

SHOUT Research Flight 3 – 20160829 -TD9

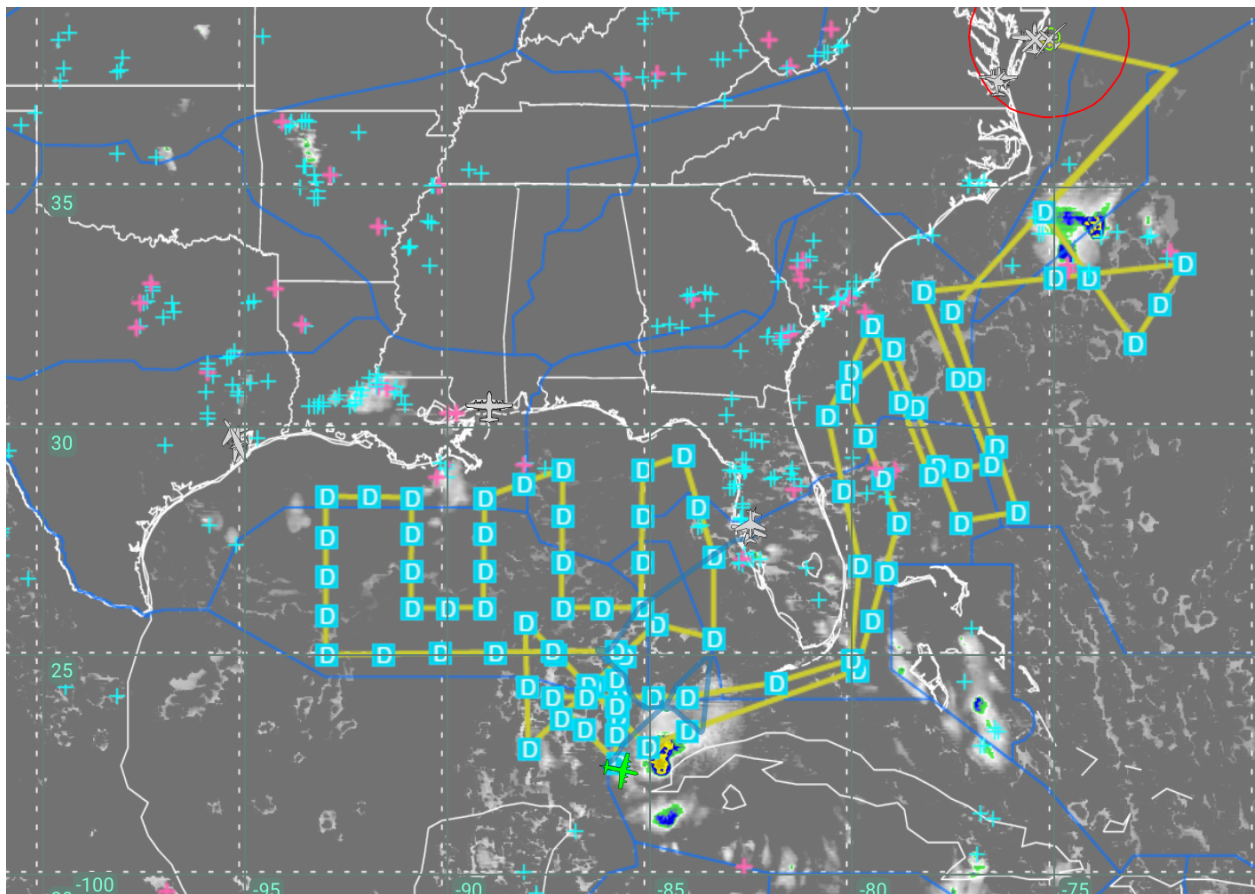
Shift 1 Mission Scientists: Scott Braun, Rosimar Rios-Berrios, Alan Brammer (8/29), David Ryglicki (8/30)

Shift 2 Mission Scientists: Pete Black, Hui Christophersen, Kathryn Sellwood

Shift 3 Mission Scientists: Darren Jackson, Jason Dunion

Log initiated by S. Braun

The first flight for TD9 in the Gulf of Mexico. TD9 current has an intensity of 30 kt and min. SLP of 1007 hPa, moving west at 6 kt. The planned flight track has us doing two legs over TD8 just offshore of North Carolina, followed by a lawnmower pattern off of the east Florida coast. We then transit around the southern end of Florida, do a figure-4 near the center, followed by a broad lawnmower survey and then another figure 4. Transit back to Wallops around the southern tip of Florida, with a repeat of the lawnmower pattern off the east Florida coast. There is lightning activity in TD8, which could pose problems during the early part of the flight when the GH is still only near 50 kft, so it will be watched closely.

