

SHOUT Research Flight 2 – 20160826 - Gaston/AL99

Shift 1 Mission Scientists: Scott Braun, Alan Brammer

Shift 2 Mission Scientists: Pete Black, Rosimar Rios-Berrios, Will Komaromi, Greg Tripoli

Shift 3 Mission Scientists: Gary Wick, Jason Dunion

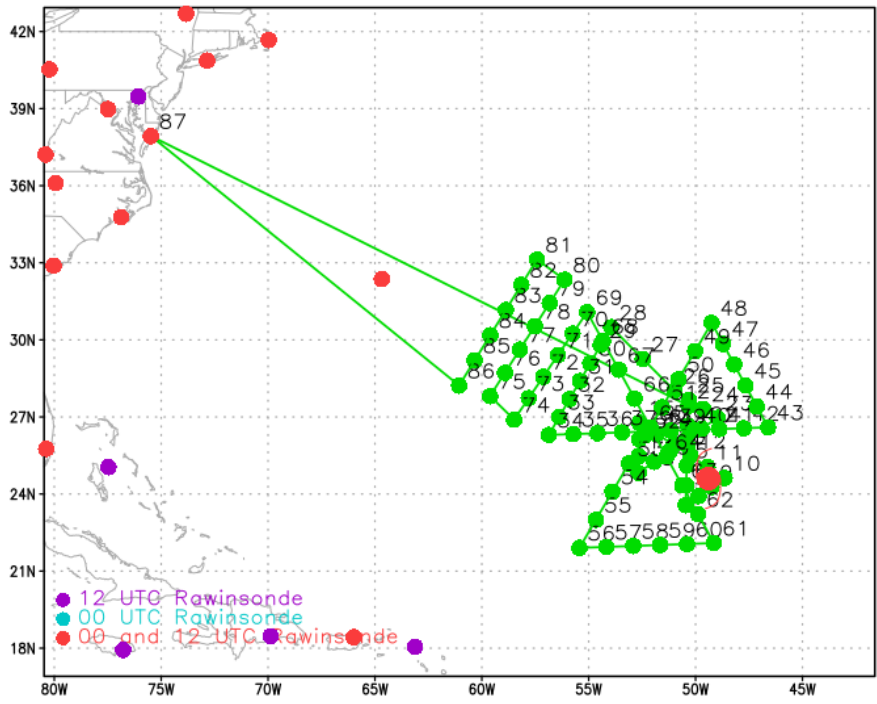
Log initiated by G. Wick

The second flight of SHOUT 2016 is a second sequential flight into Tropical Storm/Hurricane Gaston. The plan was originally drawn up with a sole focus on Gaston and surrounding environmental areas with identified forecast sensitivities. During the day prior to the mission, there was still a great deal of concern about the possible development of AL99 and its potential risk to the US. As a result, the plan was redrawn and re-filed to include a significant environmental sampling region north of the Bahamas prior to entering a single butterfly pattern over Gaston. By the morning of the mission, the forecasts for AL99 generally suggested less likelihood of development and it was decided to reduce the sampling in support of AL99. While there was some consideration of dropping any AL99 interest altogether, Jason Sippel argued for some sampling of a PV streamer extending out from roughly the SE US, and ECMWF-based forecast sensitivity results from Ryan Torn also supported this region as potentially impacting the still-uncertain AL99 forecasts. A new plan (update1) was developed and provided to the pilots for loading at departure.

Forecast uncertainty surrounding Gaston has increased since the planning of the first flight, particularly surrounding its location of recurvature.

Tracks for the mission will appear in MTS under GH Plan 2 Active

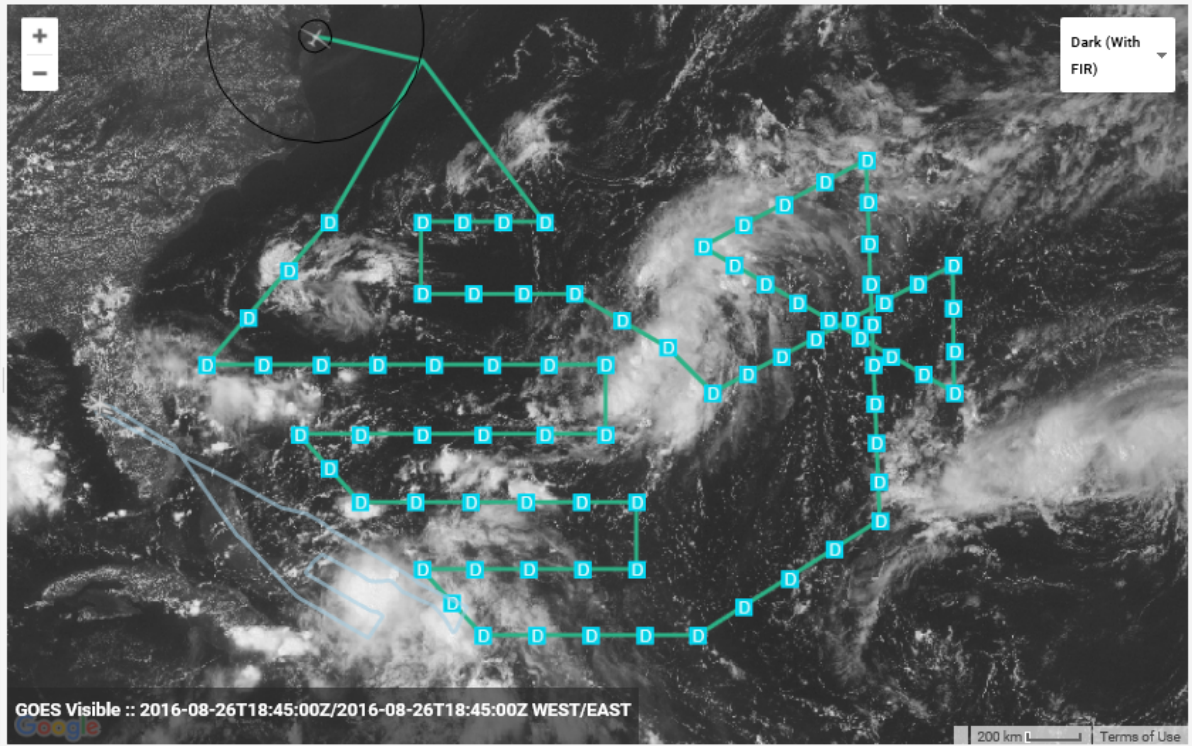
The original plan drawn up and submitted on Tuesday is shown below:



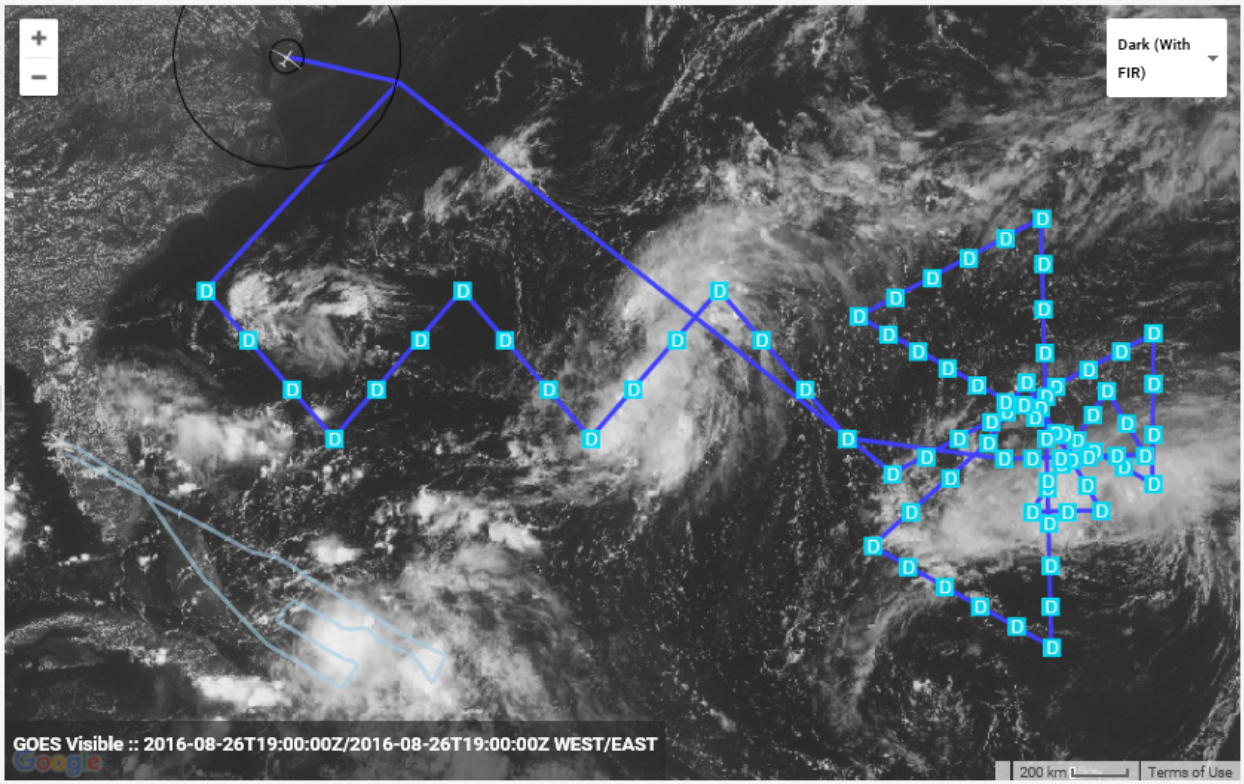
GrADS: IGES/COLA

2016-08-23-16:40

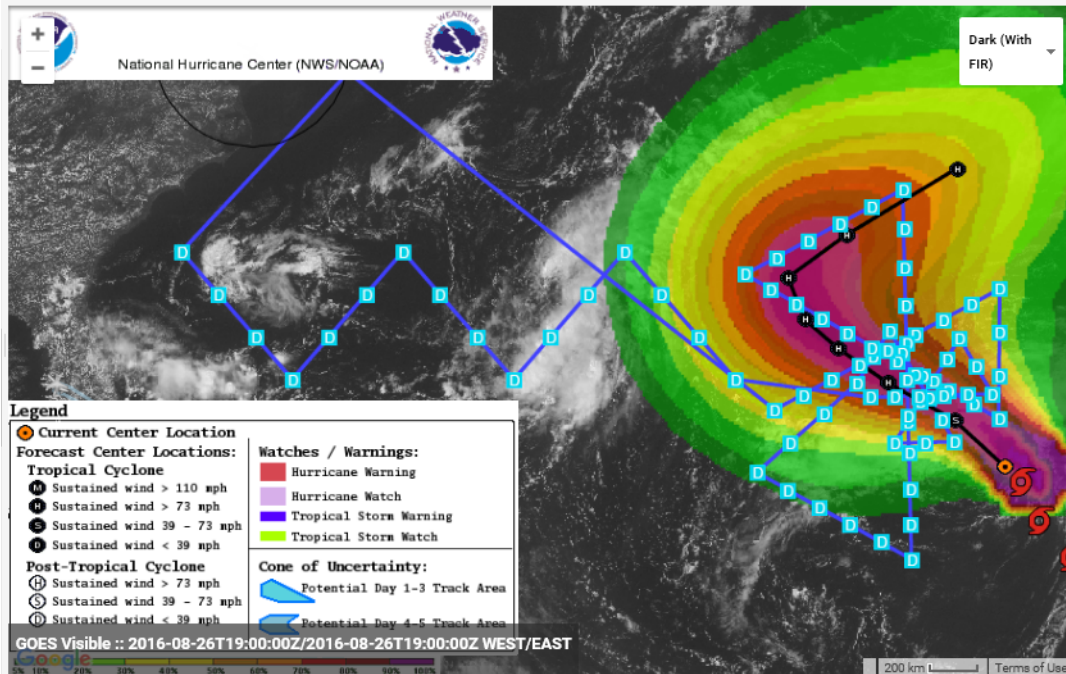
The revised pattern drawn up on Thursday overlaid on GOES visible imagery from 1845 UTC on 8/26 is shown below:



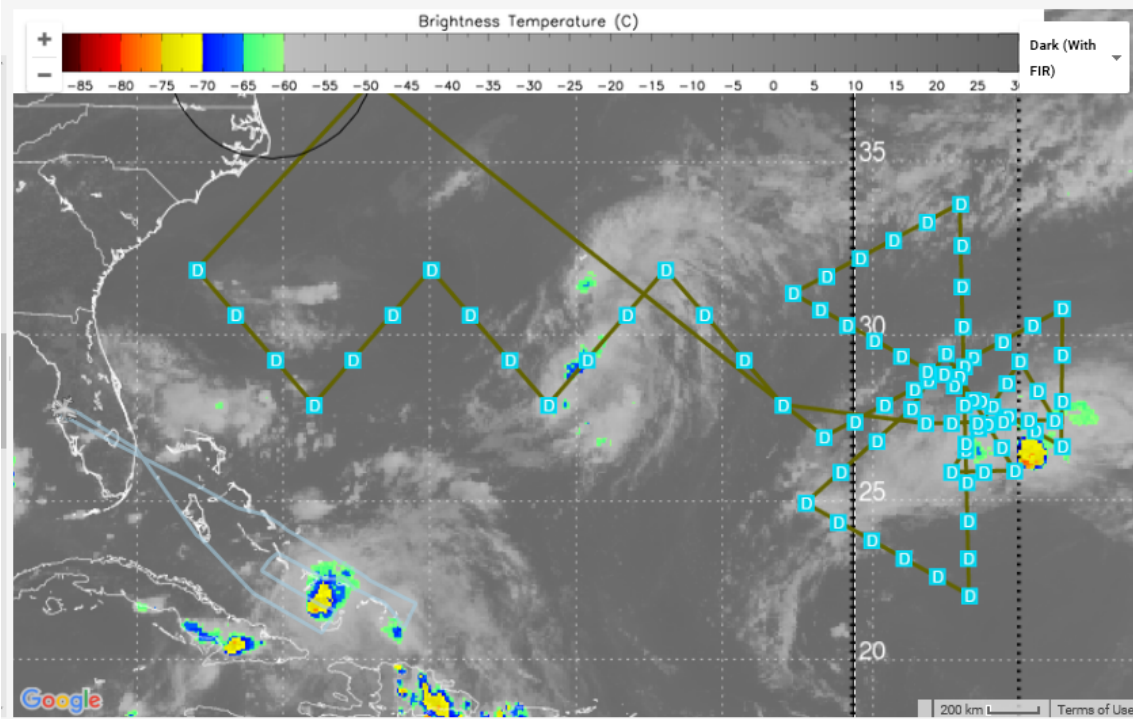
The next update to the flight track with reduced AL99 sampling is shown below on the next visible scene at 1900Z:



Again, but with forecast track:

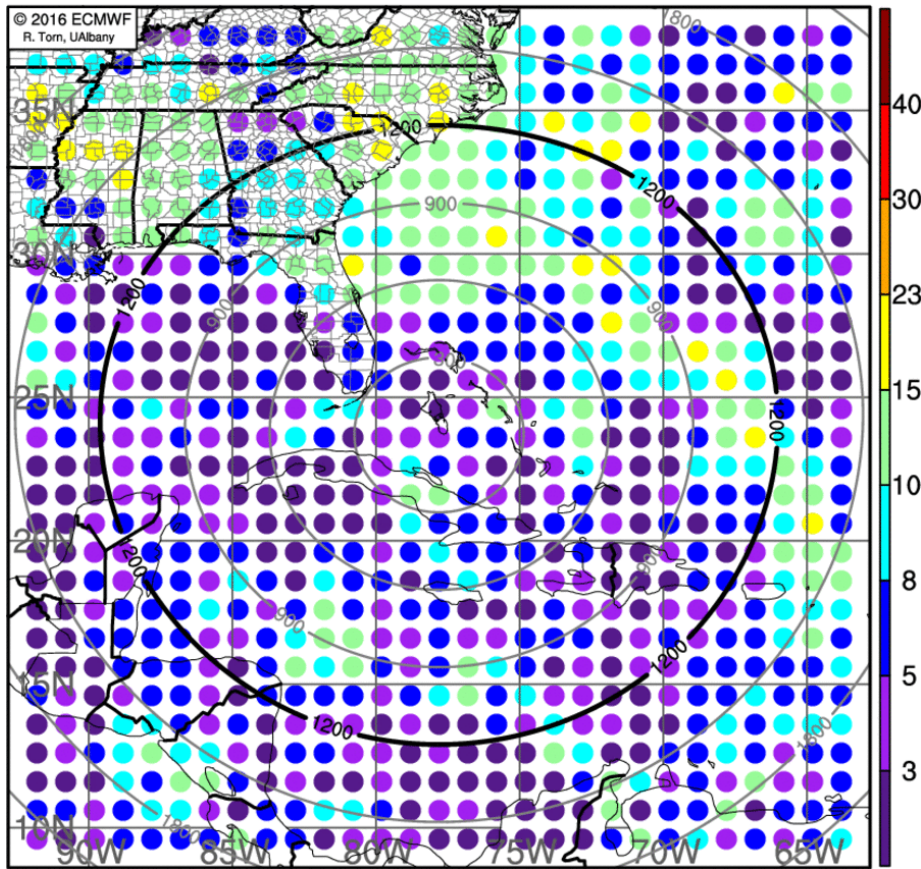


...and one more with CIMSS brightness temperature (see just small area with more notable convection)



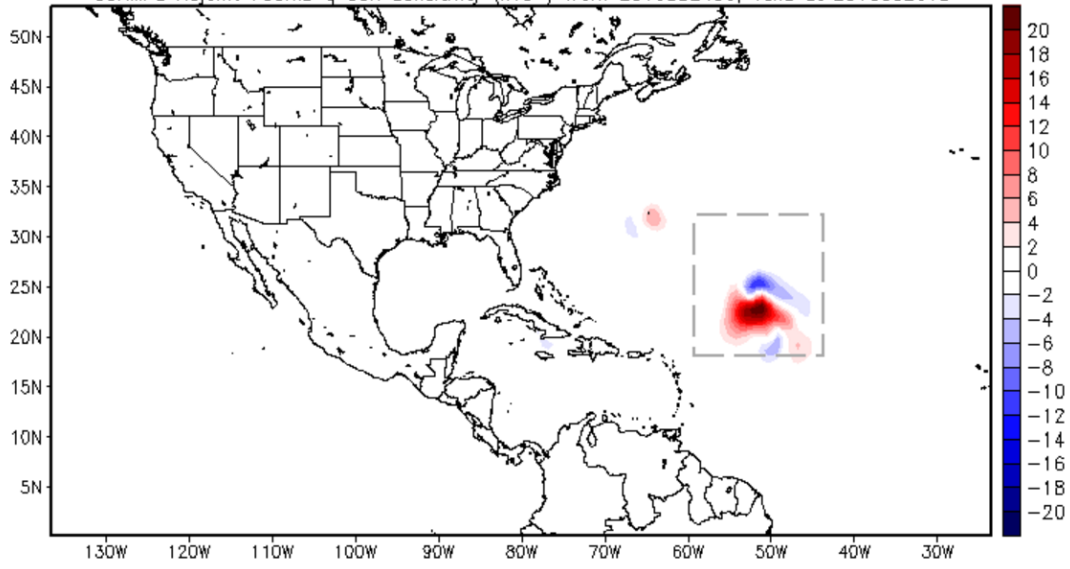
The following is the sensitivity image from Ryan Torn associated with AL99 that also helped to justify inclusion of the sawtooth pattern:

Dropsonde impact at 2016082712 (F036)

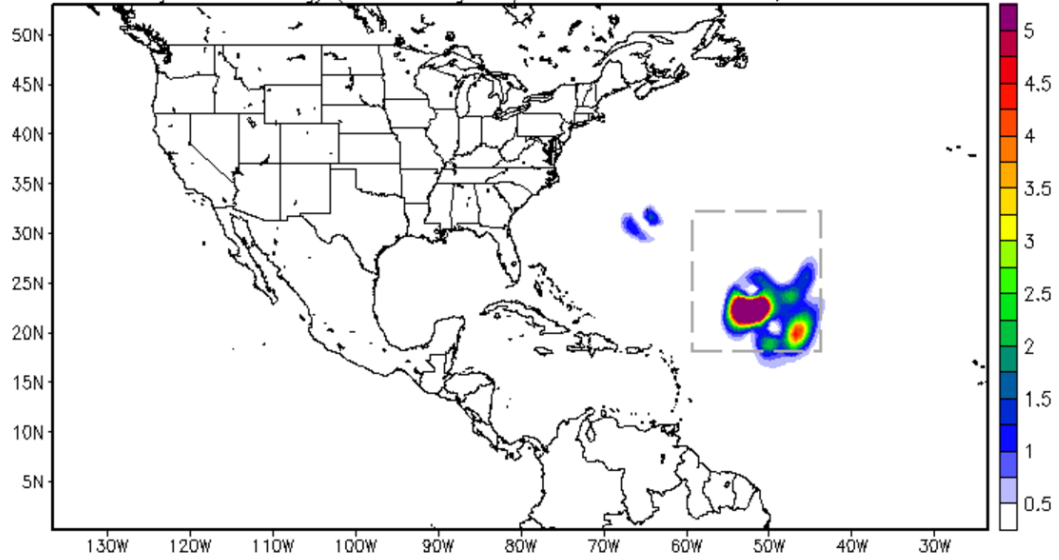


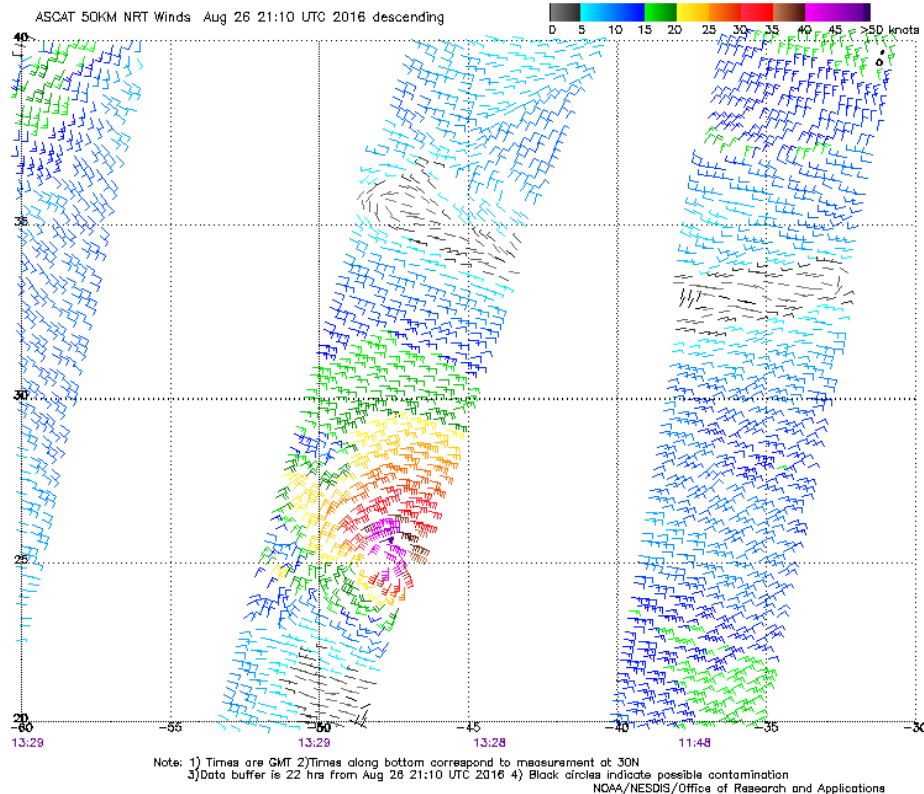
Additional adjoint sensitivity images from Jim Doyle suggesting sampling on the southern edge of Gaston:

COAMPS Adjoint 700mb q 60h Sensitivity ($\times 10^{-2}$) from 2016082406, valid at 2016082618



COAMPS Adjoint Total Energy (Vertical Integrated) at 60h from 2016082406, valid at 2016082618





2110 UTC ASCAT overpass above has winds in the core on the north side of the eye of ~50-55 kt, consistent with latest NHC forecast discussion, shown below:

TROPICAL STORM GASTON DISCUSSION NUMBER 17
 NWS NATIONAL HURRICANE CENTER MIAMI FL AL072016
 500 PM AST FRI AUG 26 2016

The hostile vertical shear from an upper low to Gaston's southwest appears to be dropping with the SHIPS and CIMSS shear analyses down to about 15 kt. The deep convection, however, is still mainly north of the center and lacks significant banding features. SAB and TAFB Dvorak current intensity estimates range from 45 to 55 kt, down slightly from earlier today. In deference to the 1330Z ASCAT scatterometer pass and the very robust low-level circulation evident in the visible imagery during the day, the maximum winds are kept at 55 kt.

As Gaston moves away from the upper-level low, the shear should continue to drop to values between 5 and 10 kt by tomorrow. The

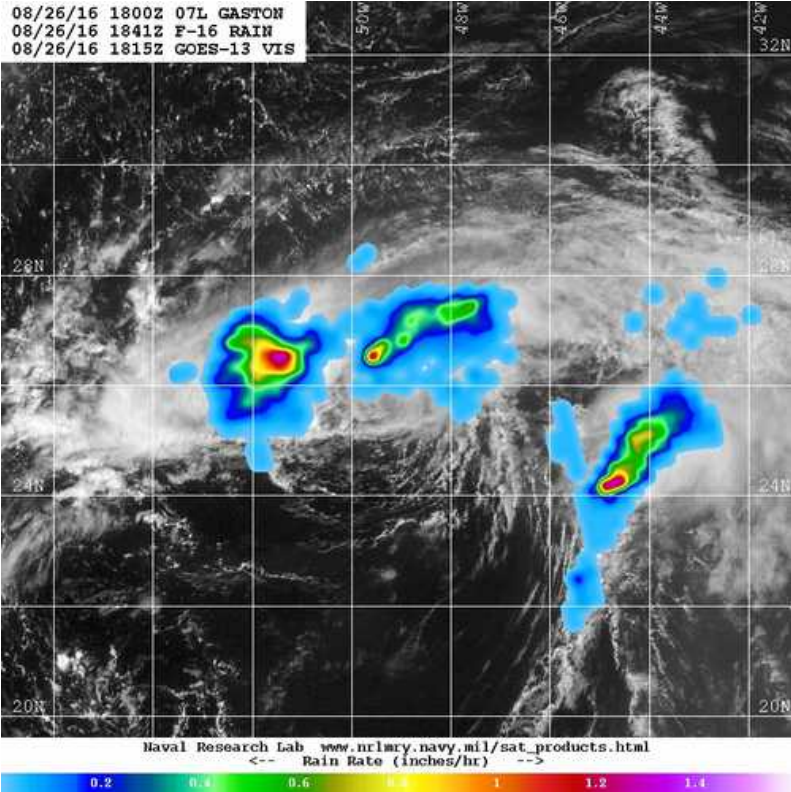
shear should then stay low through about 72 h while the cyclone traverses over quite warm waters. A key uncertainty in the intensity forecast is from the environmental low-level moisture, which may decrease substantially during the next few days. This could reduce the otherwise quite conducive conditions that Gaston should soon experience. After about three days, Gaston is likely to encounter strong mid-latitude upper-level westerlies and a return of hostile shear while SSTs steadily drop. The official NHC forecast is for steady intensification between days one and three, with gradual weakening thereafter. This forecast is based upon a blend of the tightly packed HWRF/COAMPS/SHIPS/LGEM models and is the same as in the previous advisory.

Gaston's center is just tucked in on the southern edge of the deep convection, allowing for a confident assessment of the initial position. The tropical storm is moving toward the northwest at a 15-kt clip, as it is being steered between the strong upper low and a subtropical ridge to its northeast. Around 72 h, Gaston should slow to a crawl as it reaches a weak steering pattern. But by the end of the forecast period, the system should be accelerating northeastward as it enters the mid-latitude westerlies. The track forecast is based upon a blend of the GFS and ECMWF global models and is nearly the same from that in the previous advisory.

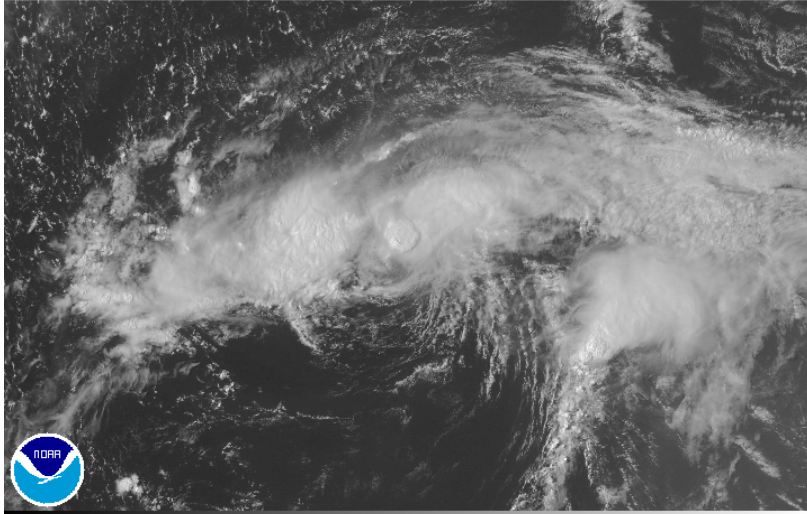
The initial 34- and 50-kt wind radii were only slightly tweaked based upon the ASCAT scatterometer pass and the wind radii forecast is similar to the RVCN consensus technique.

FORECAST POSITIONS AND MAX WINDS

INIT	26/2100Z	26.2N	49.7W	55 KT	65 MPH
12H	27/0600Z	27.4N	51.5W	55 KT	65 MPH
24H	27/1800Z	28.6N	53.5W	65 KT	75 MPH
36H	28/0600Z	29.7N	54.8W	75 KT	85 MPH
48H	28/1800Z	30.4N	55.8W	85 KT	100 MPH
72H	29/1800Z	31.5N	56.0W	95 KT	110 MPH
96H	30/1800Z	32.5N	53.5W	90 KT	105 MPH
120H	31/1800Z	34.5N	49.0W	80 KT	90 MPH



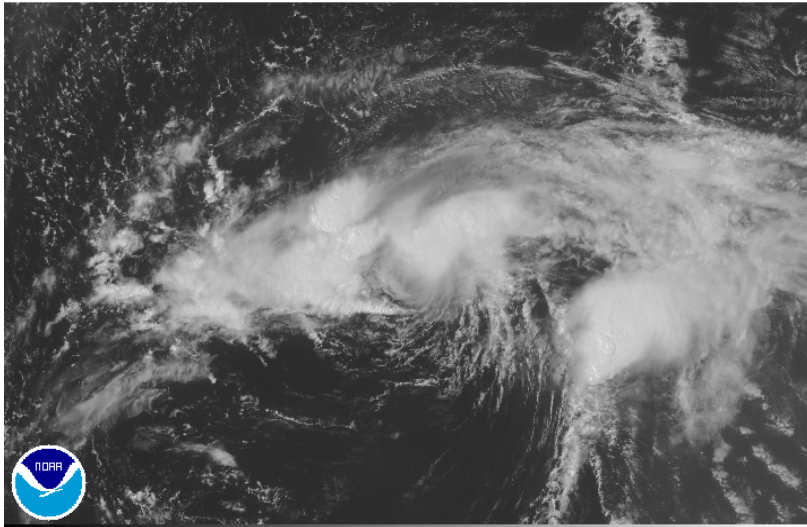
1841 UTC SSMIS images shows how strong vertical shear has altered the structure of the storm since the last flight. The storm center is just south of the central region of precipitation. Visible imagery below shows at about 1.5 hours prior to this time, the low level center was more exposed. A new convective burst was starting at the time of this SSMIS image (see also the second visible image below), with that burst growing with time (third image).



