SpartICus Flight Summary and Mid Mission Review

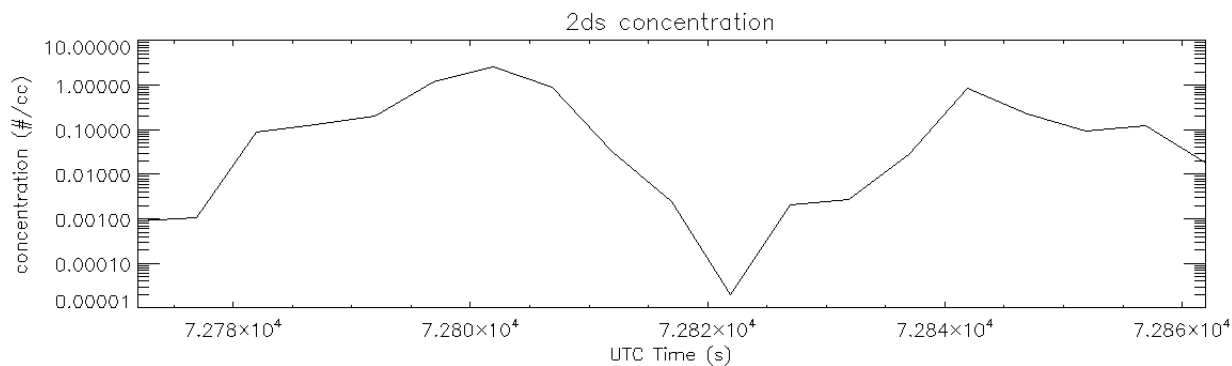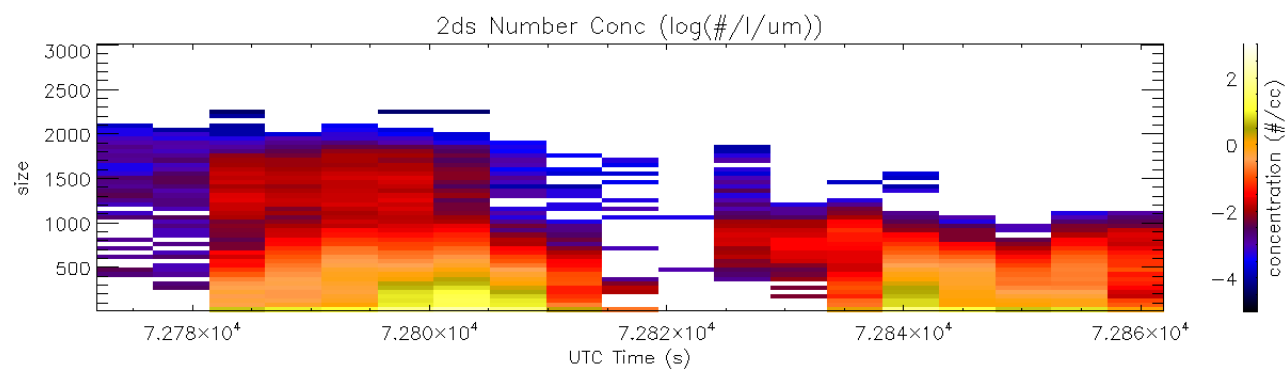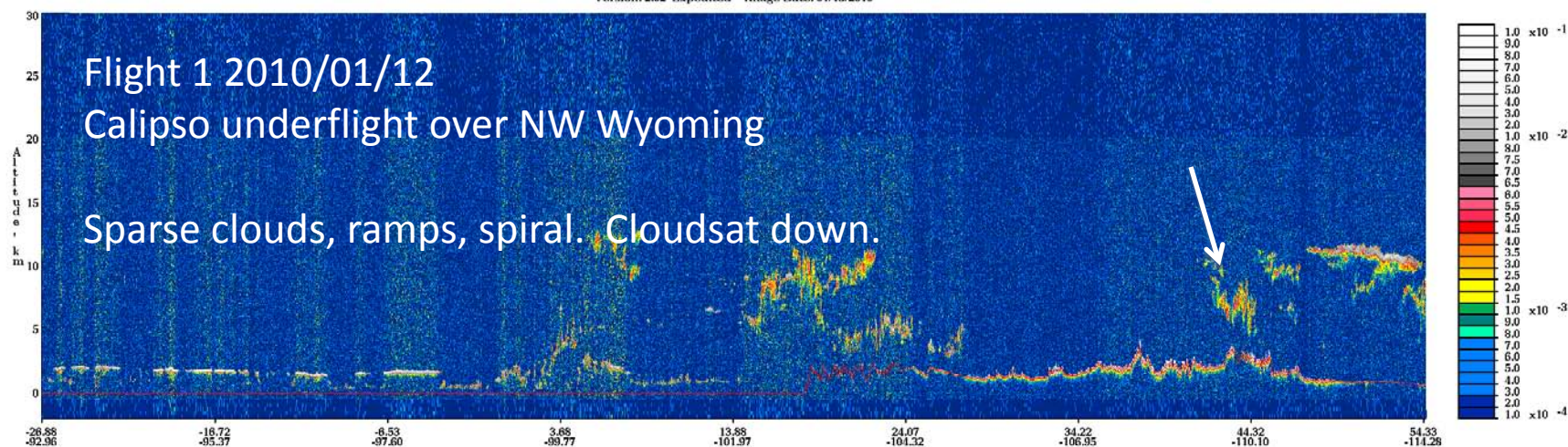|	
Data Flights To Date:	40
Flights Over SGP:	39
Flights Under A-Train:	11
Hours Used:	85
Hours Remaining:	115

Typical Flight Day: Telecon at 8 or 9 AM, Launch around 11 or 12, transit to SGP, spend about an hour in cirrus, refuel and Ponca City, Fly SGP for about an hour prior to return to Boulder
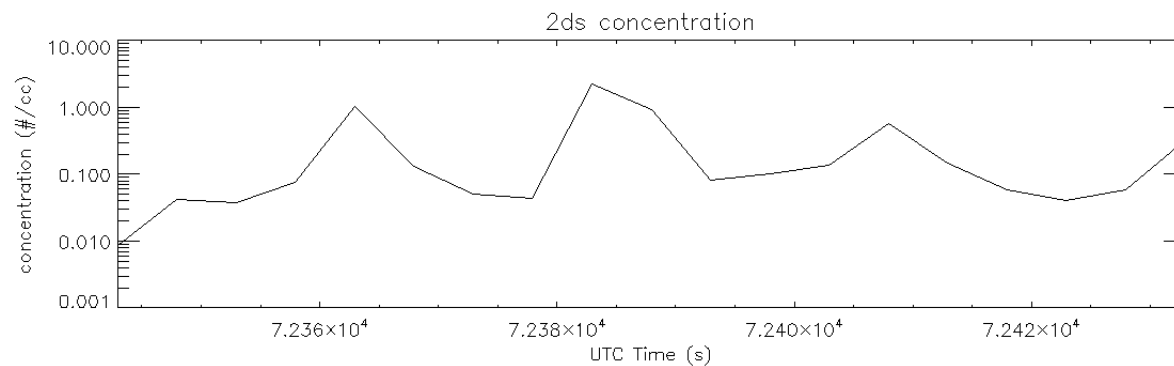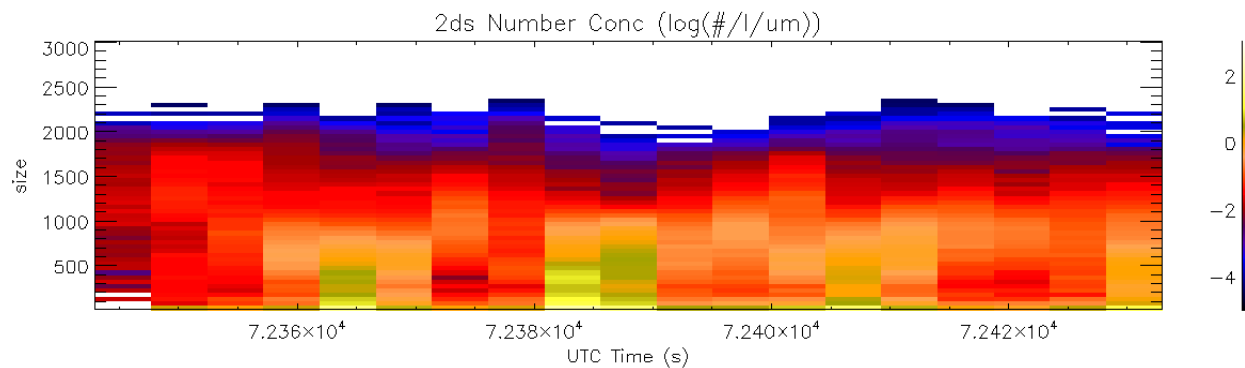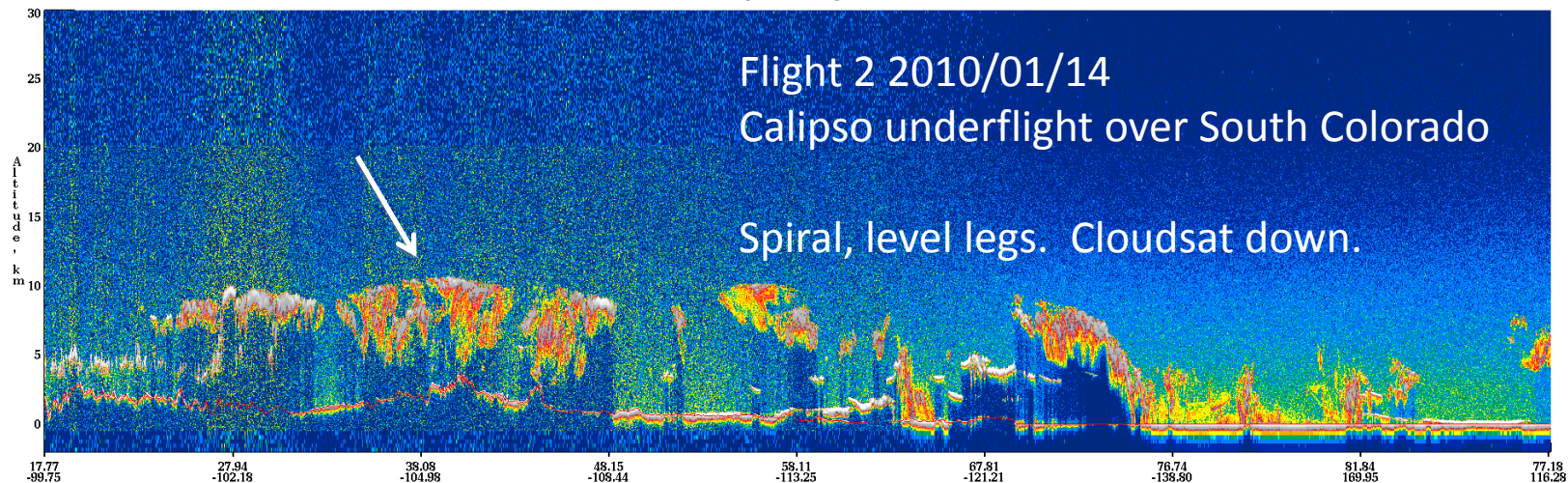
Team: Jen Comstock, Paul Lawson and Co., Eric Jensen, Tim Garrett, Mace, Xiaohong Liu