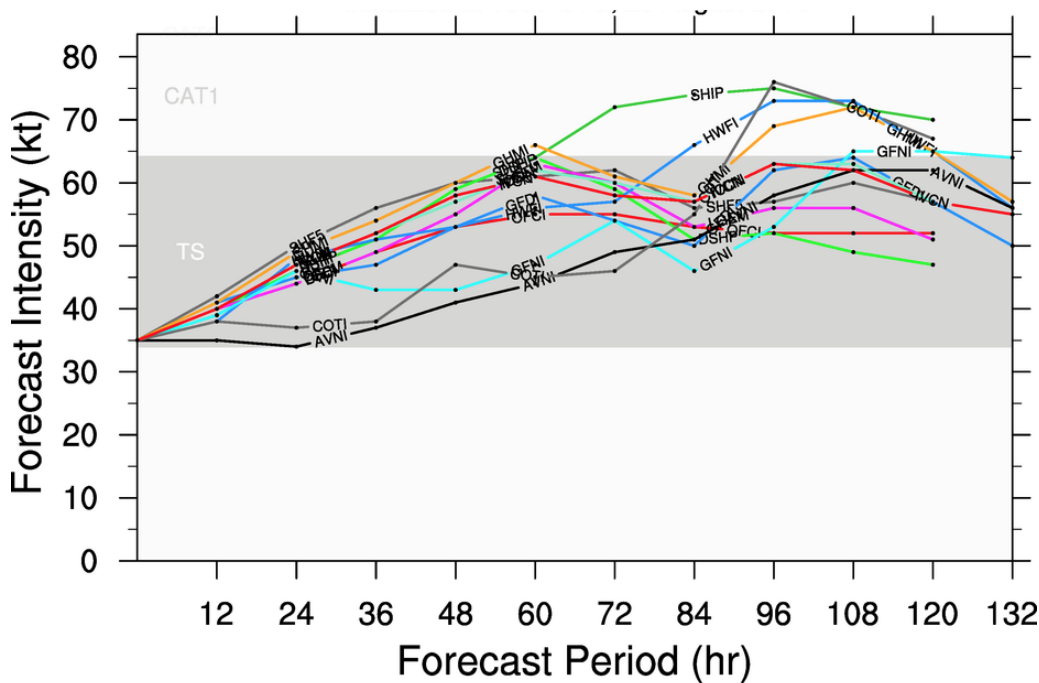
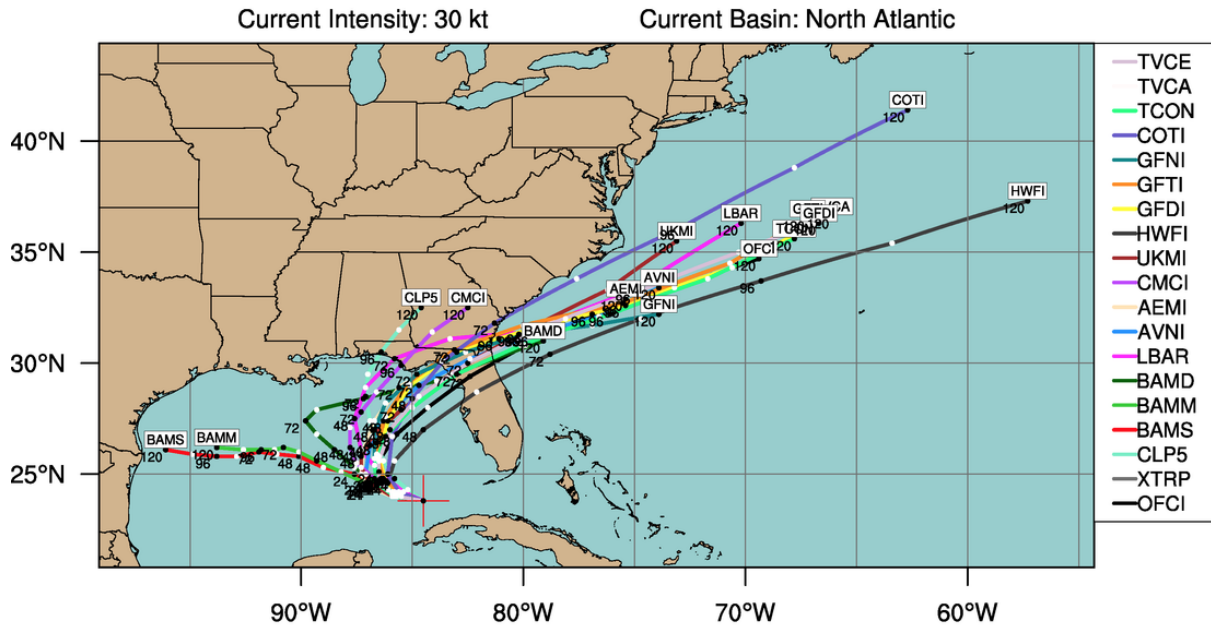


