Airborne Science using the North Dakota Citation Research Aircraft

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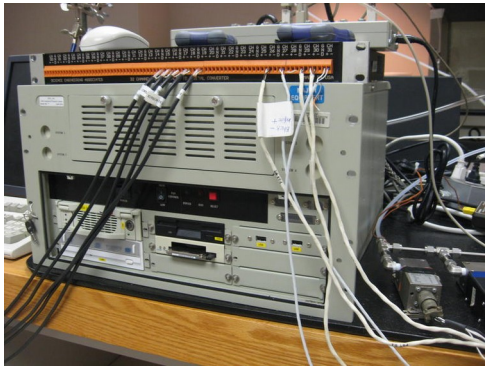
University of North Dakota Airborne Facility

- Cessna Citation jet aircraft modified for airborne measurements.
- Cloud physics and aerosol instrumentation.
- State-of-the-art aircraft data acquisition system.
- Robust open source data processing software.
- Experienced scientists.
- Top rated aviation educational institution.

Cloud Physics and Aerosol Instruments

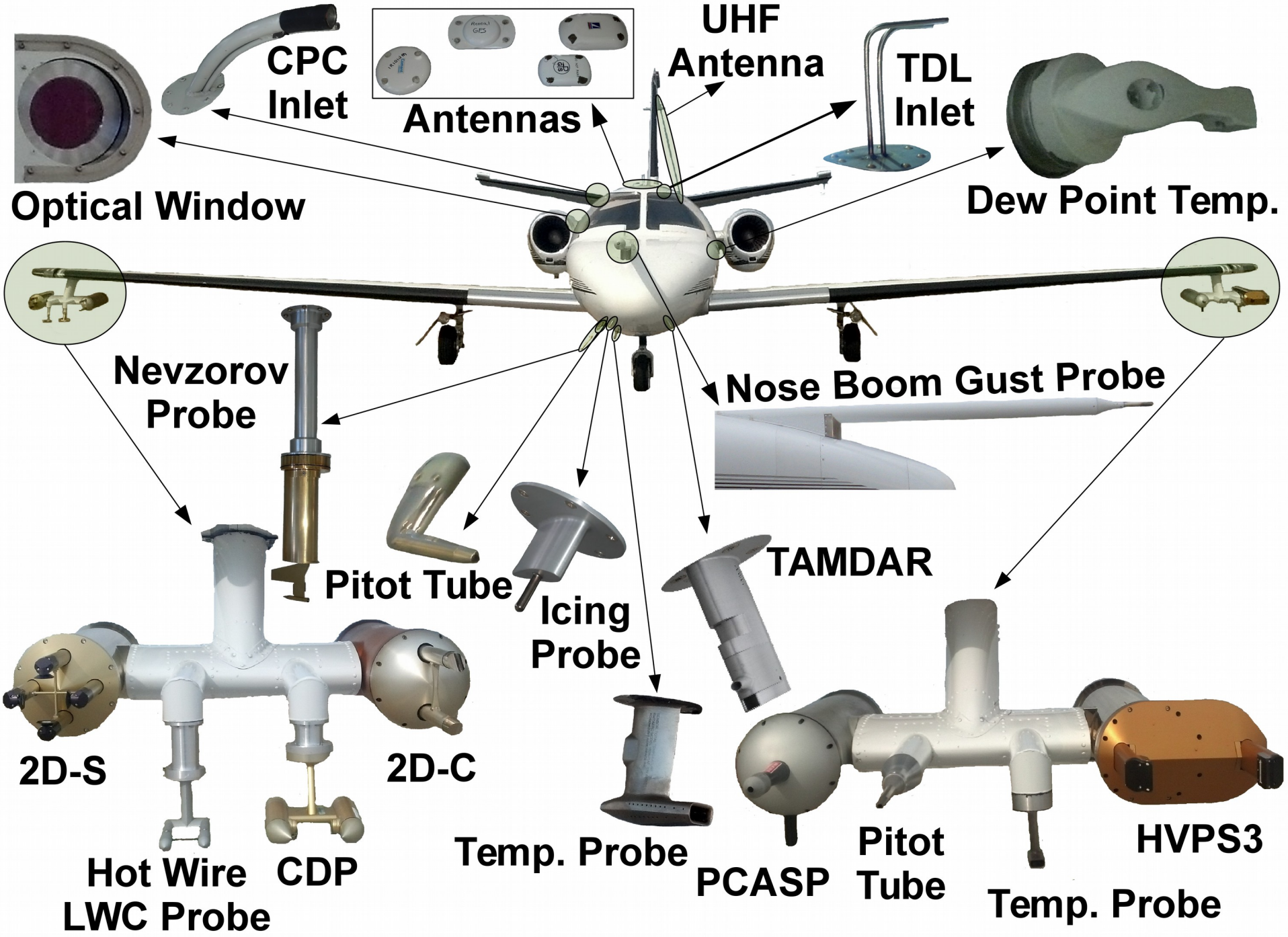
- Droplet Measurement Technologies [DMT] **Cloud Droplet Probe** [CDP] (Able to measure cloud droplets between approximately 3 and 50 µm diameter.)
- PMS **2D-C Optical Array Imaging Probe** (Able to detect cloud particles between approximately 25 to 960 µm diameter.)
- SPEC **2D-S Optical Array Imaging Probe** (Able to detect cloud particles between approximately 10 to 1280 µm diameter.)
- SPEC **HVPS3 Optical Array Imaging Probe** (Able to detect cloud particles between approximately 150 to 19,200 µm diameter.)
- **Nevzovo4 Probe** (Able to measure liquid and total cloud water content.)

