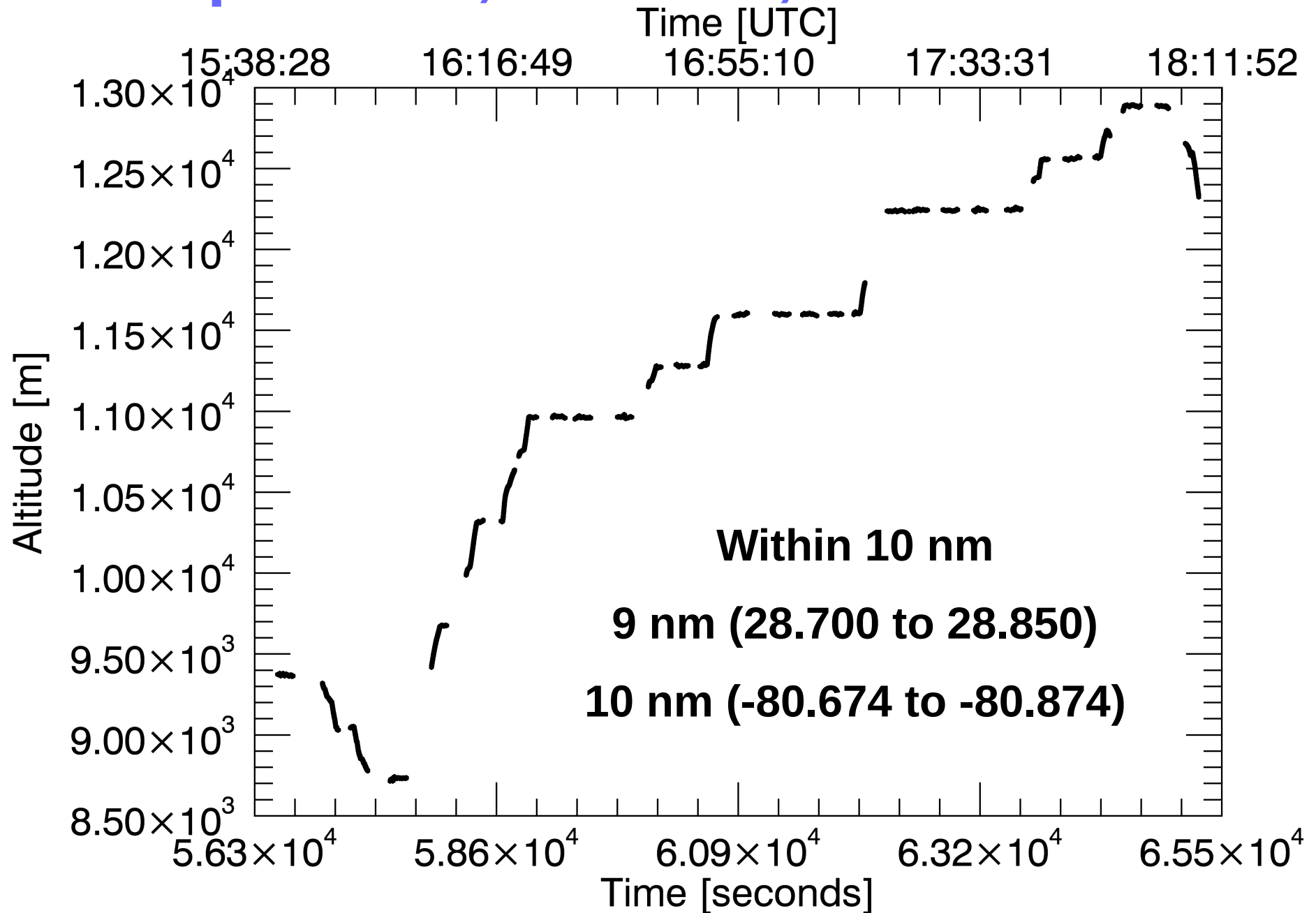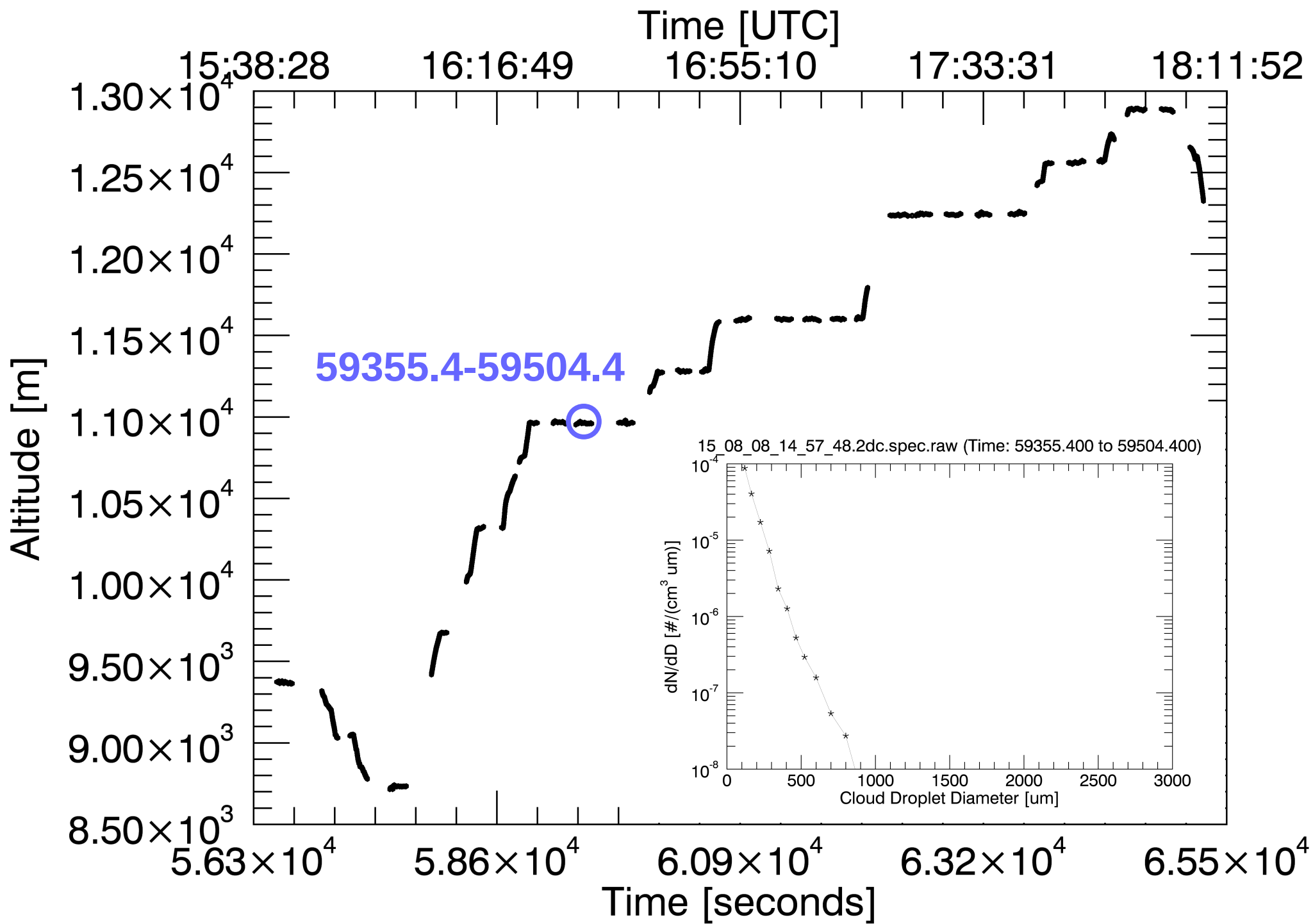- Create science file for analysis (*.cap)