1

GOES-FLOATER VISIBLE - AUG 26 16 18:45 UTC

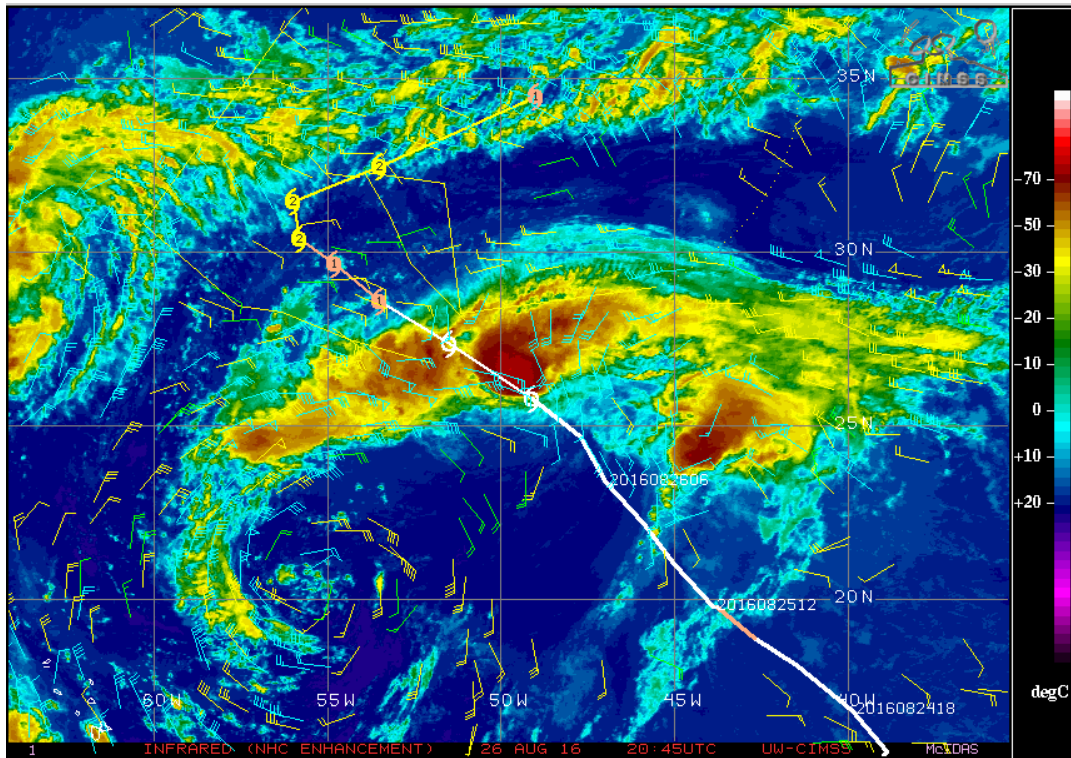
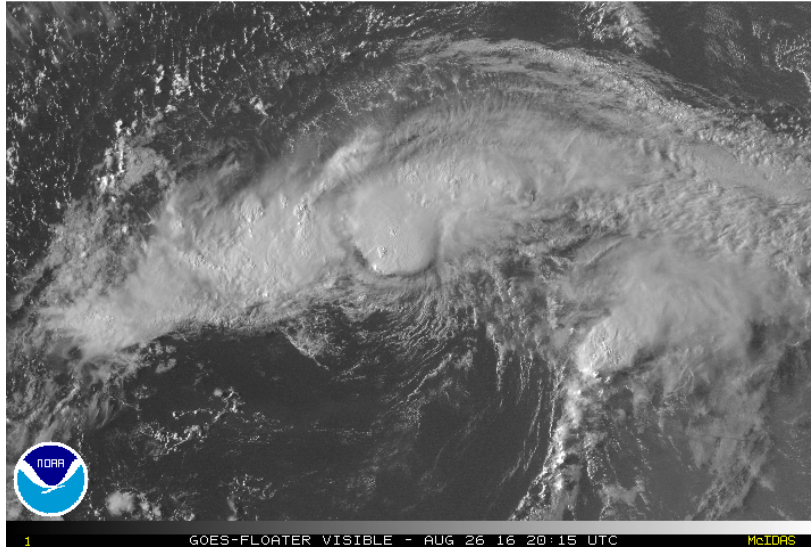
McIDAS



1

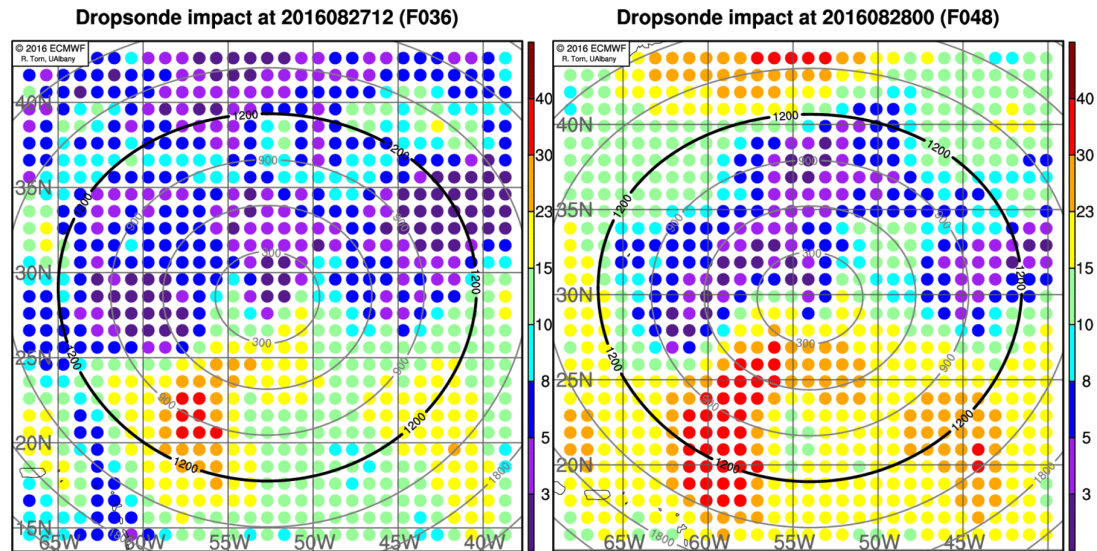
GOES-FLOATER VISIBLE - AUG 26 16 17:15 UTC

McIDAS



2045 UTC IR image with upper-level GOES AMV. Upper low is well SW of center (won't really be sampled during this flight). Diffuence presence over the convective burst with easterlies just southwest and southerlies just east of the burst.

Forecast sensitivity for track based on ECMWF ensembles highlight the upper low to the southwest as the dominant area for the forecast uncertainty in the track location. Image shows potential impact of dropsondes at 12z 27th and 00z 28th on the 72 hr forecast track location.

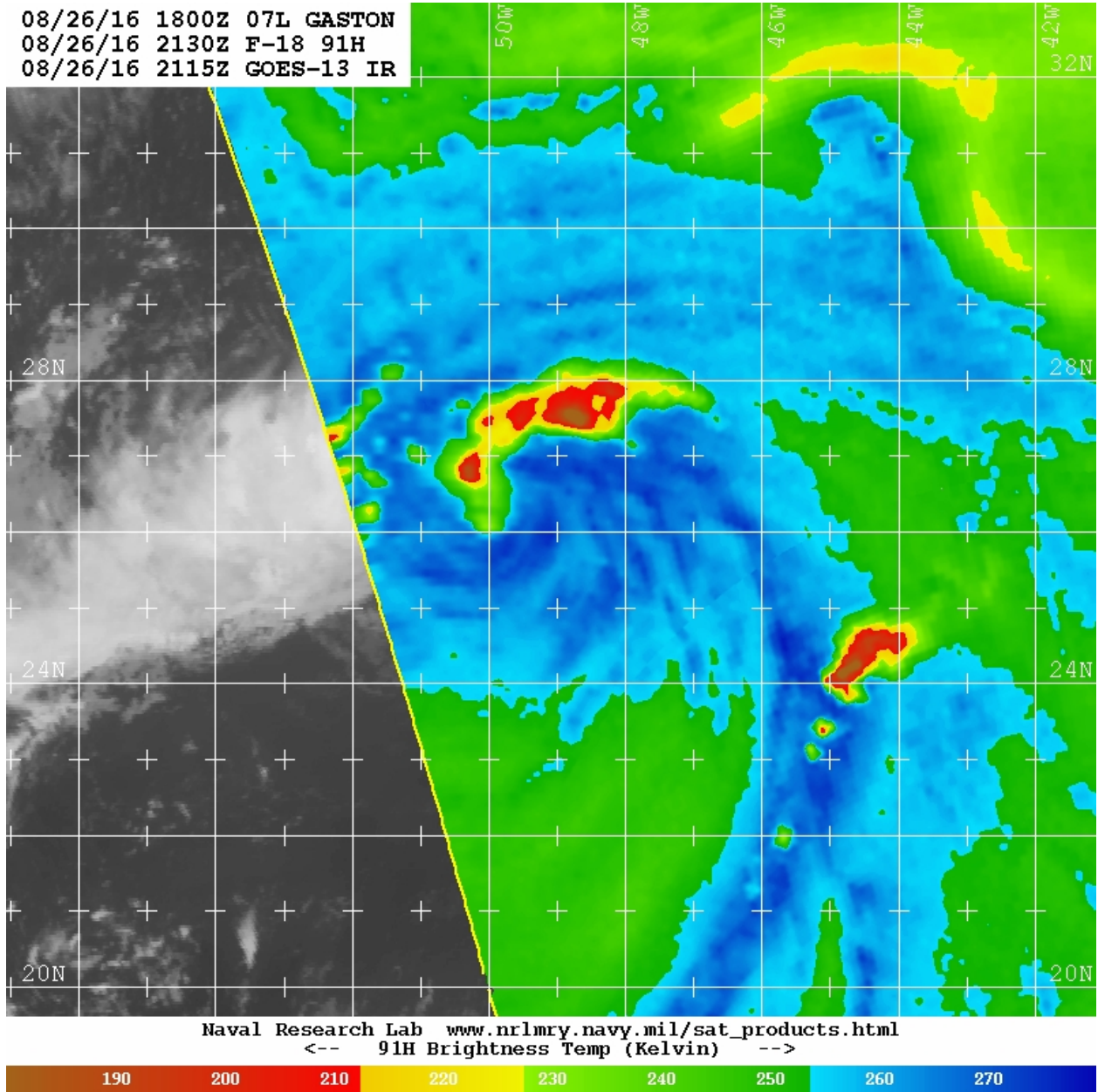


Planned flight currently reaches about 500 km from the center in the SW quadrant, on the edge of the upper low. Reaching the edge of highlighted sensitivity towards the tail end of the flight.

AL99 continues struggle between Cuba and the central Bahamas. Though had some active convection during the day. NHC keeps 2 day genesis probability at 30% (up 10% from this morning), 5 day forecast at 60%. First sawtooth pattern of planned flight will touch a region of forecast sensitivity for this system around 600 km to its NW.

2130Z SSMIS Gaston:

08/26/16 1800Z 07L GASTON
08/26/16 2130Z F-18 91H
08/26/16 2115Z GOES-13 IR

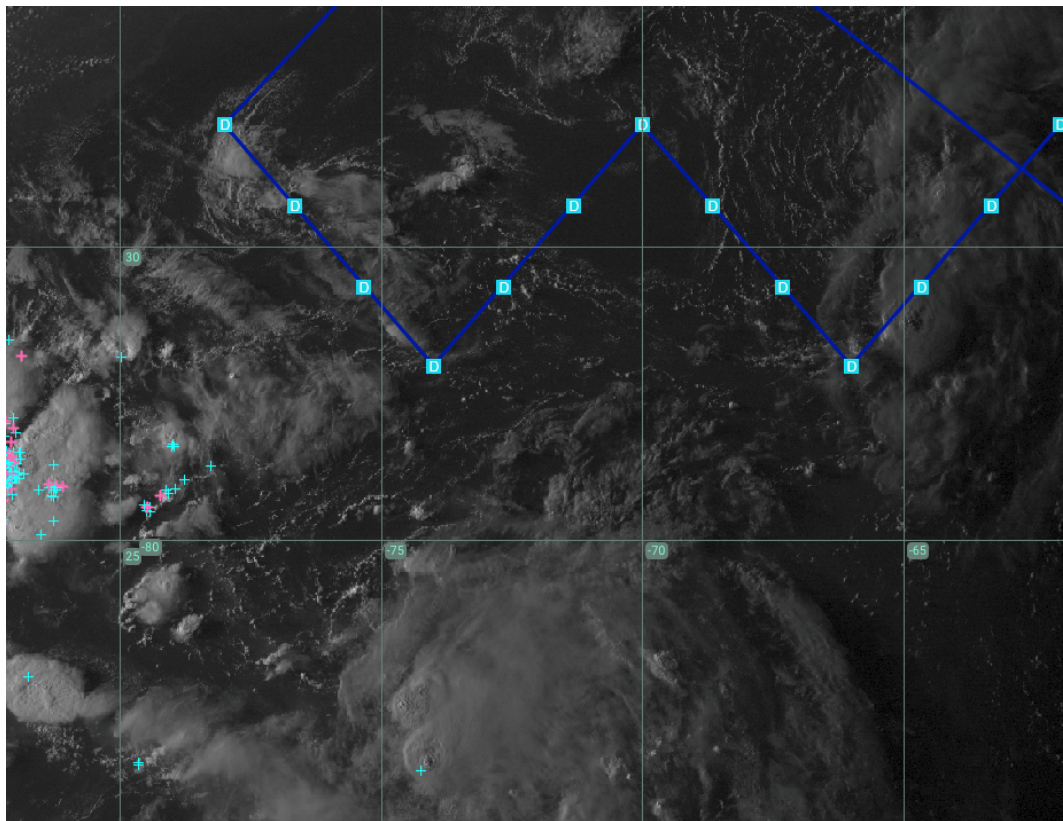


2150Z: Powered up, Instruments on, Pin Pull, and now Taxi
2154Z: Using Runway 22 tonight
2202Z: Take-off on SHOUT-HRR Science Flt. #2

2236Z: Update 1 to the flight plan has been uploaded to MTS under GH Plan 2 (Active track).
Submitted by Jason
Changes:

1. revamped flight plan submitted to the pilots earlier today
2. includes a sawtooth pattern off the SE U.S. coast and 2 butterfly patterns in TS Gaston (see pgs. 3-4)

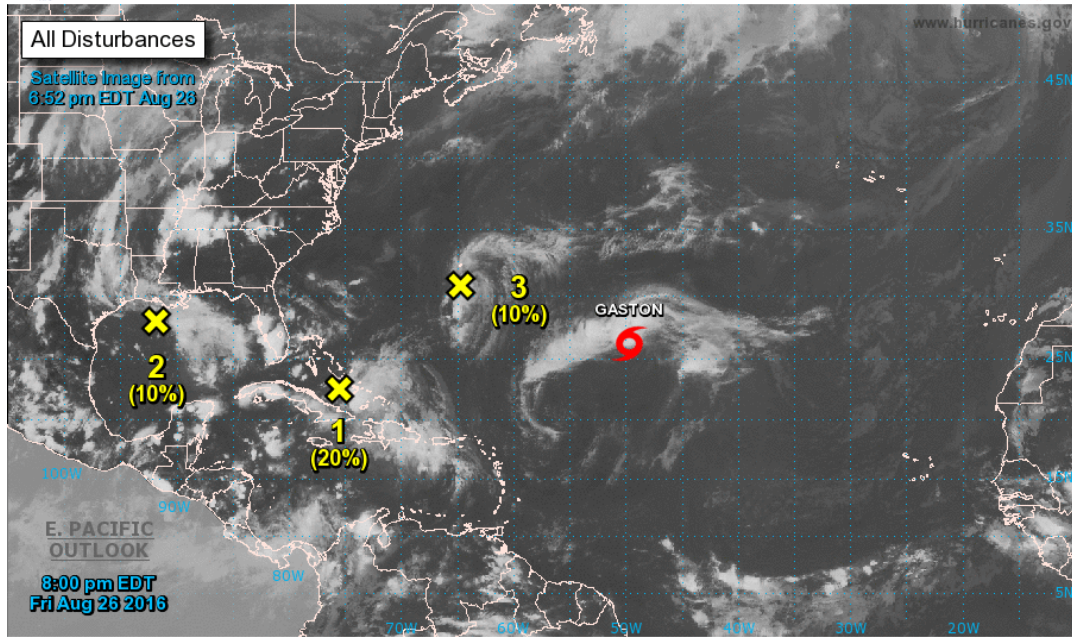
2323Z: Visible satellite covering first sawteeth pattern and AL99 at center bottom of image.
AL99 currently has active convection and at least a single recent lightning strike. Image time
2300Z. GH about 90 mins from Drop 1.





Two-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



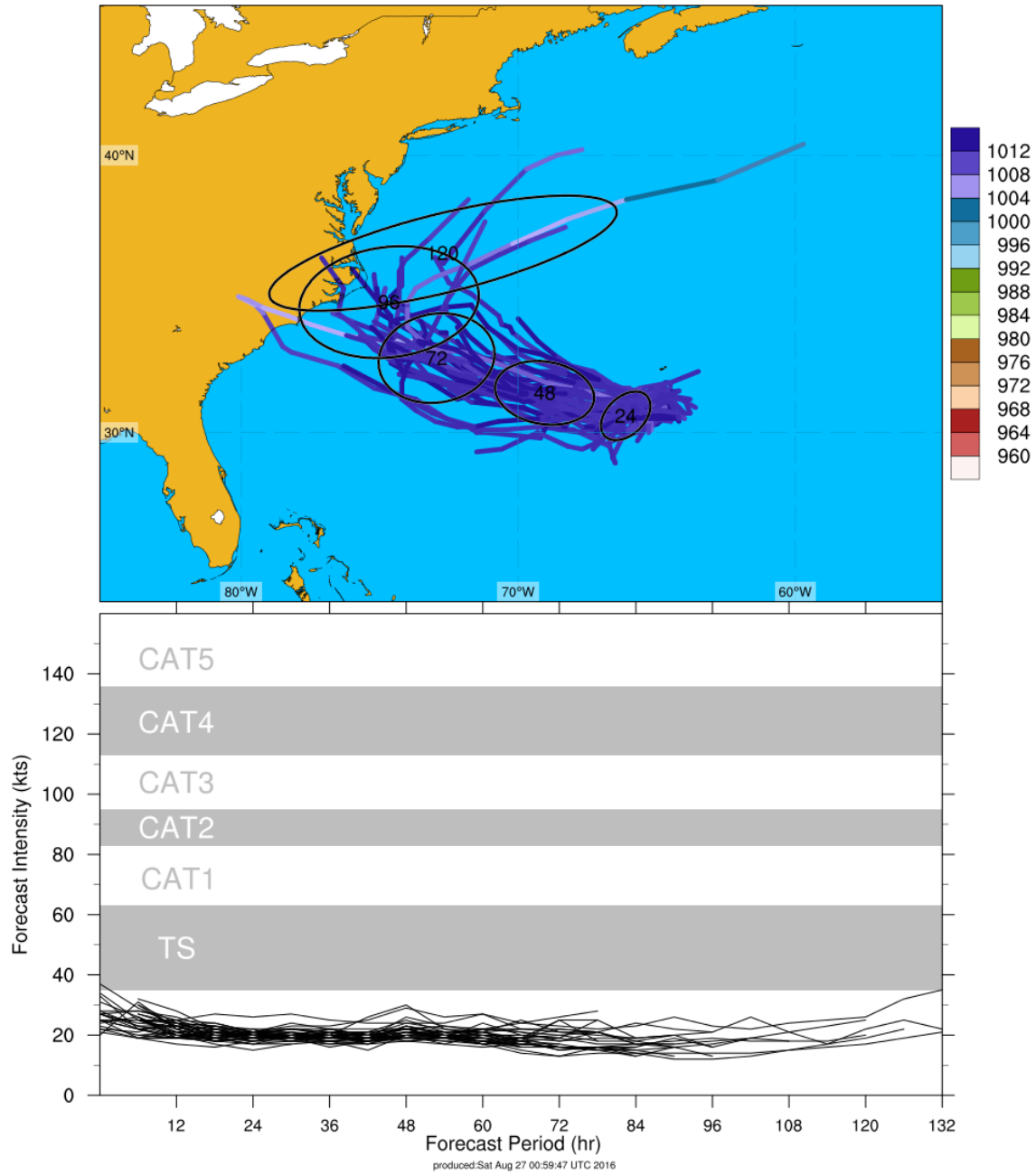
Current Disturbances and Two-Day Cyclone Formation Chance: < 40% 40-60% > 60%

Tropical or Sub-Tropical Cyclone: Depression Storm Hurricane

Post-Tropical Cyclone Remnants

NHC has declared a new invest just south of Bermuda near 30.5N, 64.8W. We will likely modify the leg between drops 10-13, making the turn NE at drop 9 and adding 3 drops (plus drop 10) onto the leg cutting across the invest center.

AL91 ECMWF ensemble tracks from 12z 26th run.



DayLight 26Aug2016 23:58:58 UTC
SHOUT-HRR Science-2
Temp: 19.0° C



Nice sunset image on the forward camera.

0028Z: Request from Eric Blake at NHC to transect AL91 with a total of 6 dropsondes along leg. Increase of 2 from current plan. Leg will be shifted roughly 75nmi to the NW to hit current estimated center.

0031Z: Sonde 1 launched at loc 1. Good drop.

0051Z: Sonde 2 launched at loc 2. Good drop.

0110Z: Sonde 3 launched at loc 3. Good drop.

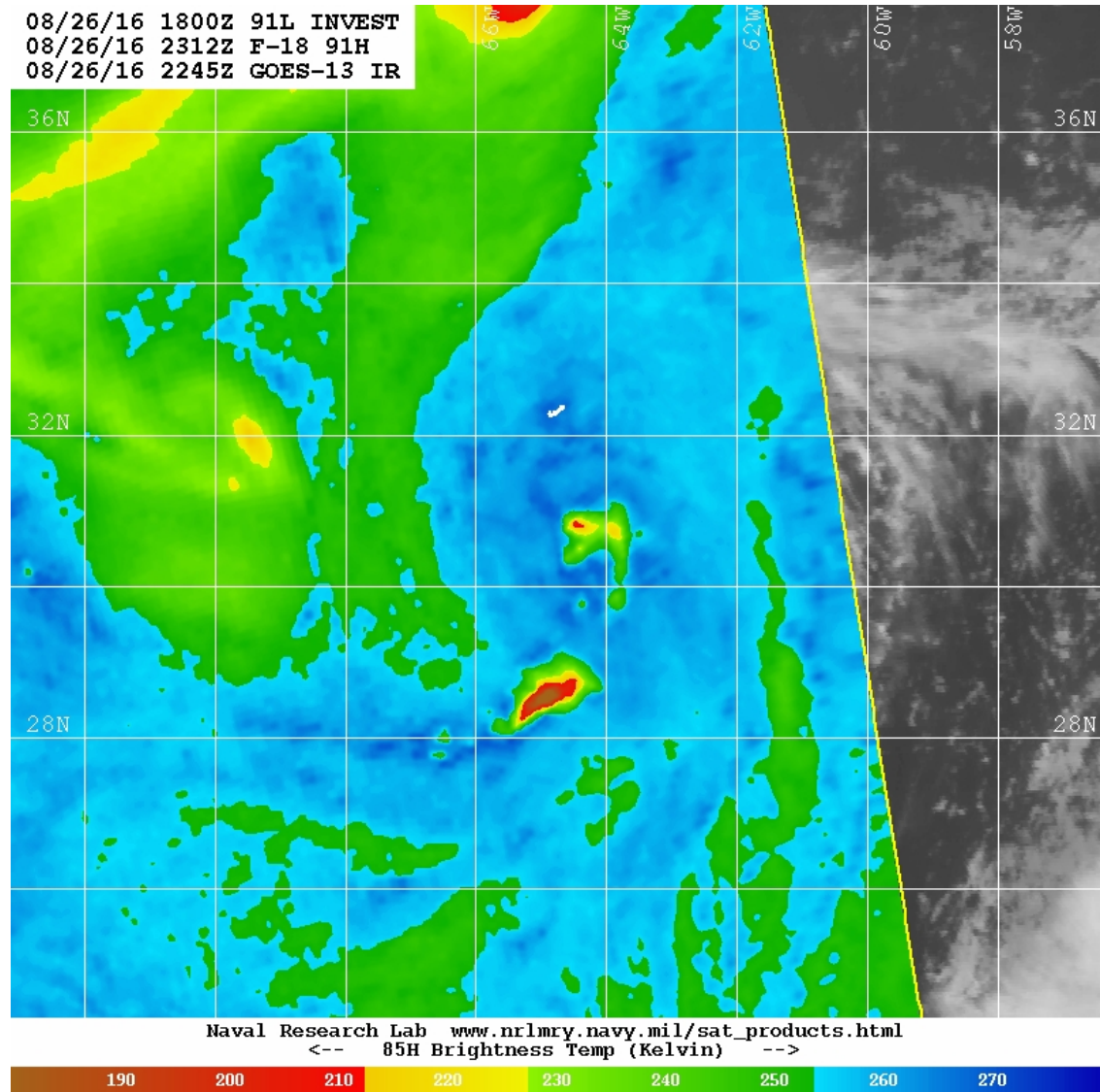
0116Z: Update #2 to the flight track. All changes below are related to adjusting the track to release dropsondes over AL91, which is roughly located at 30.5N, 64.8W.

1. Shortened leg from drop 7 to 10 with turn to the NE at the location of drop 9.
2. Added 2 extra sondes to the adjusted flight leg from drop 9 to the original drop 13.

Total number of sondes now up to 83.

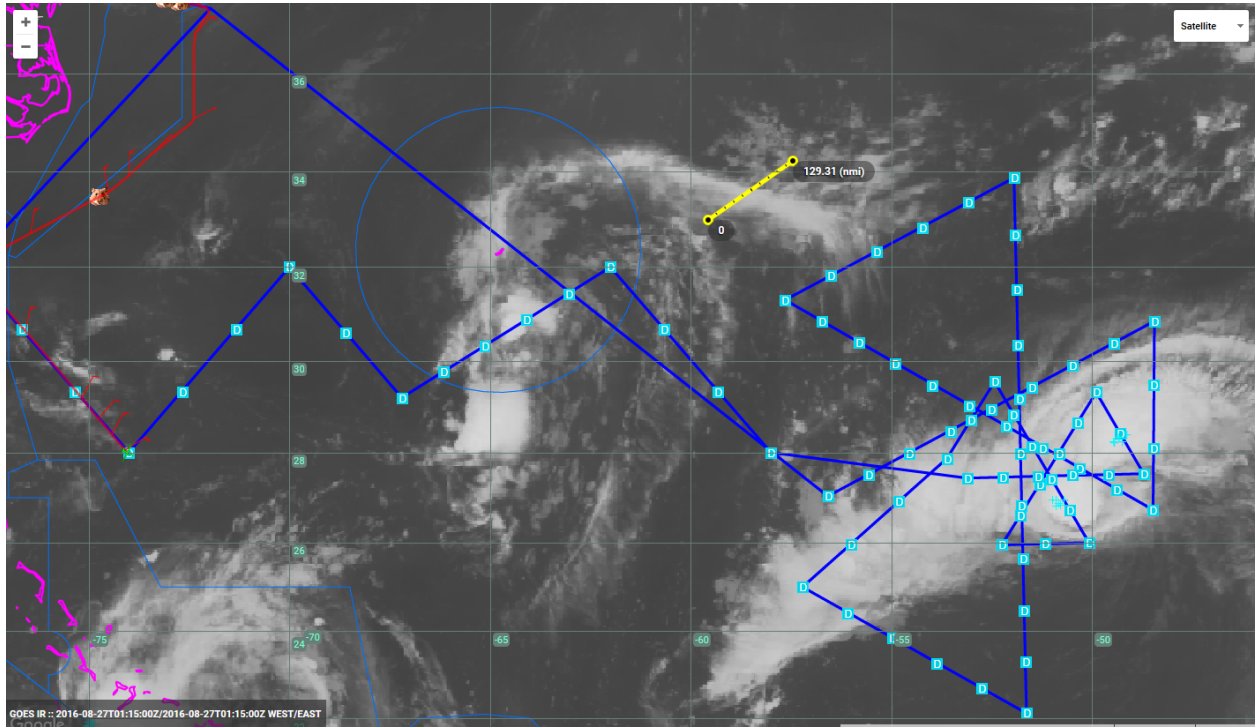
Recent (2312Z) SSMIS pass shows a small region of deep convection near the center of newly-declared invest 91L. Our current flight track should go over the center of circulation.