State Parameters Instruments

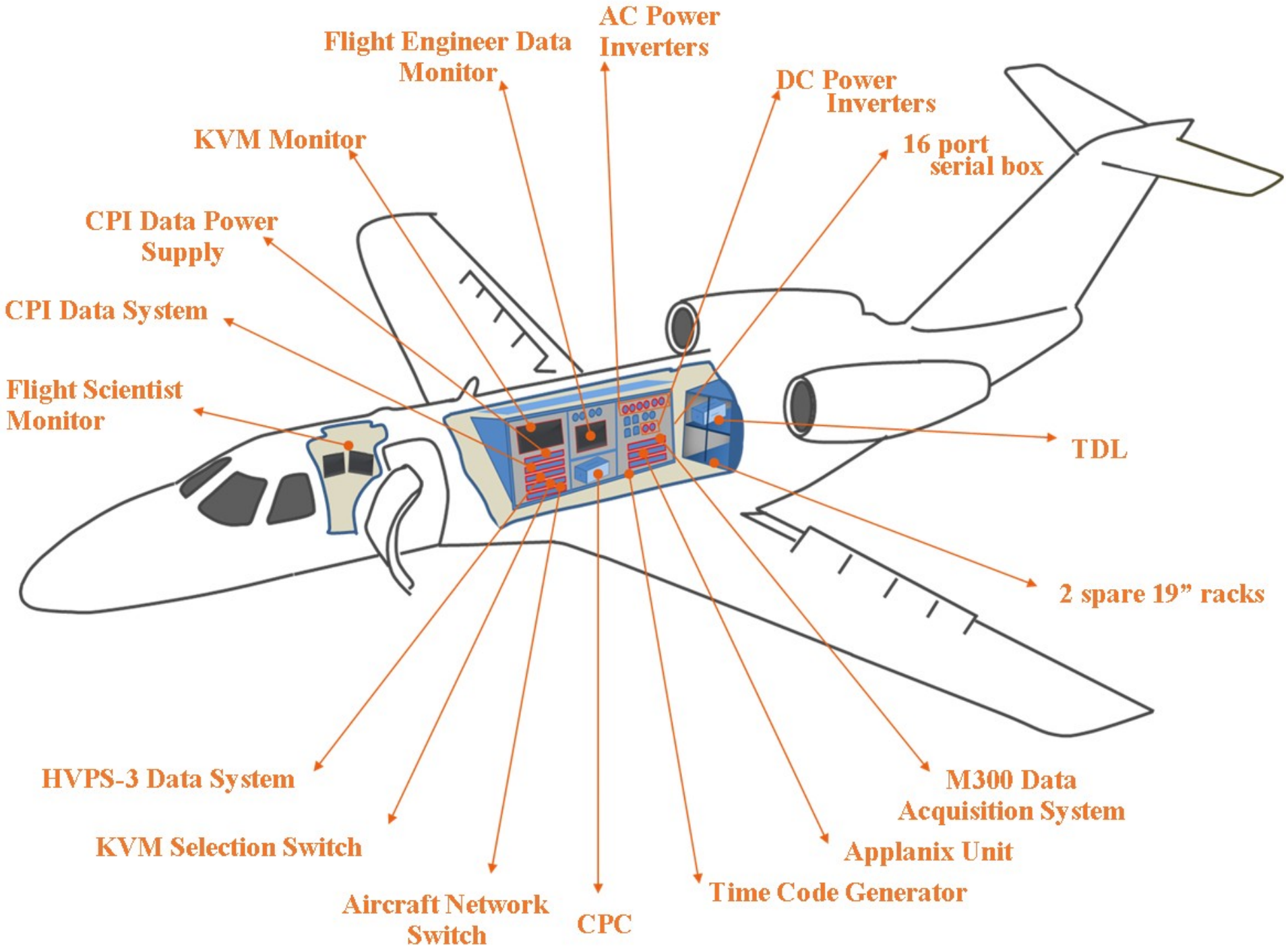


- APPLANIX **Position and Orientation System** (Able to measure position, velocity and acceleration relative to the earth's surface.)
- Nose boom with 5 port **Gust Probe** (In conjunction with POS, able to measure 3 dimensional winds.)
- EdgeTech Digital Aircraft **Hygrometer** (Able to measure dew point temperature.)
- Rosemount Aircraft **Temperature Sensor** (Able to measure total temperature.)
- **Pressure Transducers** (Able to measure static and dynamic pressure.)
- SEA M300 **Data Acquisition System** (Able to acquire instrument data.)