Forecast uncertainty surrounding TD9 is substantial, as shown below, although the 18Z forecast shows better agreement than the 12Z forecast. While a couple of members take the storm due westward, most turn the storm northward and then northeastward, and the main issue is in the

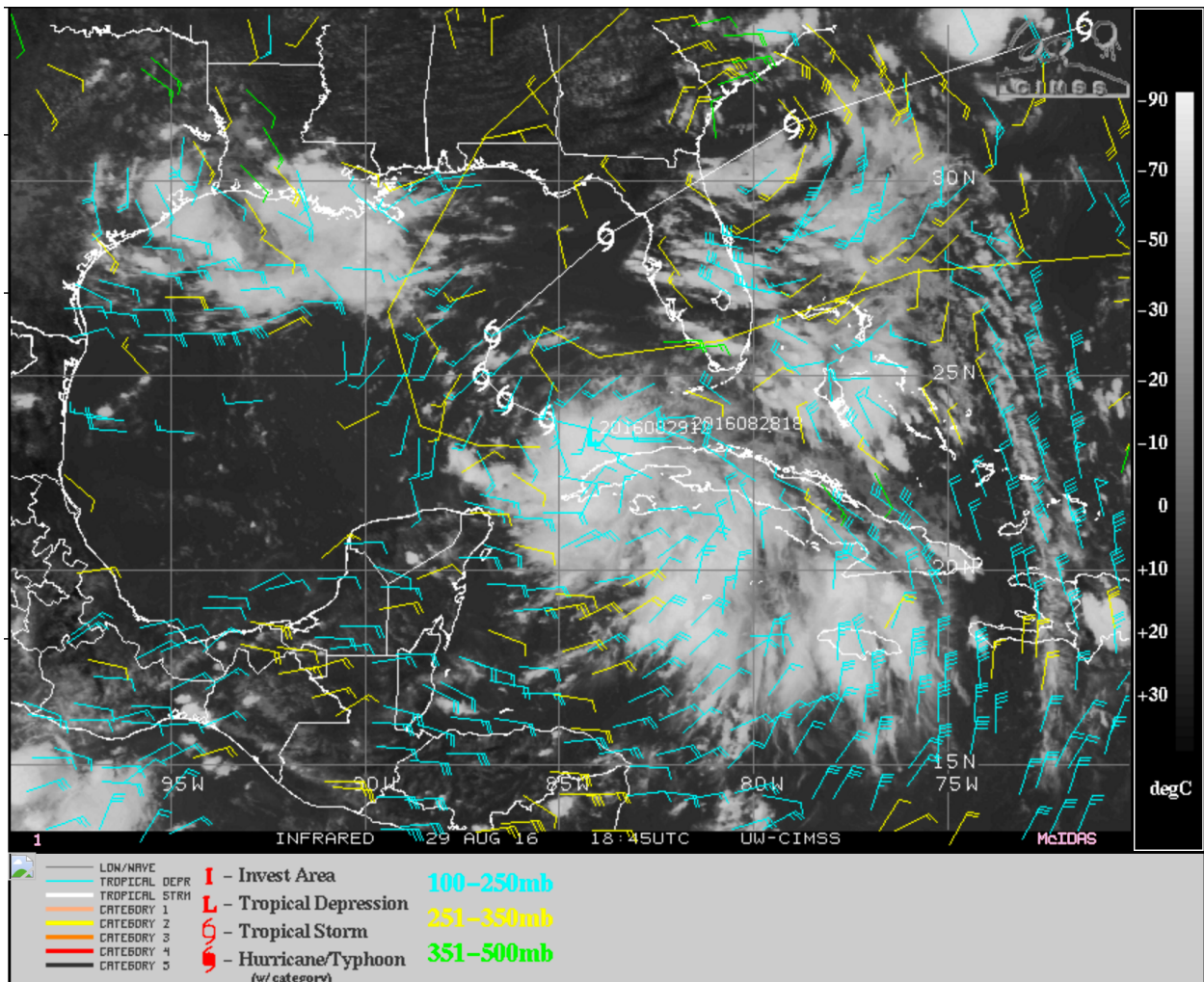
timing of the turns. Landfall appears to be most likely in the Florida Panhandle in the 72 h time frame.