23Z 91L



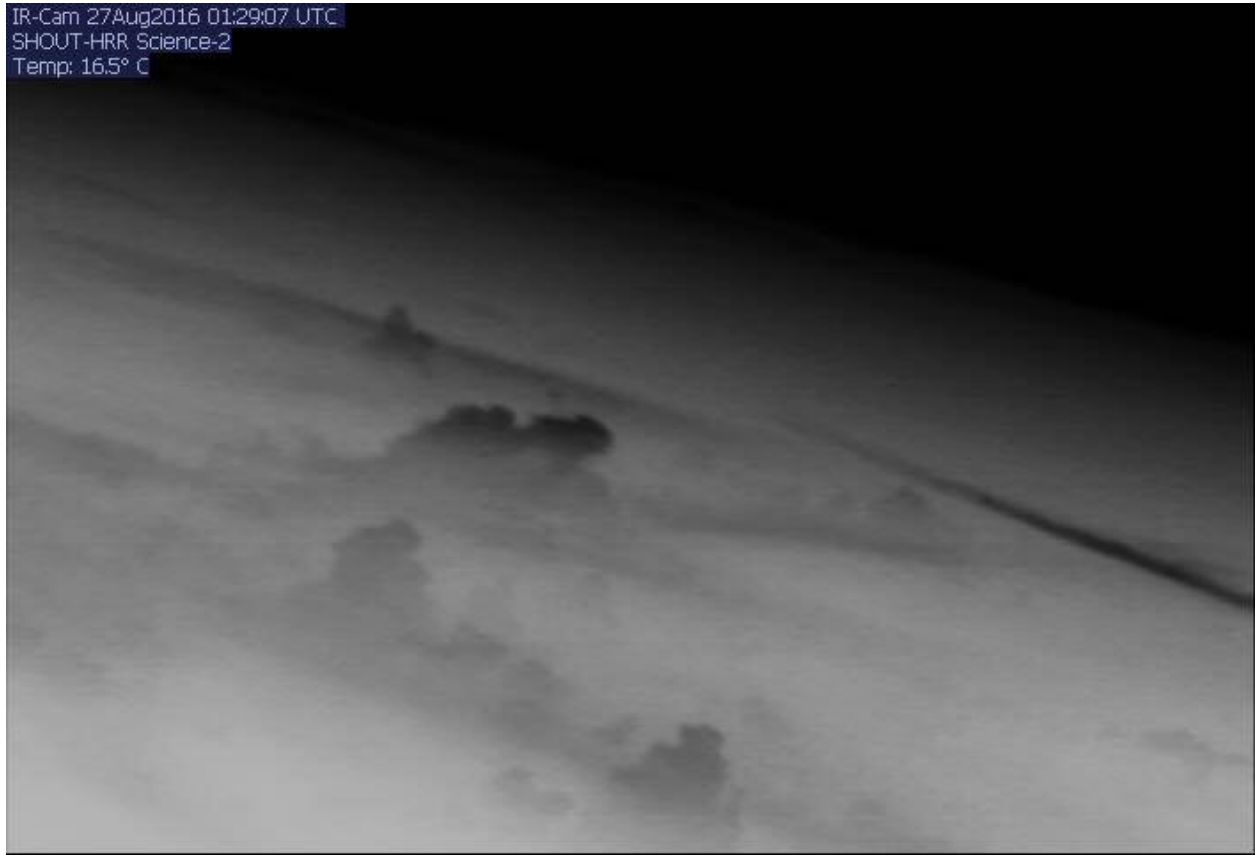
0128Z: Sonde 4 launched at loc 4. Good drop.

0133: Latest track update

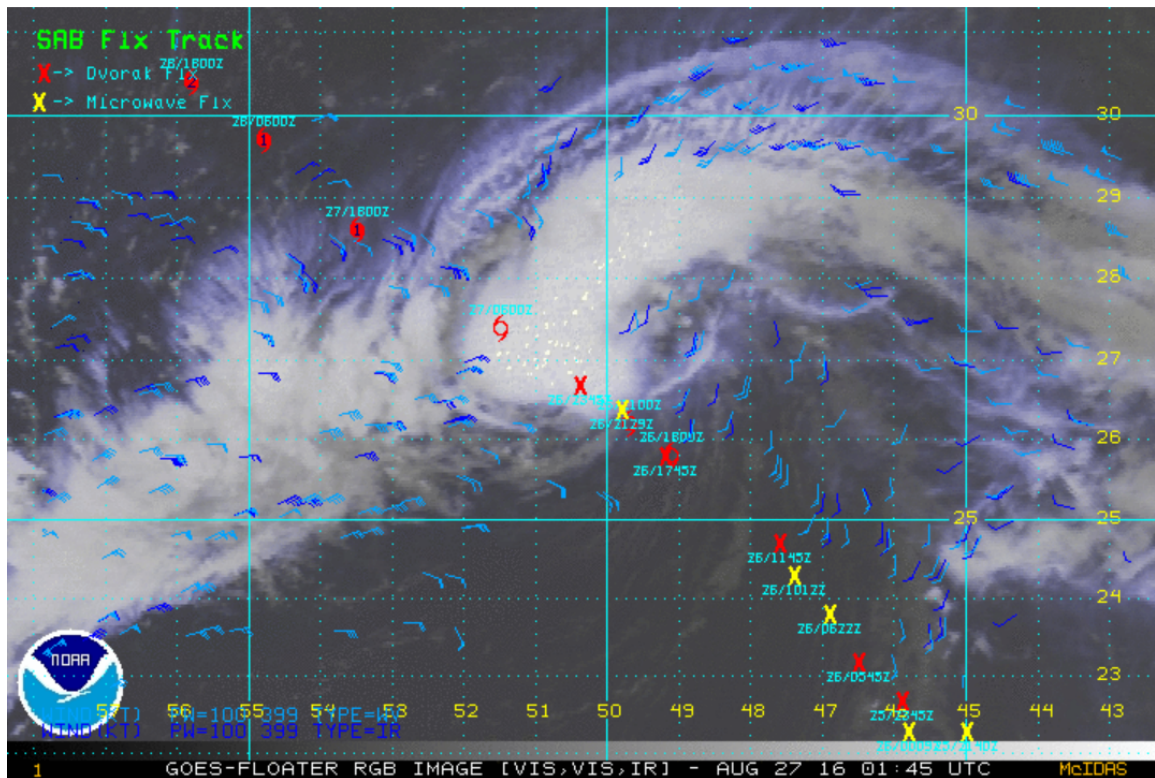


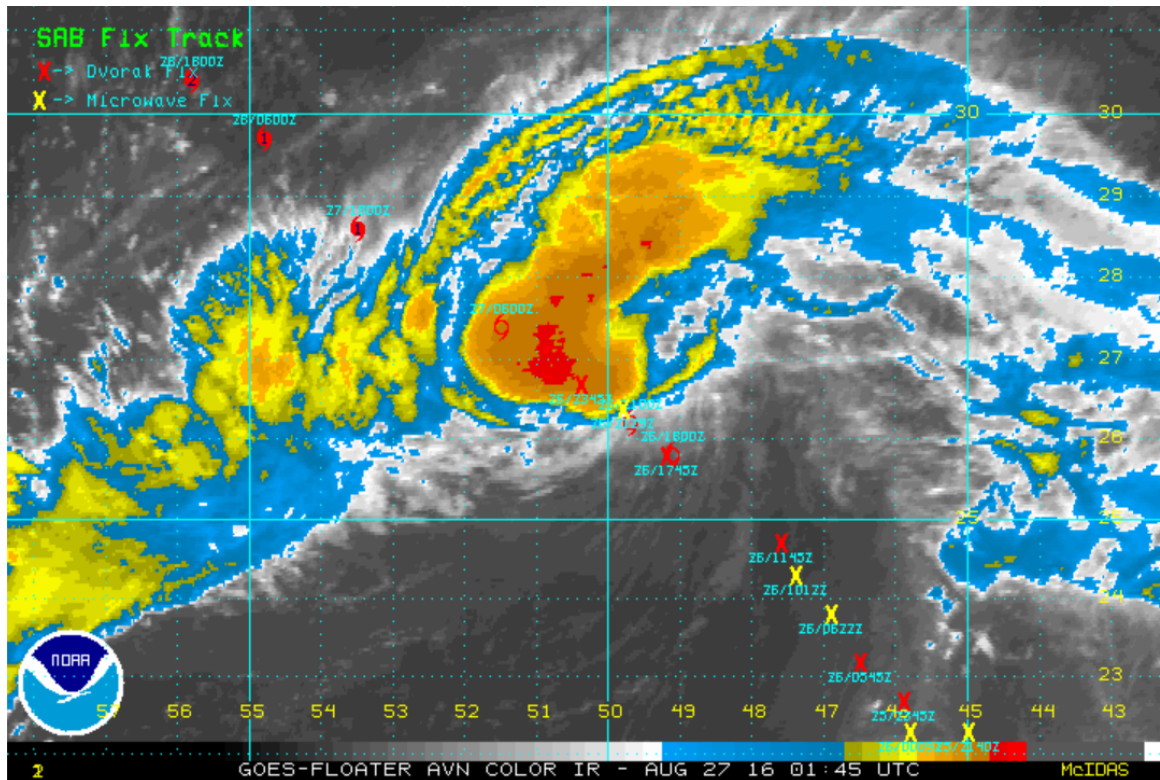
0136Z: Low-light camera view of shallow convection during drop point #4.

IR-Cam 27Aug2016 01:29:07 UTC
SHOUT-HRR Science-2
Temp: 16.5° C



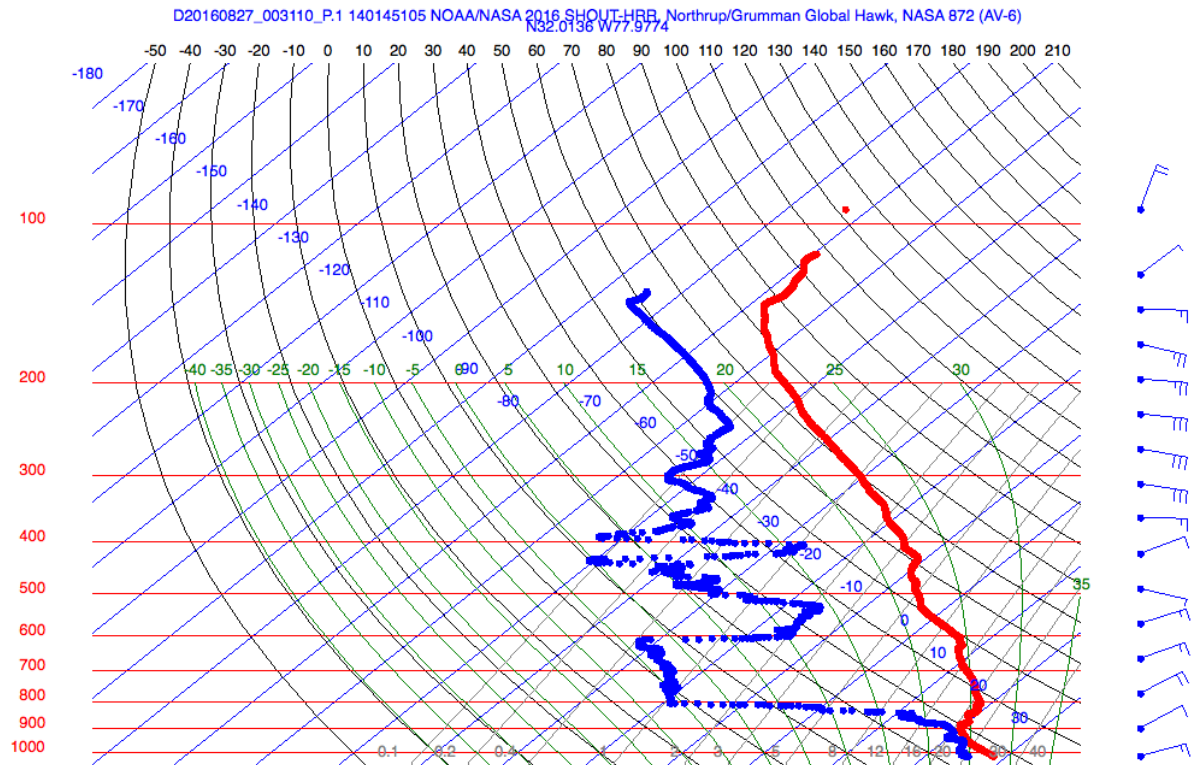
RGB Gaston 0145Z:





0150Z: Sonde 5 launched at loc 5. Good drop.

First skew-t of the night (0031Z) just came in, looking really dry right off the coast of SC:

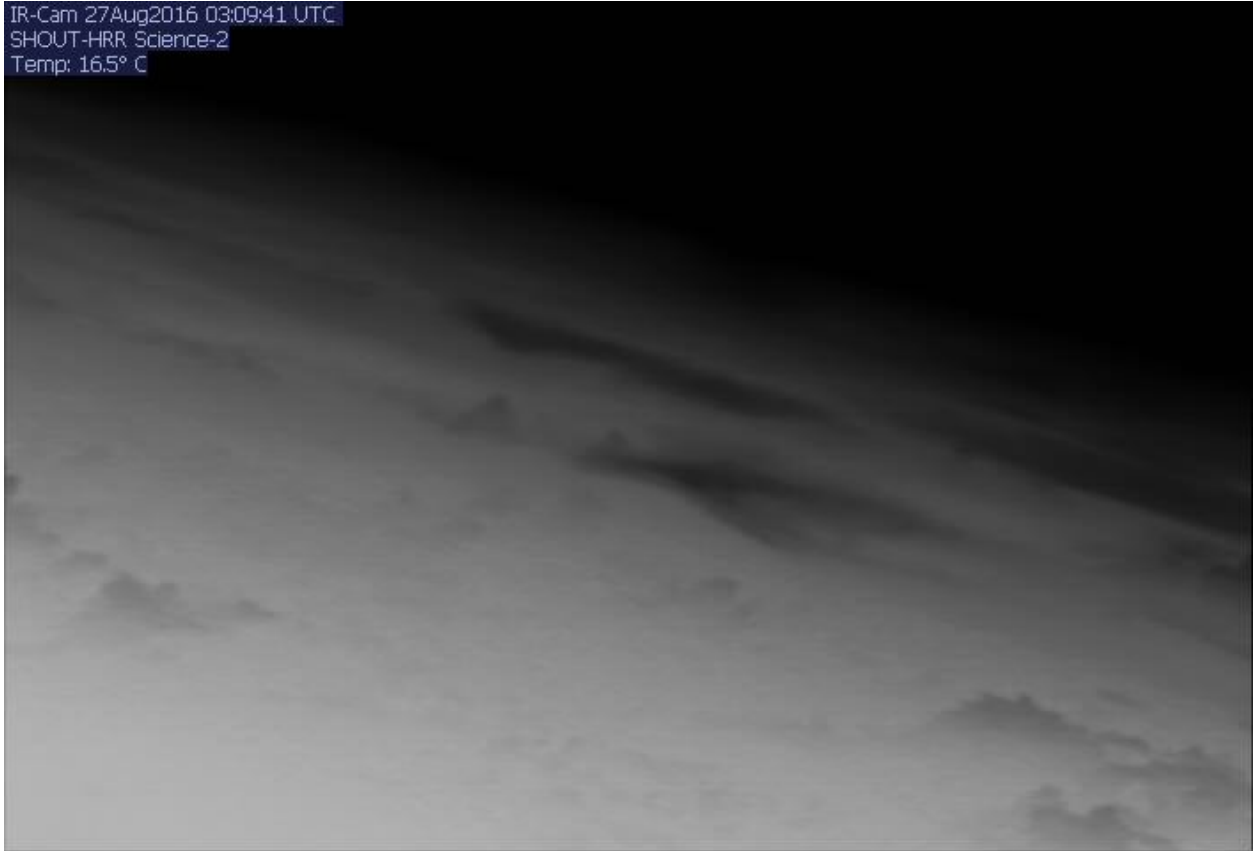


Aspen V3.3, 27 Aug 2016 00:53 UTC

- 0209Z: Sonde 6 launched at loc 6. Good drop.
- 0227Z: Sonde 7 launched at loc 7. Good drop.
- 0248Z: Sonde 8 launched at loc 8. Good drop.
- 0308Z: Sonde 9 launched at loc 9. Good drop.

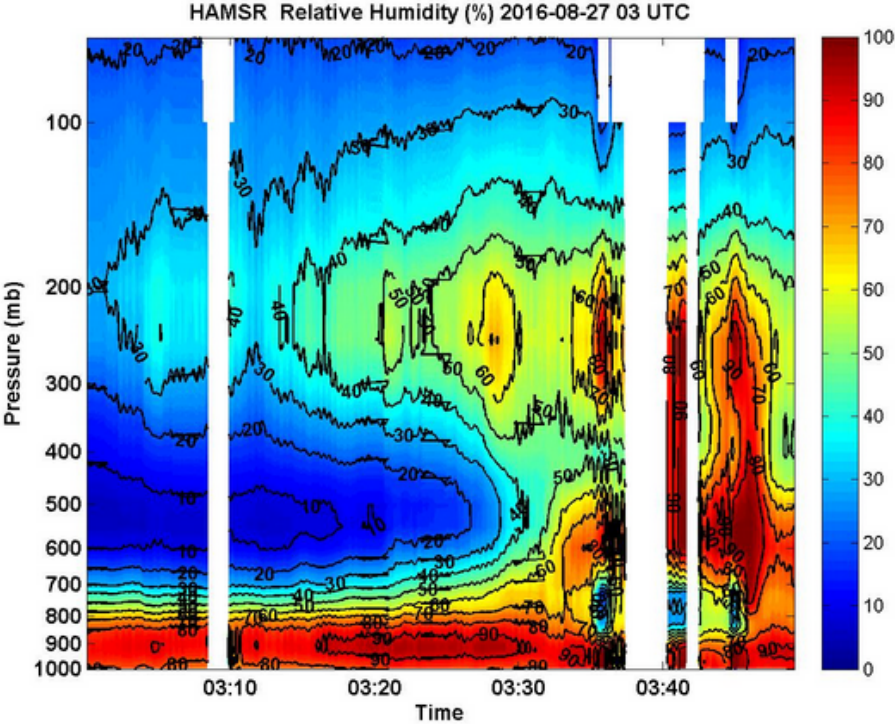
0314Z: Low-light camera view of AL91 during NE turn at drop point #9.

IR-Cam 27 Aug 2016 03:09:41 UTC
SHOUT-HRR Science-2
Temp: 16.5° C



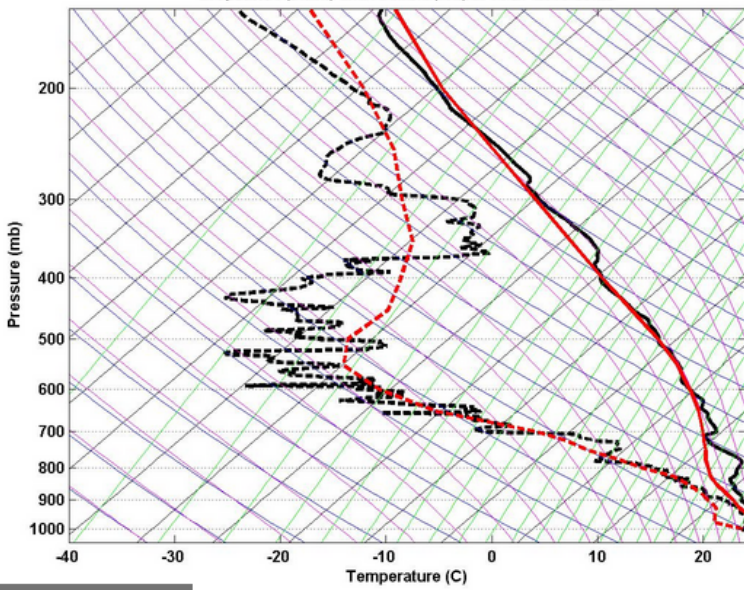
0308Z: Sonde 9 launched at loc 9. Good drop.
0322Z: Sonde 10 launched at loc 10. Good drop.
0333Z: Sonde 11 launched at loc 11. Good drop.
0346Z: Sonde 12 launched at loc 12. Good drop.
0355Z: Sonde 13 launched at loc 13. Good drop.
0406Z: Sonde 14 launched at loc 14. Good drop.

08-27-16 03:49

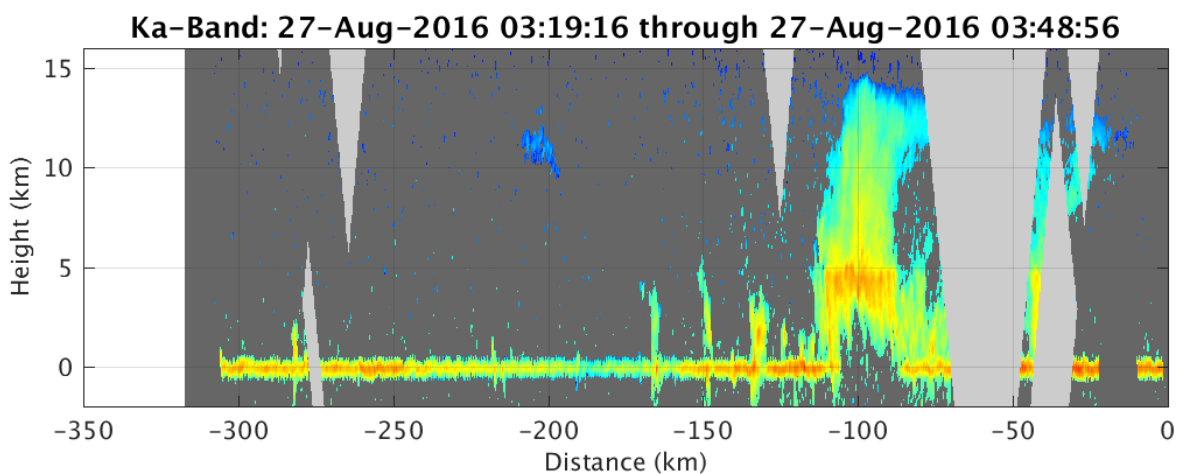
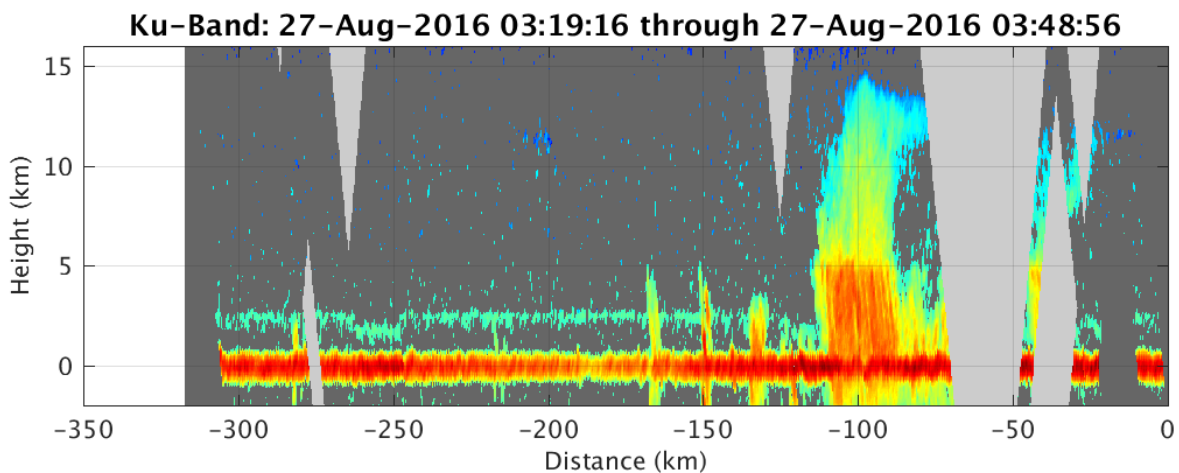


Good HAMS on approach to 91L. Good comparison with dropsonde below.

Dropsonde (black) and HAMSr (red) at 08-27-2016 03:08



08-27T03:45:00Z WEST/EAST



Good HIWRAP across 91L- Ku coms drop-outs just after main cell: tops at 48K ft estimated from IR, 45K ft from HWRAP

0426Z: Sonde 15 launched at location 15. Good drop.

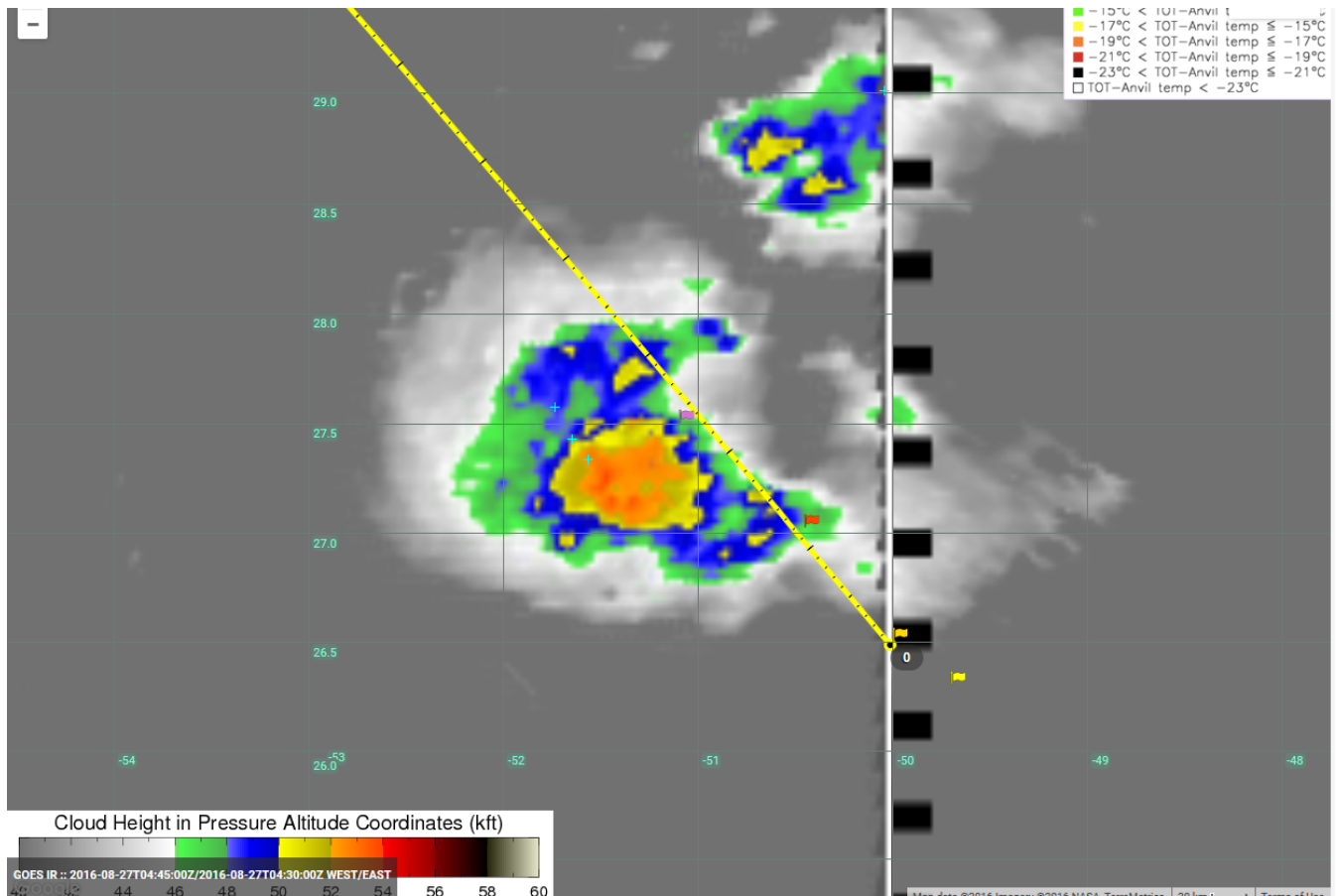
0444Z: Sonde 16 launched at location 16. Good drop.

0455Z: We're monitoring a region of lightning and increasing cloud top heights

0500Z Overshooting Cloud Tops and ltng:

0503Z Sonde 17 launched at location 17. Good drop.

Update at 0552Z: This sonde didn't transmit data. Payloads indicate that this sonde was dropped at a sharp turn, which may have caused a loss in communication.



0512- convection exploding

06Z GH mentioned in NHC Tropical Discussion re data in AL91

TROPICAL WEATHER OUTLOOK
 NWS NATIONAL HURRICANE CENTER MIAMI FL
 200 AM EDT SAT AUG 27 2016

For the North Atlantic...Caribbean Sea and the Gulf of Mexico:

The National Hurricane Center is issuing advisories on Tropical Storm Gaston, located about 900 miles east-southeast of Bermuda.

A weak area of low pressure located near the central Bahamas continues to produce disorganized showers and thunderstorms mainly to the south and east of its center. Upper-level winds are not

conducive for significant development during the next day or so while the low moves west-northwestward through the Straits of Florida at about 10 mph. Environmental conditions could become a little more conducive for some development when the system moves across the eastern Gulf of Mexico next week. Heavy rains, with the potential to cause flash floods and mud slides, are likely to continue over Hispaniola today. This activity is expected to spread over eastern and central Cuba over the weekend. Gusty winds and locally heavy rainfall are likely over portions of the Bahamas, and will spread into parts of southern Florida and the Florida Keys late this weekend. Interests elsewhere in Florida and the eastern Gulf of Mexico should continue to monitor the progress of this disturbance.

* Formation chance through 48 hours...low...20 percent

* Formation chance through 5 days...medium...40 percent

A weak trough of low pressure located about a hundred miles south of the coast of southwestern Louisiana is producing disorganized shower and thunderstorm activity over the north-central Gulf of Mexico. Conditions are not expected to be conducive for development of this system before it reaches the coast of Texas later this weekend. However, heavy rainfall is possible along the Gulf Coast from Louisiana to southeastern Texas during the next few days. For additional information, please see products from your local National Weather Service office.