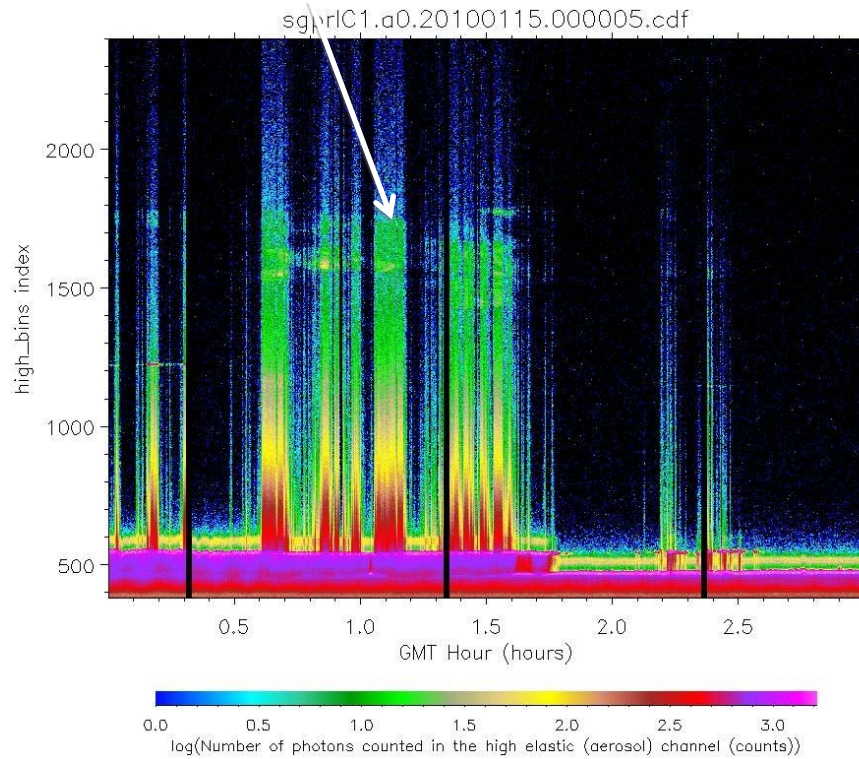What has worked well that we know: 2DS, 2DP, FSSP, CPI, State Parameters
What has worked but of unknown quality: AIMMS Turbulence, Diskin Laser Hygrometer
What has likely not worked at all: Nevzorov(s), CDP

532 nm Perpendicular Attenuated Backscatter /km /sr   Begin UTC: 2010-01-12 20:15:14.2592   End UTC: 2010-01-12 20:37:47.5441

Version: 2.02 Expedited   Image Date: 01/13/2010

Flight 1 2010/01/12
Calipso underflight over NW Wyoming

Sparse clouds, ramps, spiral. Cloudsat down.

2ds Number Conc (log(#/l/um))

2ds concentration

532 nm Total Attenuated Backscatter, /km /sr   Begin UTC: 2010-01-14 20:15:11.3791   End UTC: 2010-01-14 20:37:44.6772

Version: 2.02 Expedited   Image Date: 01/15/2010

Flight 2 2010/01/14
Calipso underflight over South Colorado

Spiral, level legs. Cloudsat down.

Flight 4 2010/01/15 ARM. Spiral out after sunset. Lidar data good. Radar sparse.

sgprlC1.a0.20100115.000005.cdf

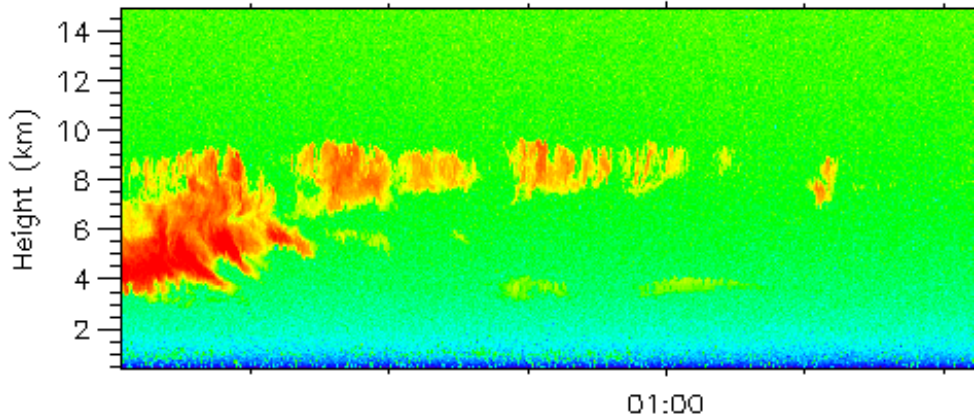Flight 5. 2010/01/19. Spiral and stepped Level Legs. cirrus cloud on level legs. Lidar blocked. Rained at surface
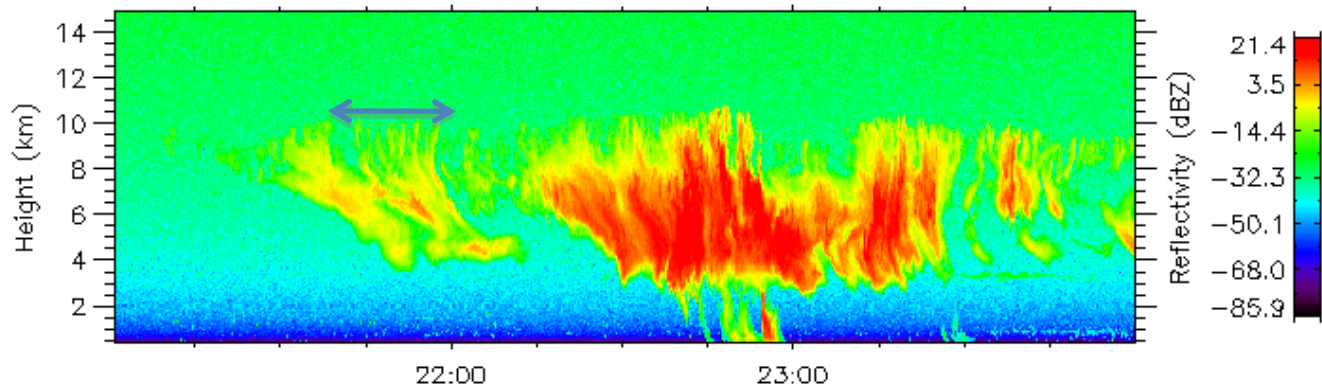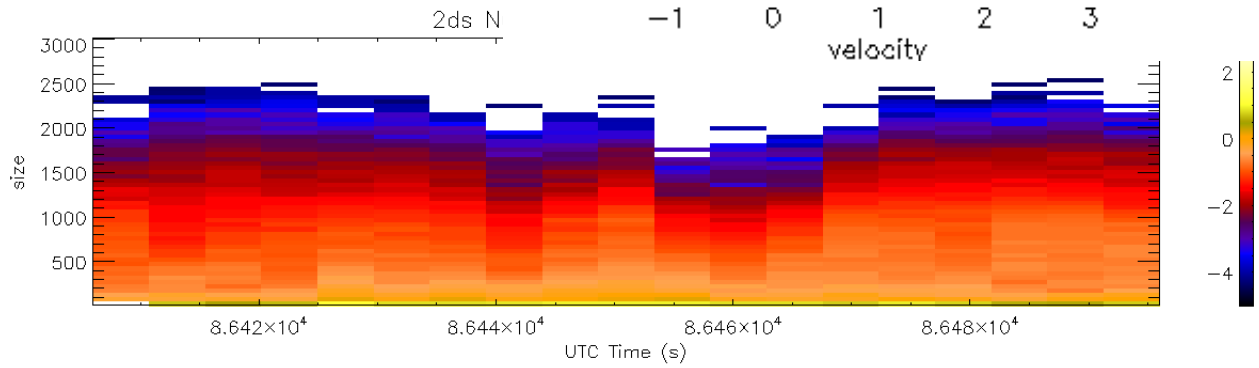

No 2ds data in archive?