TROPICAL DEPRESSION NINE (AL09)

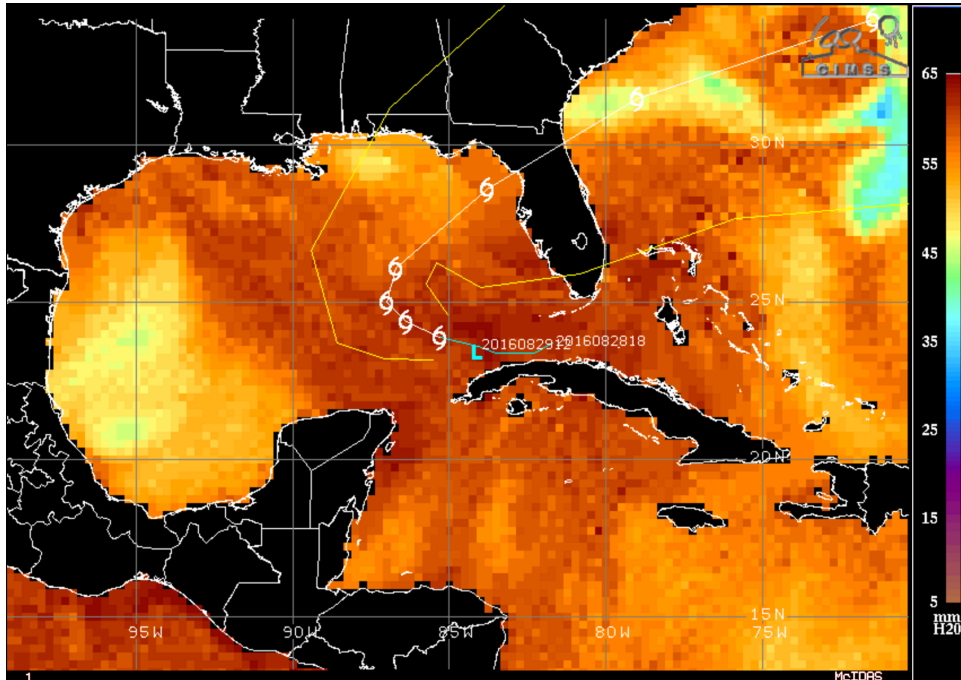
Early-cycle track guidance initialized at 1800 UTC, 29 August 2016