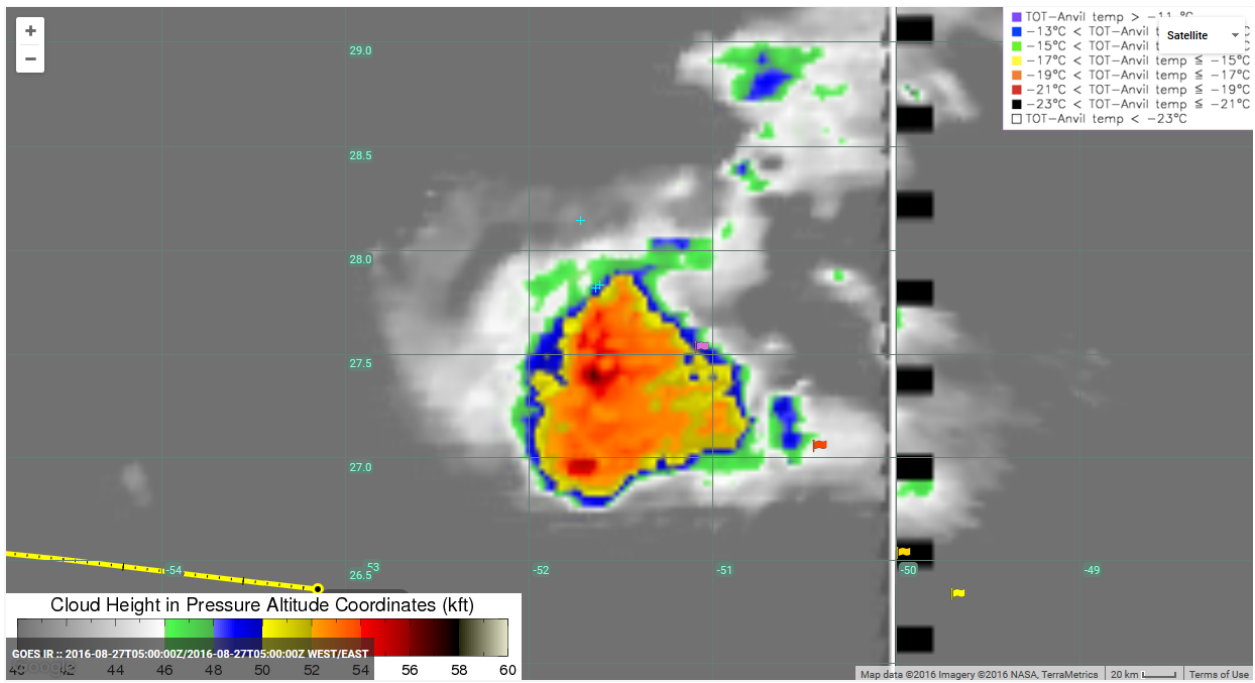
* Formation chance through 48 hours...low...10 percent

* Formation chance through 5 days...low...10 percent

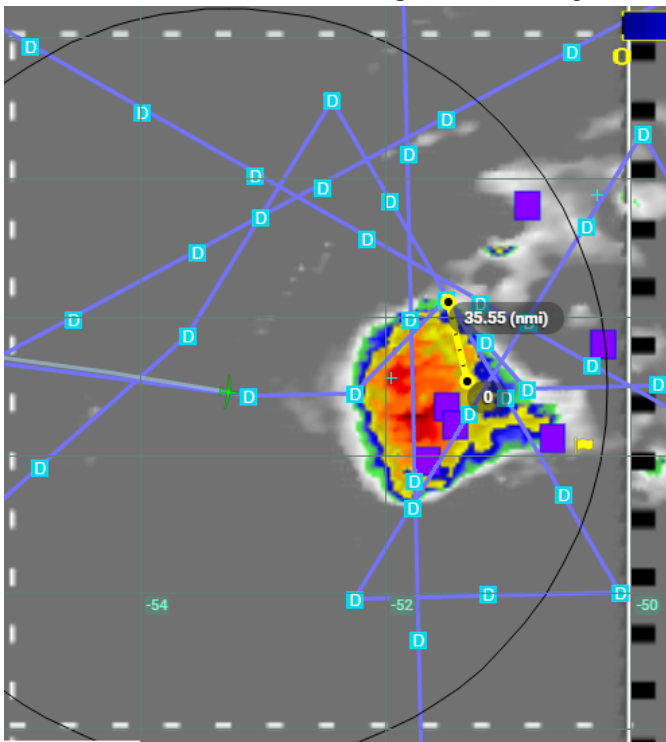
A broad area of low pressure is centered a little over a hundred miles south-southwest of Bermuda. The associated shower activity is currently disorganized. However, data from the NASA/NOAA Global Hawk aircraft indicate that the low is producing winds near 35 mph east of the center. This low is forecast to move westward and then west-northwestward at about 10 mph toward the coast of the Carolinas during the next few days, but any development is likely to be slow to occur due to the system's proximity to dry air.

* Formation chance through 48 hours...low...20 percent

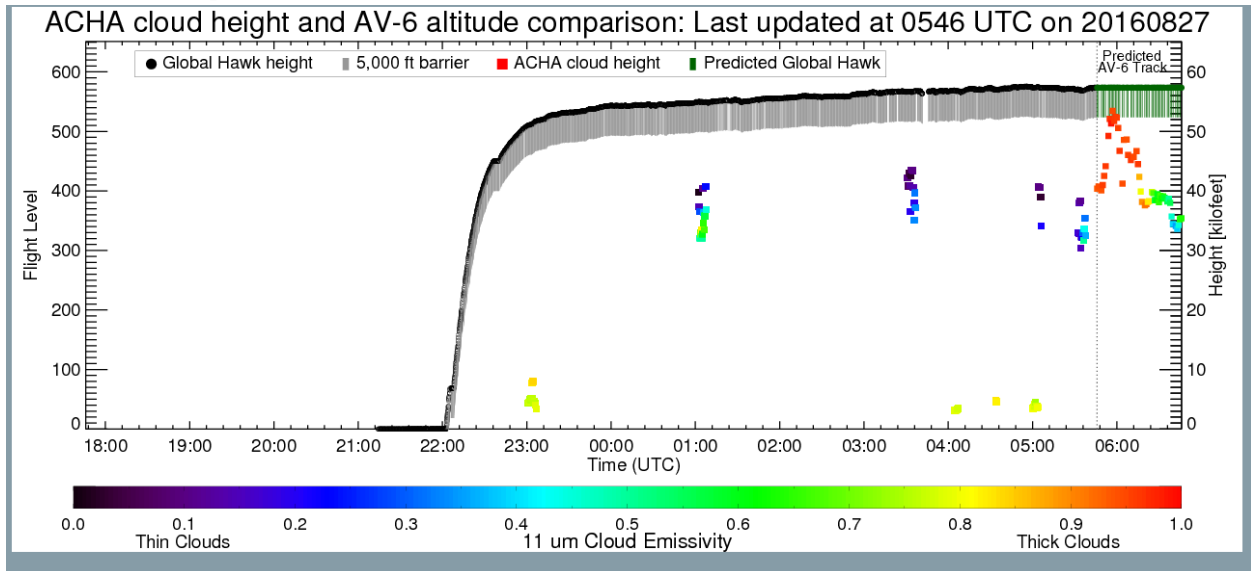
* Formation chance through 5 days...low...30 percent



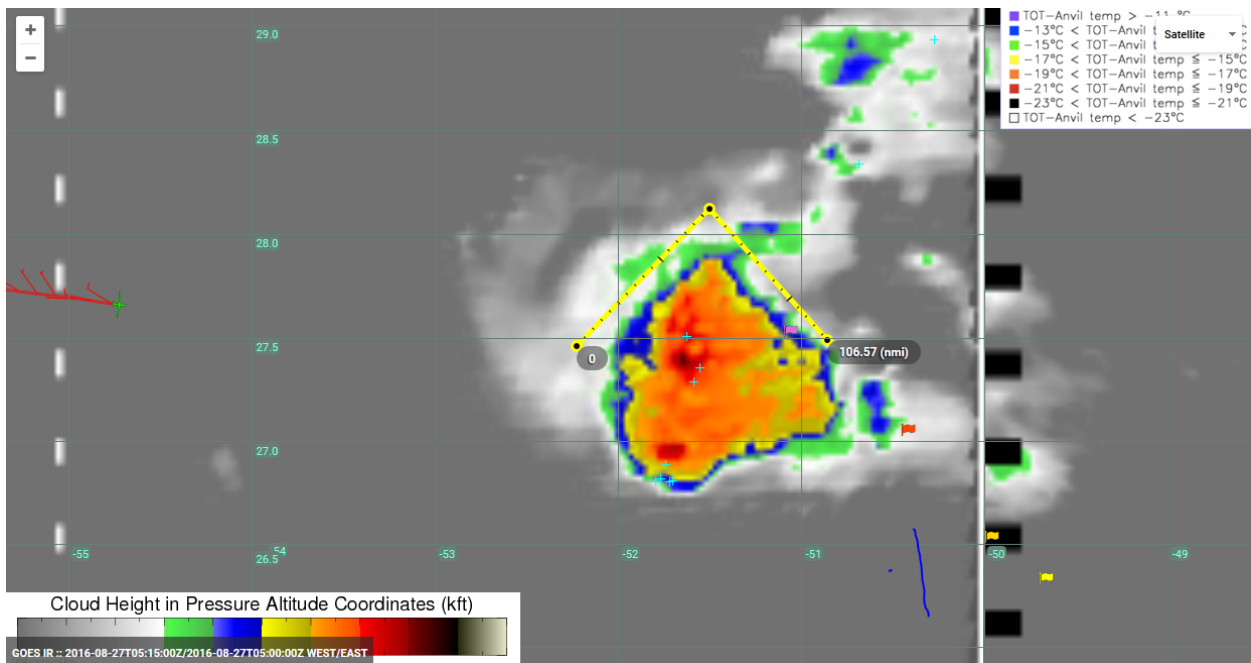
Planned track would've taken us right over the deepest convection



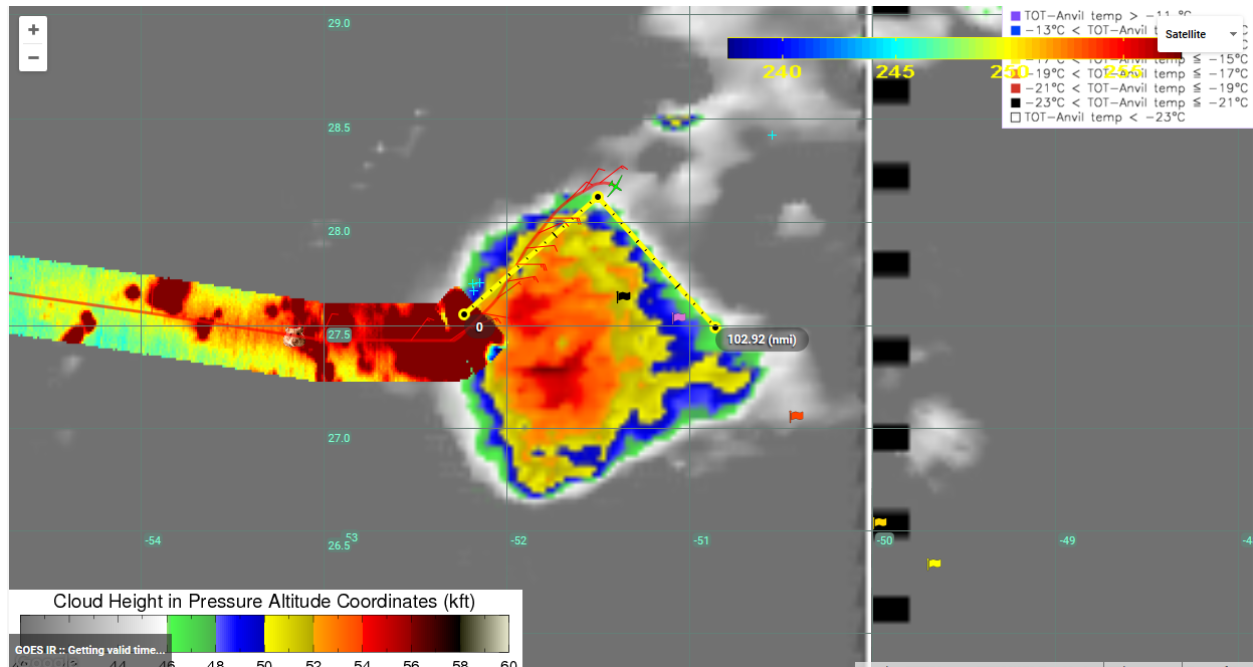
Predicted cloud top heights indicating that the aircraft was within the 5 kft range from convection.



0536Z: Freq ltnng 30 nm right of track with, occasional ltnng along track, tops at 55.5K ft: deviating north (left) by 30 nm



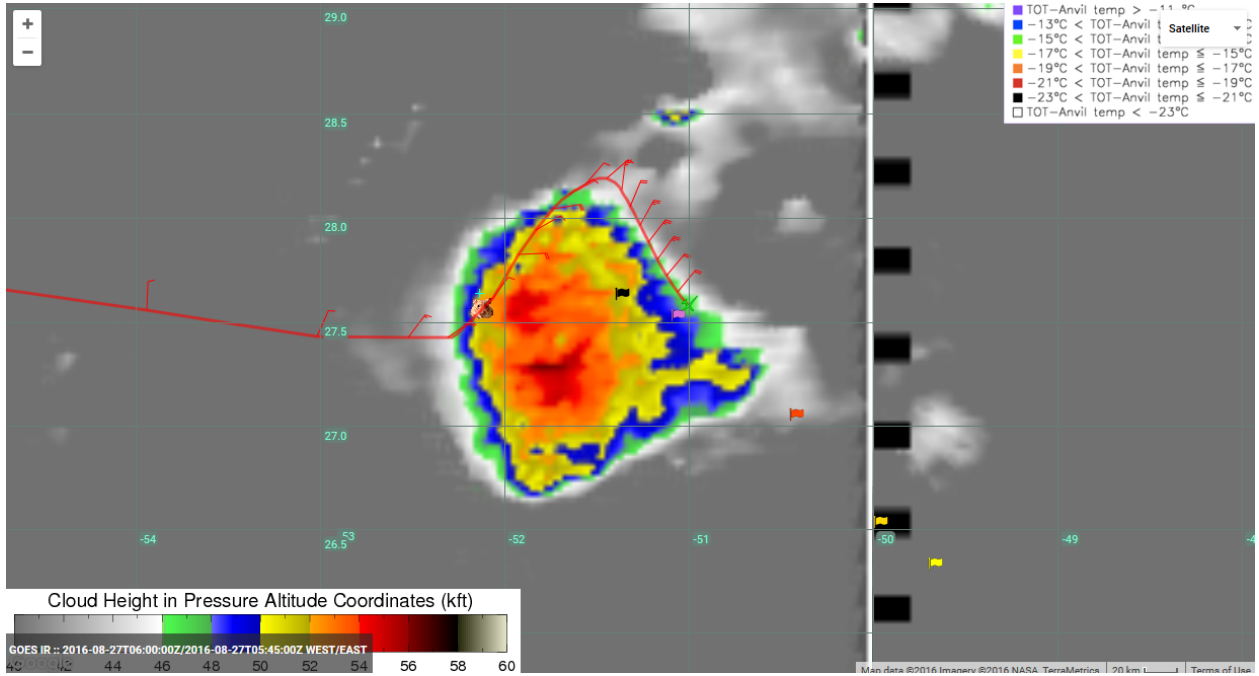
0613Z leg in front of convection with HAMSr 50 GHz



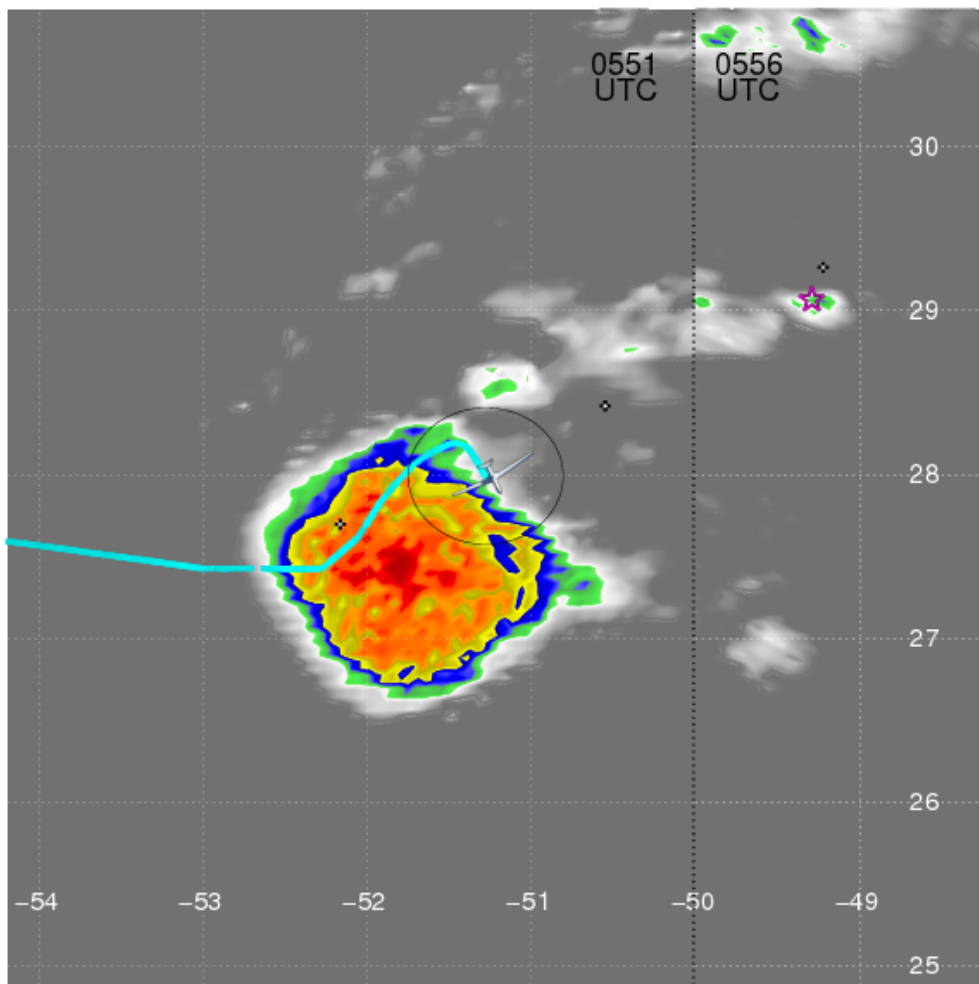
0614Z: Sonde 20 released at loc 20. Good drop.

0617Z: Sonde 21 released at loc 21. Good drop.

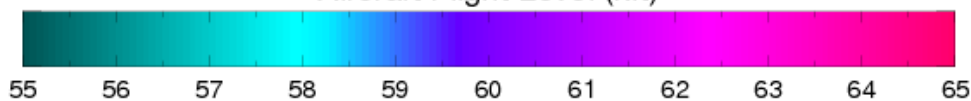
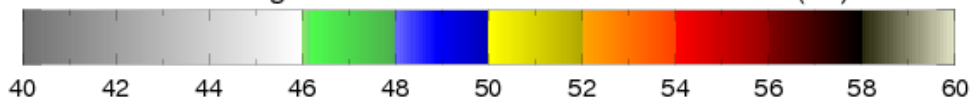
Aircraft track over leading edge of expanding convective blowup, 0620Z



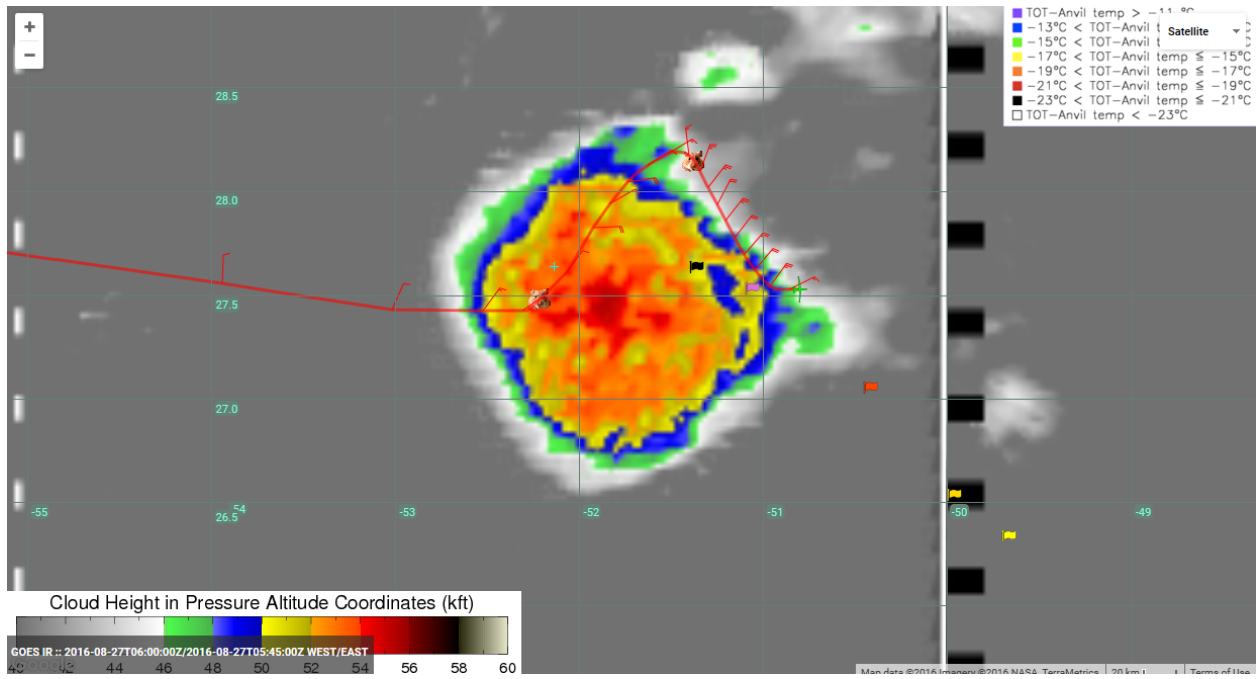
Lightning and AV-6 on 20160827 at 0614 UTC ACHA CTH & TOTs at time listed



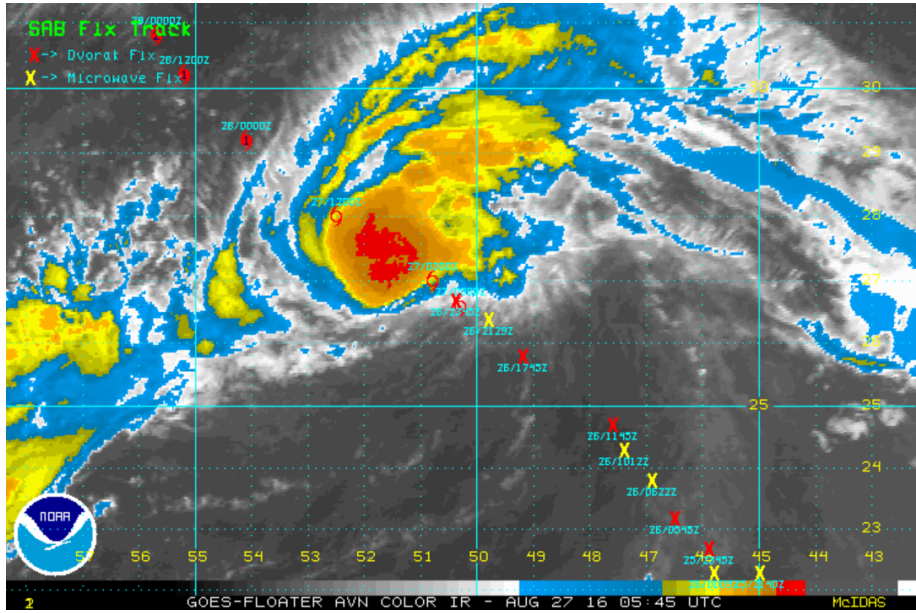
○: $4 \text{ K} \leq \text{TOT} < 6 \text{ K}$
 △: $6 \text{ K} \leq \text{TOT} < 8 \text{ K}$
 □: $8 \text{ K} \leq \text{TOT} < 10 \text{ K}$
 ☆: $\text{TOT} \geq 10 \text{ K}$
⊕: 0–5 mins. old lightning
 ⊕: 5–15 mins. old lightning
 Cloud Height in Pressure Altitude Coordinates (kft)



0622Z:



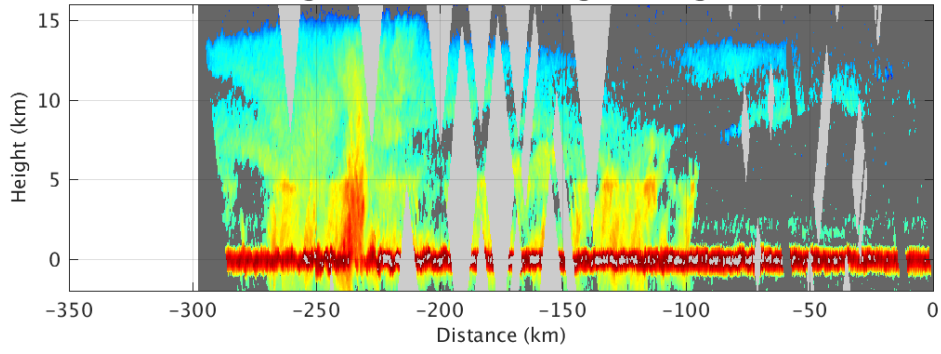
IR 0545Z



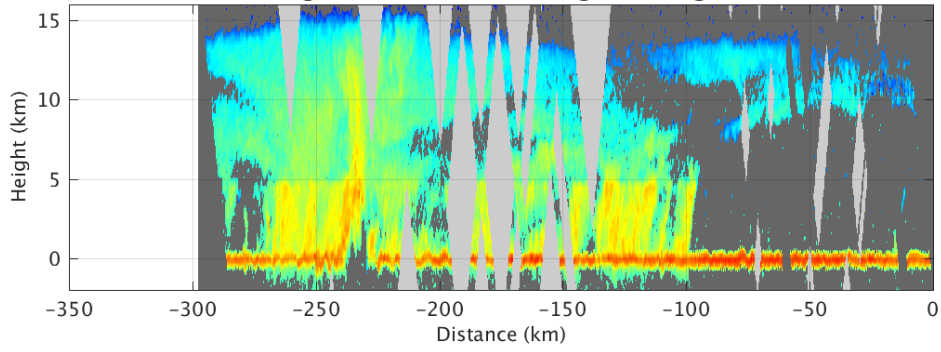
0622Z: Sonde 22 released at loc 22. Good drop.

HIWRAP fantastic:

Ku-Band: 27-Aug-2016 05:56:46 through 27-Aug-2016 06:25:00



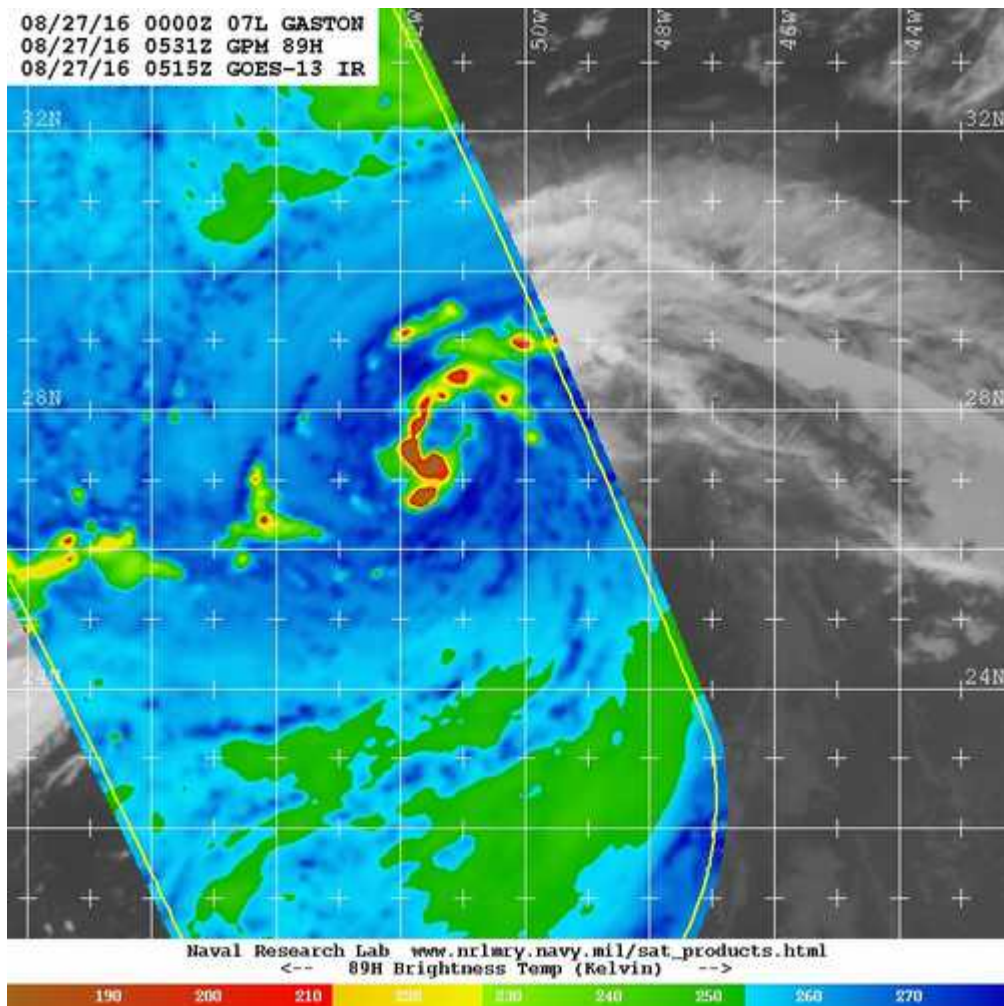
Ka-Band: 27-Aug-2016 05:56:46 through 27-Aug-2016 06:25:00



GPM MW 0530Z:

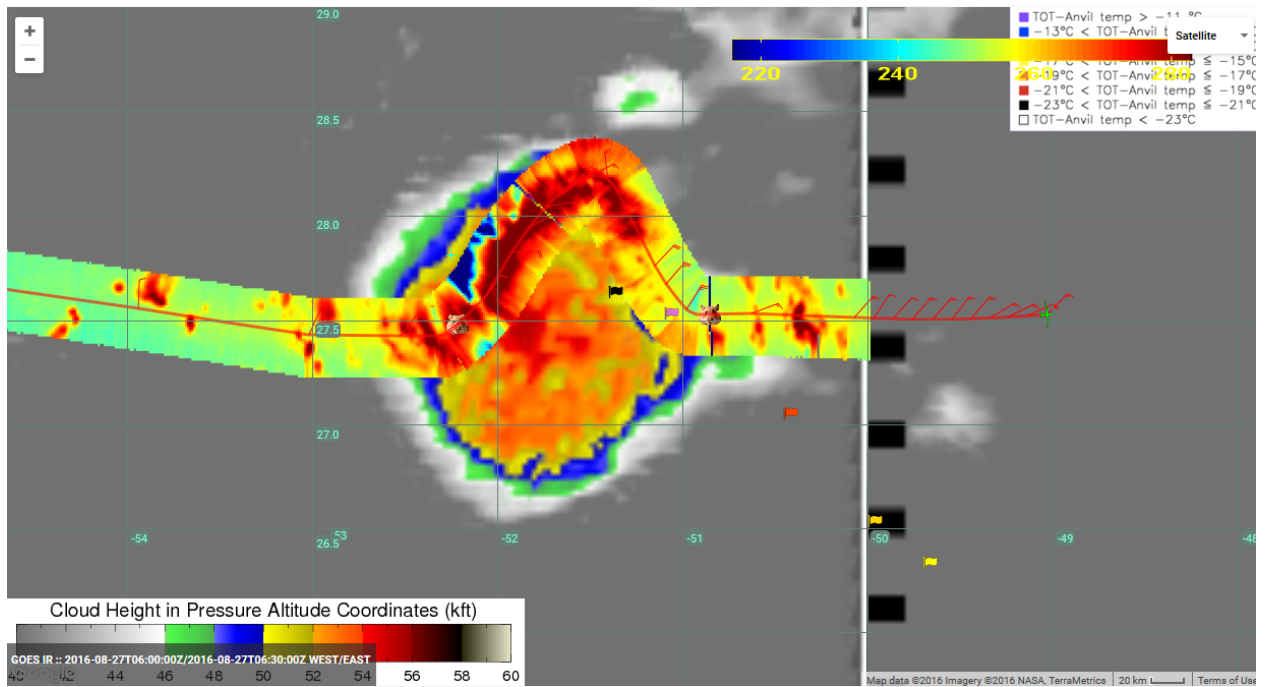
Sonde north of center: 28.1, -51.5

Sonde in center: 27.8, -51.2

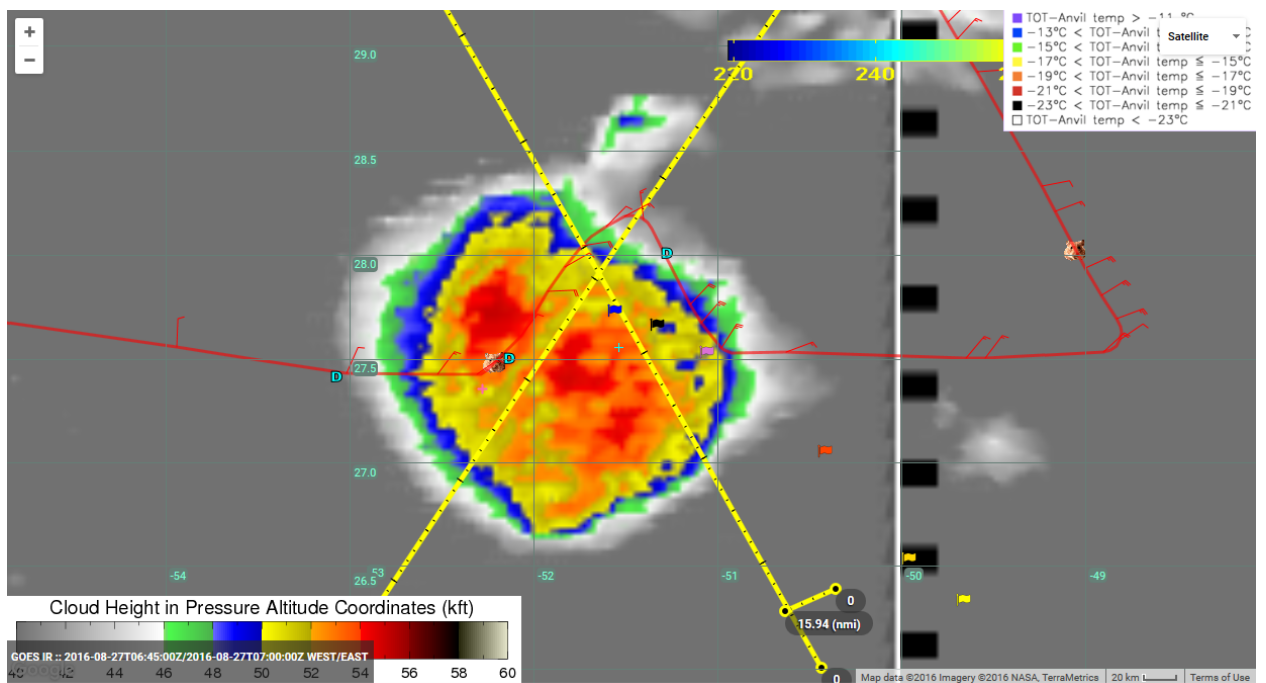


0632Z Sonde 23 released at loc 23. Good drop.
0644Z: Sonde 24 released at loc 24. Good drop.
0652Z: Sonde 25 released at loc 25. Good drop.