External Instruments: 2014



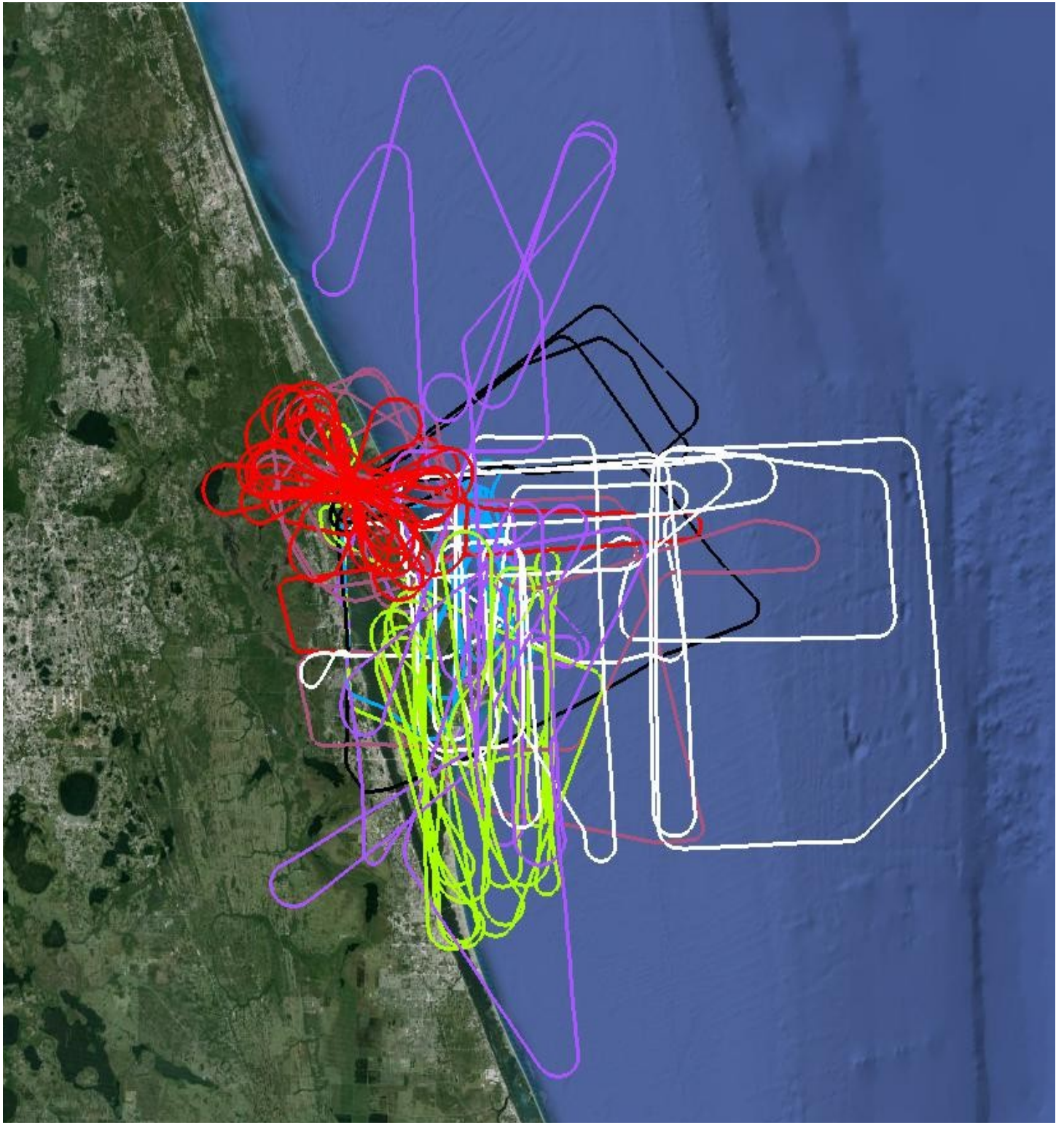
Internal Instruments



Navy CAPE2015 Florida Field Project