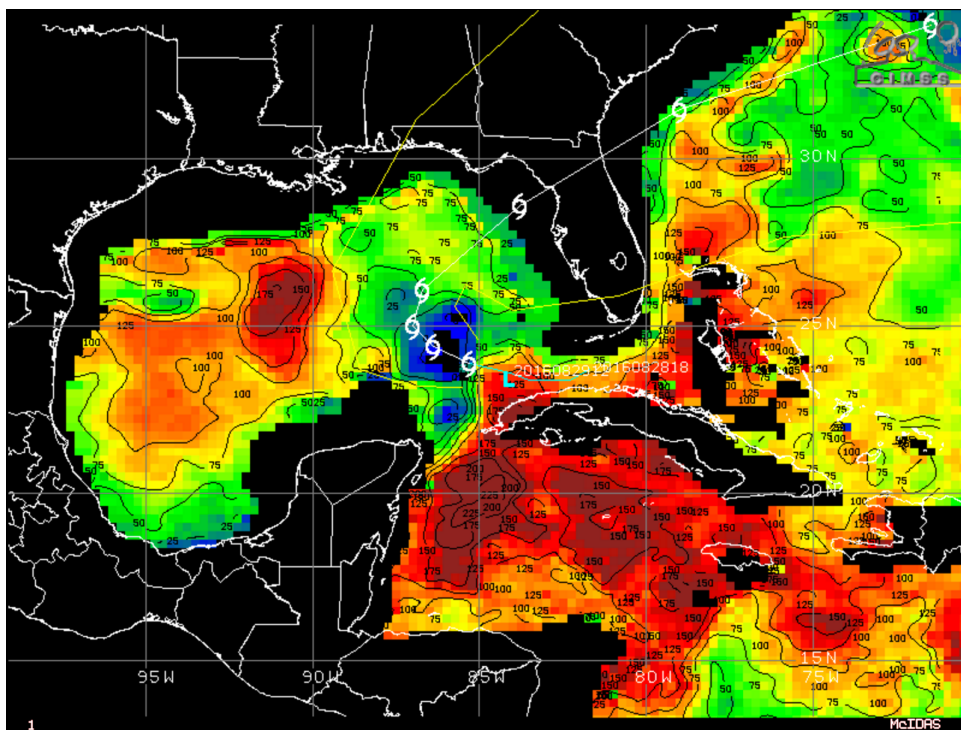
Models appear to be in better agreement for TD9 to become a strong tropical storm or weak hurricane by landfall. The SHIPS model has the shear below 15 kt through 72 h then increasing to 50 kt by 108 hours.



IR image at 1845 UTC shows substantial convection primarily from the storm center southward, although spreading more northward than seen in the forecast briefing this morning. The storm appears to have a well-defined anticyclonic outflow layer established, with the primary outflow channel to the southeast.



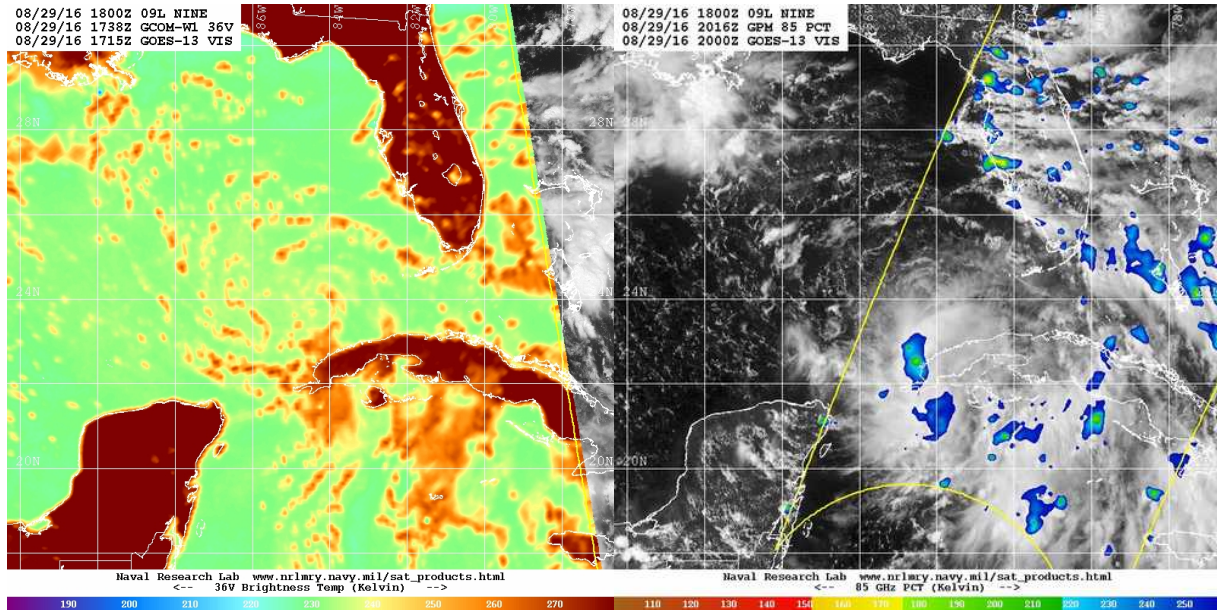
The TPW image above for 1700 UTC shows lots of water vapor for the storm to work with. Some dry air in the western Gulf and near the Alabama/Mississippi coast, but otherwise rather moist.