HAMSR 50 GHz



0703Z: Update 4 to the flight plan. Based on IR image above, shifted the next center pass to the west to get a closer path to the center. Track was adjusted by shifting all drops 26-31 about 30 nmi west of original location.



0725Z: drop points disappeared on MTS. Drop 27 was released a couple of minutes later.

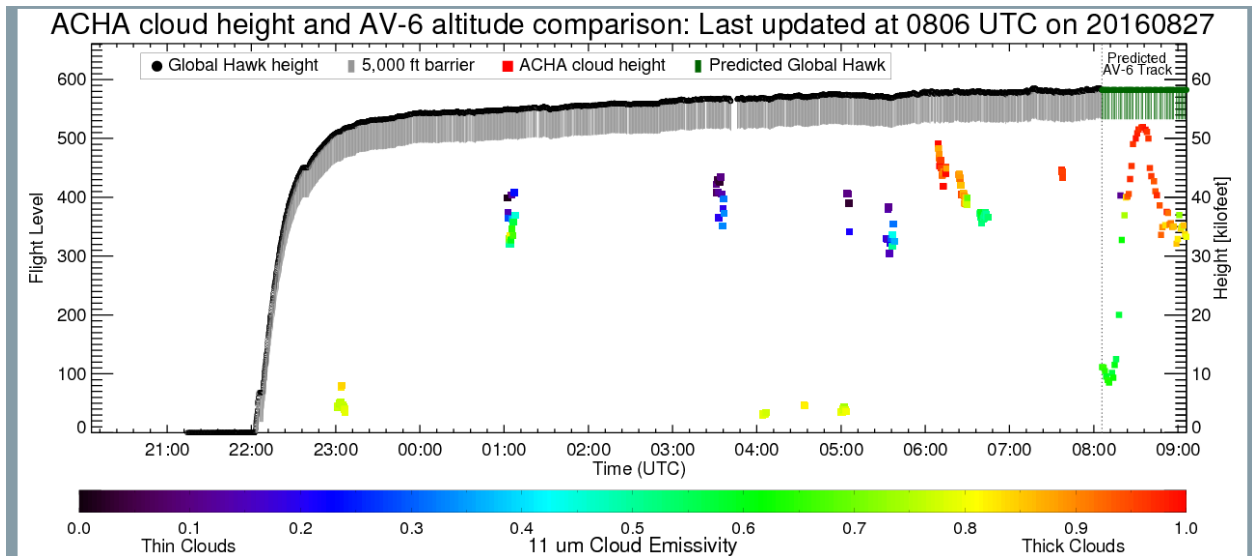
0725Z: sonde 28 released at loc 28. No Ku at launch

Stan from HRD comments: OB 28 had 999.3 mb lowest of the flight

0733Z sonde 29 released at loc 29. Good drop.

0741Z sonde 30 released at loc 30. Good drop.

0749Z sonde 31 released at loc 31. Good drop.

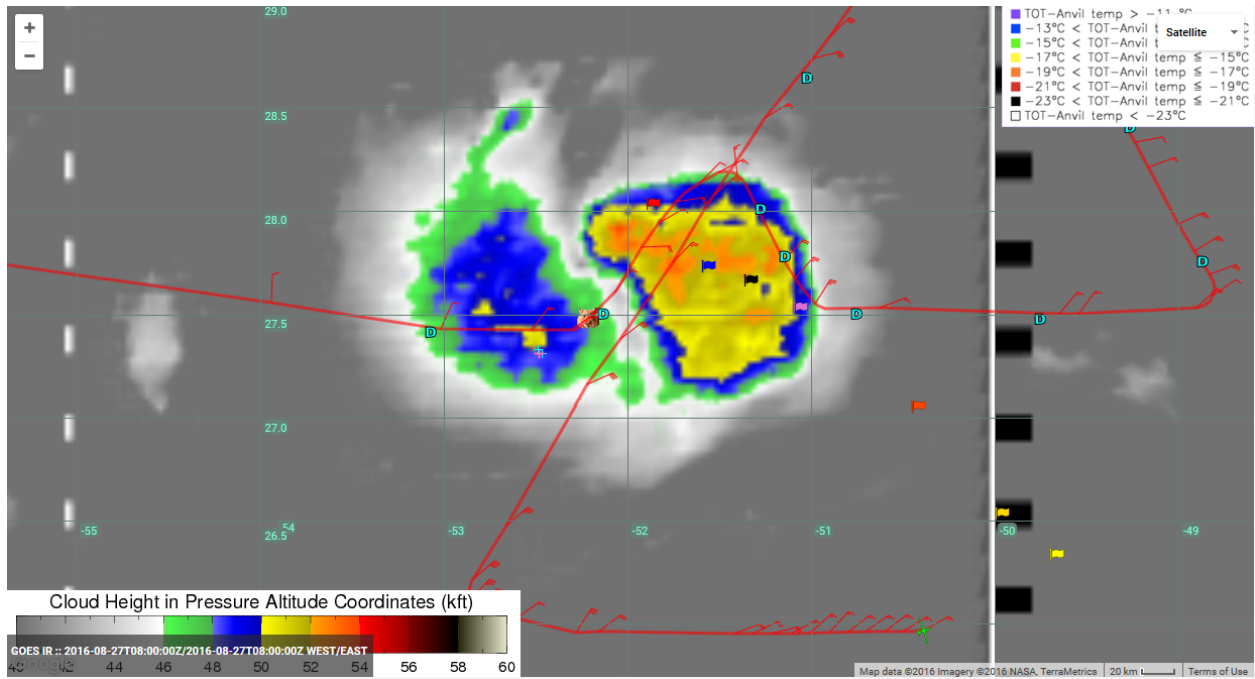


0754Z: Update 5 to the flight plan. All changes below related to getting a closer center pass and adding one more sonde.

1. Shifted all sondes 33-38 about 15 nmi west of original location.
2. Added a new sonde between sondes 35 and 36.

0759Z sonde 32 released at loc 32. Good drop.

0815Z Convection weakening.

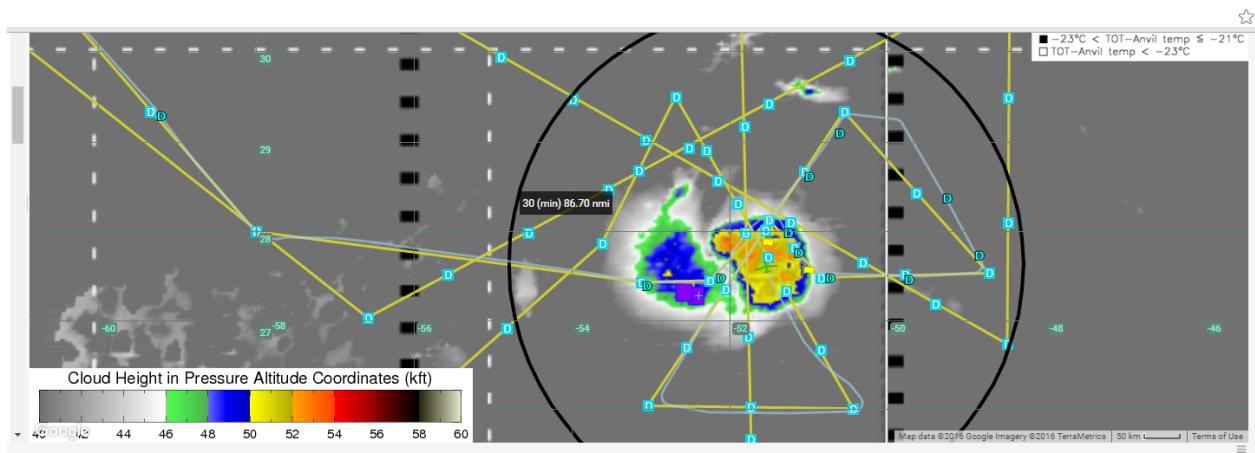


0822Z sonde 34 released at loc 34. Good drop.

0829Z Gary stepping in for Rosimar

0830Z: sonde 35 released at location 35. Good drop

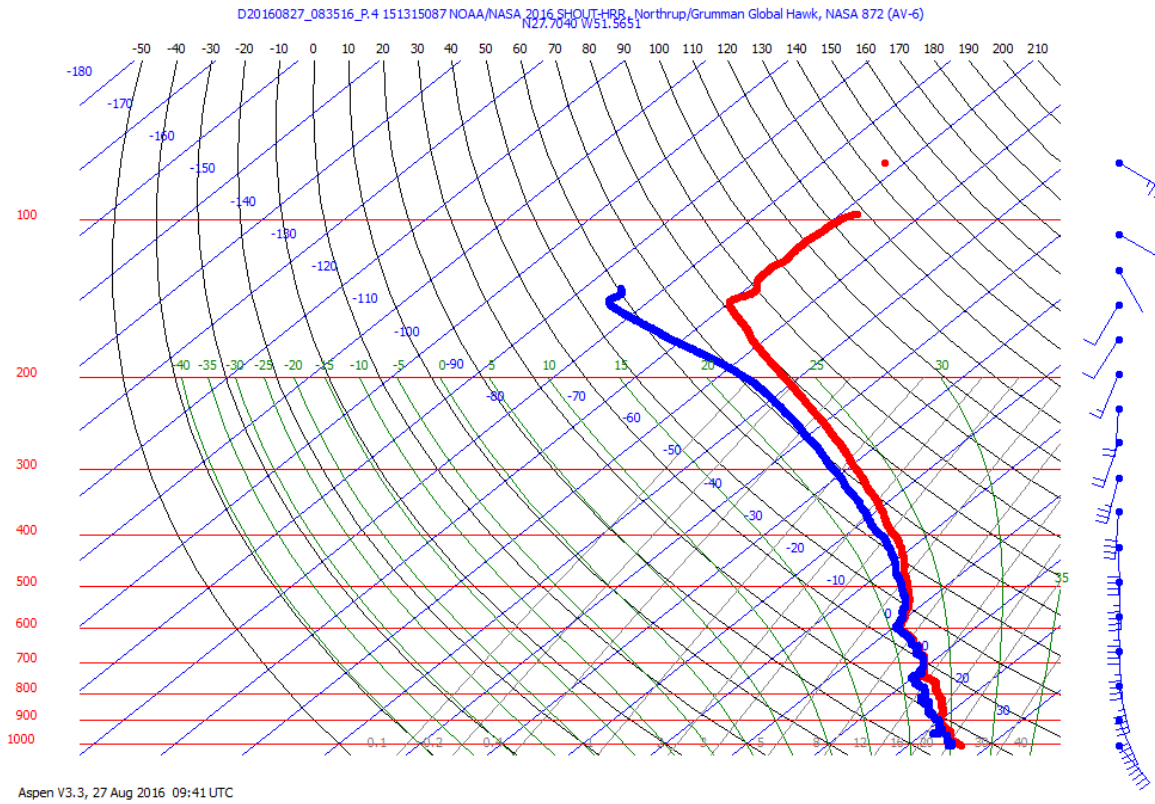
0834Z Cloud top height as approaching added center drop. Convection has been on the wane.



Next sonde is a sonde added to try and catch center

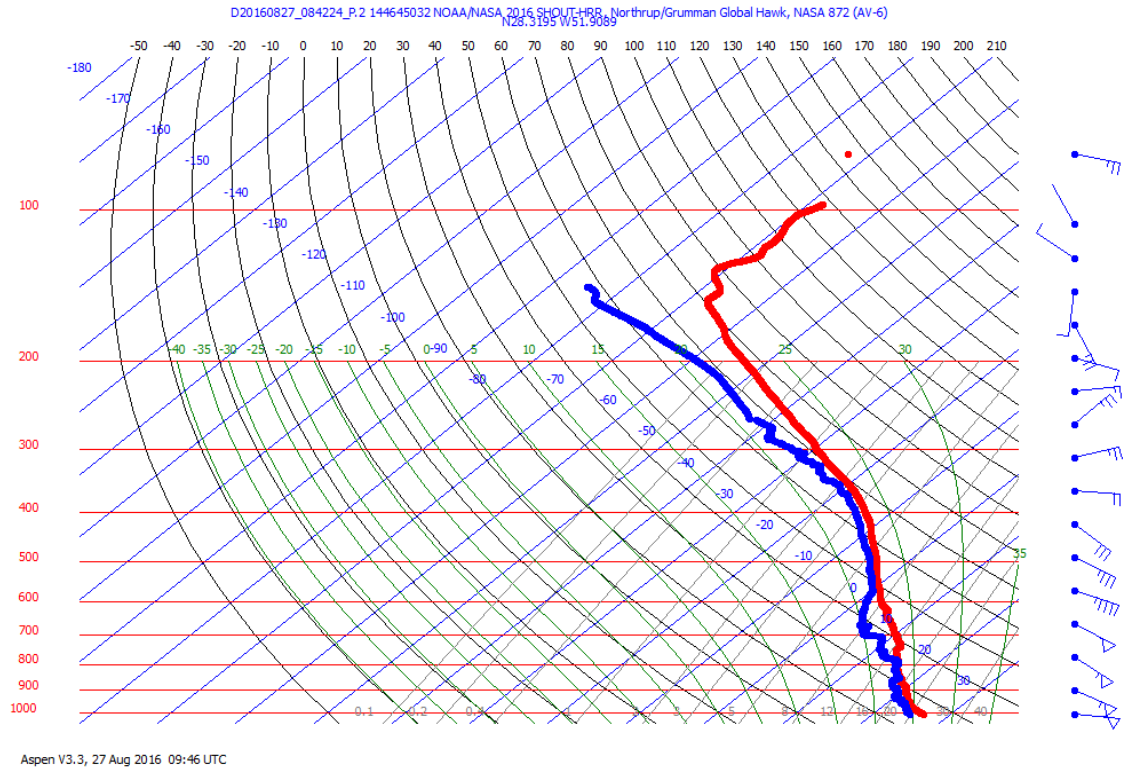
0835Z: sonde 36 released at location 36. Good drop. Was added drop for ~center

Corresponding skew-T: winds from south at surface



0842Z: sonde 37 released at location 37. Good drop.

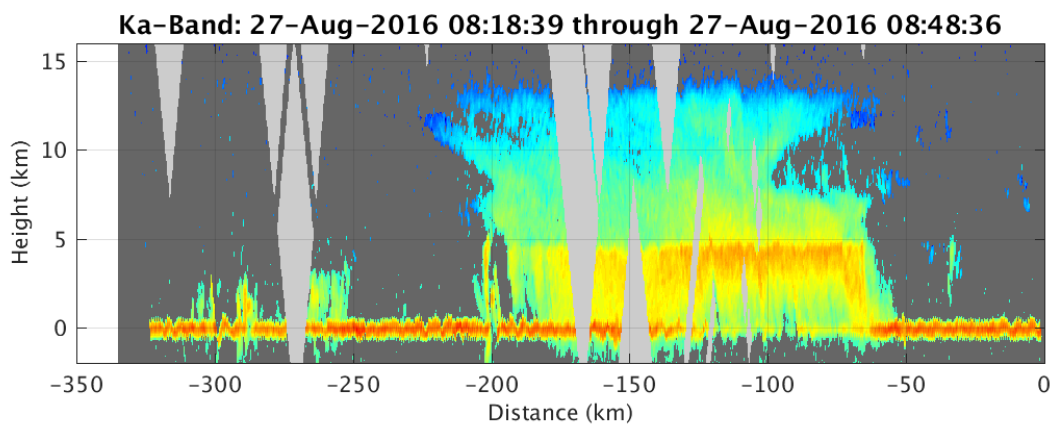
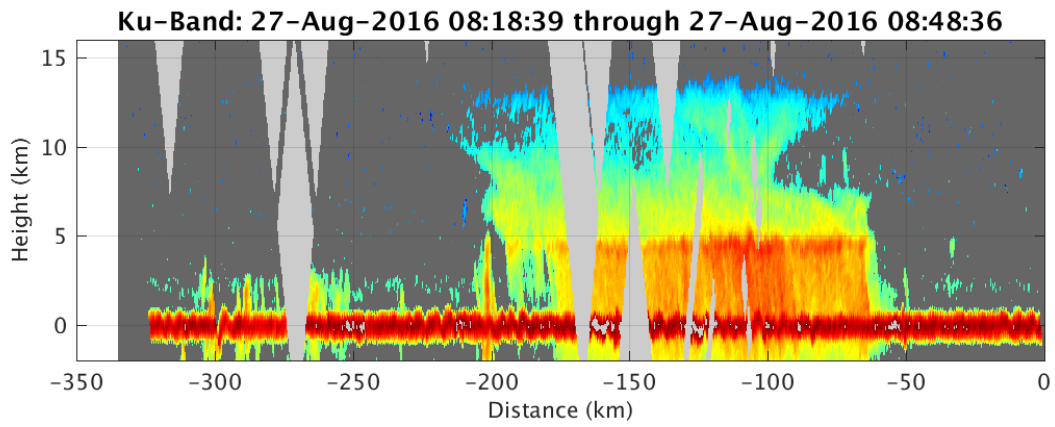
Surface winds from this drop now about 50 knots from the east



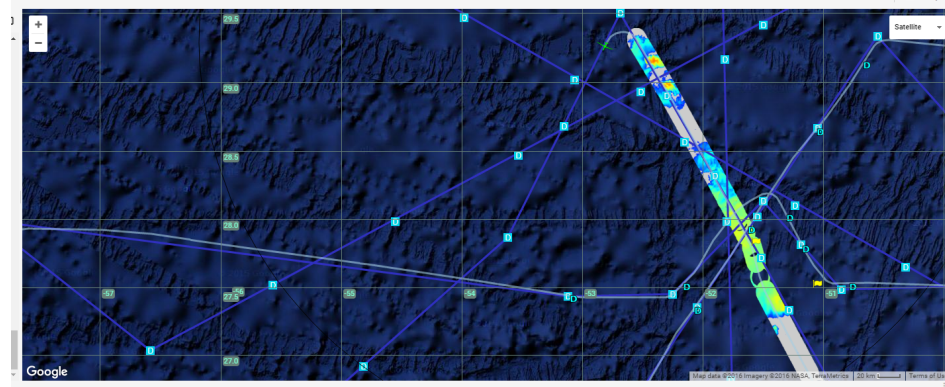
Convection continues to be weaker; no recent lightning

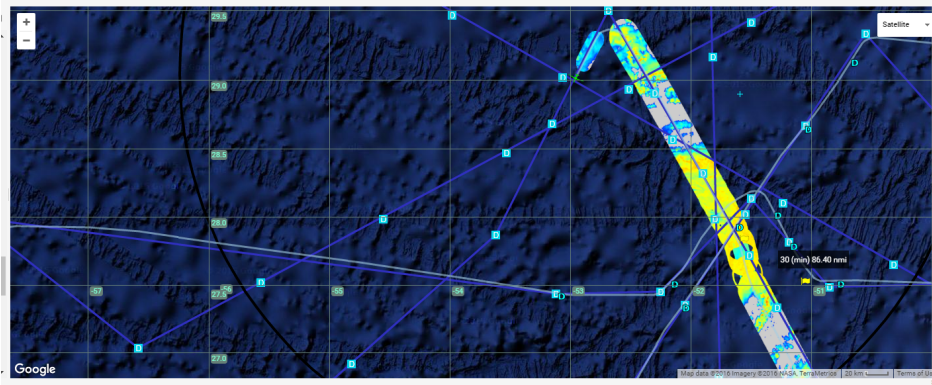
0849Z: sonde 38 released at location 38. Good drop

0851Z: HIWRAP data from last pass over center (last of small butterfly). Seeing cloud tops up to ~13 km)
 About 150 km across.



Gerry Heymsfield reports horizontal plots are now working in MTS. Below is 8000 m (first) and 2000 m Ka





0857Z: sonde 39 released at location 39. Good drop.

0903Z: sonde 40 released at location 40. Good drop.

0914Z: sonde 41 released at location 41. Good drop.

0950Z: Adjusted S-N large butterfly leg ~30 nm to the west to adjust for storm position (update #6 to the GH Plan 2 Active track

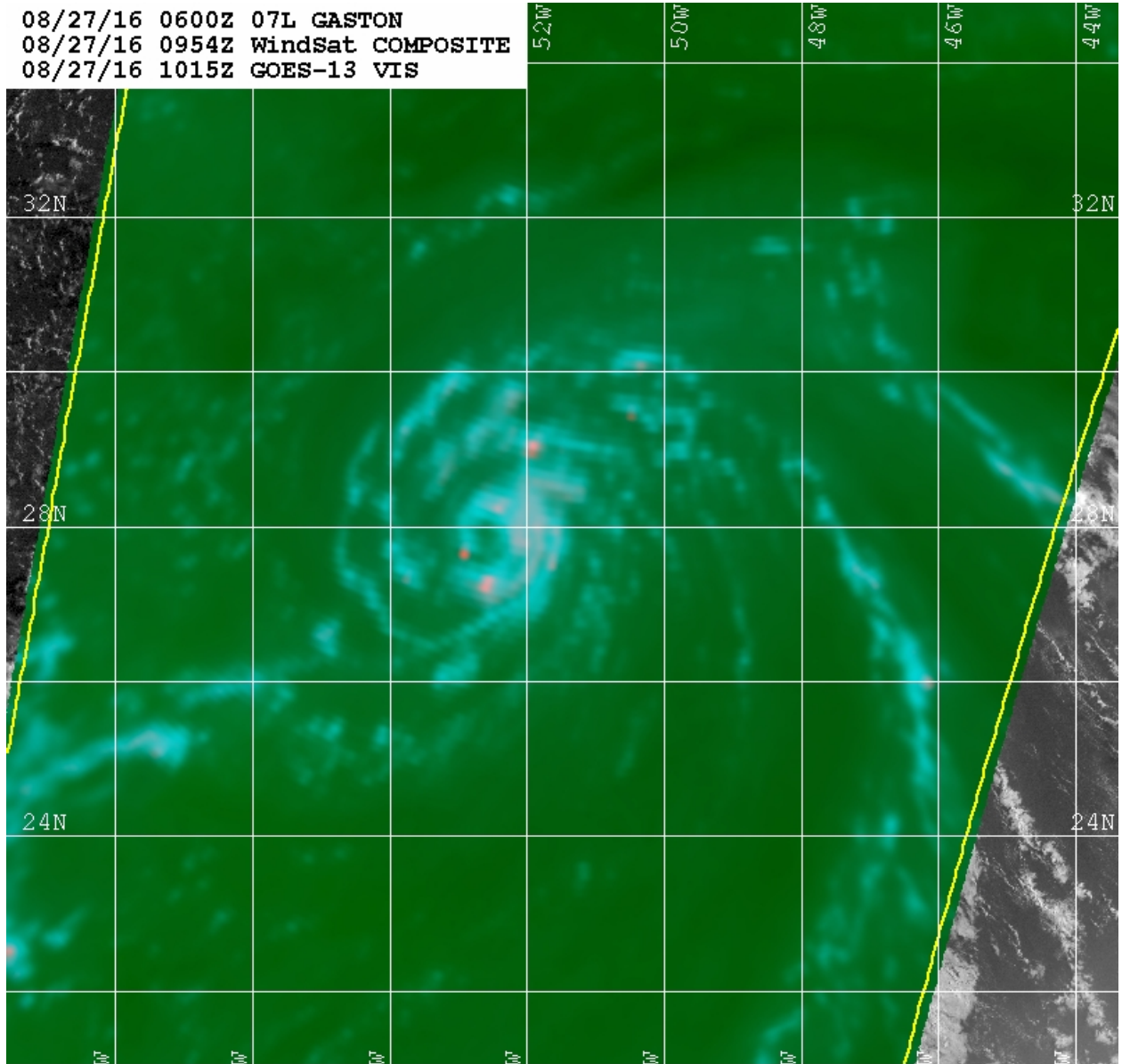
0927Z: sonde 42 released at location 42. Good drop.

0941Z: sonde 43 released at location 43. Good drop.

0956Z: sonde 44 released at location 44. Good drop.

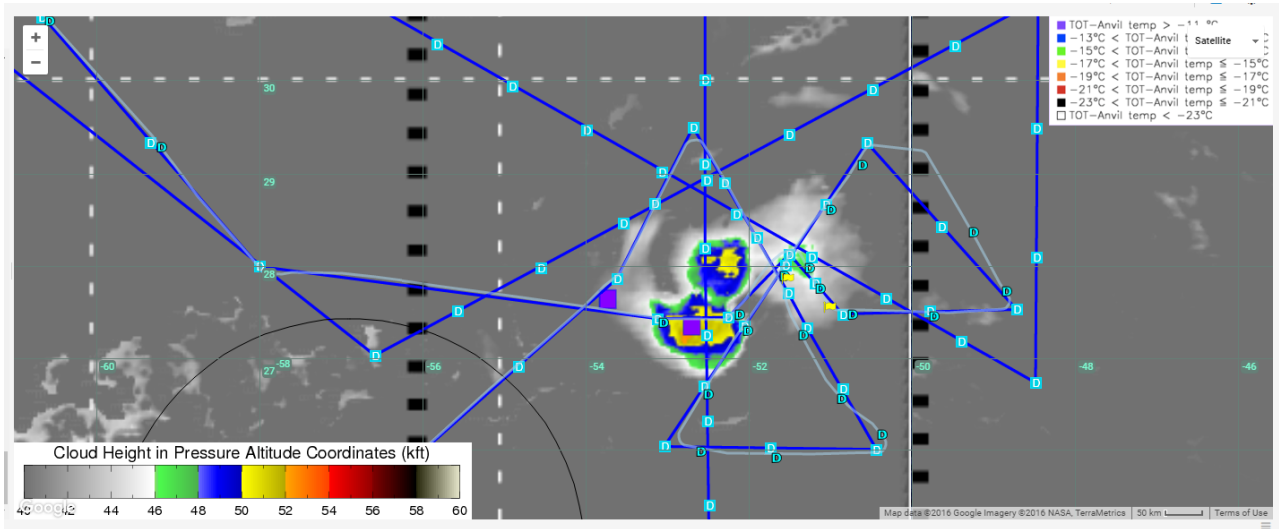
0958Z Update 6 appears in MTS. Cloud top height product below shows convection still less than in previous flare ups with maximum tops below about 53kft

08/27/16 0600Z 07L GASTON
08/27/16 0954Z WindSat COMPOSITE
08/27/16 1015Z GOES-13 VIS



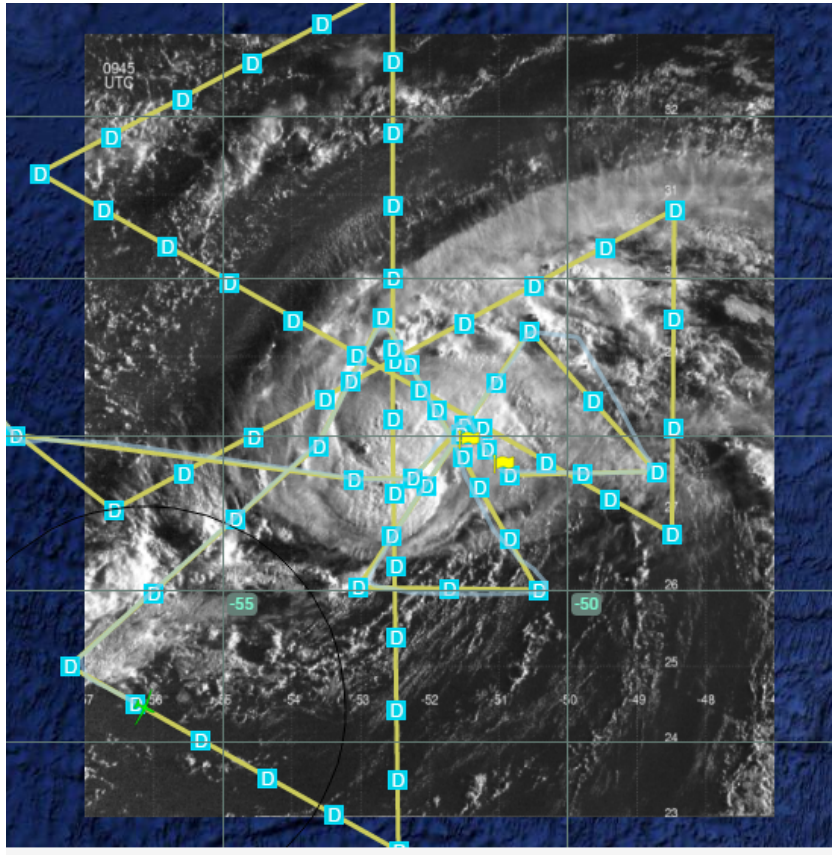
Naval Research Lab www.nrlmry.navy.mil/sat_products.html
Red=37PCT Green=37V Blue=37H

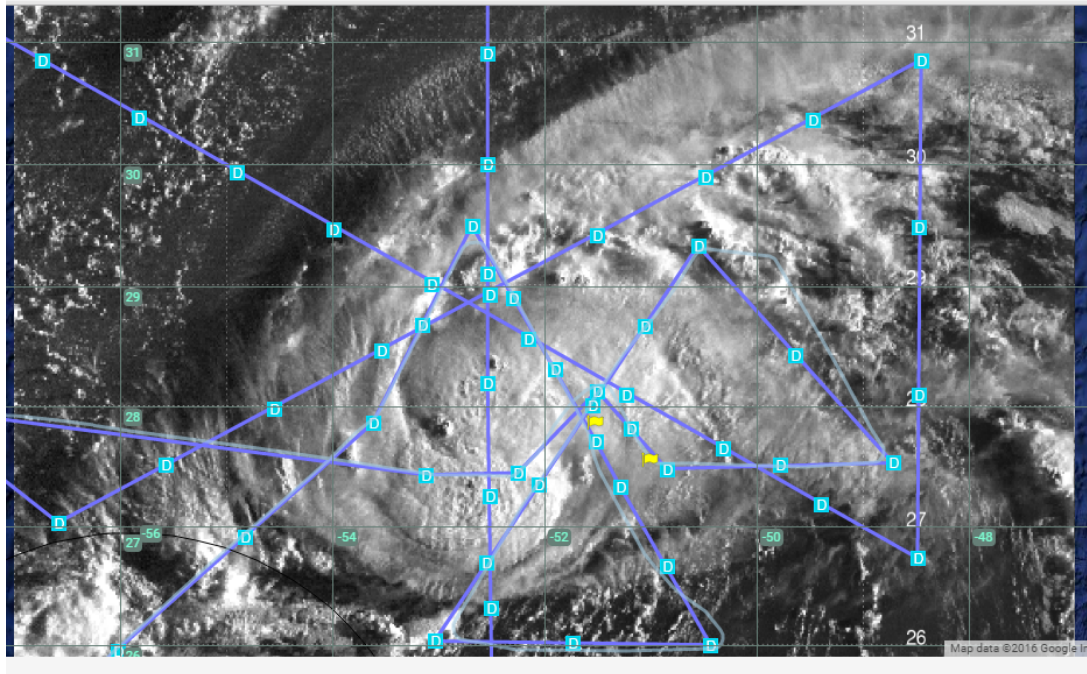
0954 UTC WINDSAT image shows a clear eyewall with a center near 28N, 52.7W.