Flight 6. 20100120. Spiral out after sunset.
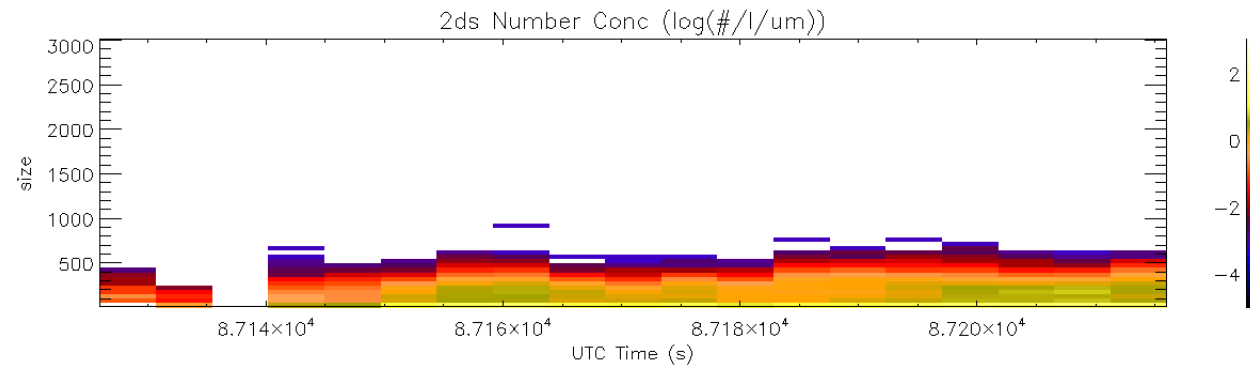 Likely missed lidar.
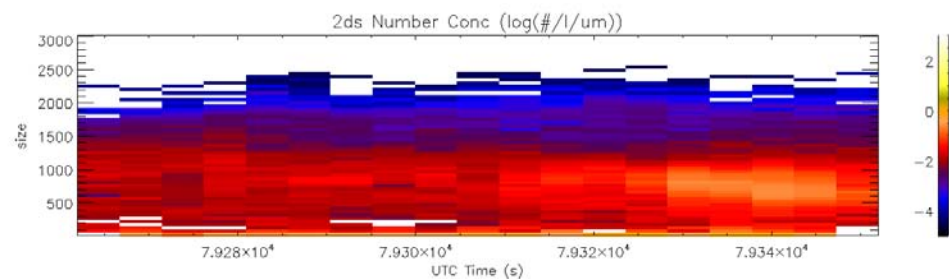
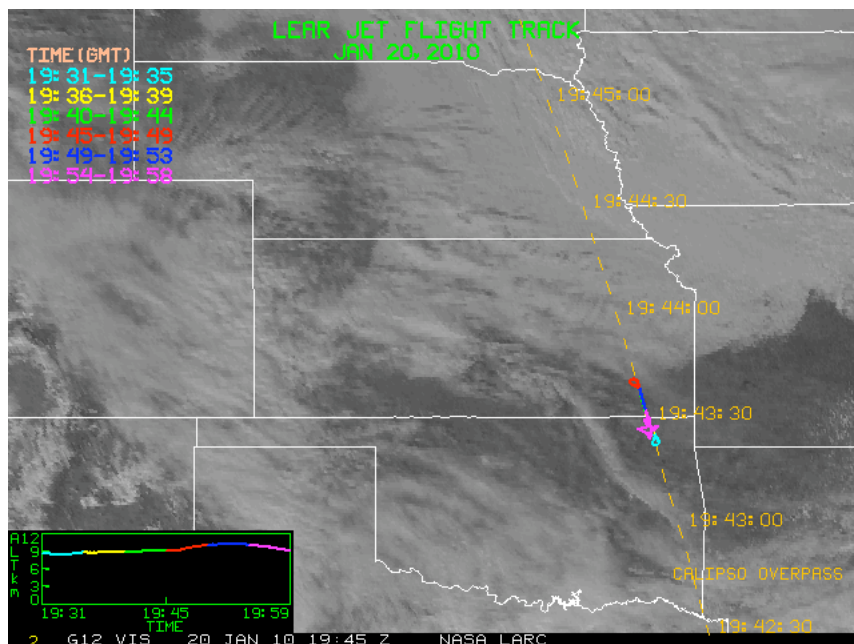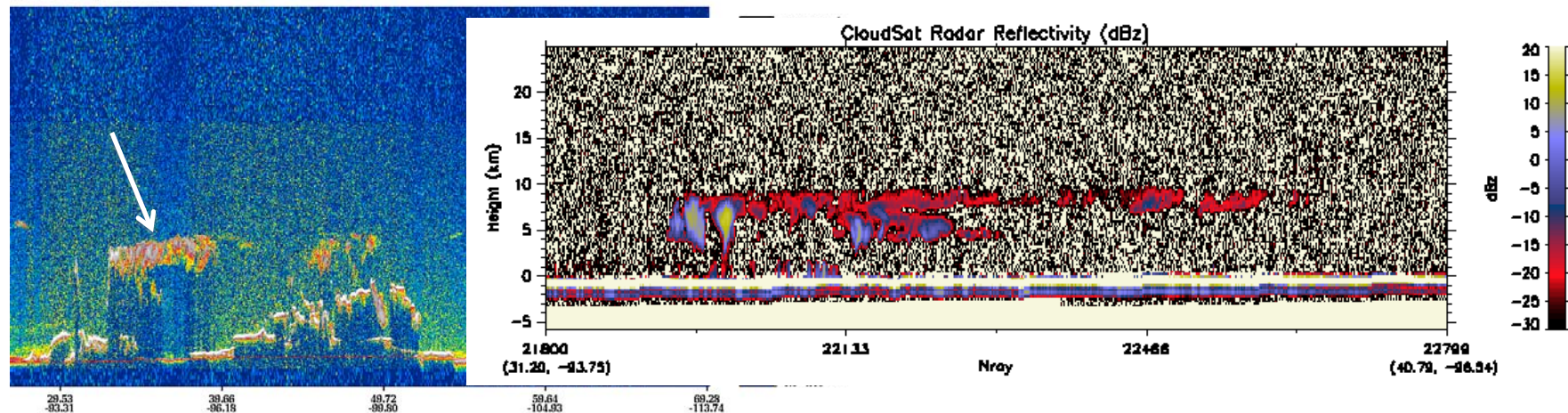Spectra for mmcr: 20100120.001102.00
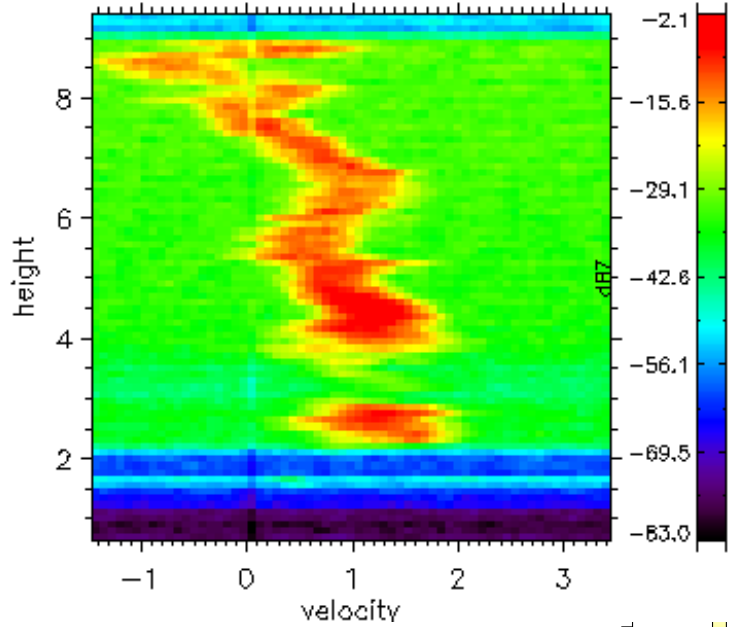
8km just after 00 UTC

10 km at 00:15
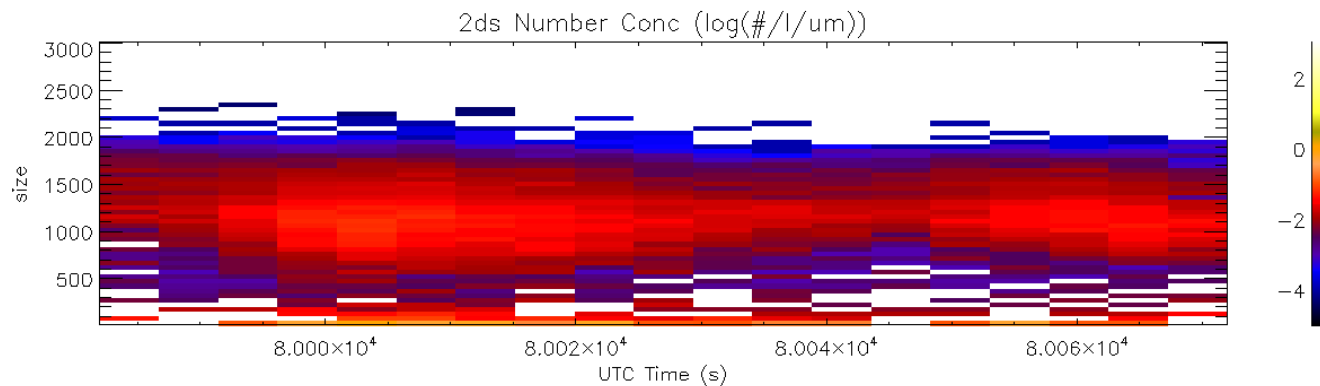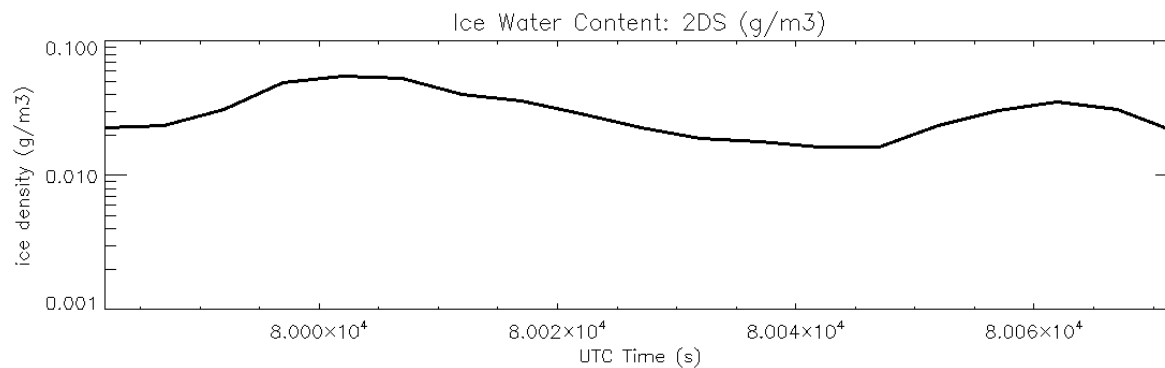
Flight 7. Cloudsat-Calipso - 20100120