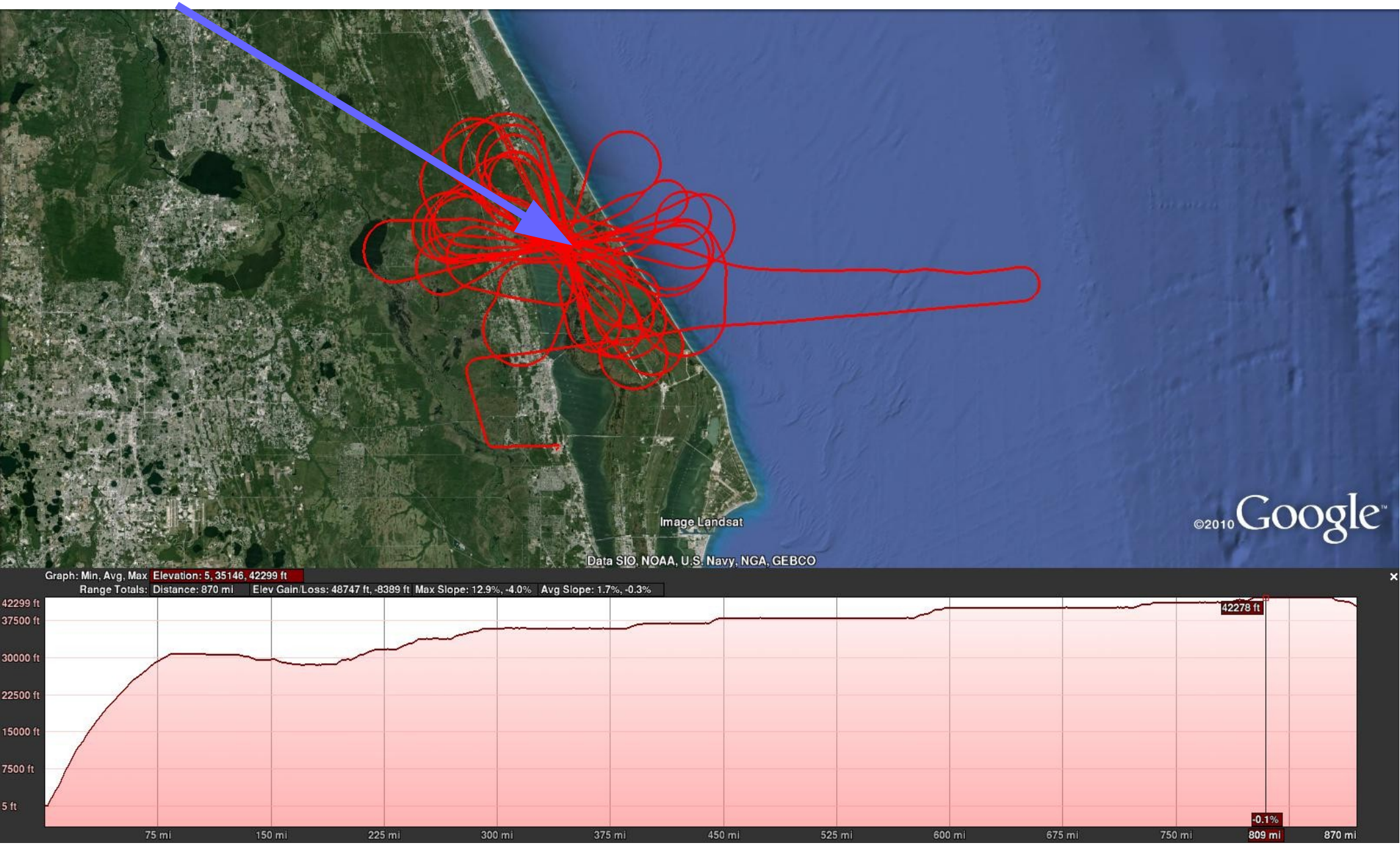
Flight Paths: CAPE2015

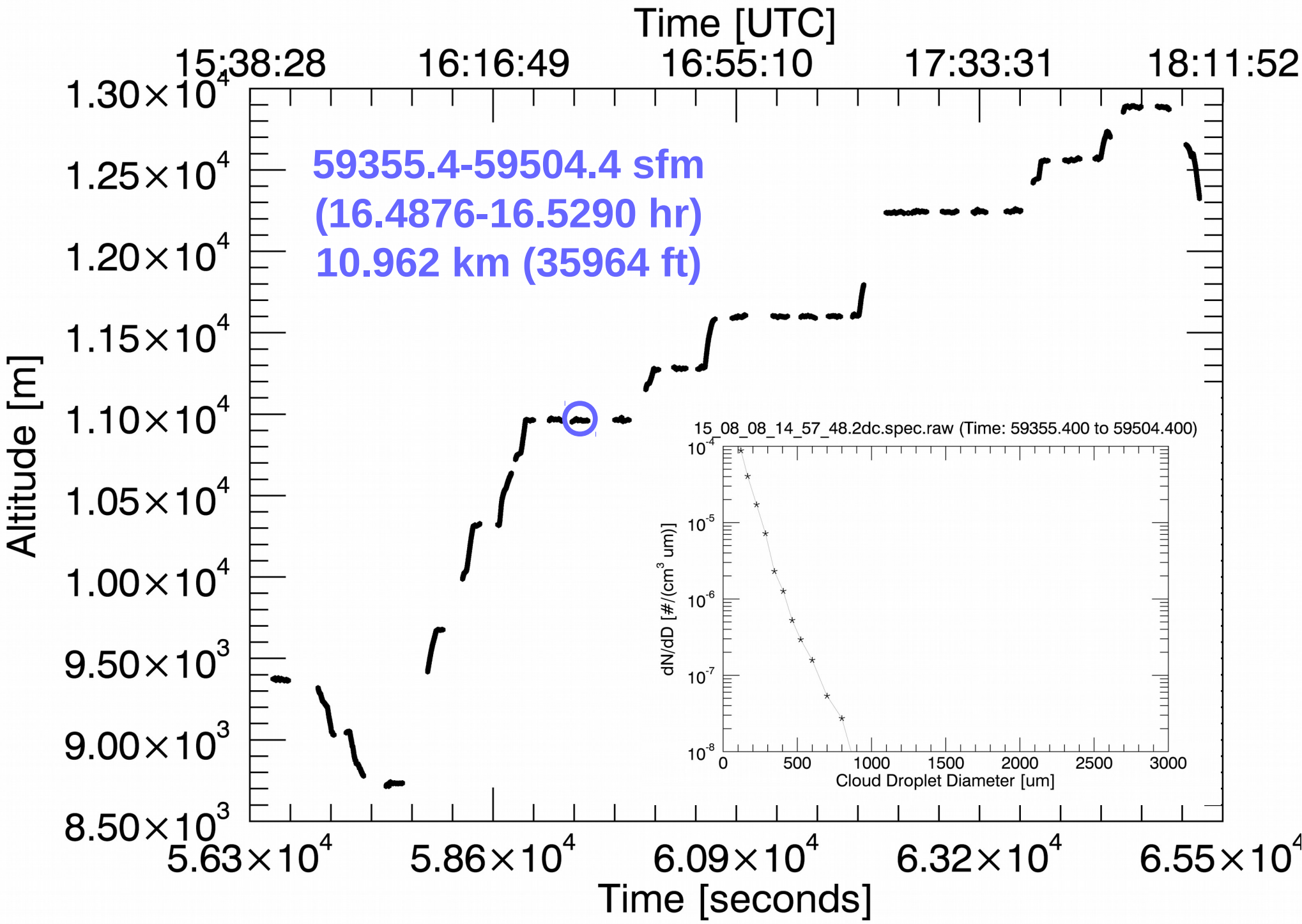
July 29
July 30
July 31
August 1-a
August 1-b
August 2
August 8