1005Z: sonde 45 released at location 45. Good drop.

1007Z: CIMSS storm centric visible image: (see two more pronounced areas of convection consistent with cloud top product





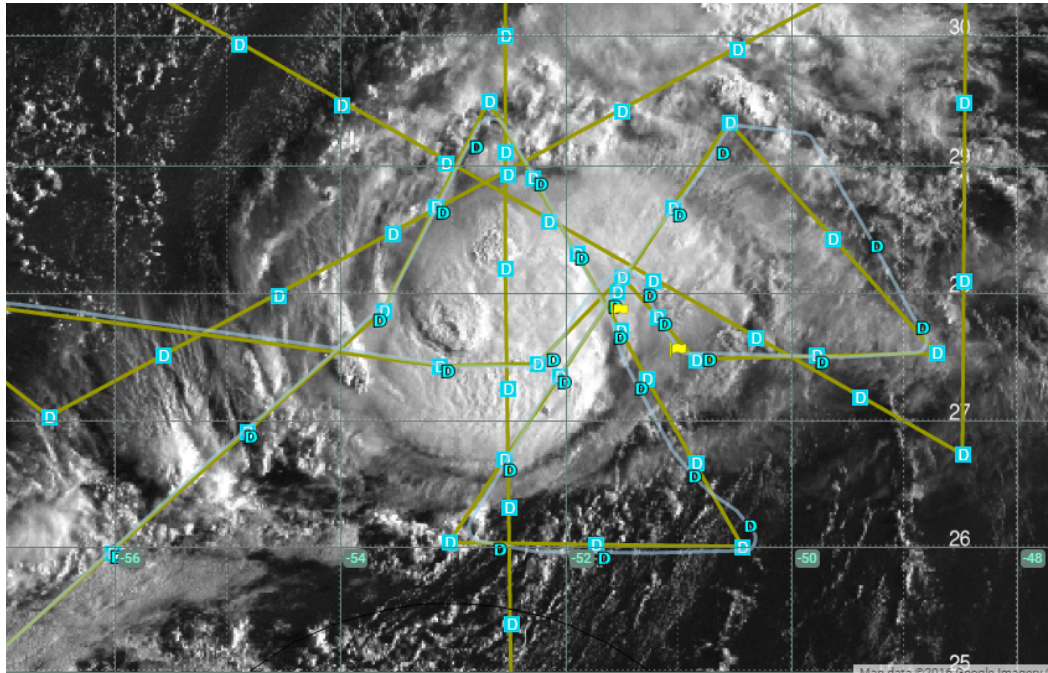
1017Z: sonde 46 released at location 46. Good drop

1028Z: sonde 47 released at location 47. Good drop

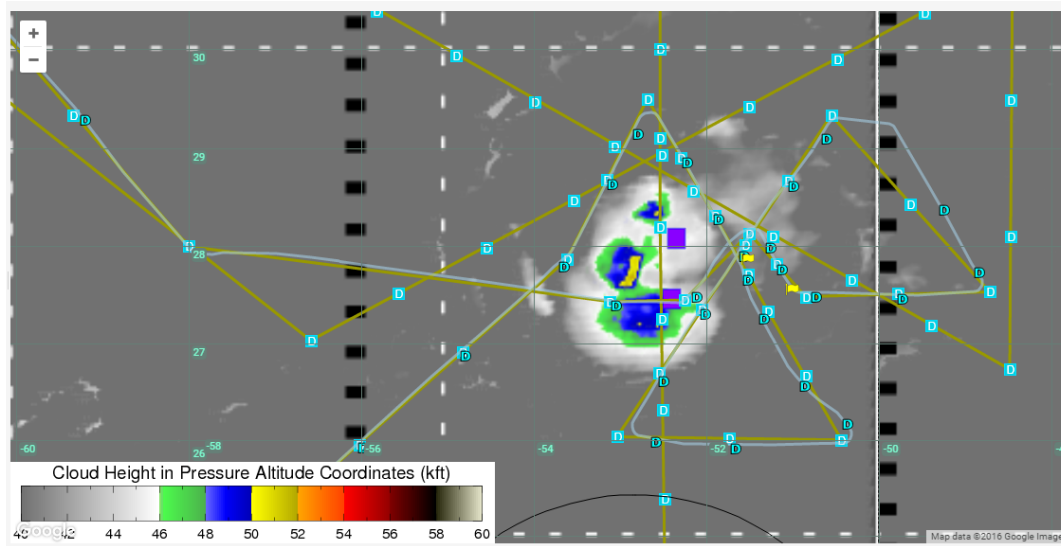
1039Z: Have noticed no HAMS data updates in some time. Have e-mailed Shannon and tried to call number listed on monitor. Goes to voice mail - left message.

1039Z: sonde 48 released at location 48. Good drop

1044Z; About to enter large S-N butterfly leg. Updated visible image shows new area of convection popping up to the west edge of track. Convection at northern edge also appears a bit more active



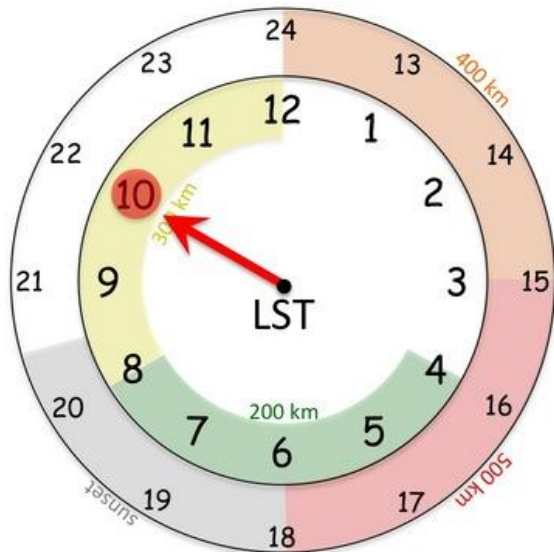
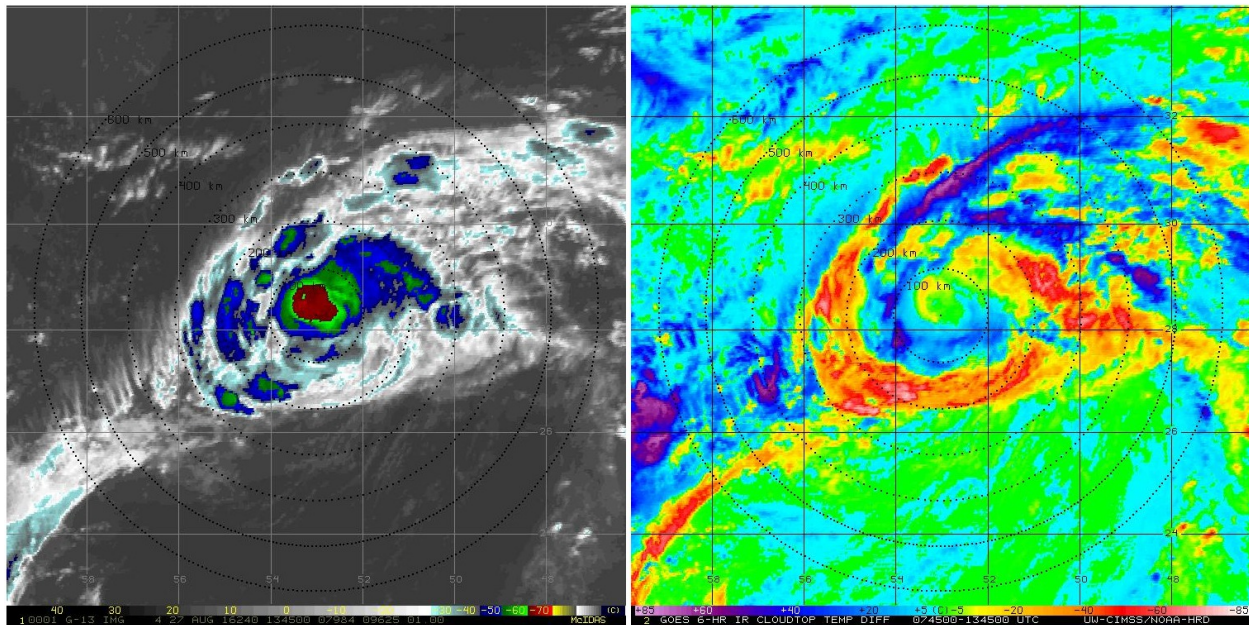
Cloud top height product also reflecting this area. Cloud tops indicated between 50-52 kft



1054Z Wings level on S-N leg. Procedure now to wait 1 min after wings level to launch sondes to enable better Ku stabilization

1055Z: sonde 49 released at location 49. Good drop

1103Z: sonde 50 released at location 50. Good drop



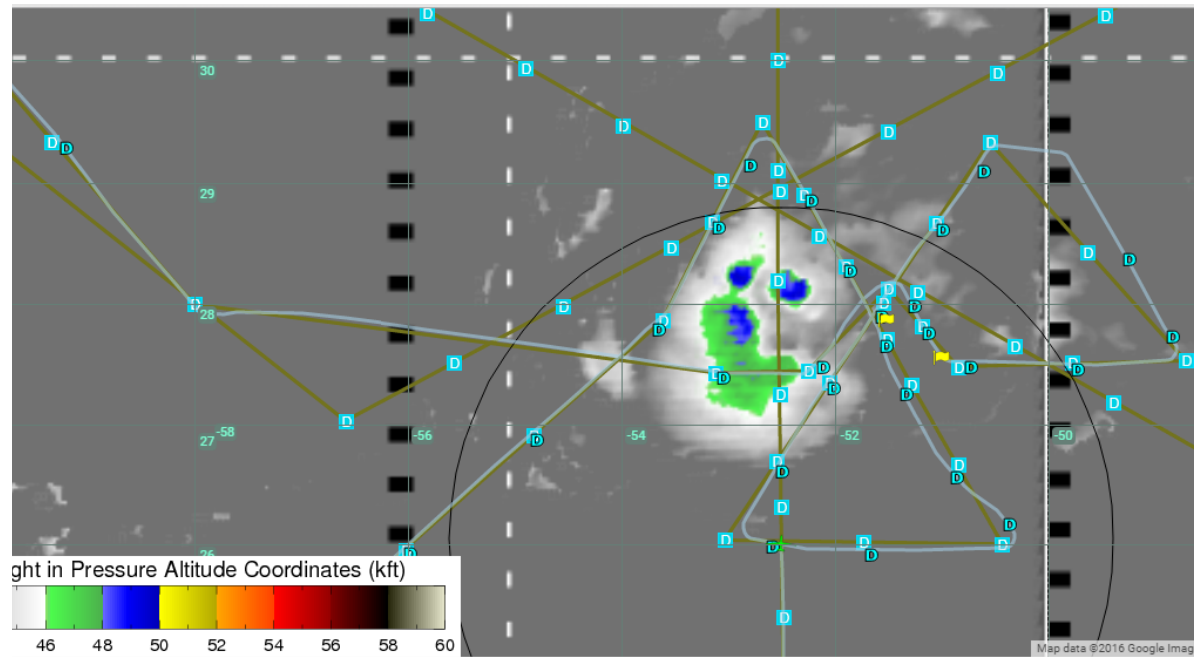
(Top left) GOES IR imagery and (top right) CIMSS TC diurnal cycle (TCDC) imagery from 1345 UTC (~10 am LST). The TCDC imagery shows a radially propagating diurnal pulse (cooling cloud tops, yellow to red ring) is located at $\sim R=250$ km and is propagating away from the storm center. As is typical, IR cloud tops are warming (blue shading) radially inward of the diurnal pulse. This TC diurnal clock (lower left) predicts that the pulse should be at $R\sim 300$ km at this time (1000 LST) and closely matches the satellite image. Since the

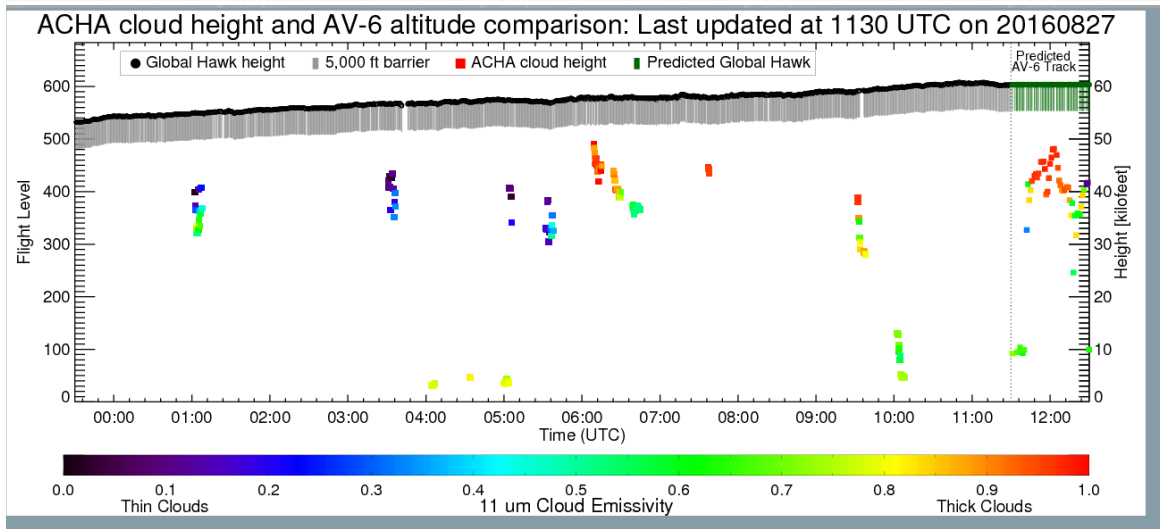
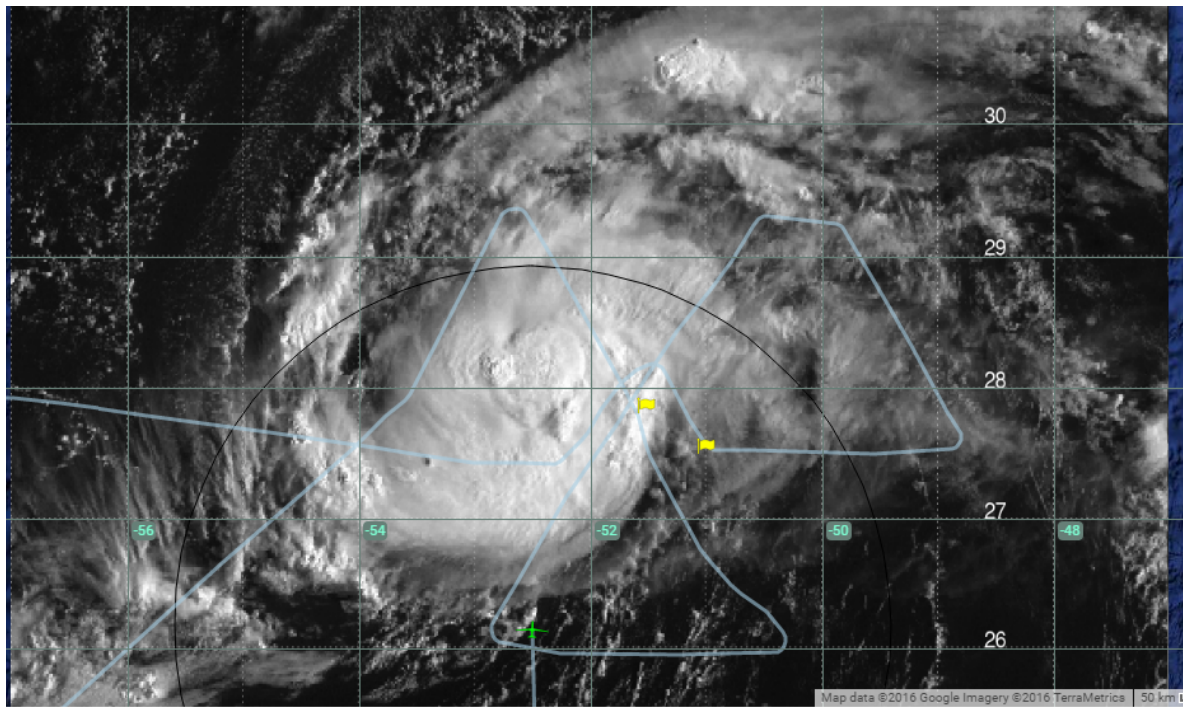
CTHs are typically enhanced along the diurnal pulse and lower radially behind the diurnal pulse, the timing/motion of diurnal pulses could be useful for overstorm GH situational awareness.

1113Z: sonde 51 released at location 51. Good drop

1123Z: sonde 52 released at location 52. Good drop

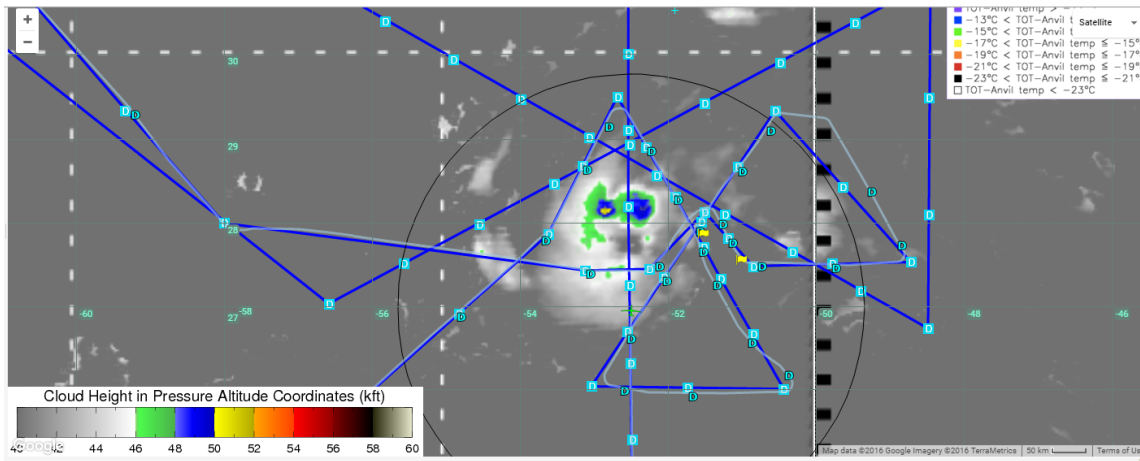
1130Z Approaching center on S-N leg. Cloud tops have dropped to below 50kft. No lightning. No concerns with center overpass





1133Z: sonde 53 released at location 53. Good drop

1140Z: Latest CTH show region now just peaking above 50kft to west of track

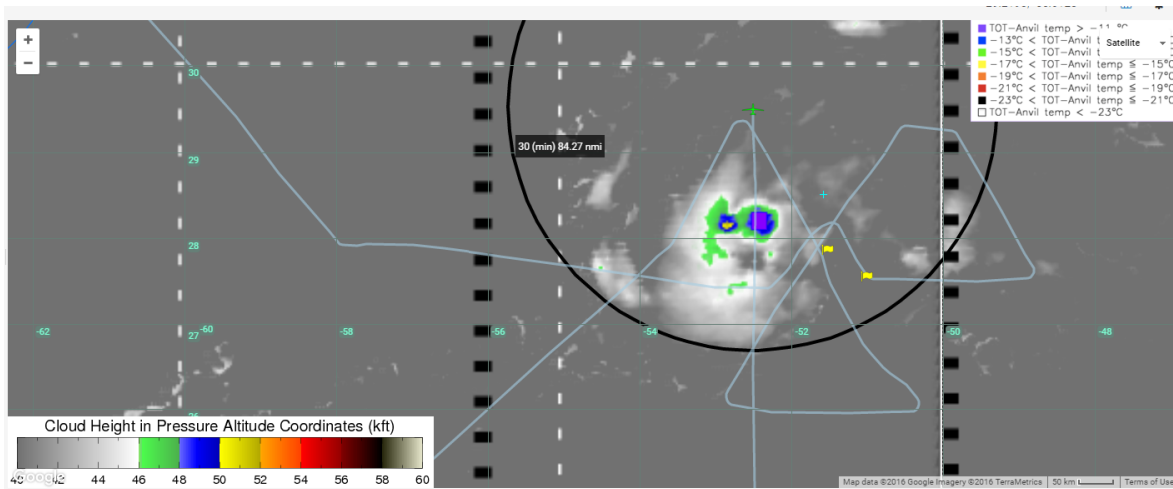


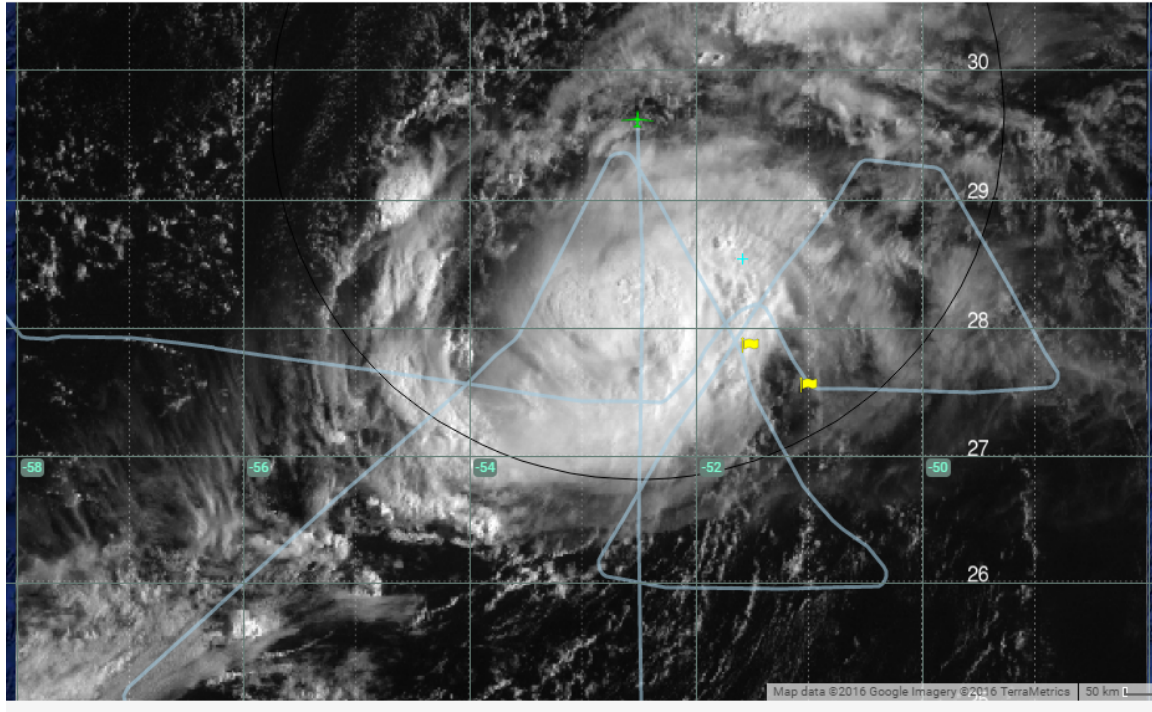
1143Z: sonde 54 released at location 54. Good drop

AVAPS reports no RH data on this sonde. Advises came back about a minute later

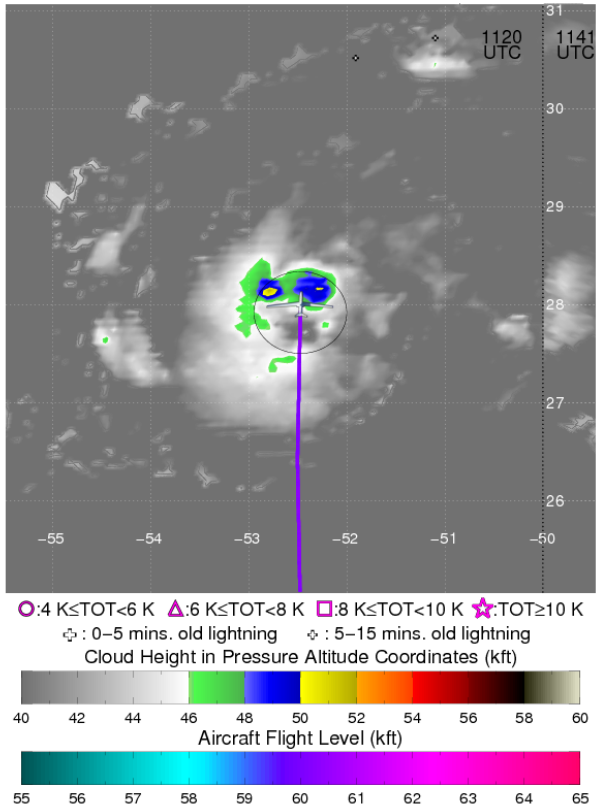
1153Z: sonde 55 released at location 55. Good drop

1205Z: Cloud top height and visible images just after center crossing

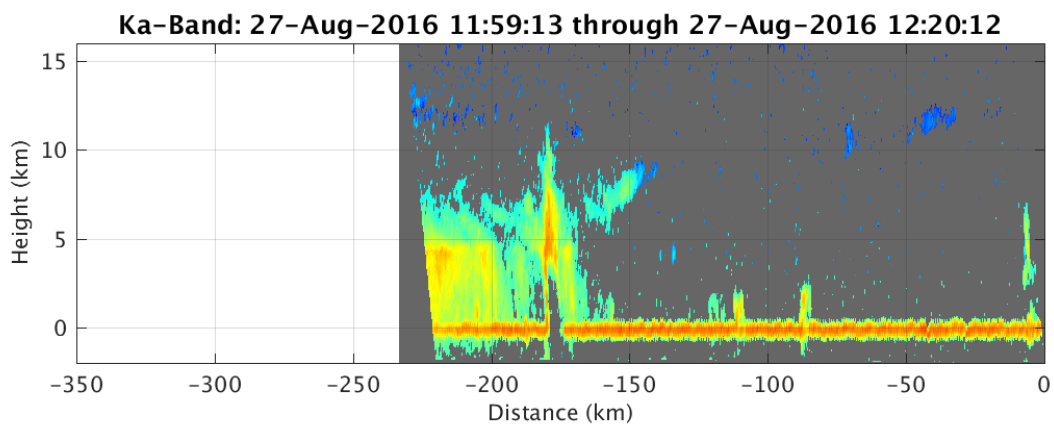
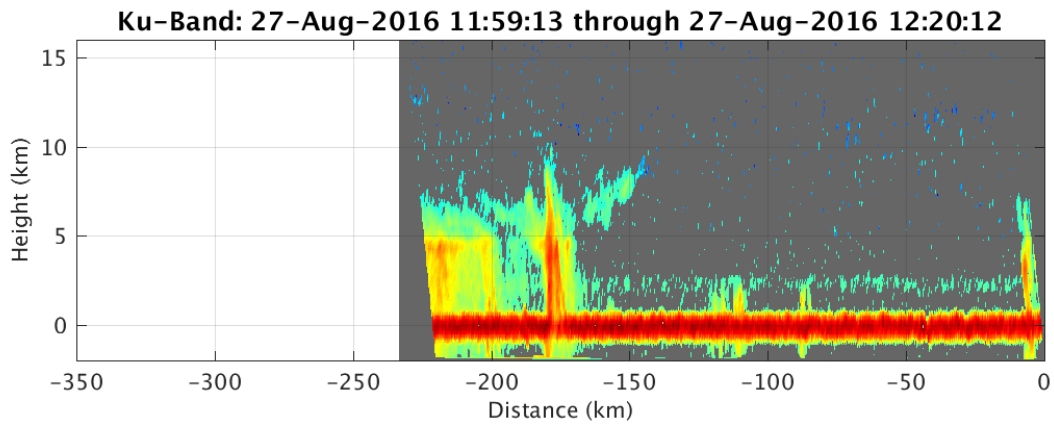




Lightning and AV-6 on 20160827 at 1150 UTC
ACHA CTH & TOTs at time listed



Caught just the end of HIWRAP data from this last center crossing



1203Z: Approaching drop 55 AVAPS questions if is power to launcher - not getting engineering messages. Messages not looking correct. Dave Costa calling Terry

1211Z: Going to cycle power on AVAPS

1218Z: Starting power back up on AVAPS. Launcher first

Still seeing no current to the AVAPS launcher

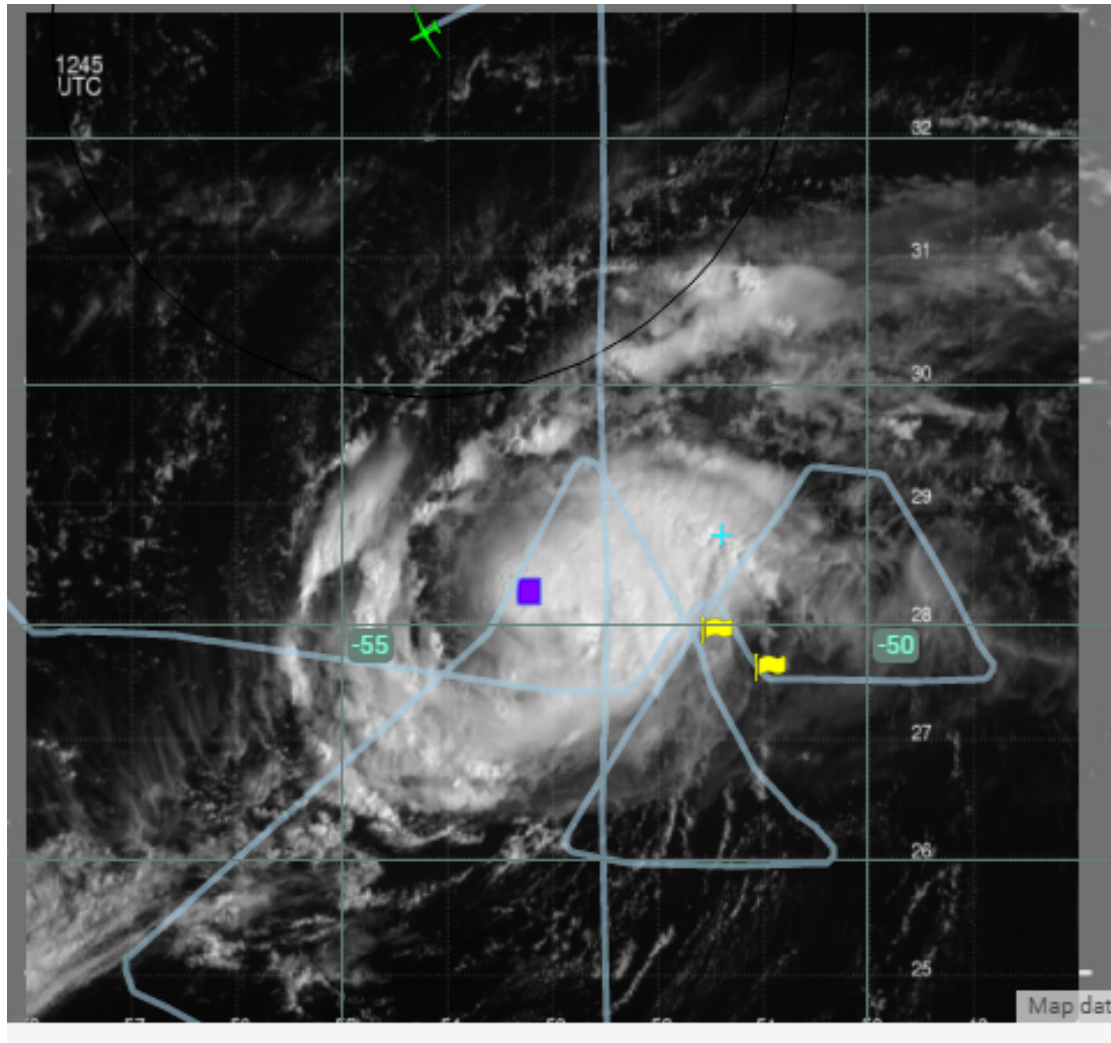
1245Z: Mathias from HAMSRS finally arrives - have not been seeing HAMSRS data for some time and couldn't reach folks by listed contacts. Was finally able to dig up Mathias' cell phone.