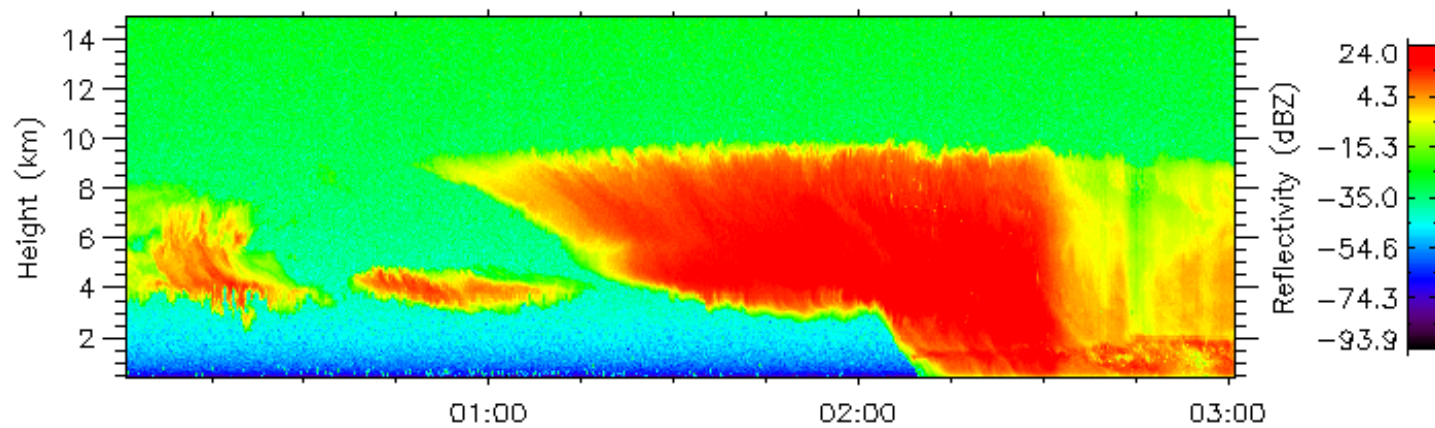2ds data in archive starts about 20 min after overpass

2010/01/20 – ARM. No low clouds!
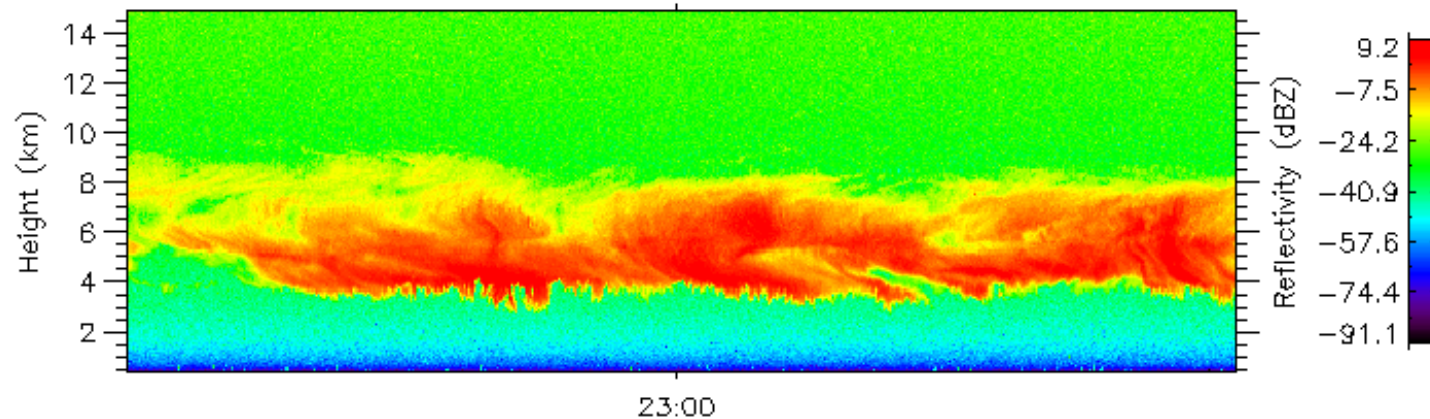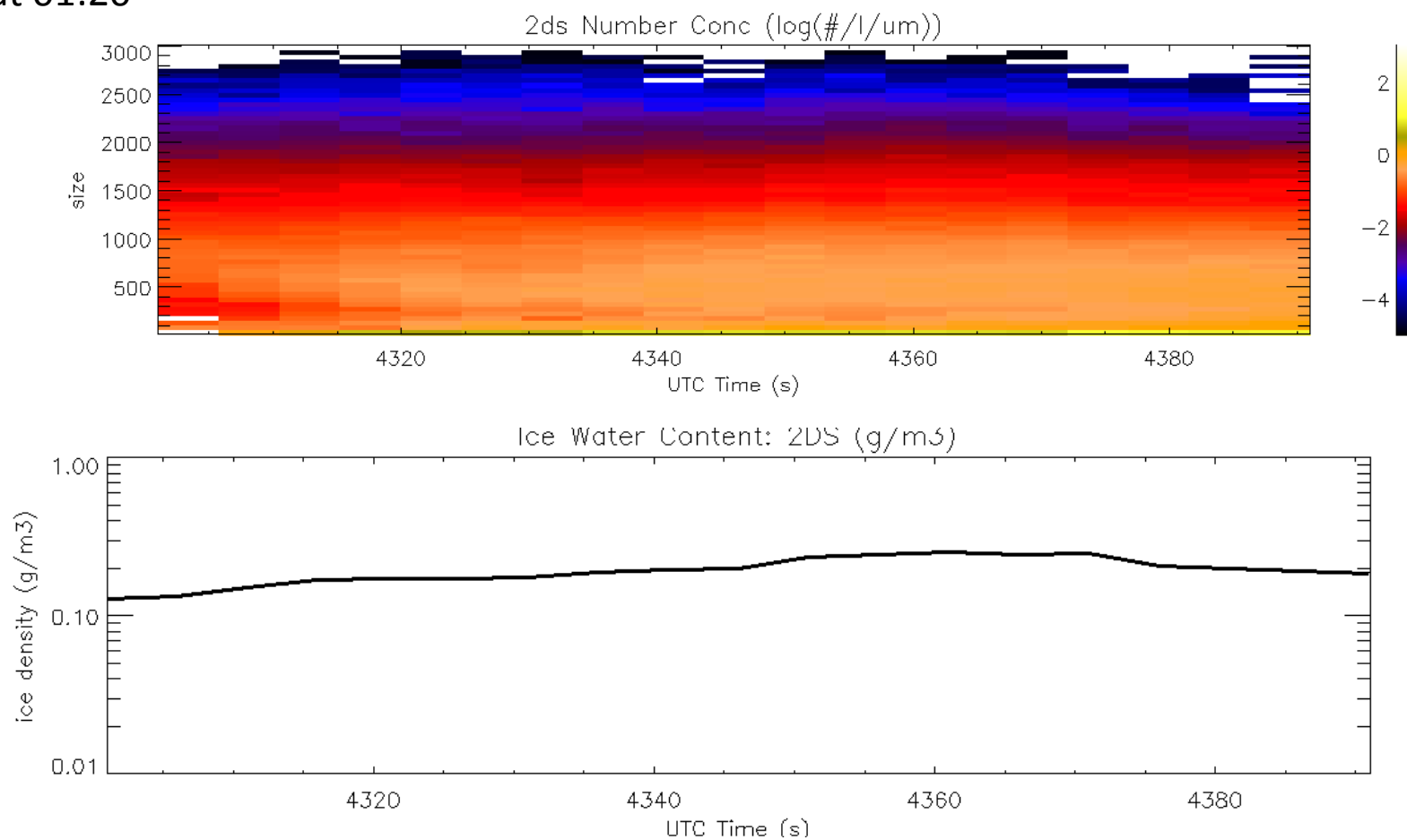

8 km at 22:15
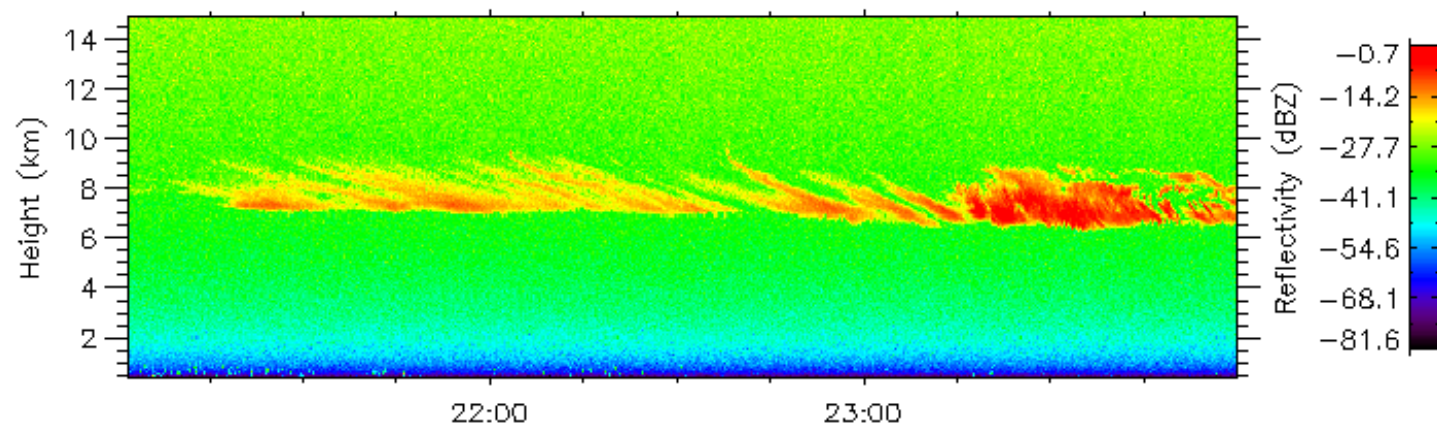
2010/01/21 spiral through anvil