August 8, 2015 Flight Path
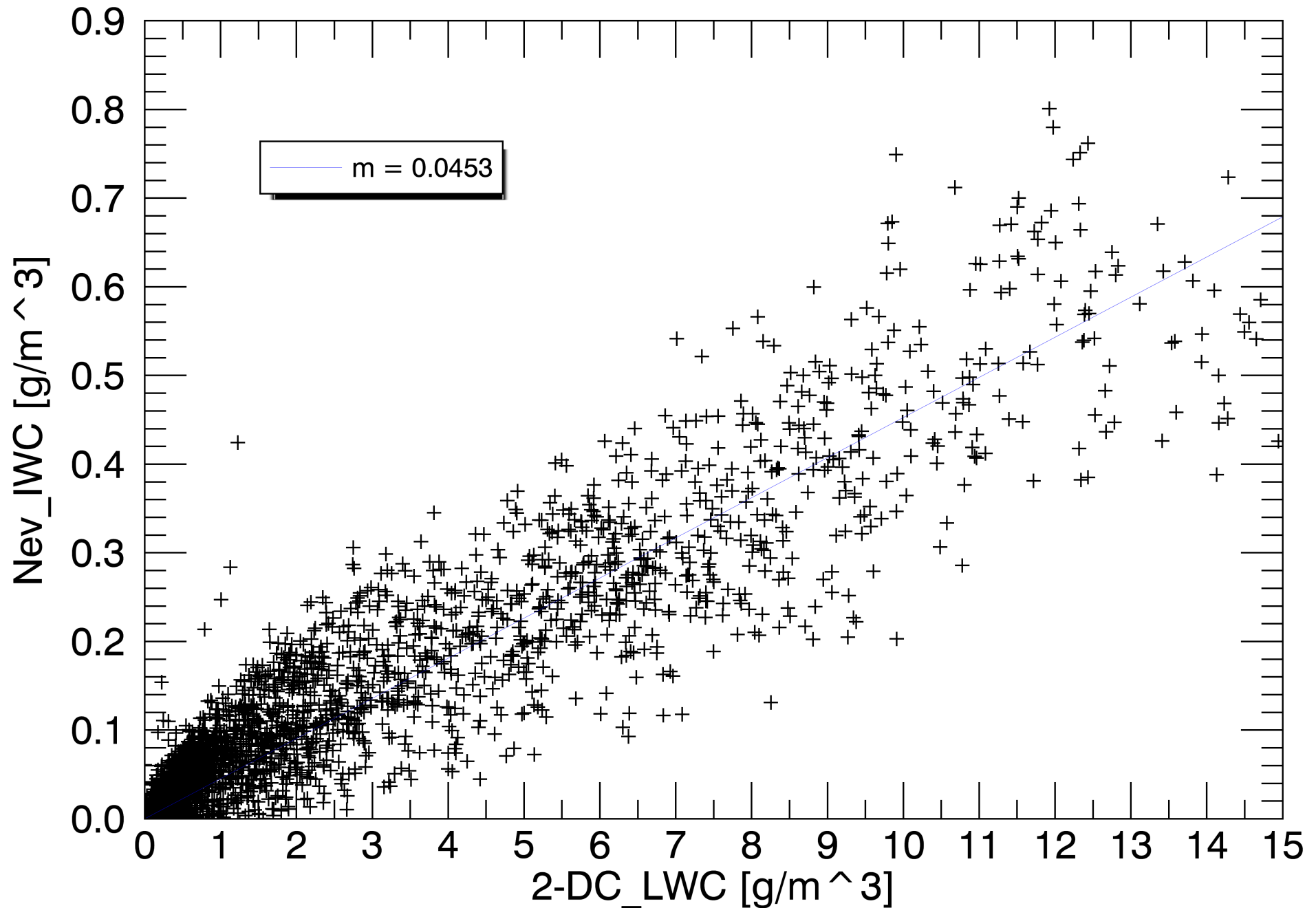## MCR at 28.7550265 N and -80.7743669 W