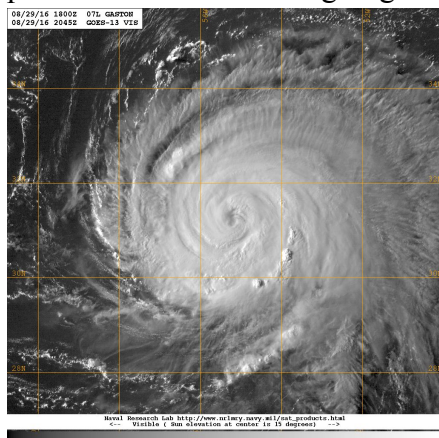
Ocean heat content for August 29. Low OHCs in the path of the storm, although SSTs are high. However, since the storm is still fairly weak, it may not matter initially, but if it starts to intensify, the low OHCs could put a break on it.

Tracks for the mission will appear in MTS under GH Plan 1 Active

Corresponding 37GHz AMSR2 pass as of 1738 showing center in agreement with reconnaissance winds. Highlighting the sheared nature of the storm at this time, low-level center somewhat clear of deep convection to the south. The recent GMI 85 GHz PCT shows minimal scattering, so the storm lacks significant deep convection in the past hour or so.

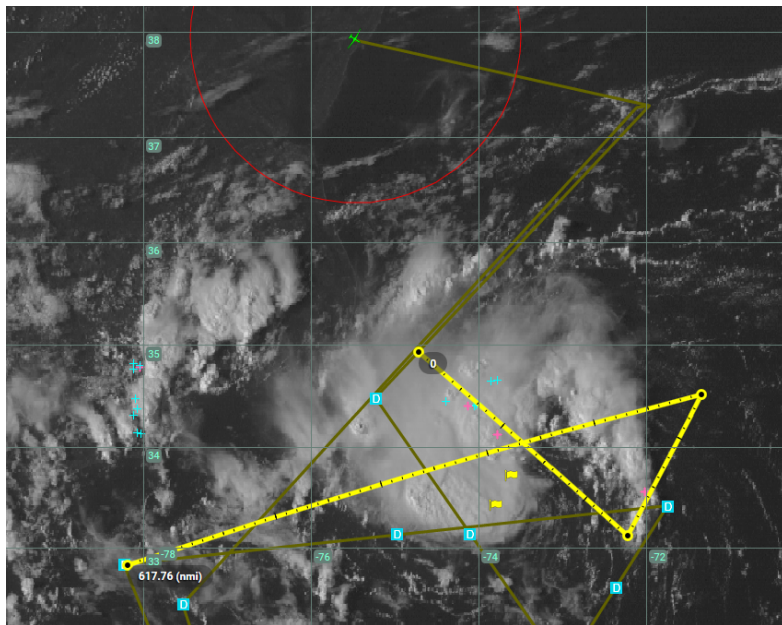
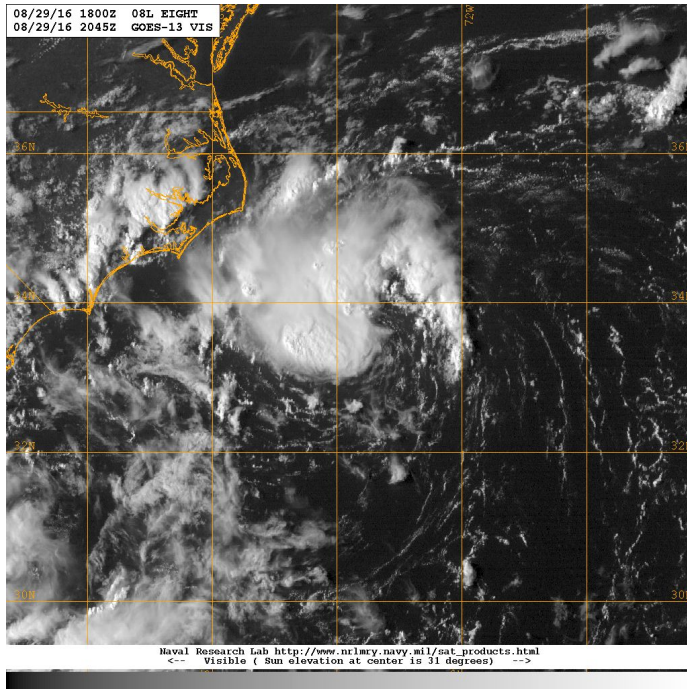