9 km at 01:20

2ds Number Conc (log(#/l/um))

Ice Water Content: 2DS (g/m3)

2010/01/26 ARM

9 km at 23:45

2ds Number Conc (log(#/l/um))
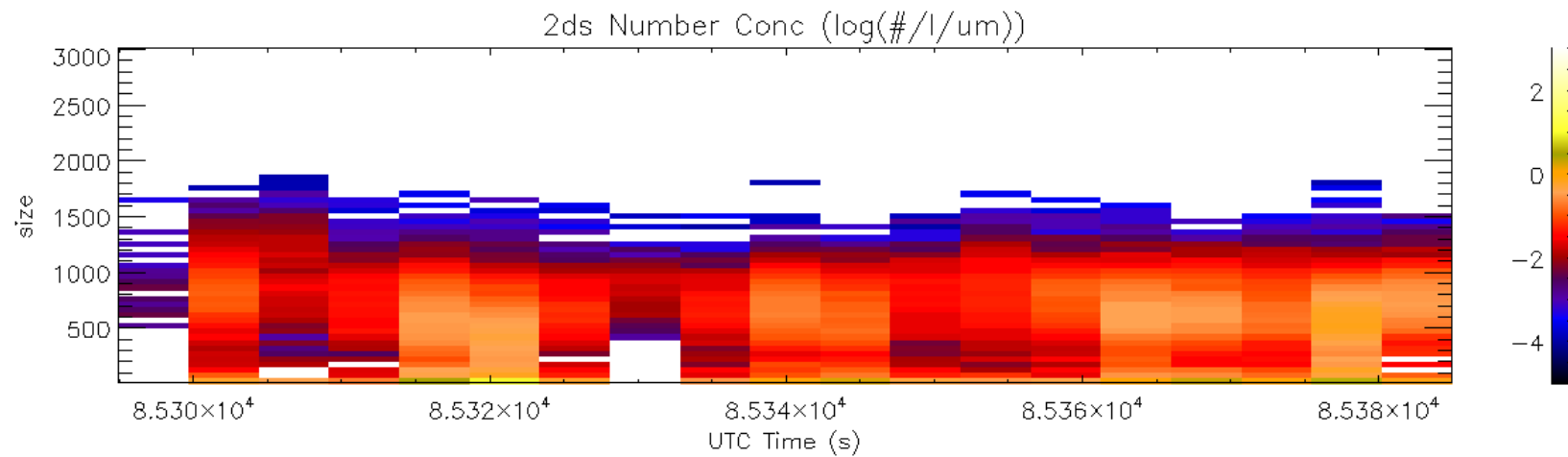
2010/01/27 at 2.2 UTC and 8 km.

MMCR Radar Reflectivity 20100127

Observed and Simulated (diamonds) Doppler Spectra

2ds Number Conc (log(#/l/um))
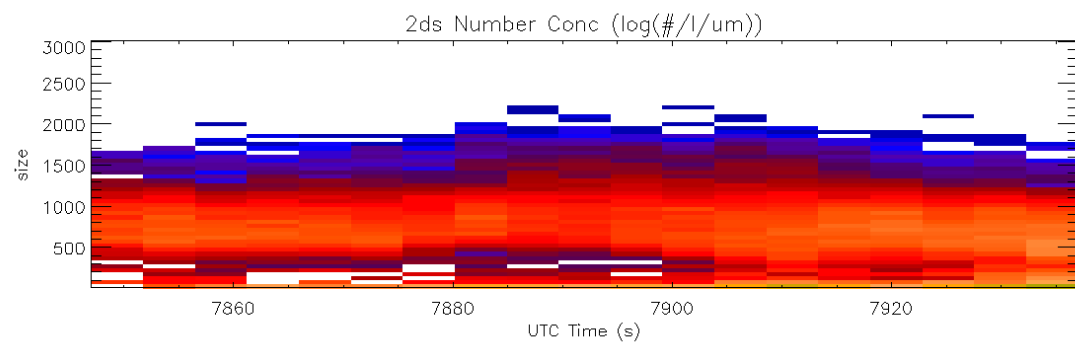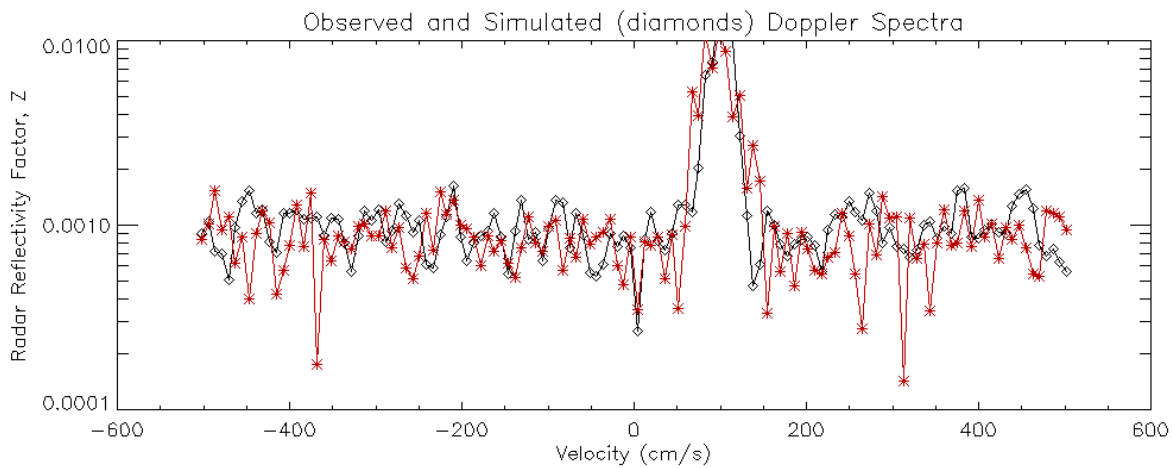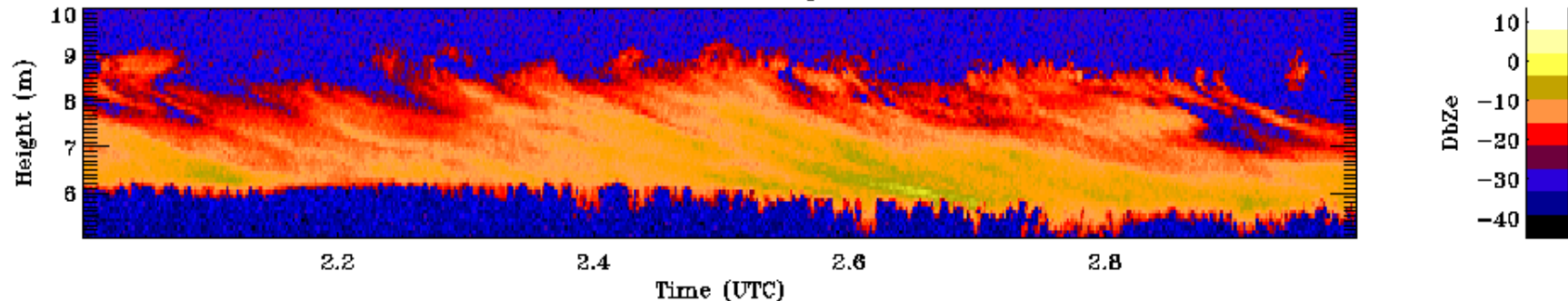
2010/01/27 at 10 km.