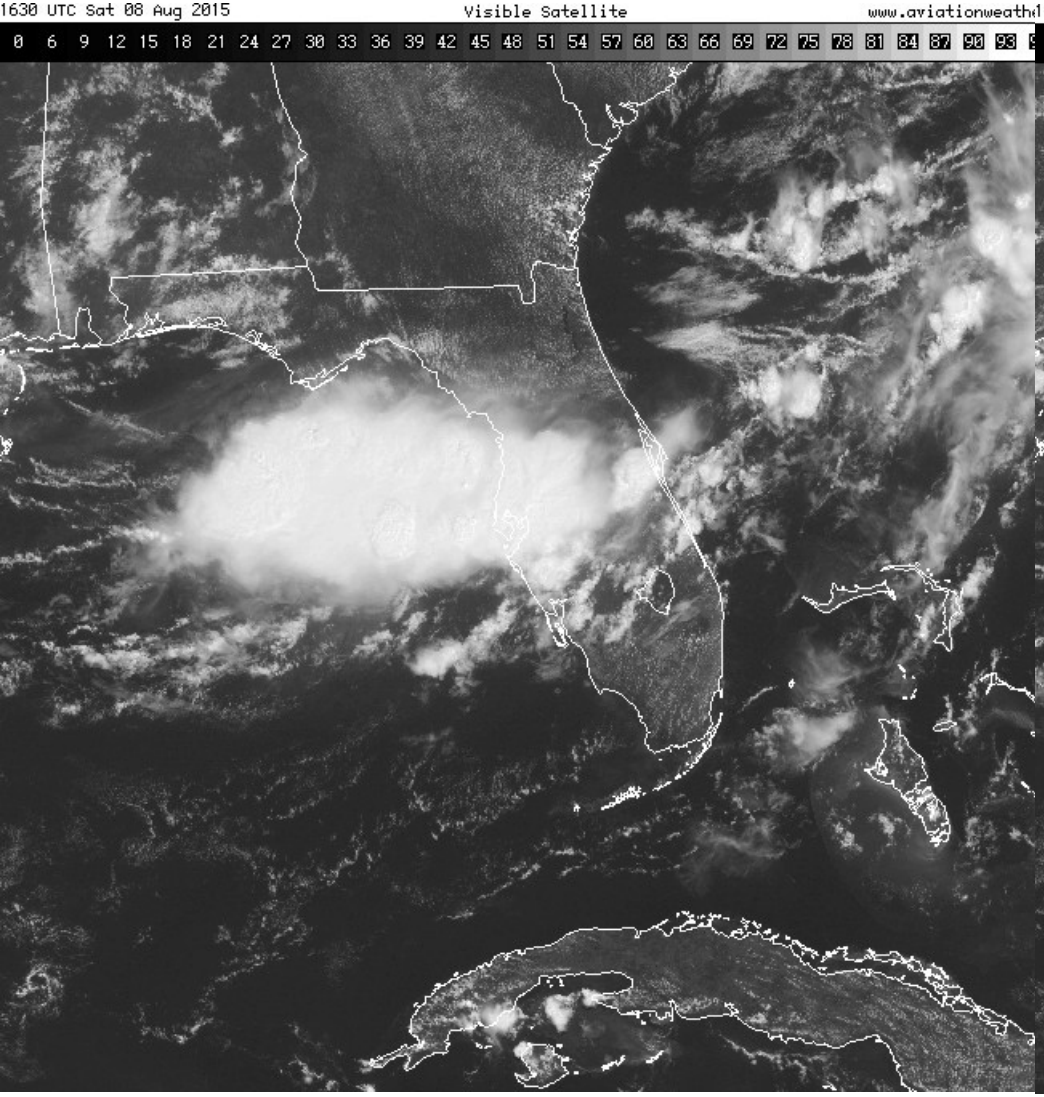
August 8, 2015 Flight Path

MCR at 28.7550265 N and -80.7743669 W

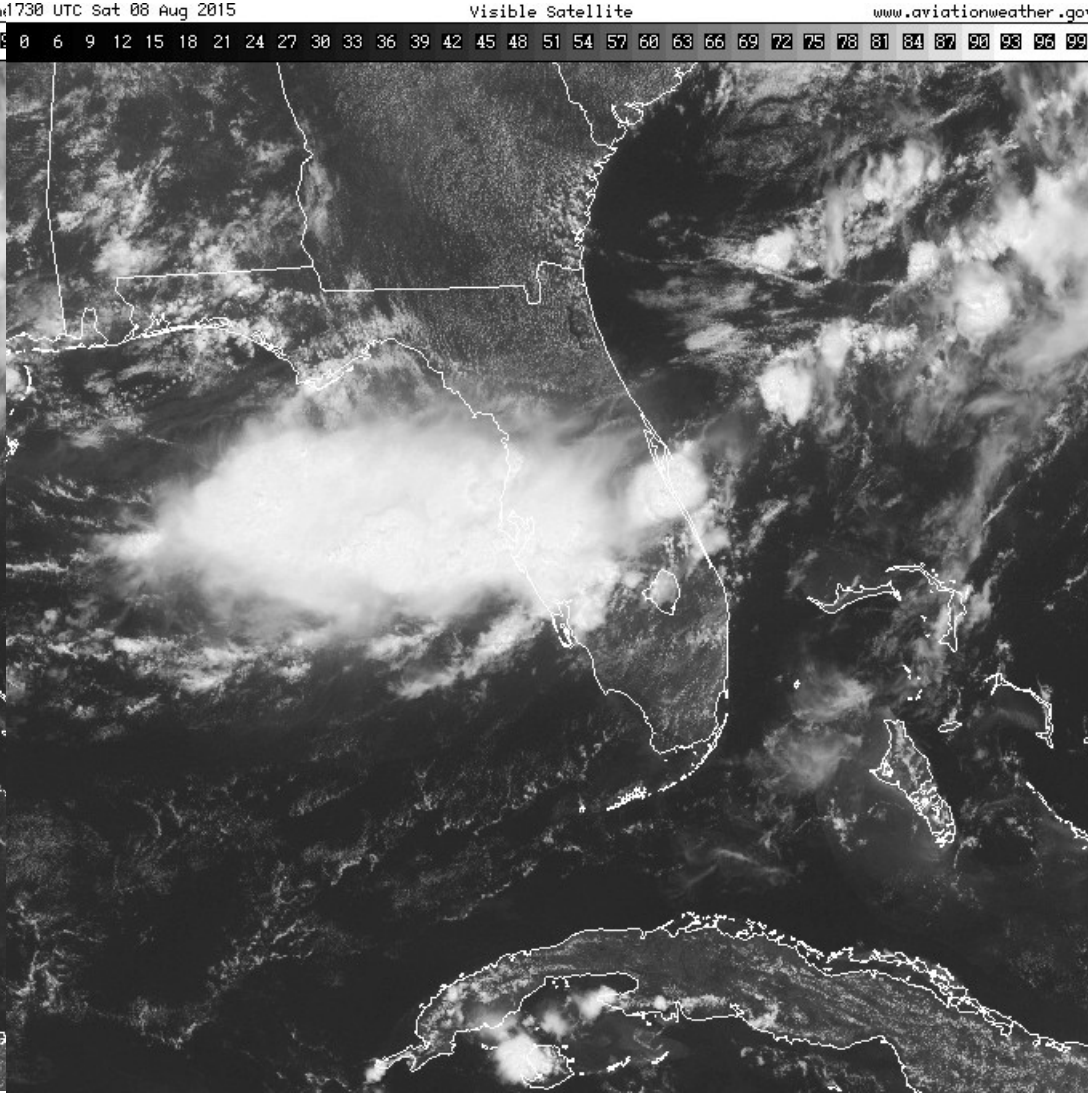



Time [UTC]
15:38:28
16:16:49
16:55:10
17:33:31
18:11:52
59355.4-59504.4 sfm
(16.4876-16.5290 hr)
10.962 km (35964 ft)
Altitude [m]
1.30×10^4
1.25×10^4
1.20×10^4
1.15×10^4
1.10×10^4
1.05×10^4
1.00×10^4
9.50×10^3
9.00×10^3
8.50×10^3
5.63×10^4
5.86×10^4
6.09×10^4
6.32×10^4
6.55×10^4
Time [seconds]
15_08_08_14_57_48.2dc.spec.raw (Time: 59355.400 to 59504.400)
dN/dD [#/(cm^3 um)]
10^-4
10^-5
10^-6
10^-7
10^-8
0
500
1000
1500
2000
2500
3000
Cloud Droplet Diameter [um]