Although not a target on this flight, it's worth noting that Gaston remains a Cat 2 hurricane located at 31.2N 55.2W. Due to the lack of any possible landfall over the US and the gap in flights it was decided that TD9 (with substantial forecast uncertainty) and a transect over TD8 provided more interesting targets.



TD 8 low-level center separated from most of the associated convection early this morning. Convection has however redeveloped during the day. Visible as of 2045Z. Currently subject to

southerly shear of ~20kts. As mentioned earlier, 2 small regions of deep convection exist with frequent lightning across the system.



Seeing lightning in TD8 at the moment with heights nearing 50 kft. Could pose a problem for getting over the storm early in the flight, but we will watch closely. May postpone initial figure 4 to end of flight if lightning continues. Also, storm is more northward than expected, so will shift the figure 4 northward if we can get over it.

T-0 Briefing:

- Engine starts at 1750 local
- Taking off runway 4
- Edwards takes over control at midnight
- Planning to release dropsondes over TD8 and TD9. Total number of dropsondes: 90. AVAPS is ready to go.

C130 is currently conducting a reconnaissance mission into TD8. Latest center fix as of 2106Z:

Product: Air Force Vortex Message (URNT12 KNHC)

Transmitted: 29th day of the month at 21:06Z

Agency: United States Air Force

Aircraft: Lockheed WC-130J Hercules with reg. number AF97-5304

Tropical Depression: Eight (flight in the North Atlantic basin)

Mission Number: 3

Observation Number: 15

A. Time of Center Fix: 29th day of the month at 20:53:20Z

B. Center Fix Coordinates: 33°39'N 73°42'W (**33.65N 73.7W**)

B. Center Fix Location: 152 statute miles (245 km) to the SE (137°) from Cape Hatteras, NC, USA.

C. Minimum Height at Standard Level: 1,529m (5,016ft) at 850mb

D. Estimated (by SFMR or visually) Maximum Surface Wind Inbound: 21kts (~ 24.2mph)

E. Location of the Estimated Maximum Surface Wind Inbound: 27 nautical miles (31 statute miles) to the NNE (30°) of center fix

F. Maximum Flight Level Wind Inbound: From 116° at 24kts (From the ESE at ~ 27.6mph)

G. Location of Maximum Flight Level Wind Inbound: 58 nautical miles (67 statute miles) to the NE (42°) of center fix

H. Minimum Sea Level Pressure: 1012mb (29.89 inHg)

I. Maximum Flight Level Temp & Pressure Altitude Outside Eye: 17°C (63°F) at a pressure alt. of 1,522m (4,993ft)

J. Maximum Flight Level Temp & Pressure Altitude Inside Eye: 20°C (68°F) at a pressure alt. of 1,523m (4,997ft)

K. Dewpoint Temp & Sea Surface Temp (collected at same location as temp inside eye):
Not Available

L. Eye Character: Not Available

M. Eye Shape: Not Available

N. Fix Determined By: Penetration, Radar and Wind

N. Fix Level: 850mb

O. Navigational Fix Accuracy: 0.02 nautical miles

O. Meteorological Accuracy: 0.02 nautical miles

Remarks Section:

Maximum Flight Level Wind: 28kts (~ 32.2mph) which was observed 71 nautical miles (82 statute miles) to the ENE (71°) from the flight level center at 20:11:00Z