Learjet Sparticus Data, Sheet Two 20100127 9737-9827 2.70-2.73
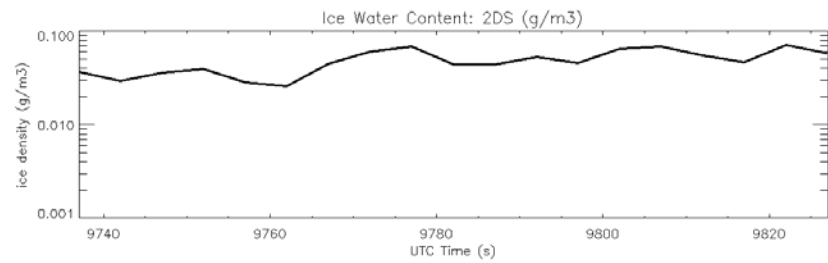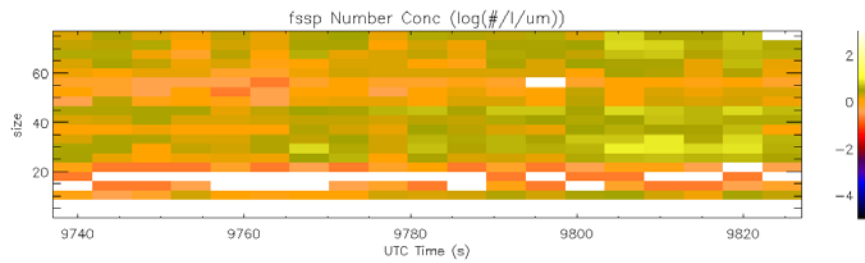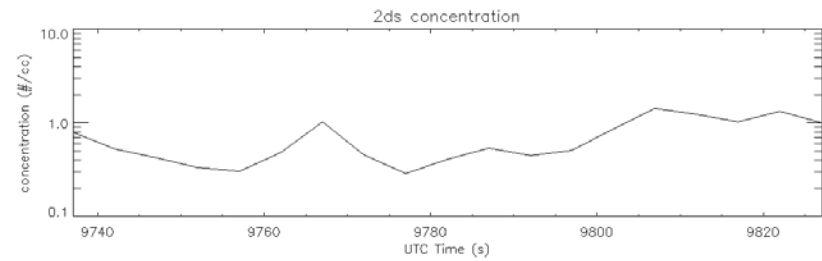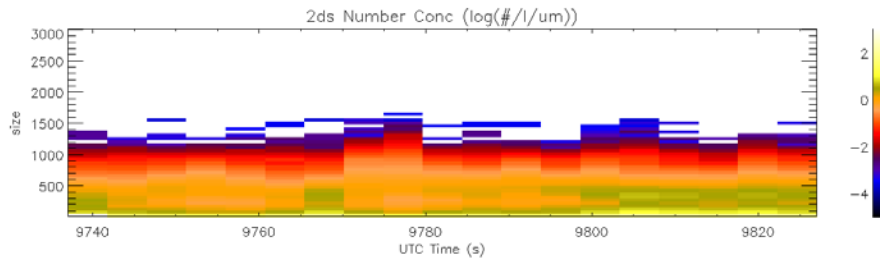
20100131 – Flight 12 – Lidar Blocked
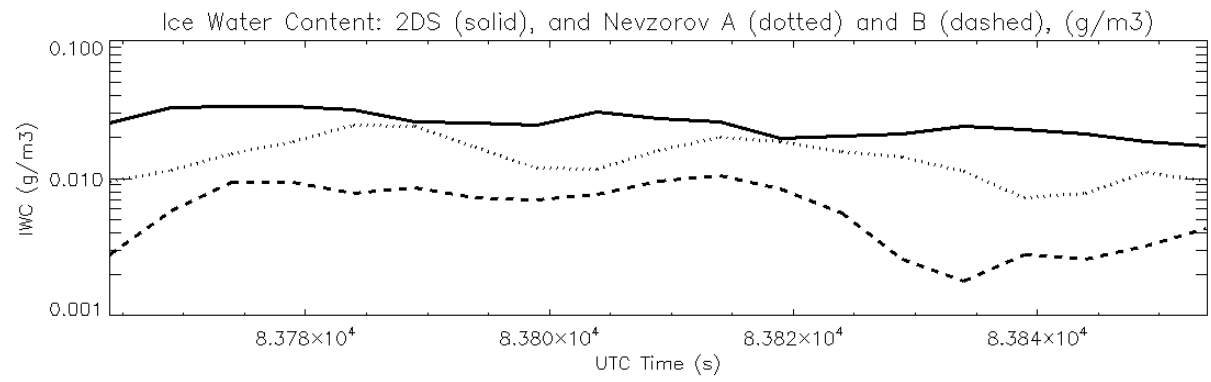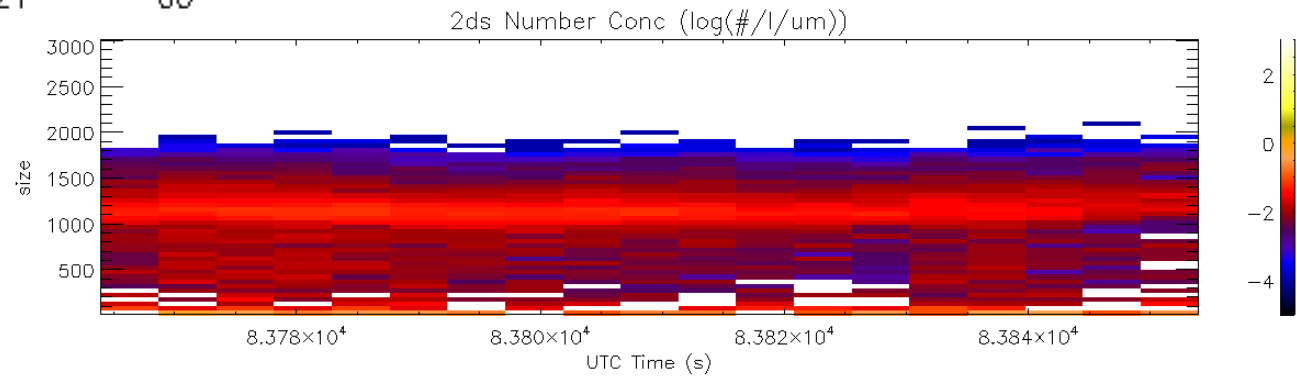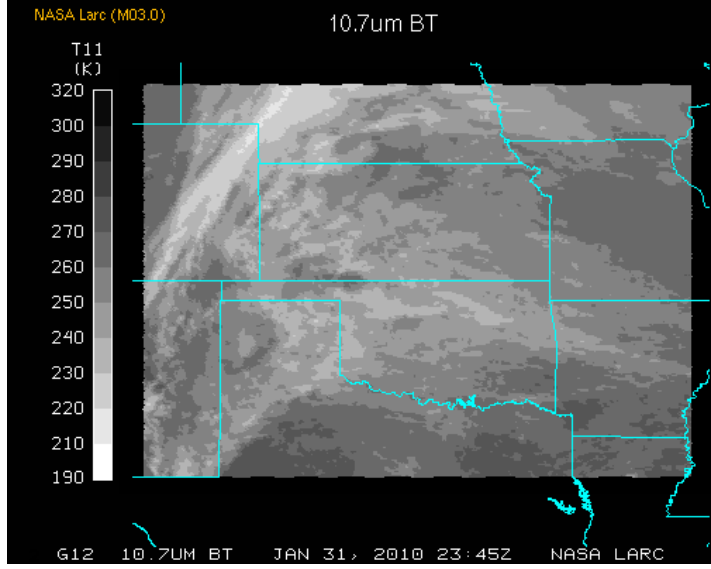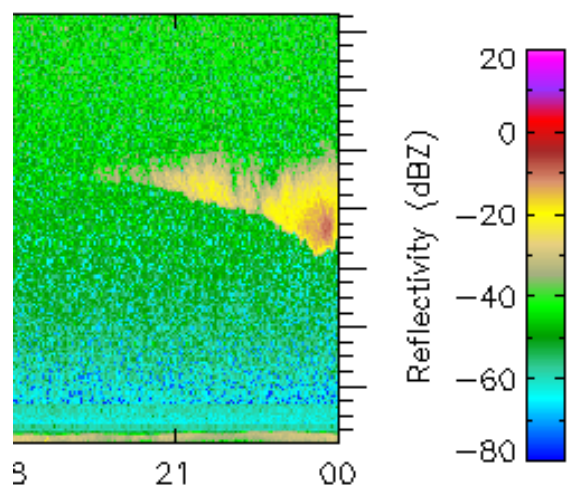
2010/02/01 at 1:10 UTC and 7.5 km

2ds Number Conc (log(#/l/um))

Ice Water Content: 2DS (solid), and Nevzorov A (dotted) and B (dashed), (g/m3)

2010/02/03 – 8km 20 UTC

2ds Number Conc (log(#/l/um))

CloudSat Radar Reflectivity (dBz)