He indicates should have just been a data transfer problem - no lost data

Mathias confirms instrument function is good and no data have been lost. Rsync is resumed but may not catch up by end of flight for data displays.

1250Z: Terry on the way in. Dave speculates EIP or circuit breaker issue. Zero current on EIP 62

1306Z: Screen grab with 1245Z visible image shows convection still much weaker than in earlier portion of flight. Seeing one TOT, but total heights only around 48kft

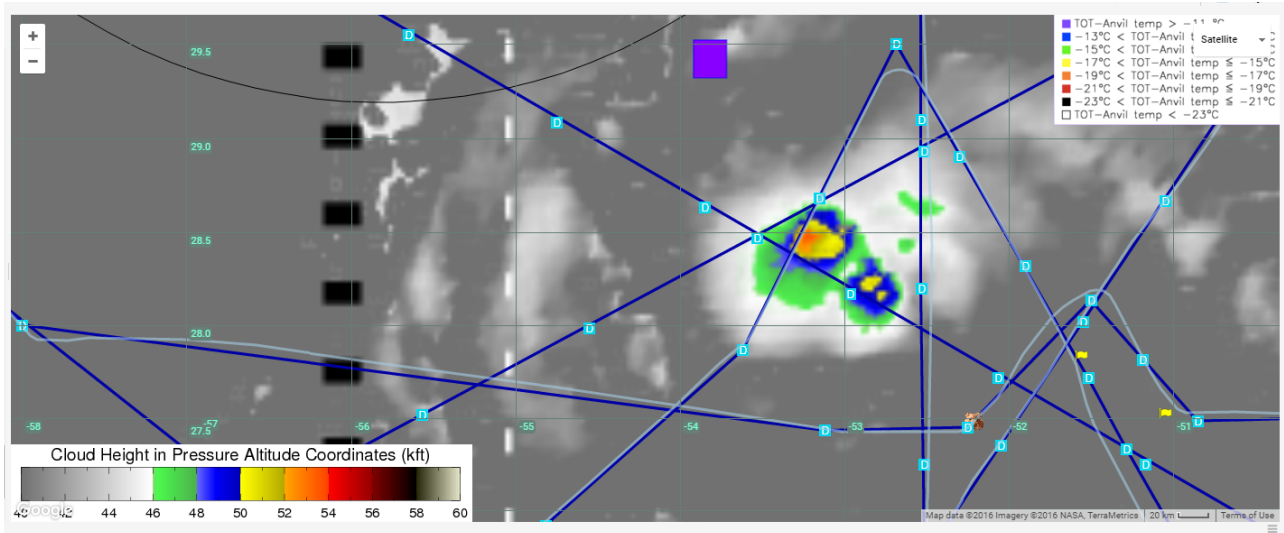


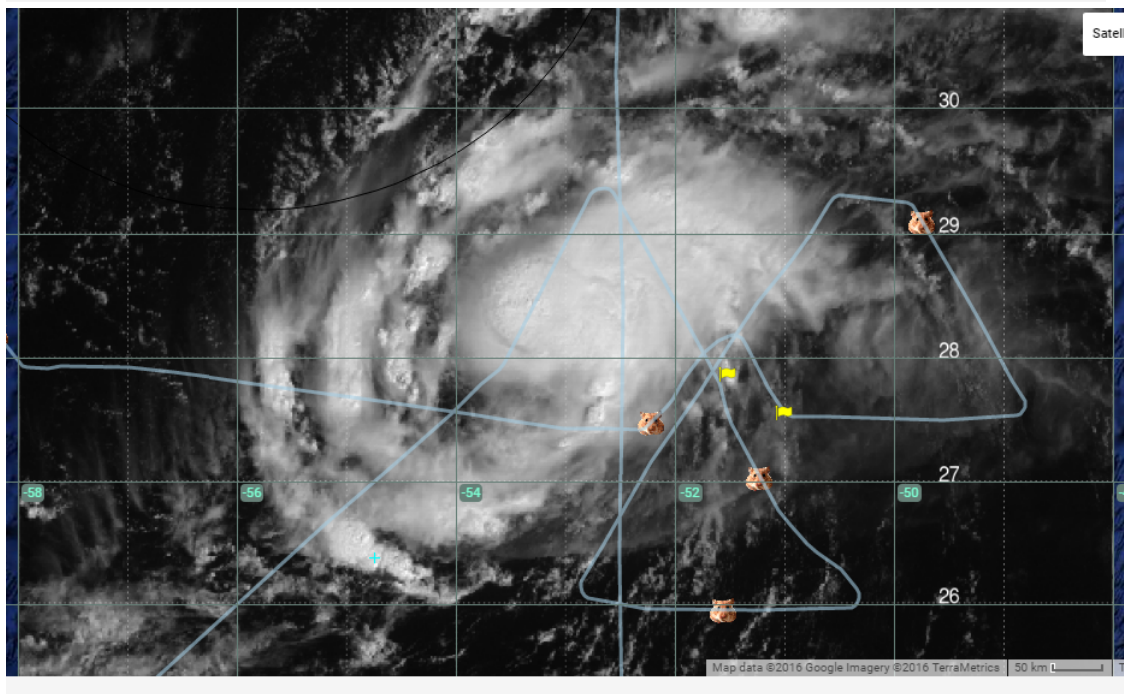
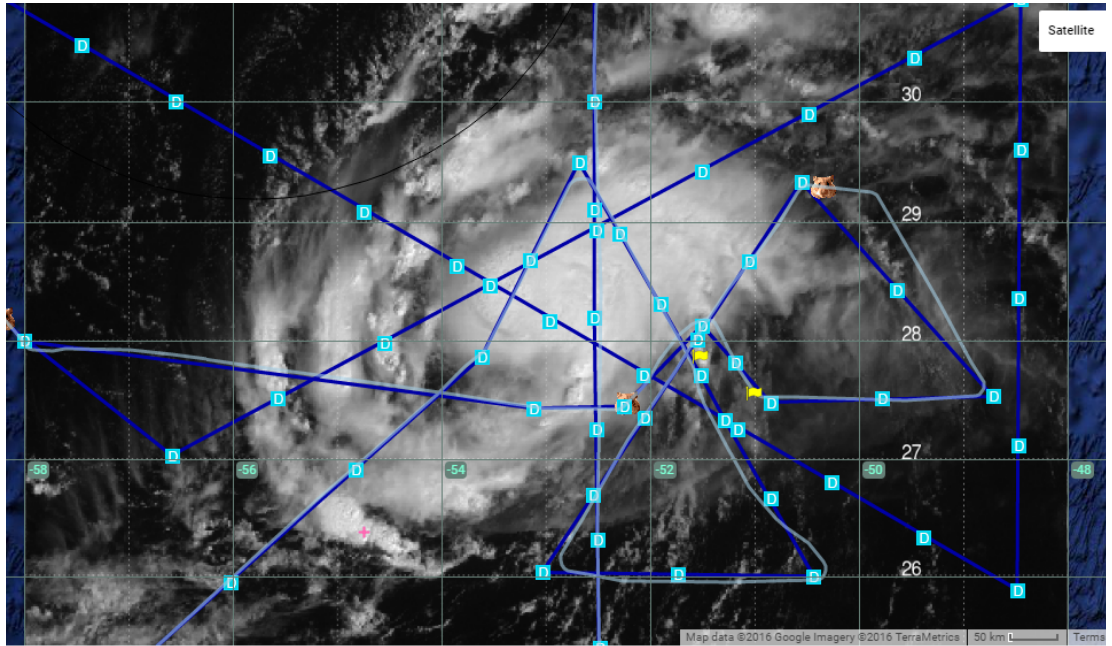
1310Z: Terry in - checking with IT to track packets.

Is chance it could be a circuit breaker on the EIP that popped.

1345Z GH position not updating in MTS. Jason reached out to Aaron - he felt possibly something coming from payload IT. IT investigating.

1358Z: Still no position in MTS but GH inbound on NW to SE long butterfly leg. Cloud top heights have increased slightly in an area north of track, but are still below about 54kft. No lightning has been apparent. No apparent safety of flight issue not having exact GH position



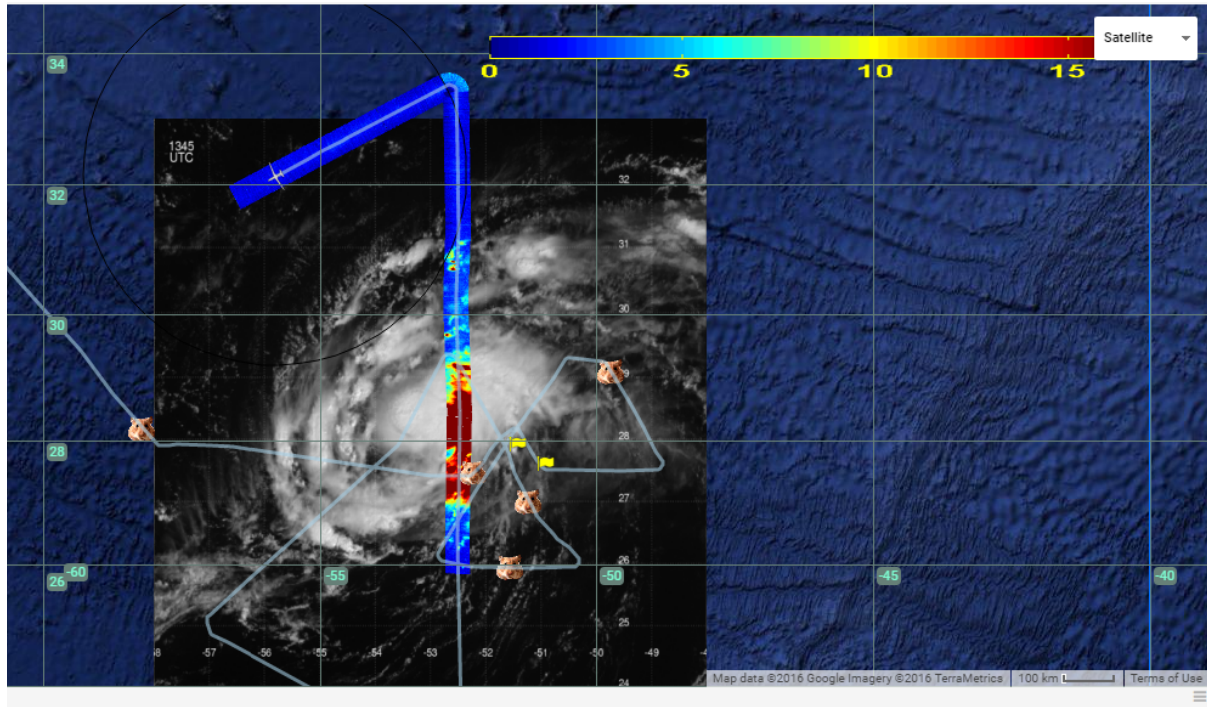


1404Z: Aaron Duley and payload IT still looking at refresh of GH position

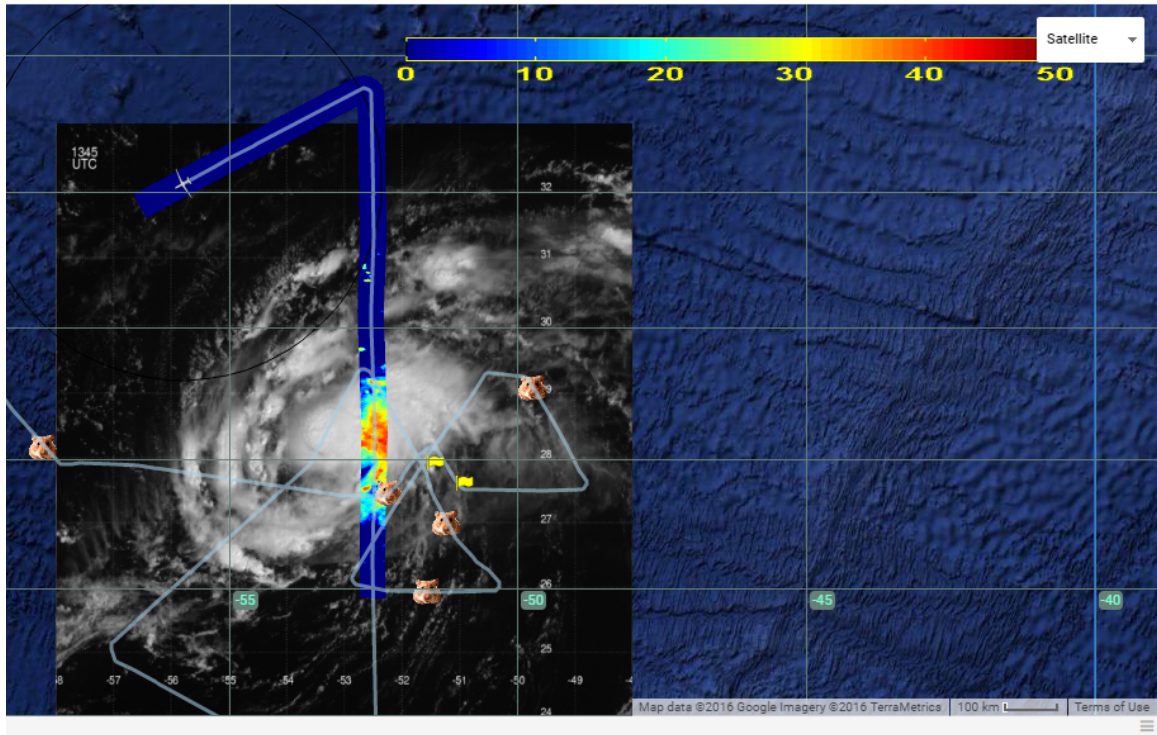
Discussed with Robert Rivera potential options if wanted to return early. Did it buy any more debugging time before a Sunday flight? Crew was already set to come in at 17:30 and they can stay until 0300 to work

postflight preflight. Not trivial to get crew to come in early and would not buy more debugging time. Pilots later added that no VACAPES windows either, so fixed with regular return. Discussed options to alter pattern, but not adequate time to add another small butterfly so will stay with current plan.

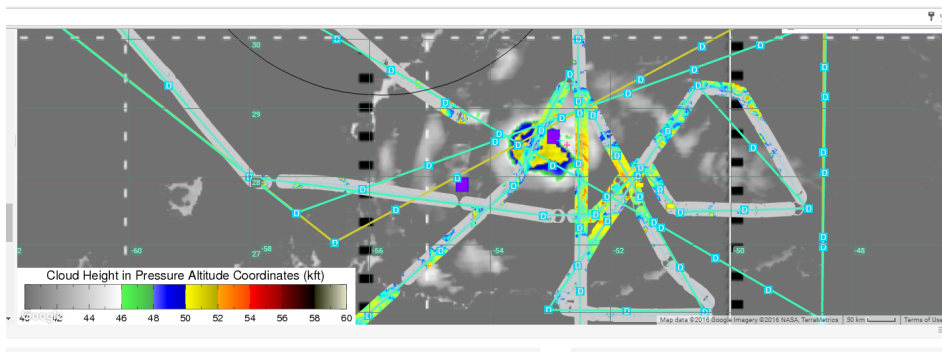
1411Z: HAMSRS products now updating. Below is scattering index from previous pass over center on S-N line

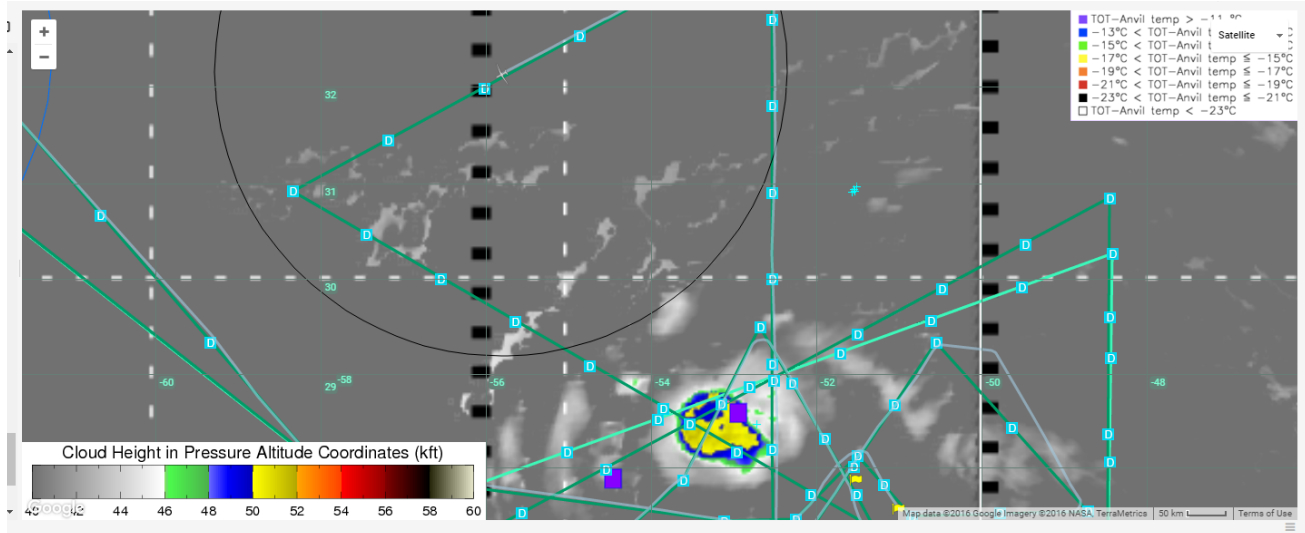


Corresponding reflectivity at 6 km below

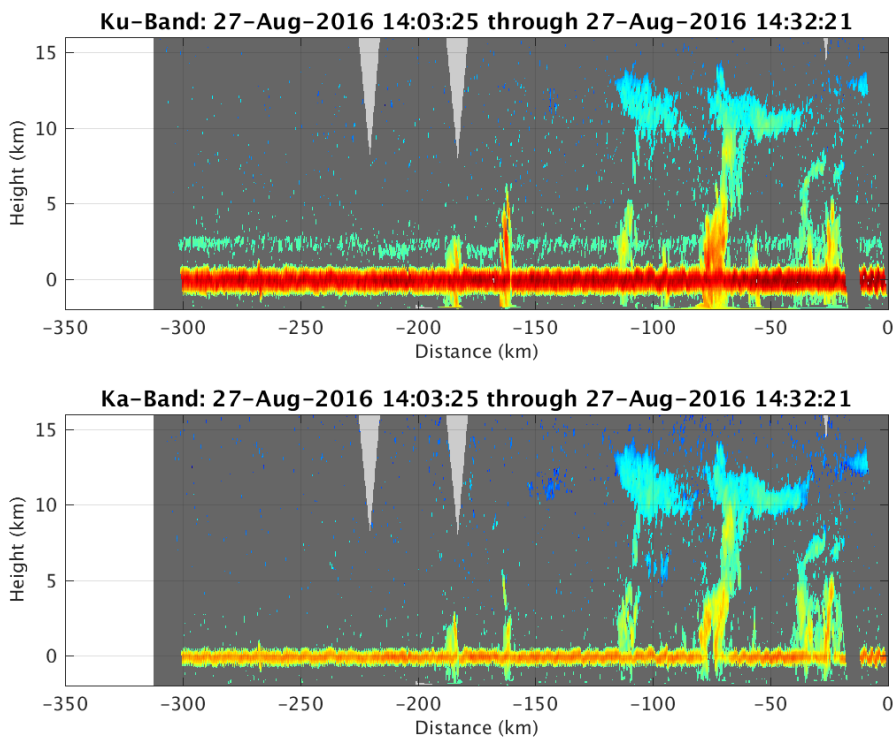


1426Z Approaching center. Convection has increased, have TOT, and starting to pick up some lightning. Closest approach to TOT was about 20 nmi, so GH will deviate just a bit further S. Perhaps some question if we had sufficient vertical spacing, but lightning occurred right as approaching. Pilots were cautious with no active position in MTS.

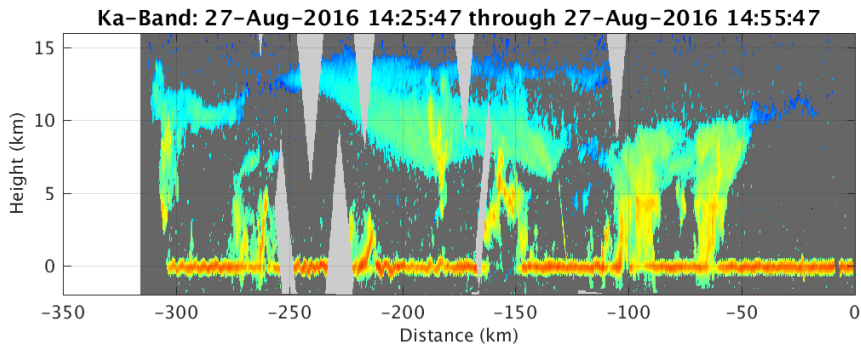
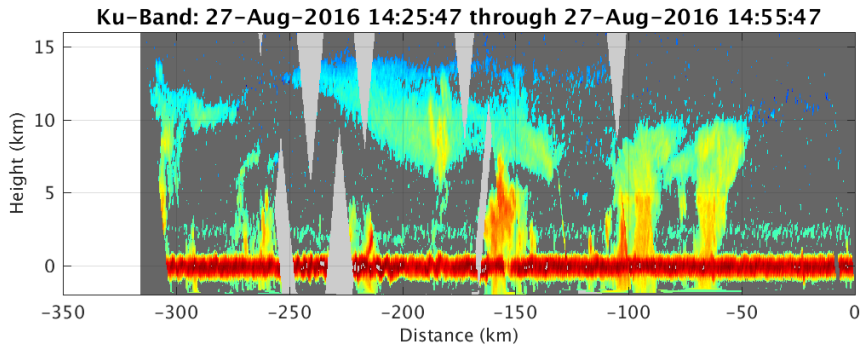




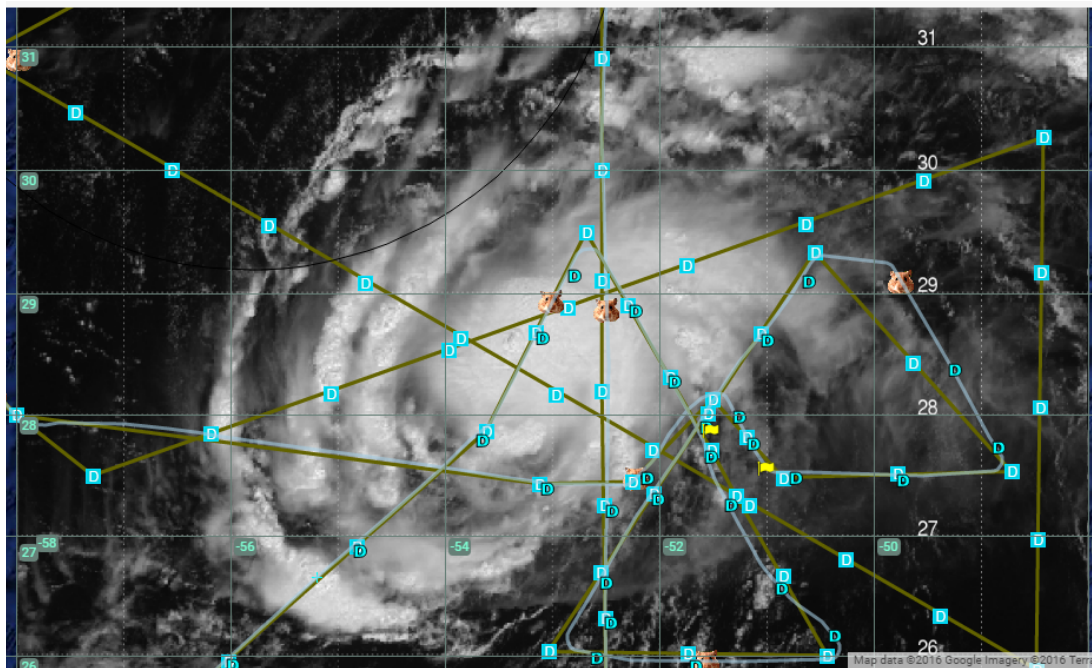
1435Z Gerry reports passing some of cirrus on way into center



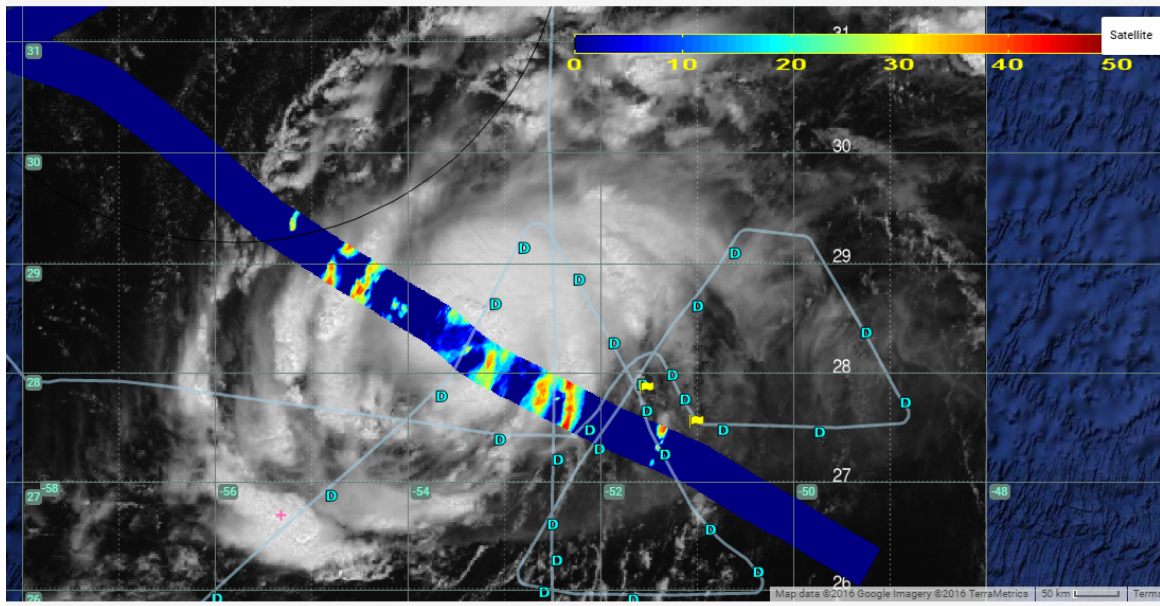
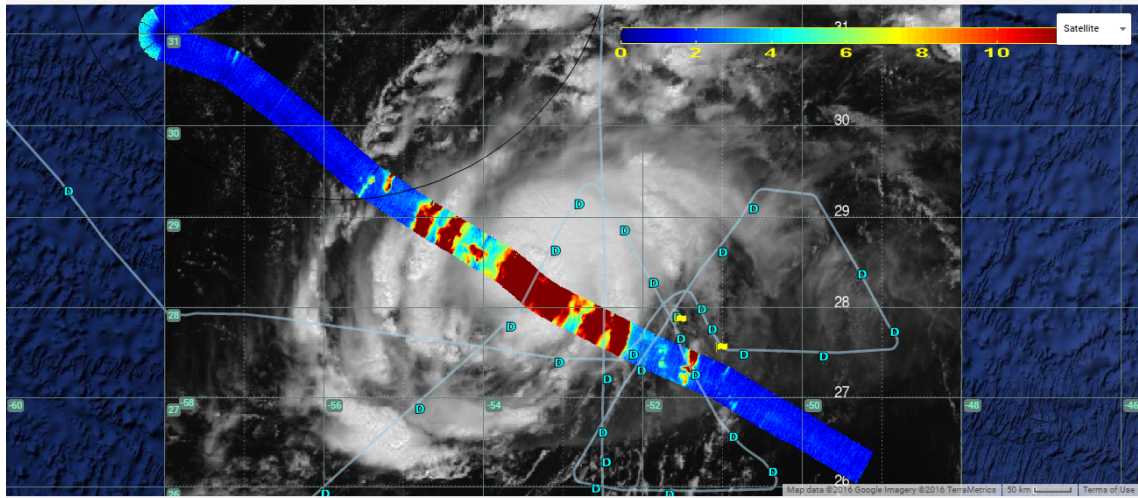
The following is the HIWRAP vertical section after the previous center crossing heading from NW to SE. Gerry was dissappointed about deviation to South.