Visible GOES Image on 8 Aug 2015

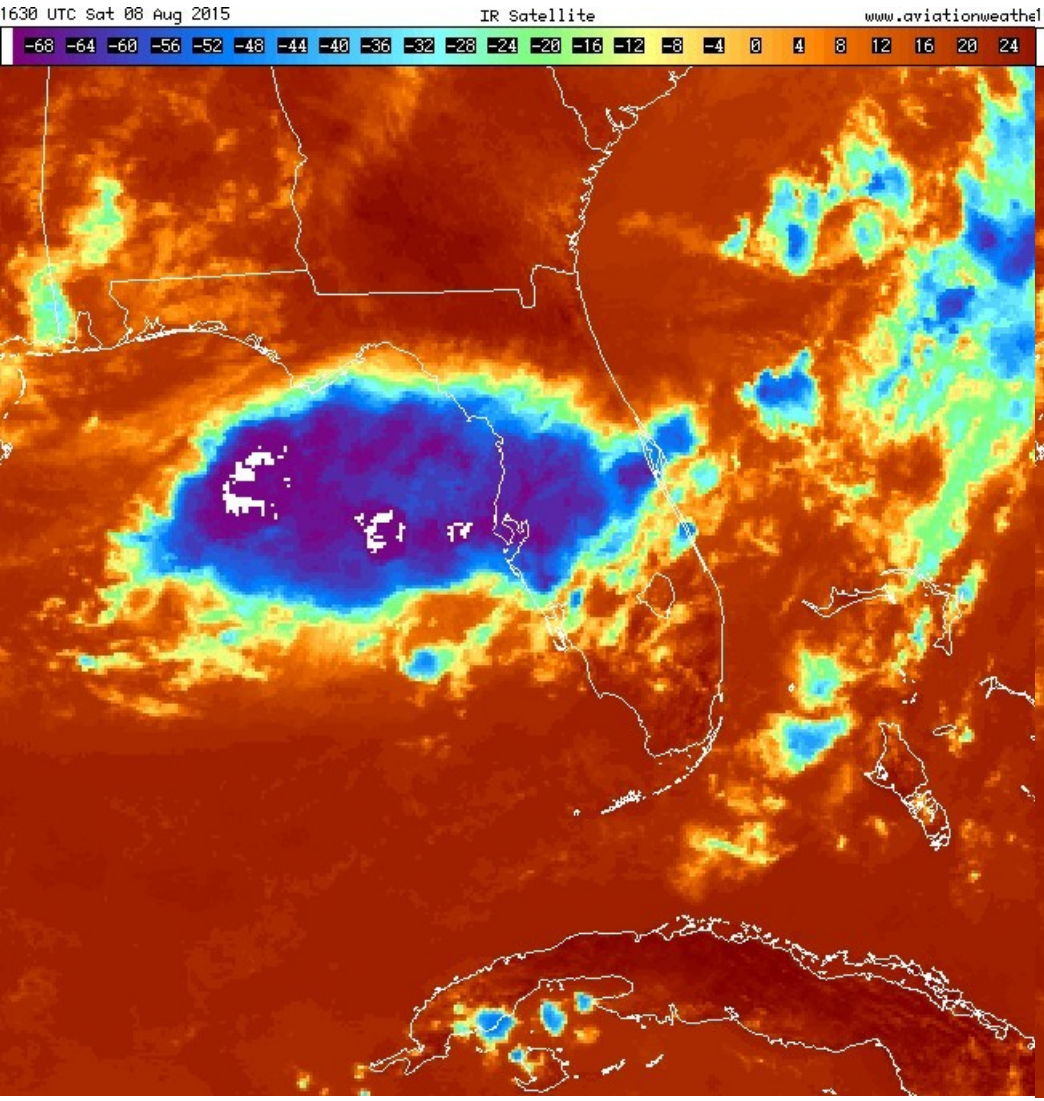


16:30 UTC



17:30 UTC

IR GOES Image on 8 Aug 2015



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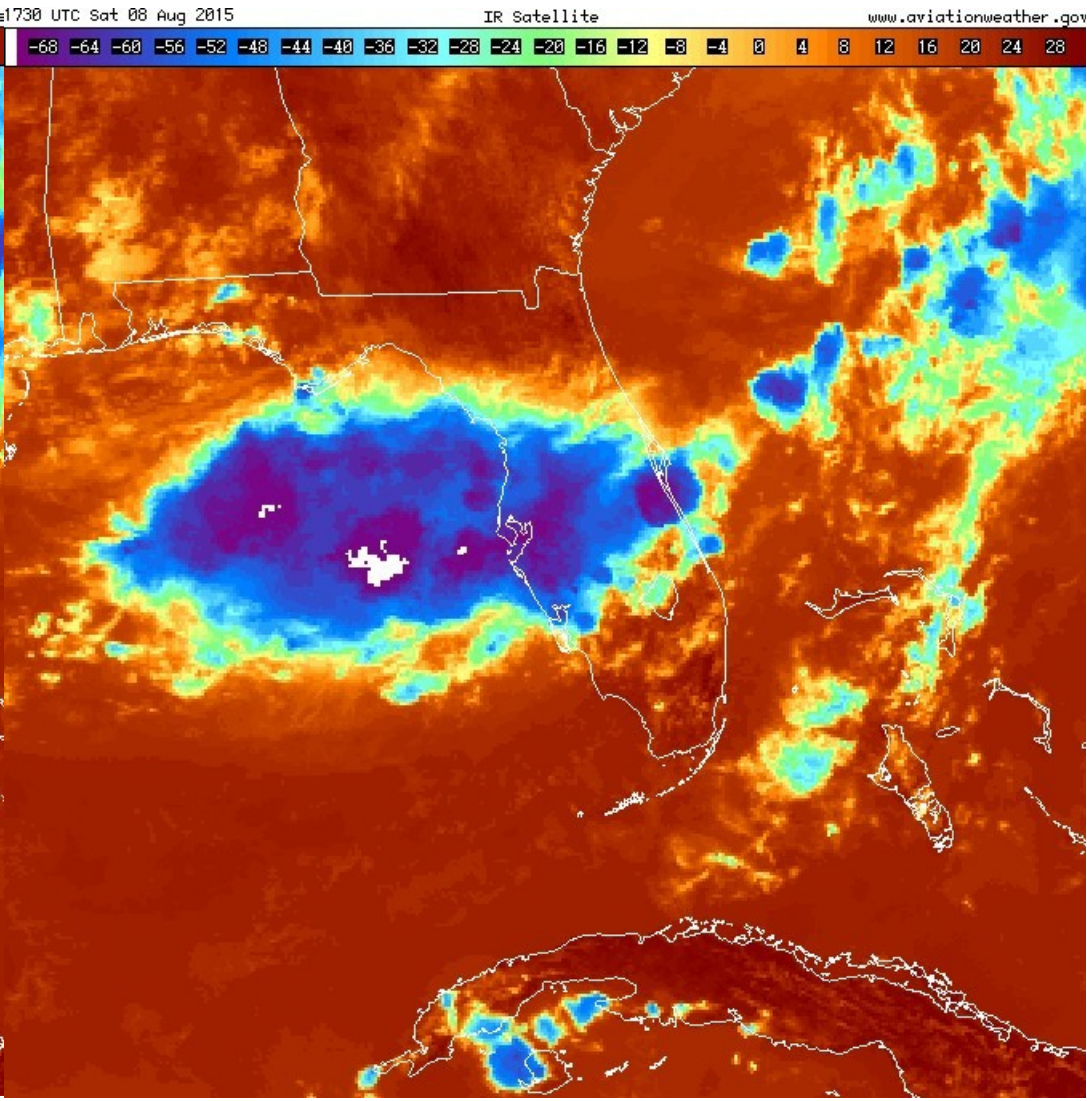
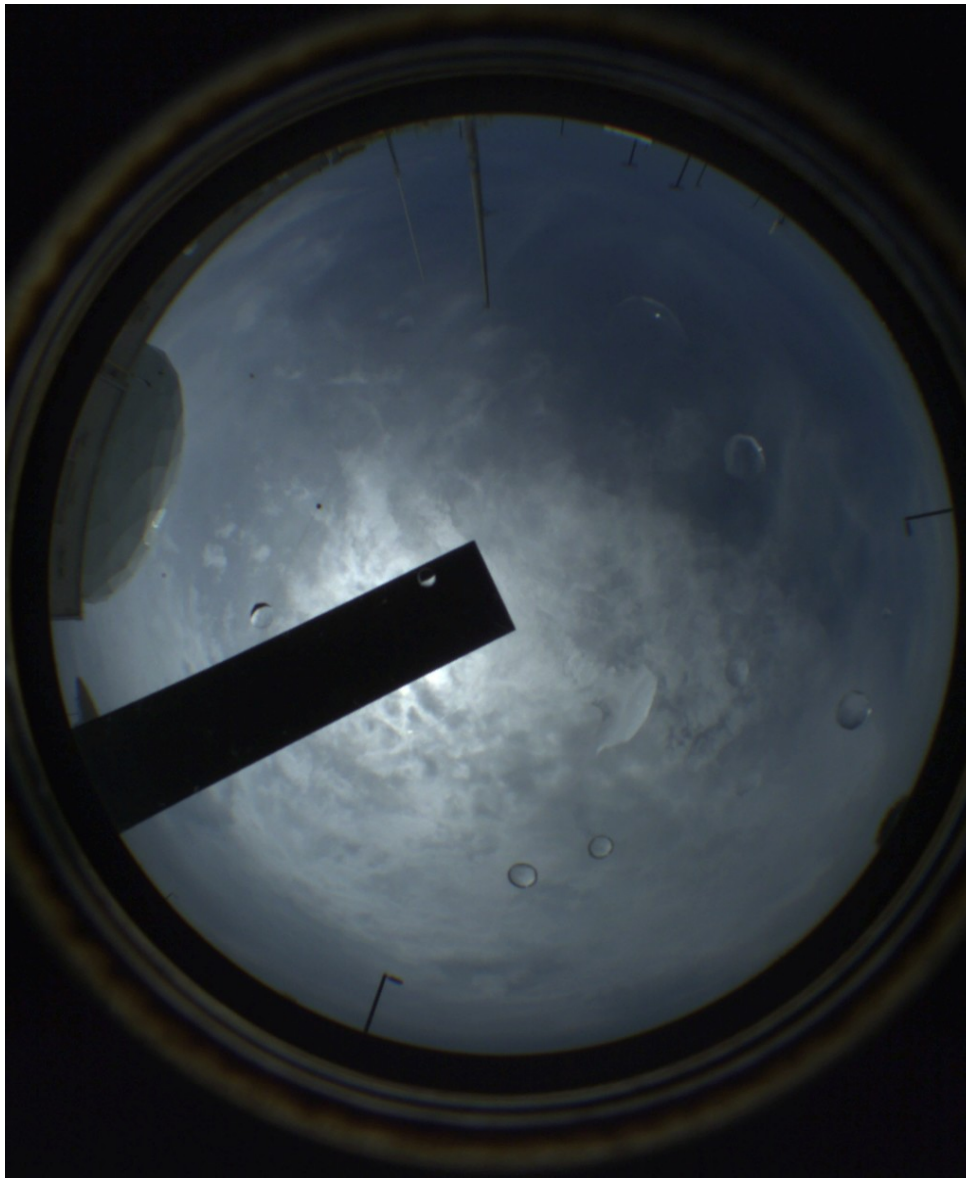