2010/02/10 – A-Train

10.5 km
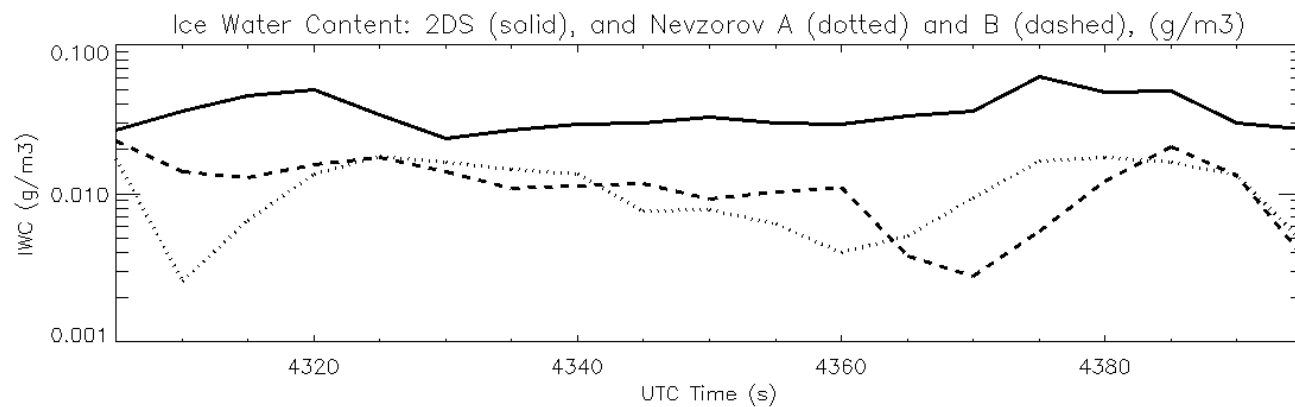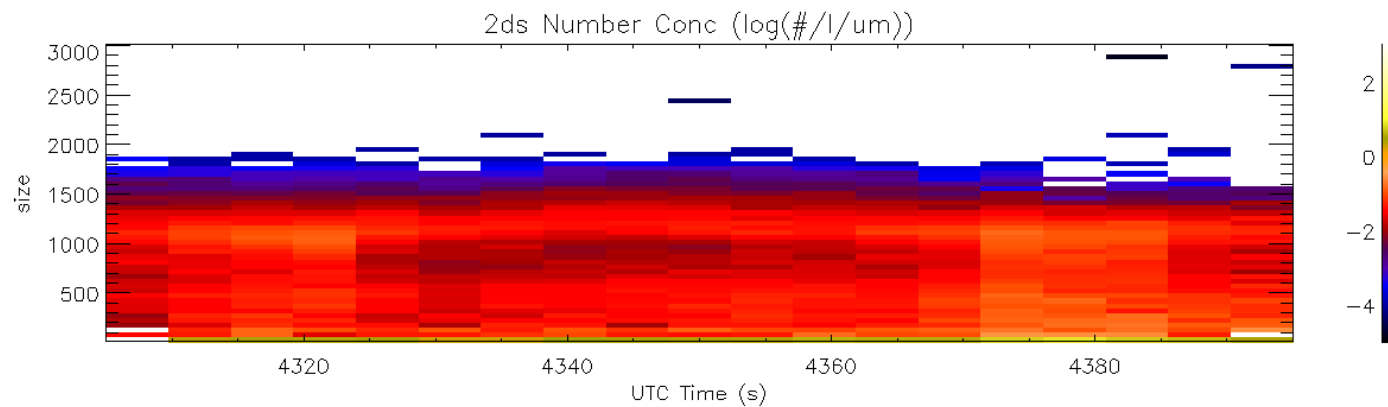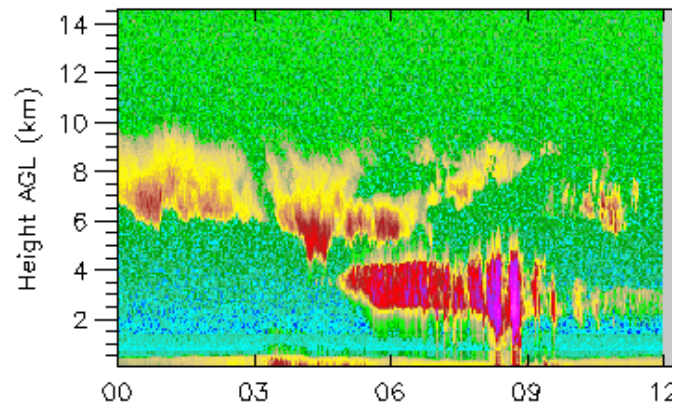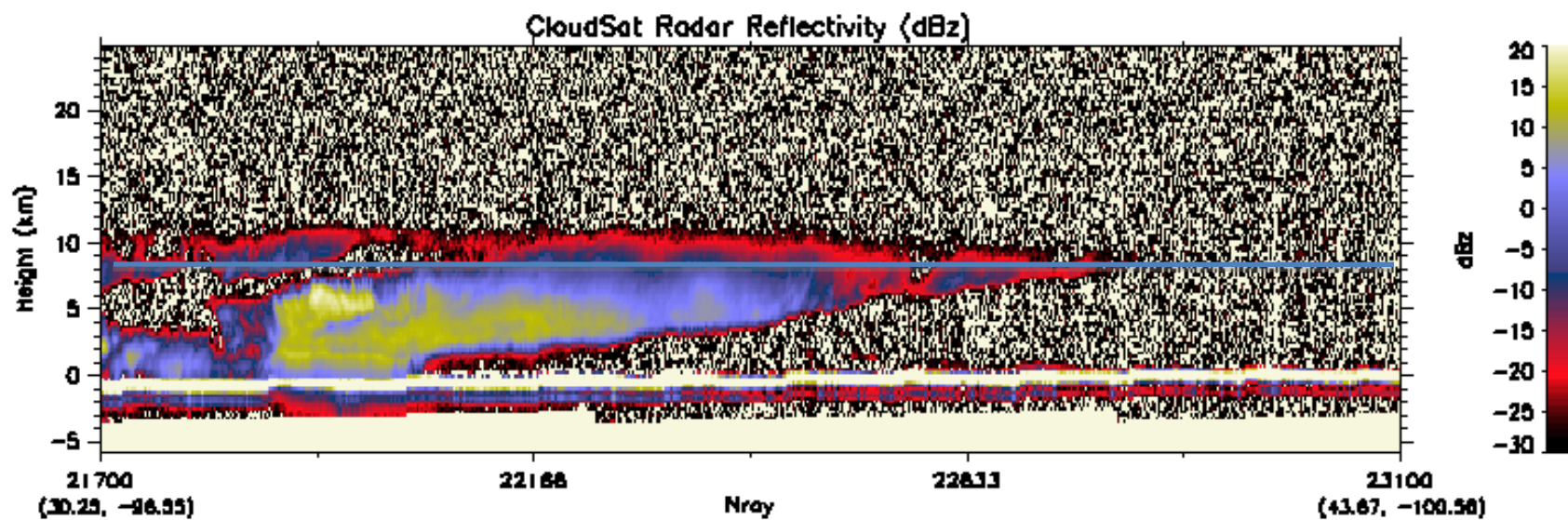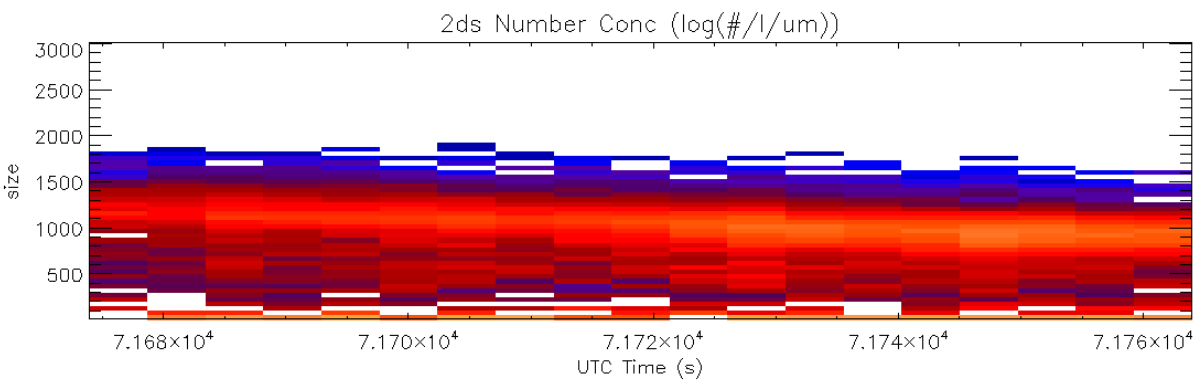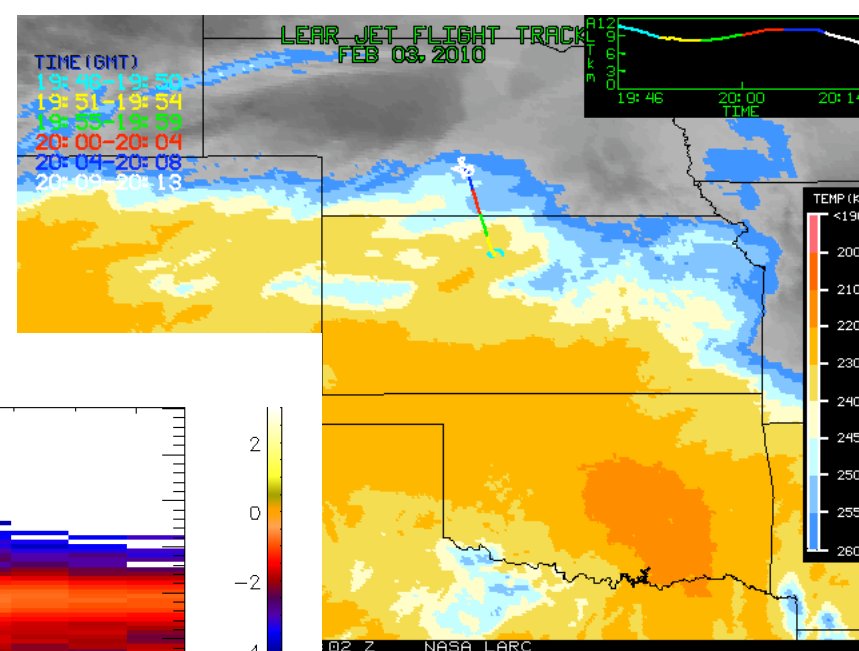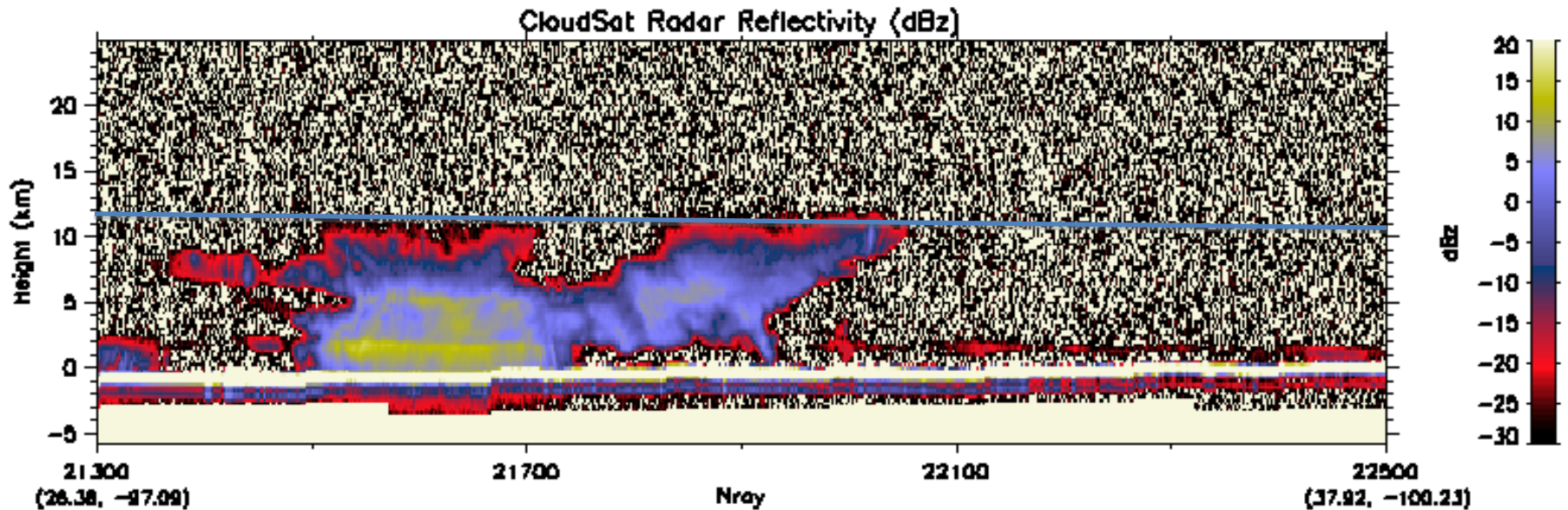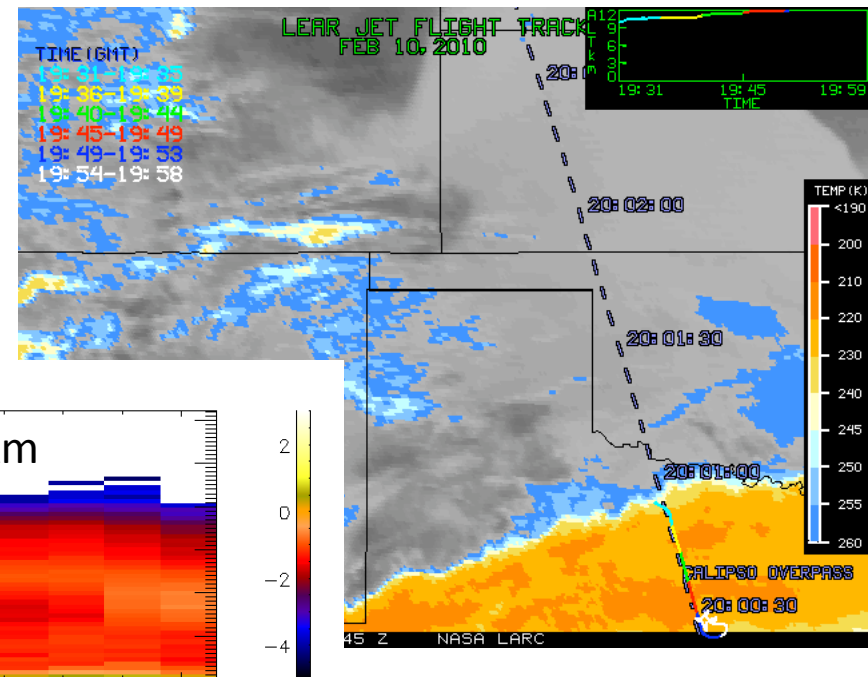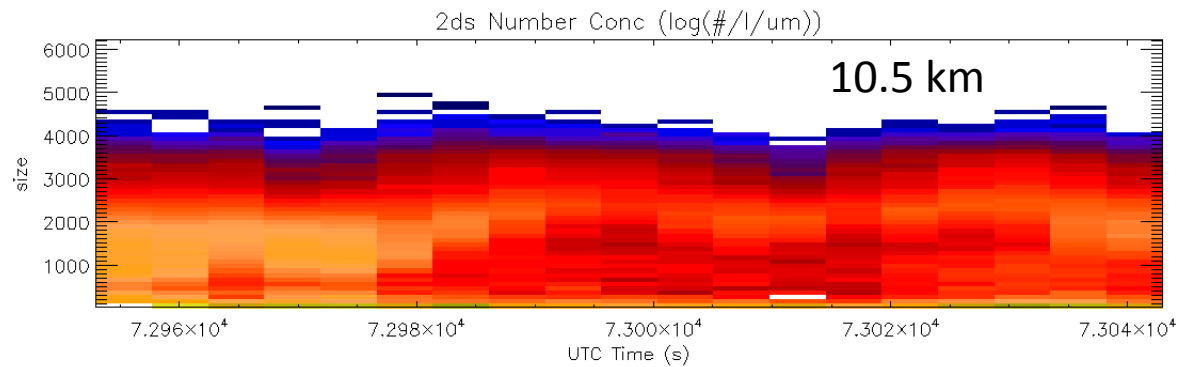
SPartICus Science Questions
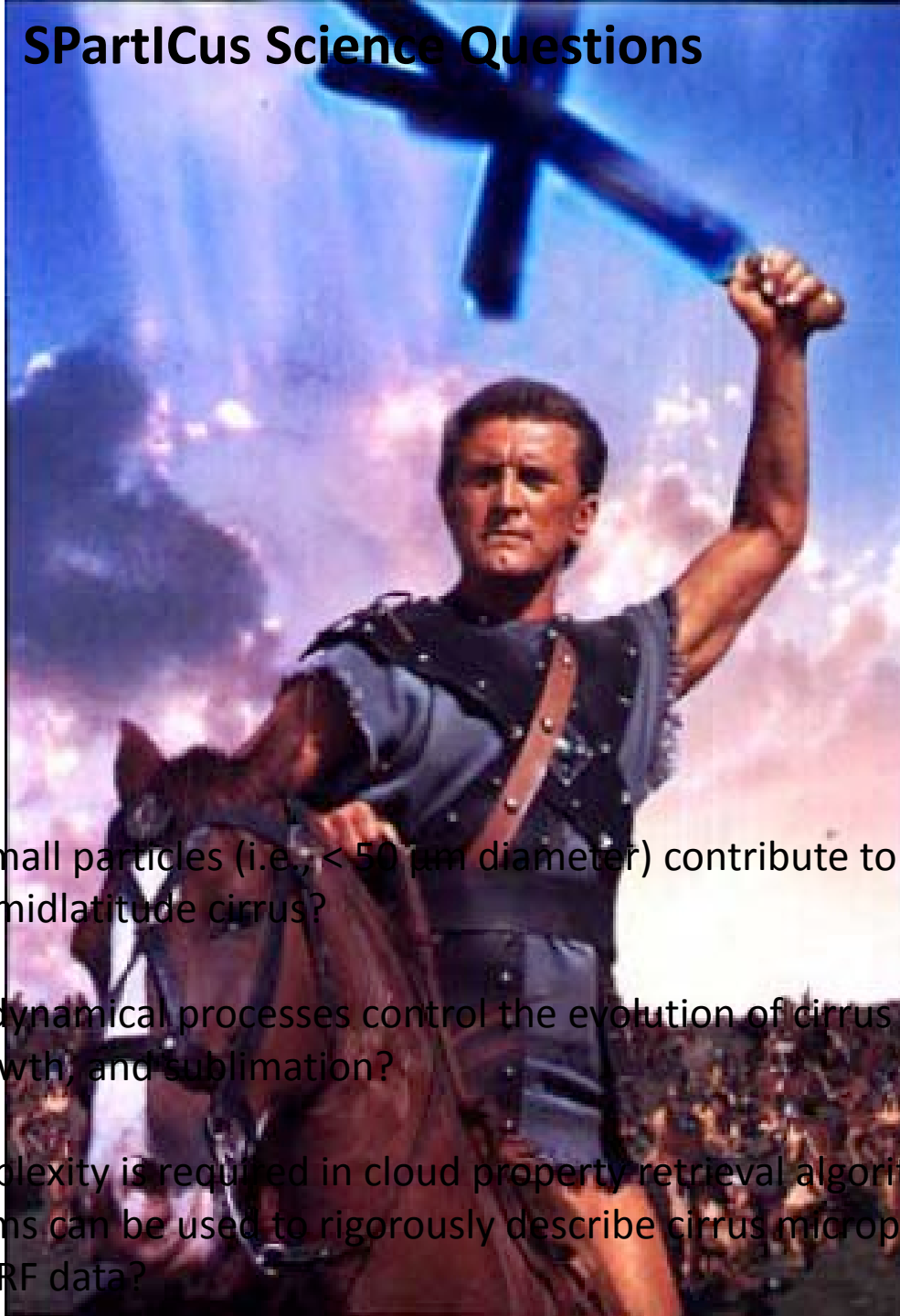
1. To what degree do small particles (i.e., < 50 µm diameter) contribute to the mass and radiative properties of midlatitude cirrus?