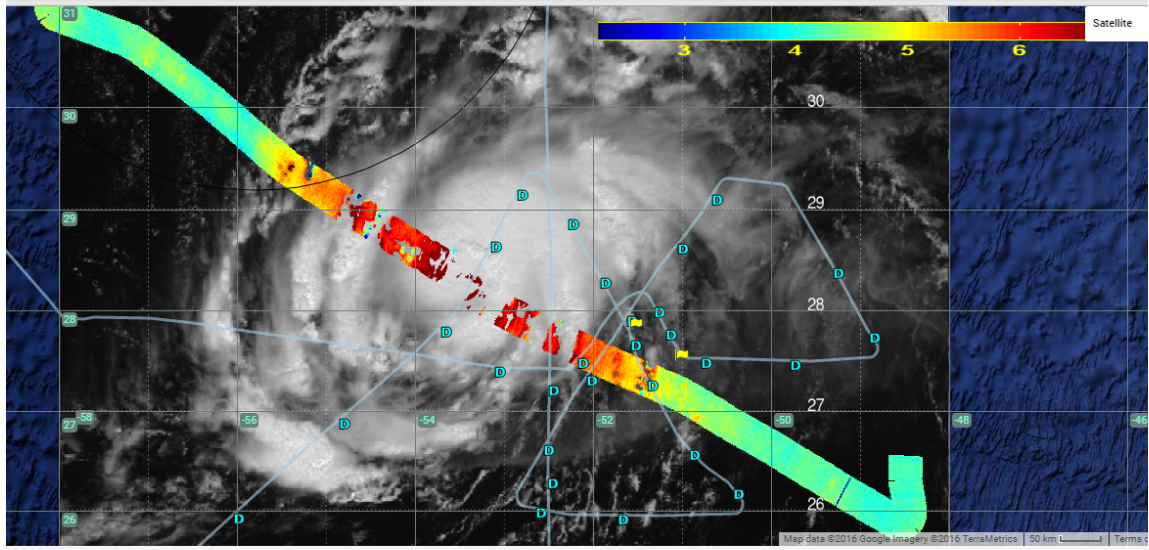
1529Z: GH just approaching SE end of butterfly before turning north. Following screen grap shows visible imagery with pattern of expanding diurnal pulse



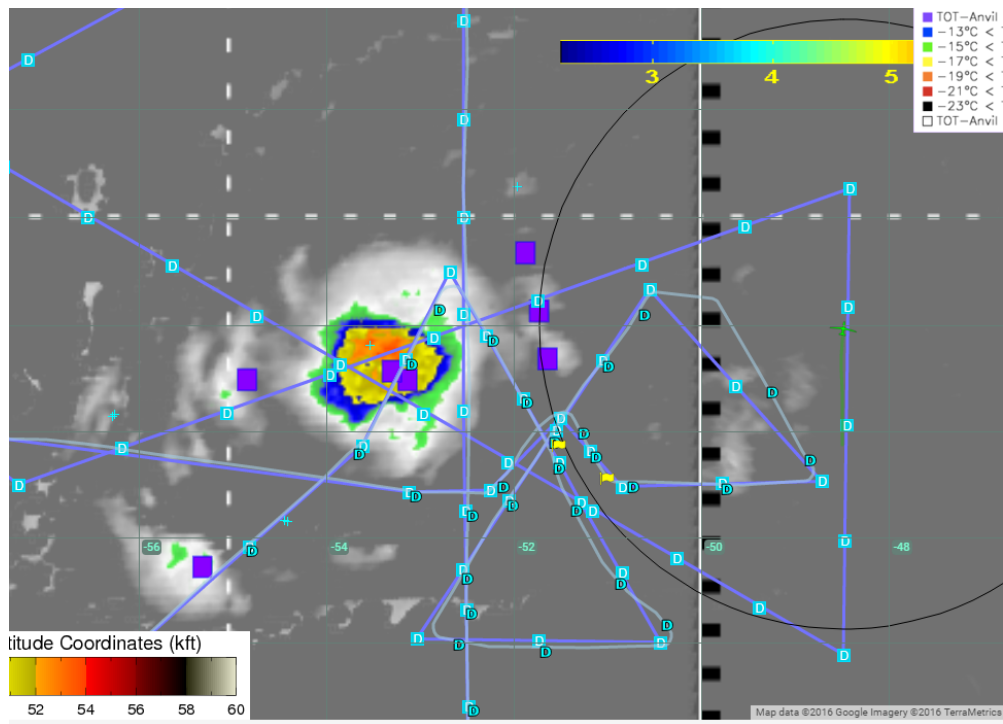
1533Z: Making turn to the north. Following is HAMSr scattering index from previous butterfly line over the center, followed by reflectivity at 6 km. In second image is interesting to see how banding has spread a bit further out



TPW below

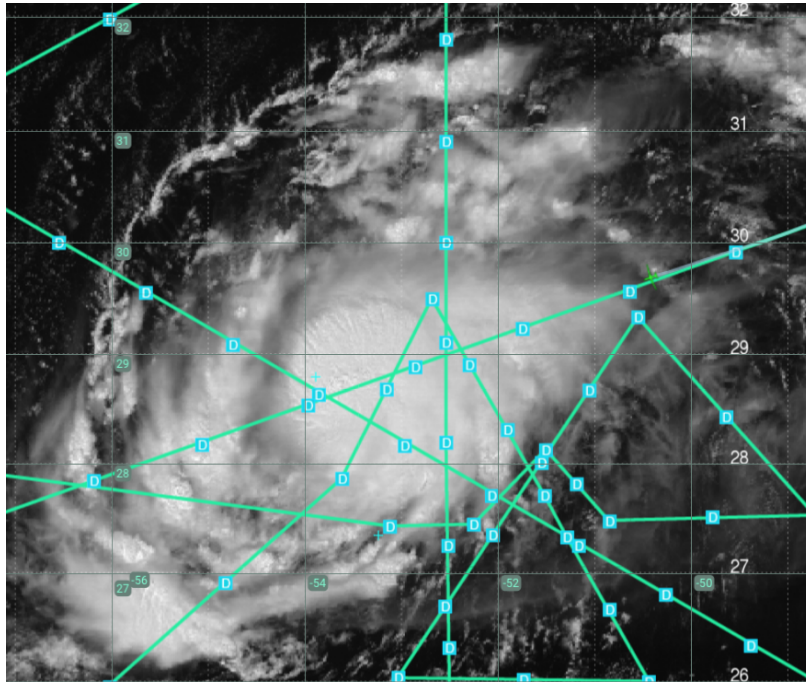


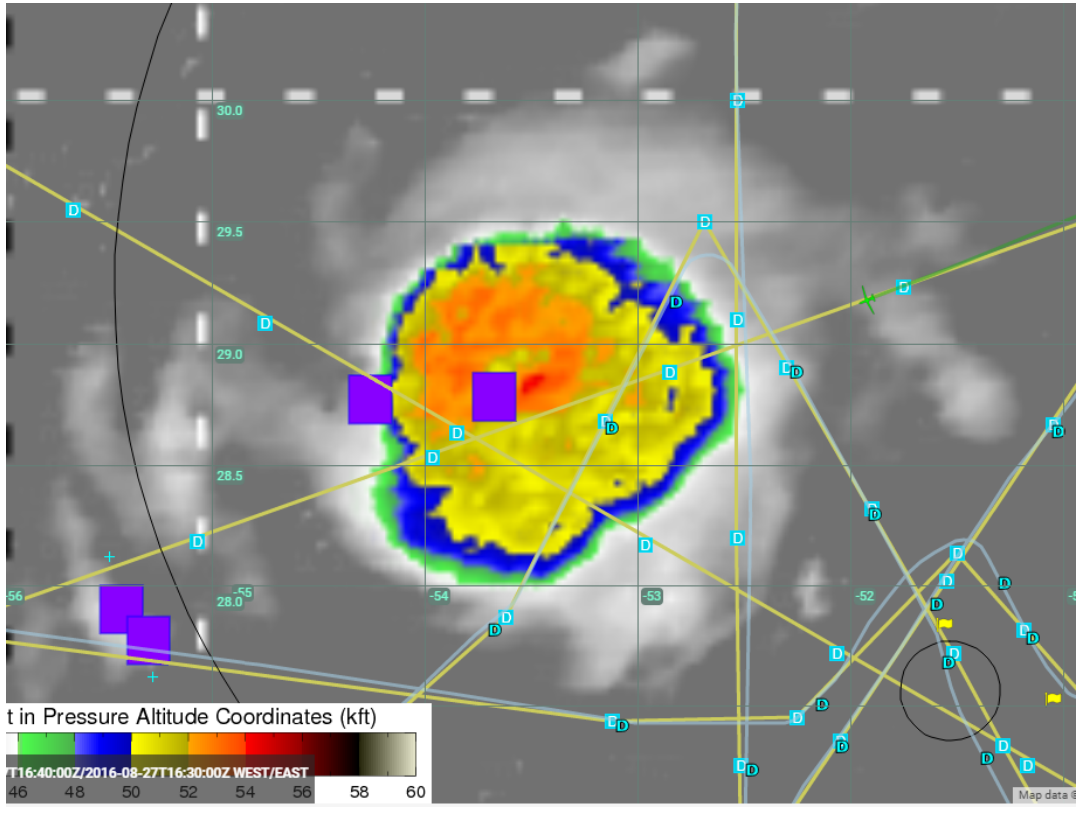
1550 Z: Gary stepping away; Scott taking over...



1545 UTC CTH image. A couple of TOTs over the deepest convection, one lightning stroke. GH now back on MTS on easternmost leg. Will approach convection in about 45-60 minutes.

1635 UTC Visible Satellite from 1615 as GH approaches for final transect. CTH have remained fairly constant from 1545 image, peaks near 54 kft. GH currently up at 62.5 kft.

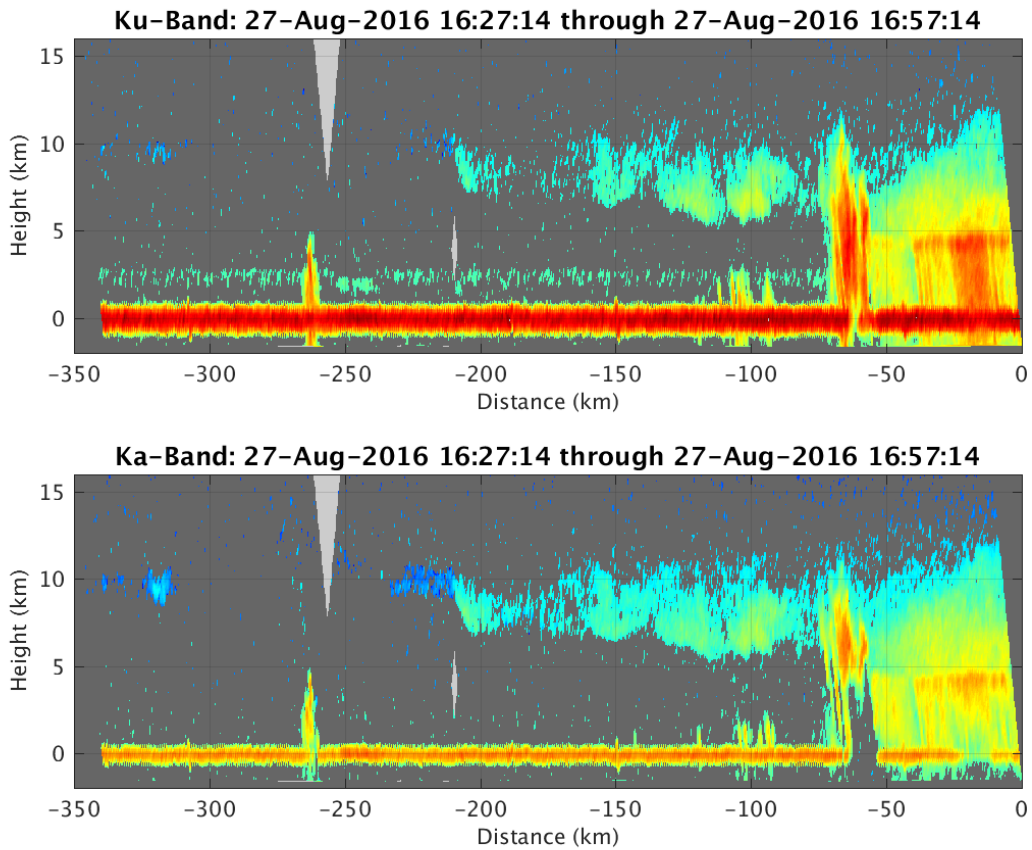




1615 UTC image of CTH as GH approaches for its last overpass near the center. No lightning during past 10 minutes, only sporadic before that.

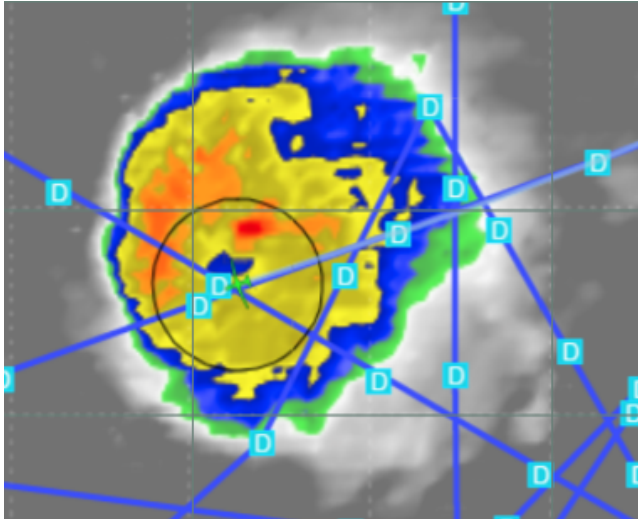


Forward camera view shows flat tops, no significant TOTs.

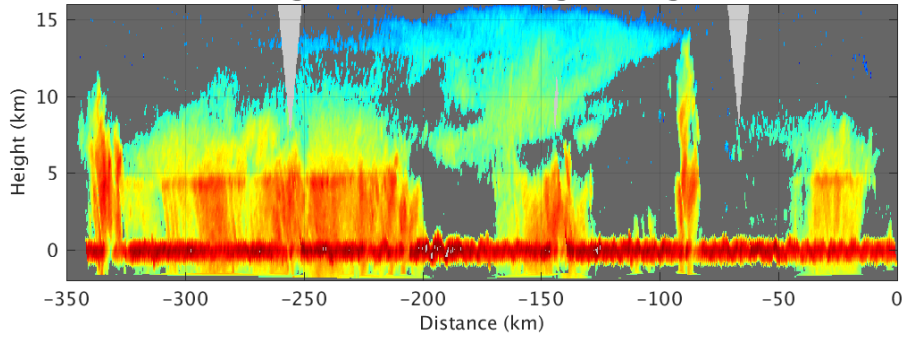


1655 UTC HIWRAP saw an intense convective tower extending up to ~10-12 km on the eastern edge of the cold cloud shield. Still approaching to highest CTHs.

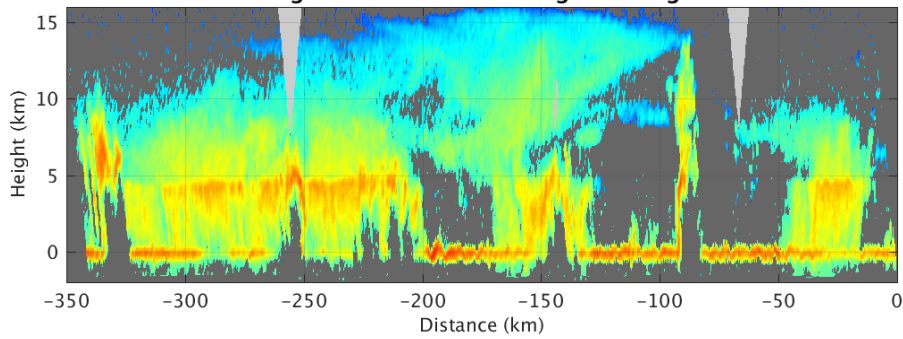
1705 UTC CTH captured at 1650 as GH passes over the Gaston. CTH product indicates tops around 50-52 kft along track.



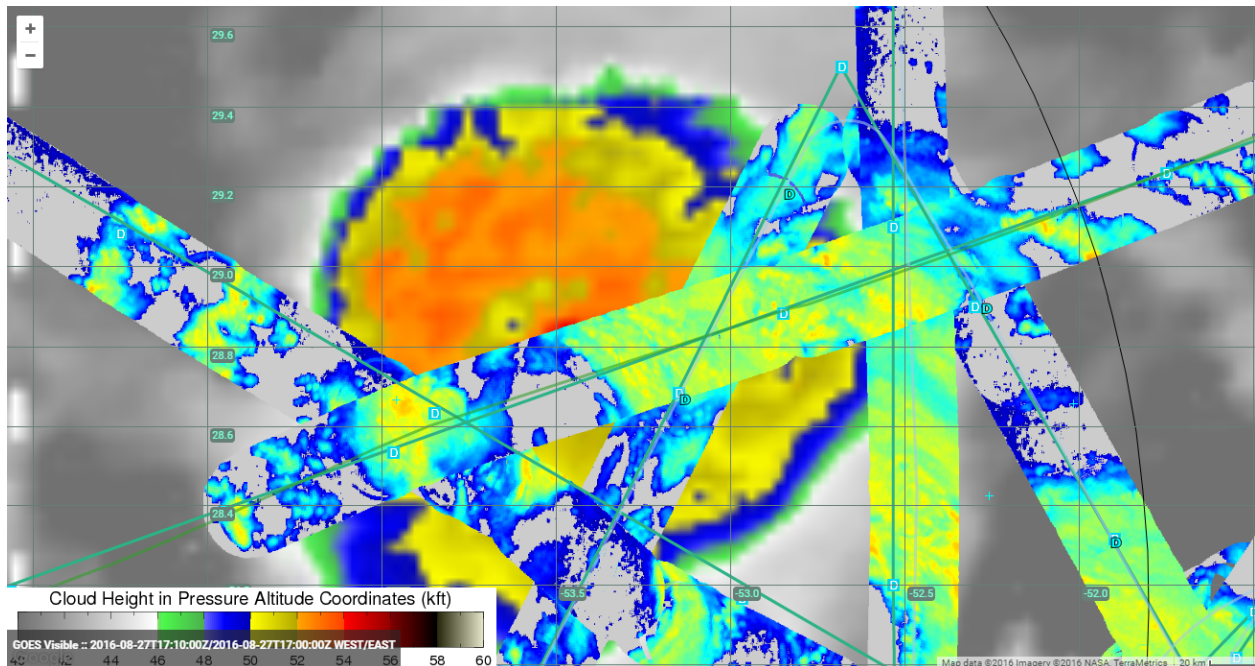
Ku-Band: 27-Aug-2016 16:50:59 through 27-Aug-2016 17:21:02



Ka-Band: 27-Aug-2016 16:50:59 through 27-Aug-2016 17:21:02

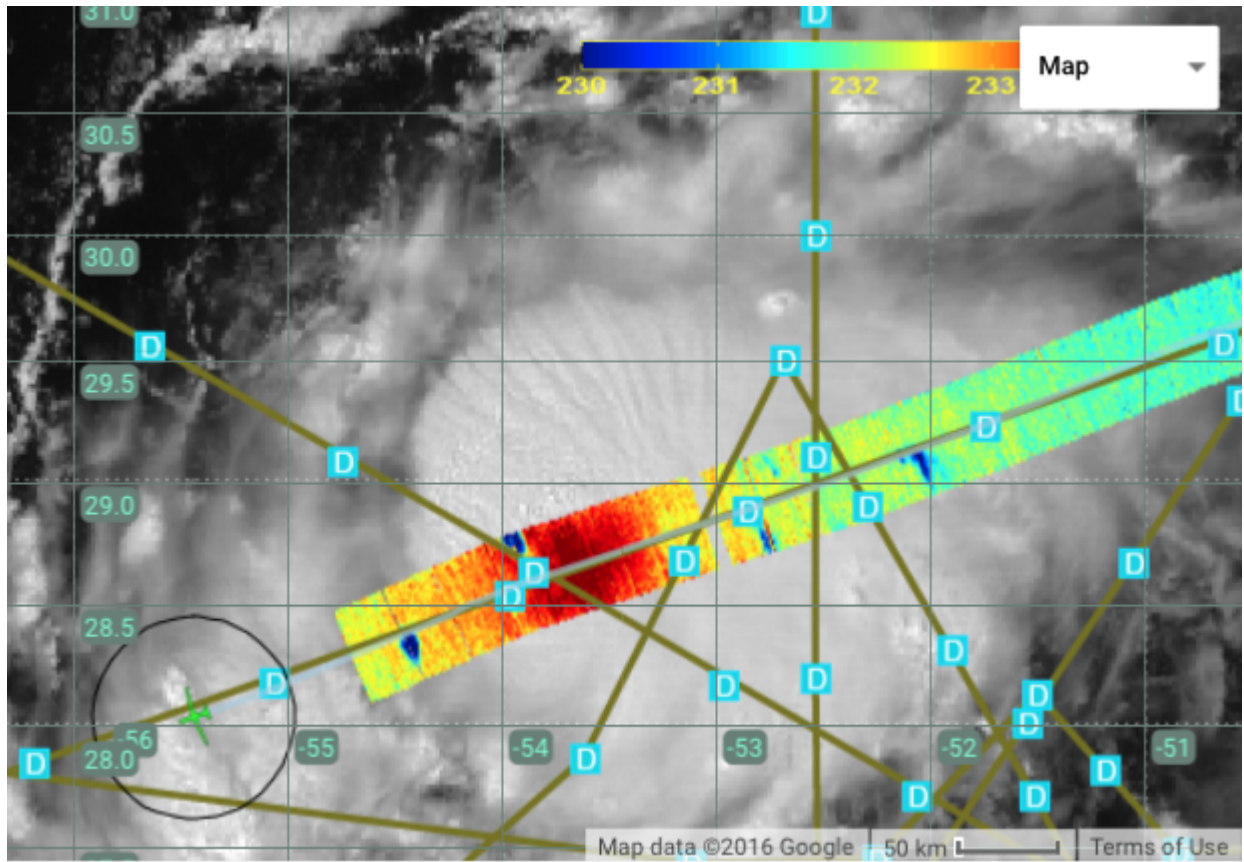


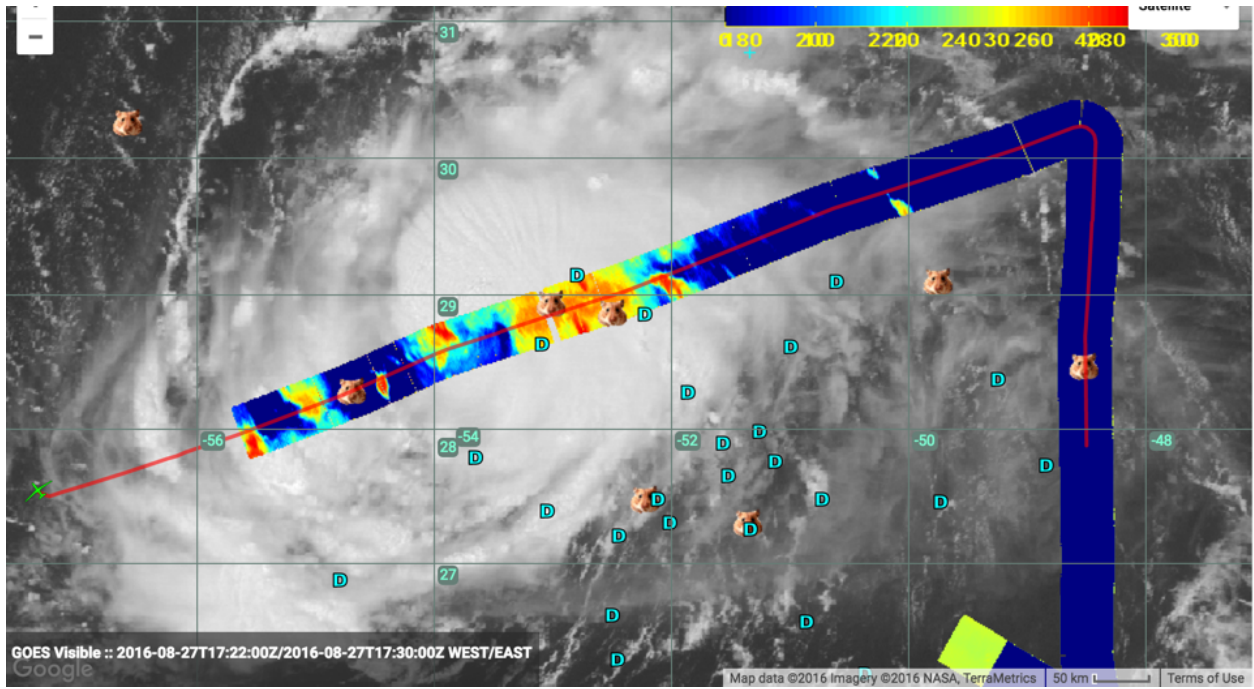
1713 UTC Full cross section of HIWRAP data during last past across, or near, the center (center near -175 to -200 km).



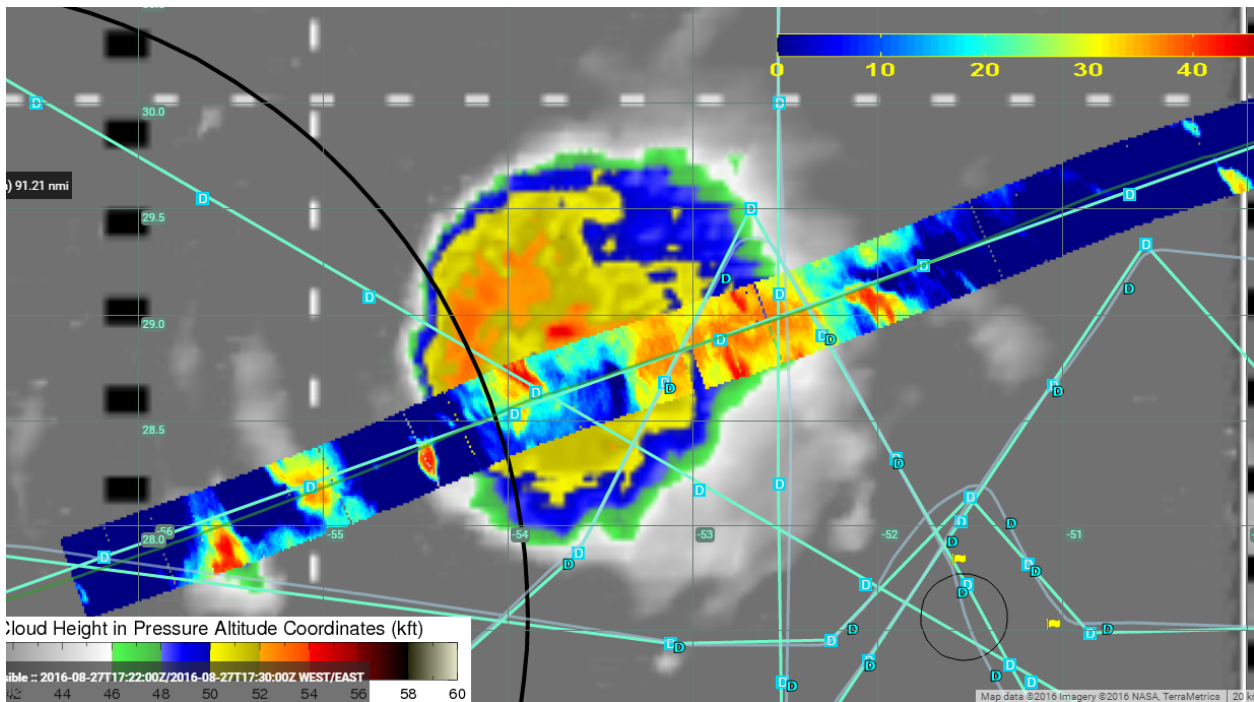
Horizontal cross section of HIWRAP Ku at 2 km just after reaching the southwestern edge of the CDO. The cell on the eastern side is fairly small in scale, part of a narrow band. The region of the CDO is mostly heavy stratiform precipitation. The region of clearing at 2 km on the western edge of the broad stratiform region has only weak echoes above it at higher levels, so attenuation is not a cause (see vertical cross section). That suggests that the clear region is inside the eyewall near the center of the storm, so appears to be a really good overpass.

HAMSr 54.94GHz Tb shows center around 28.6N 53.6W with around 3K warm anomaly at 250 hPa. Overlaid on the 1645 UTC visible.





HAMSR reflectivity at 6 km showing eye and GOES VIS showing circular supercell in NE quadrant of Gaston eyewall.



1740 UTC Here is the HAMSRS 6 km reflectivity product. Qualitatively similar to HIWRAP. Suggests that rainfall on the western side of the eyewall did not wrap around to the south.

1743 UTC GH turning north, heading back to WFF.