Graph: Min, Avg, Max Elevation: 5, 35146, 42299 ft
Range Totals: Distance: 870 mi   Elev Gain/Loss: 48747 ft, -8389 ft Max Slope: 12.9%, -4.0% Avg Slope: 1.7%, -0.3%

42299 ft
42278 ft
37500 ft
30000 ft
22500 ft
15000 ft
7500 ft
5 ft

-0.1%

75 mi   150 mi   225 mi   300 mi   375 mi   450 mi   525 mi   600 mi   675 mi   750 mi   809 mi   870 mi

*cap Science File
Temperature, Position, Water Content

Within 10 nm

9 nm (28.700 to 28.850)

10 nm (-80.674 to -80.874)

59355.4-59504.4

15_08_08_14_57_48.2dc.spec.raw (Time: 59355.400 to 59504.400)

Comparison of Instruments

m = 0.0453

2-DC_LWC [g/m^3]

Nev_IWC [g/m^3]

Conclusions

- Data set has been processed and quality assured.

- Analysis of data has stated.

Project Team

Future Work – UND Team

- Reflectivity Microphysics/Radar Comparison
  - Nicholas Gapp, Senior Undergrad, UND
- Sounding Comparison
  - Blake Sorenson, sophomore Undergrad, UND
- All Sky Camera Analysis
  - Sylke Boyd, Professor University of Minnesota - Morris