2. How do cloud-scale dynamical processes control the evolution of cirrus properties through nucleation, particle growth, and sublimation?

3. What degree of complexity is required in cloud property retrieval algorithms, and what minimal set of algorithms can be used to rigorously describe cirrus microphysical properties using ground-based ACRF data?

1. To what degree do small particles (i.e., < 50 µm diameter) contribute to the mass and radiative properties of midlatitude cirrus?

- 2DS, FSSP, and 2DP, CPI, are providing very good PSD measurements. IWC from 2DS is likely reasonable. However, we DO NOT HAVE AN INDEPENDENT MEASUREMENT OF IWC!
    - No CSI
    - Nevzorov probes have not produced reliable data

2. How do cloud-scale dynamical processes control the evolution of cirrus properties through nucleation, particle growth, and sublimation?

- We do not know if we have any dynamics since the turbulence probe has not produced any data that we can evaluate.
- Humidity? Science team has seen no data.

3. What degree of complexity is required in cloud property retrieval algorithms, and what minimal set of algorithms can be used to rigorously describe cirrus microphysical properties using ground-based ACRF data?

- This will take time. But we are collecting a diverse data set.

From this point:

Sparticus will run at least through May and we have 100 hours yet to use.

It is time to use them to build the data set. So we propose the following decision tree:

1. Is Cirrus likely at SGP today? If yes then fly there. If no, then
2. Are cirrus under the A-Train today? If yes, then fly the A-Train. If no,
3. Are cirrus likely at SGP or under the A-Train tomorrow? If yes then stand down. If no,
4. Are there cirrus anywhere in range today? If yes, then fly today.

This should allow us to use hours to build the data set to the point where it is statistically viable.

What to change in the operations?

My look at the data suggest that the Lear is flying too high over SGP and under the A-Train.

Suggest that the Lear always fly at the lowest altitude (Vance ceiling over SGP) or cloud base first and work up. Always return to cloud base or lowest available altitude.

Will attempt to capture Terra/MISR overpasses by staging the Lear near expected cirrus overnight for morning overpass. Will do the same for SGP – doing this today.

Do we need a person on the ground at SGP to communicate the correct heights while the Lear is flying?

SWACR operations.

Science Team:

Need to fill out the mission scientist and co-mission scientist schedule. Eric and Tim have shouldered most of the burden.

After the breakout, let me know your availability from now until the end of May.

Post Sparticus:

Feel free to submit proposals to use the data. It will be public within 6 months of the end of the experiment.

Much to do to process the data set to the point where it is in good form. This is primarily Paul's responsibility but funding will be necessary to accomplish this.