17:30 UTC

All-sky Camera



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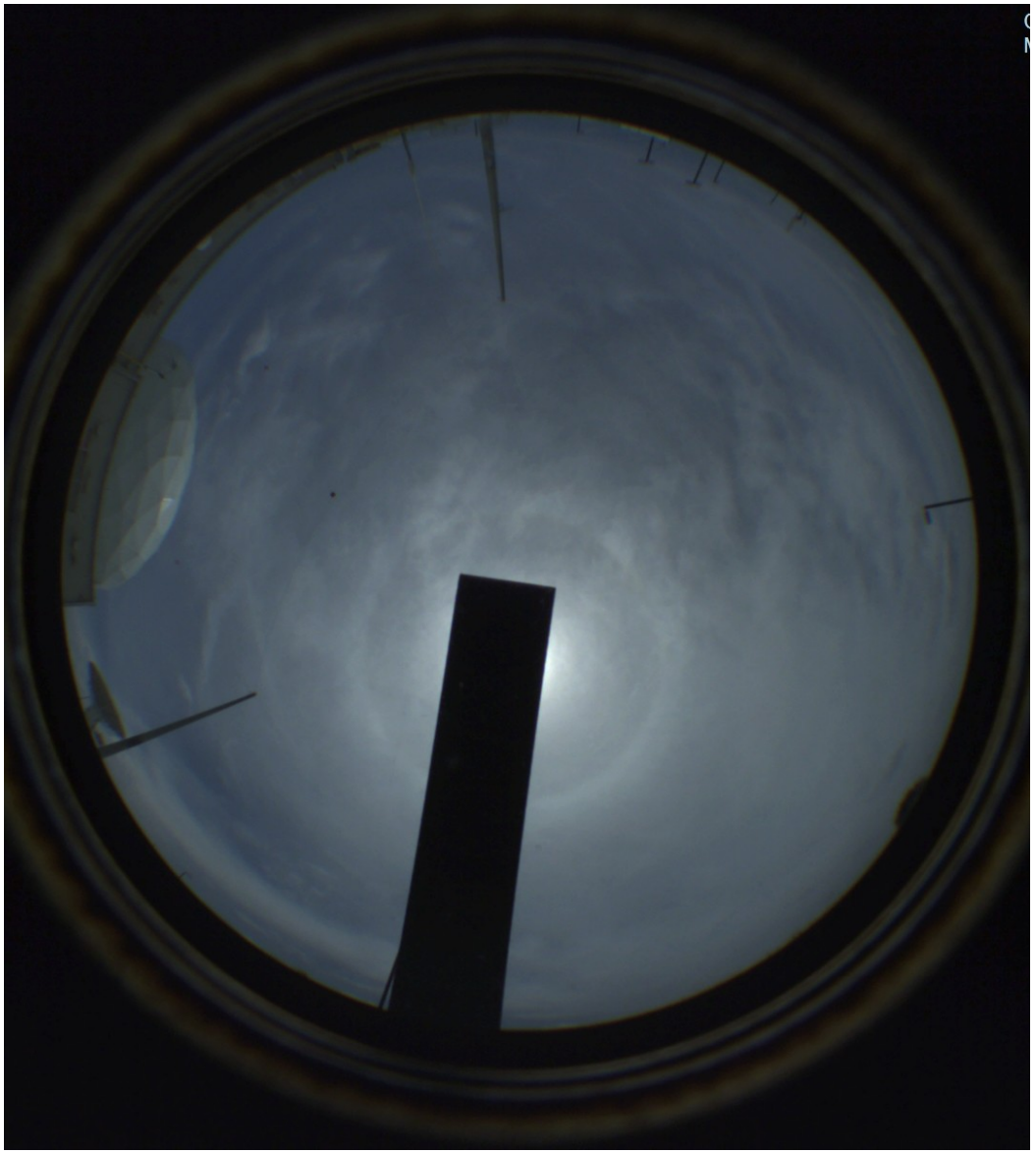
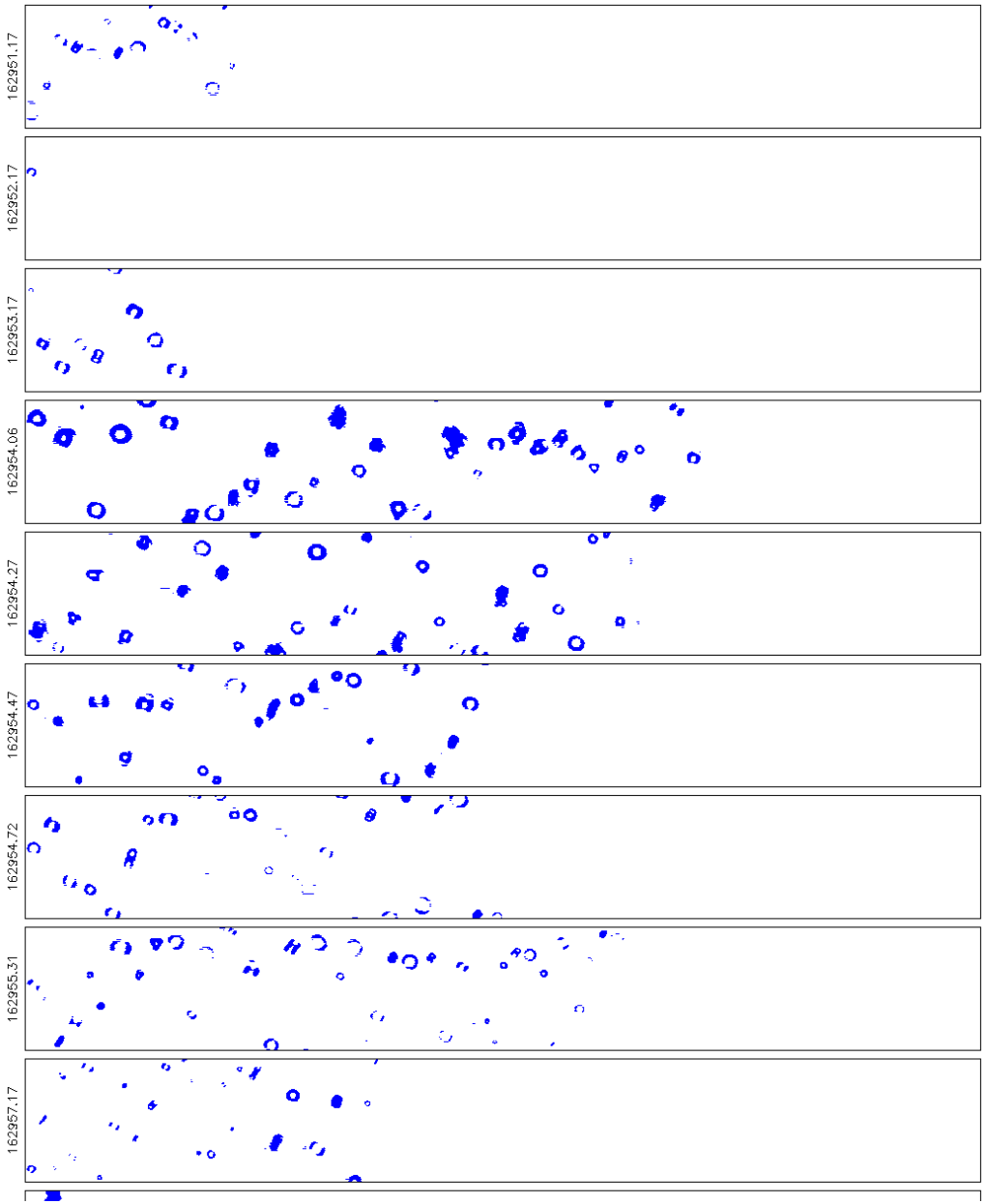
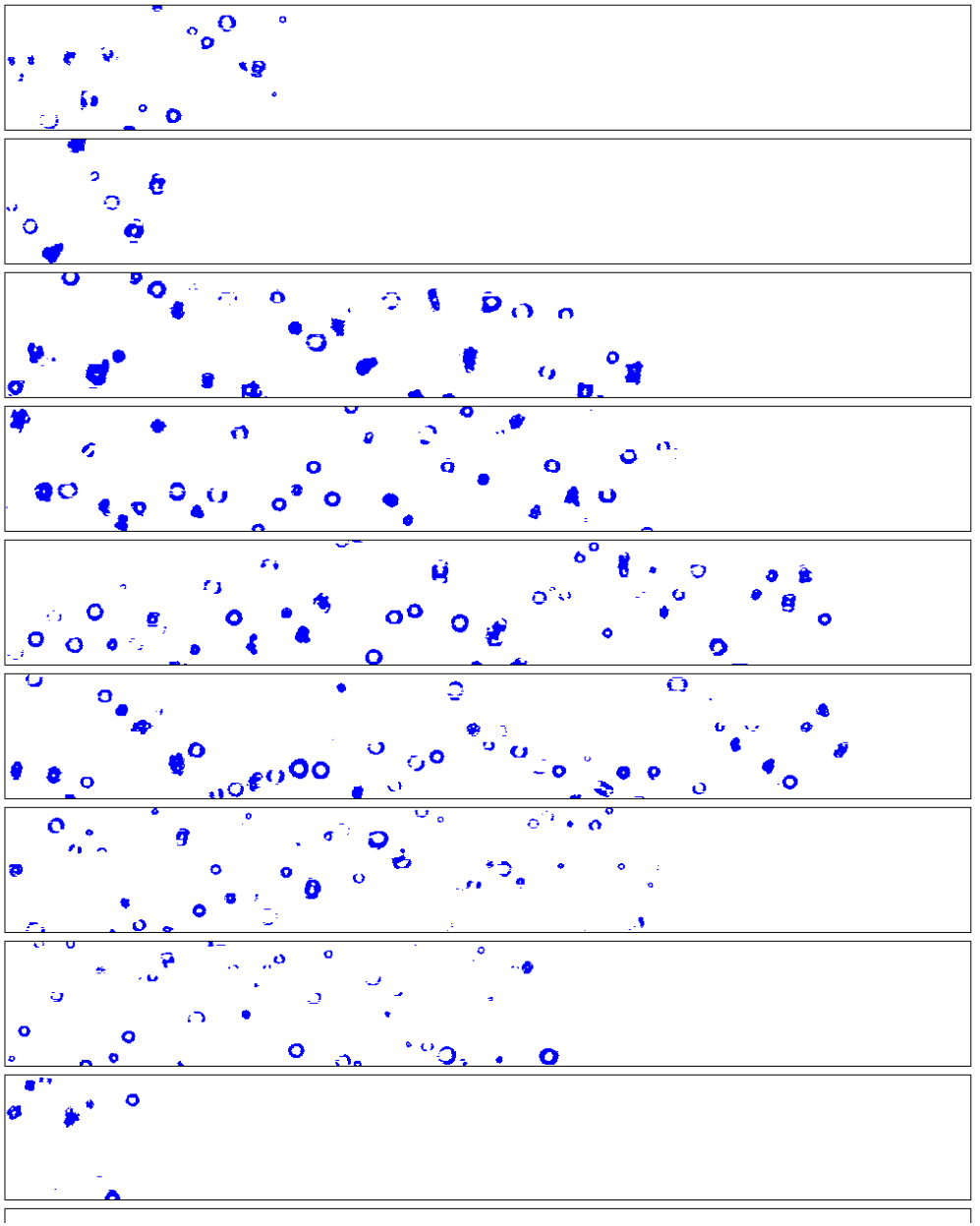


17:30 UTC

2D-S 16:30 UTC

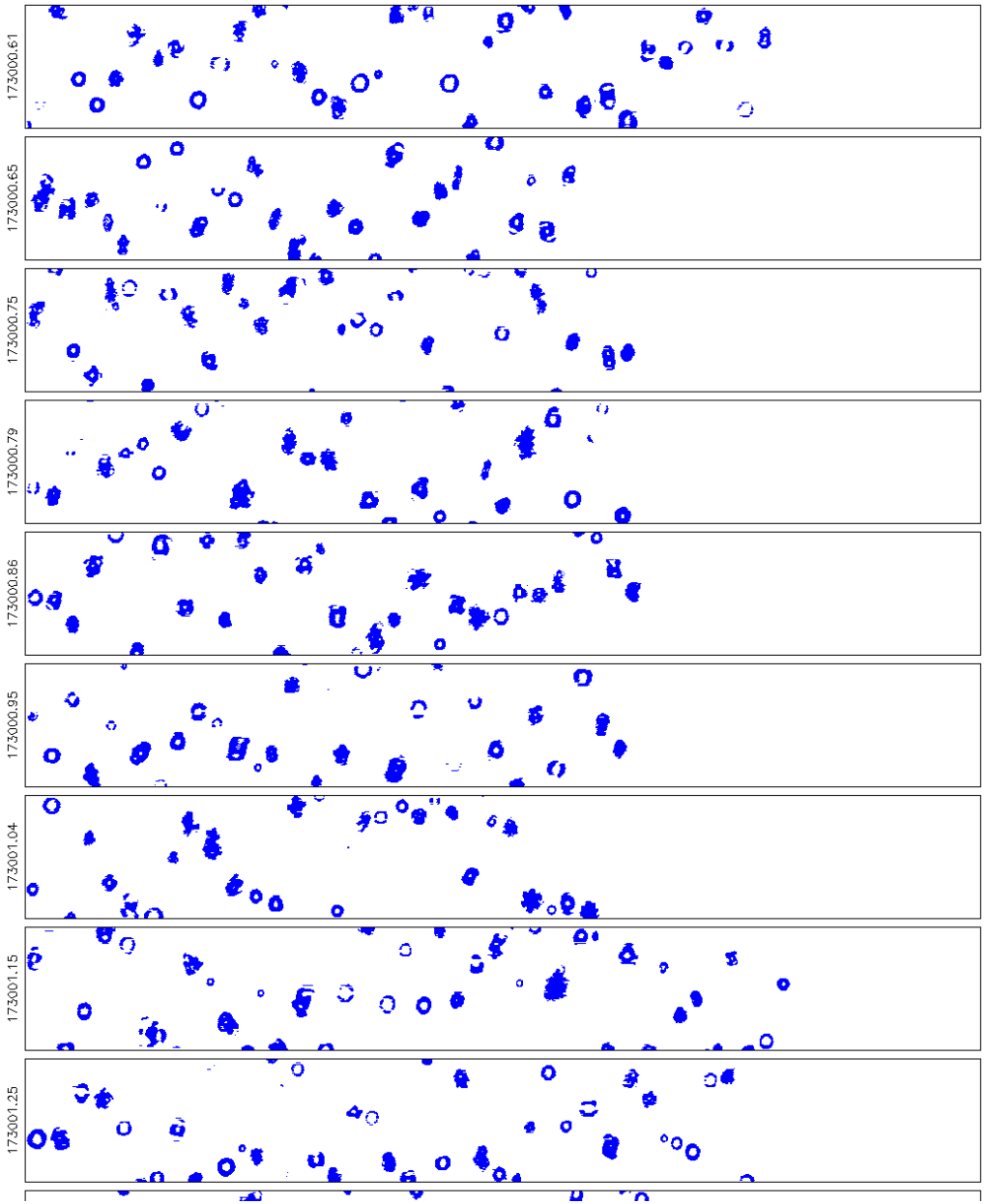


Vertical Arm

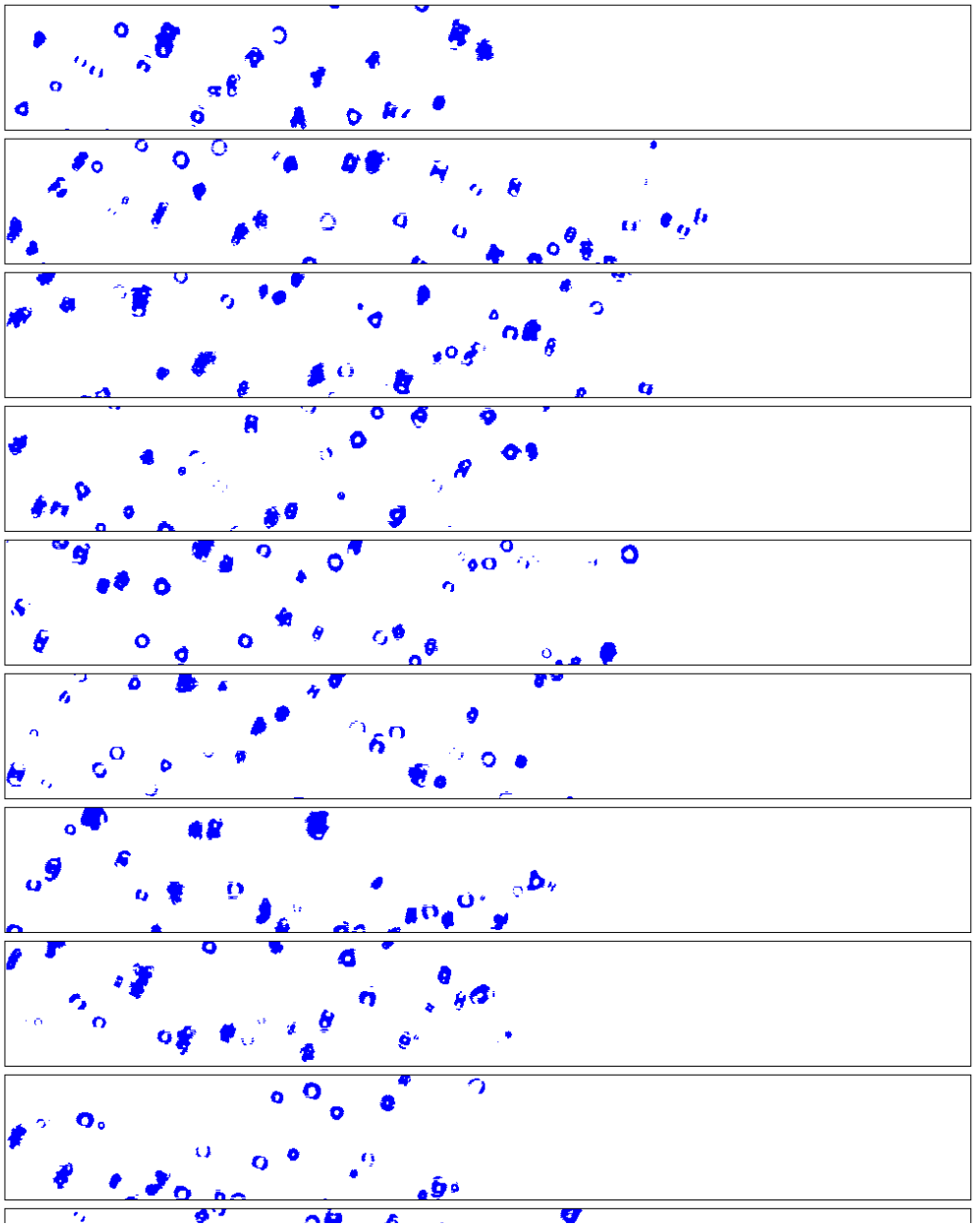


Horizontal Arm

2D-S 17:30 UTC



Vertical Arm



Horizontal Arm

Conclusions

- Airborne Research is fun, challenging,
  and rewarding.

The Future

- We need more researchers, like you.
- Ask Questions, always!