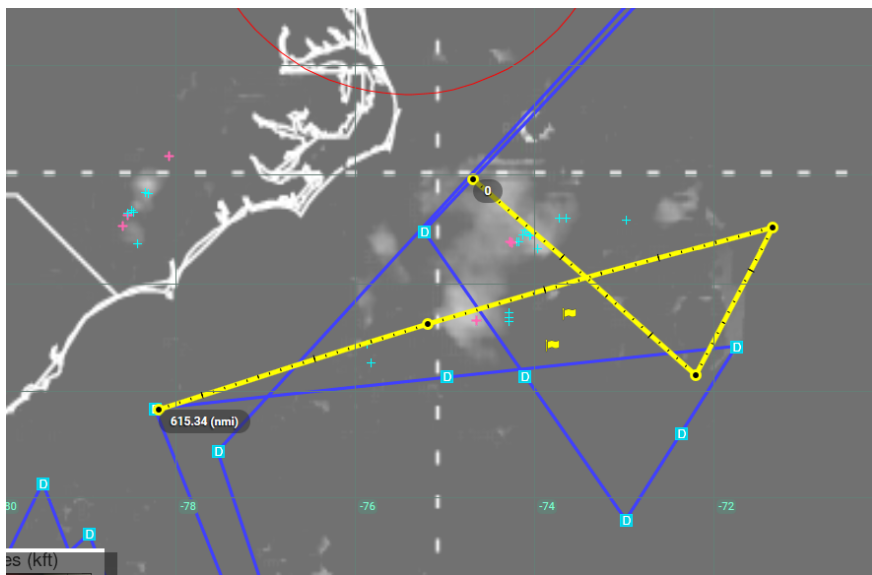
Dropsonde Surface Wind at Center: From 20° at 17kts (From the NNE at 20mph)

Engine start at 2125 UTC.

2202Z: Pin Pulled

2210Z: Taxi

2219Z: Power is up, vehicle is moving.



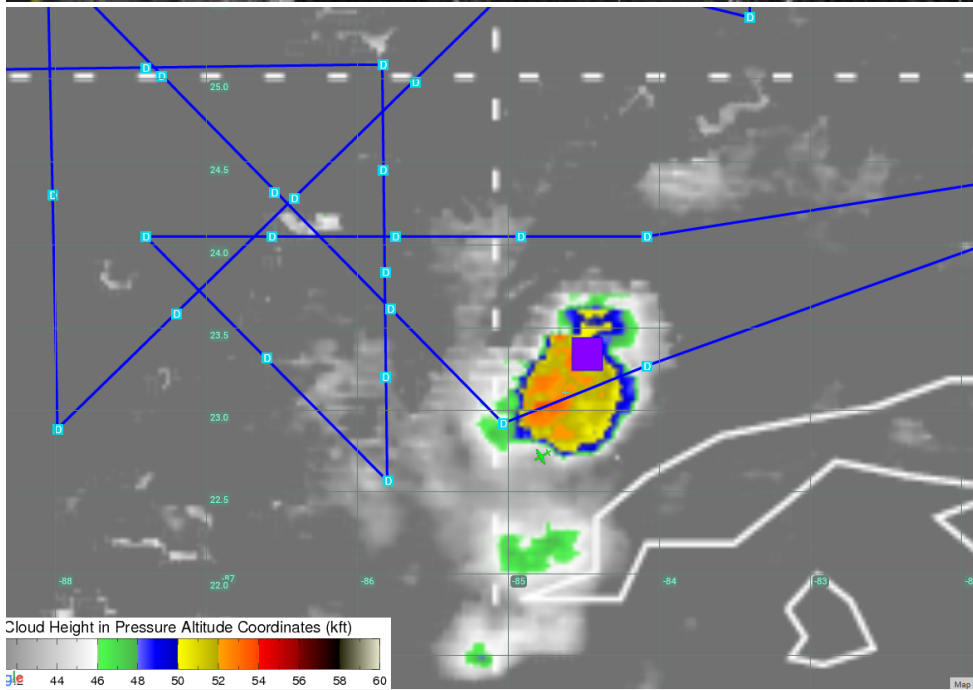
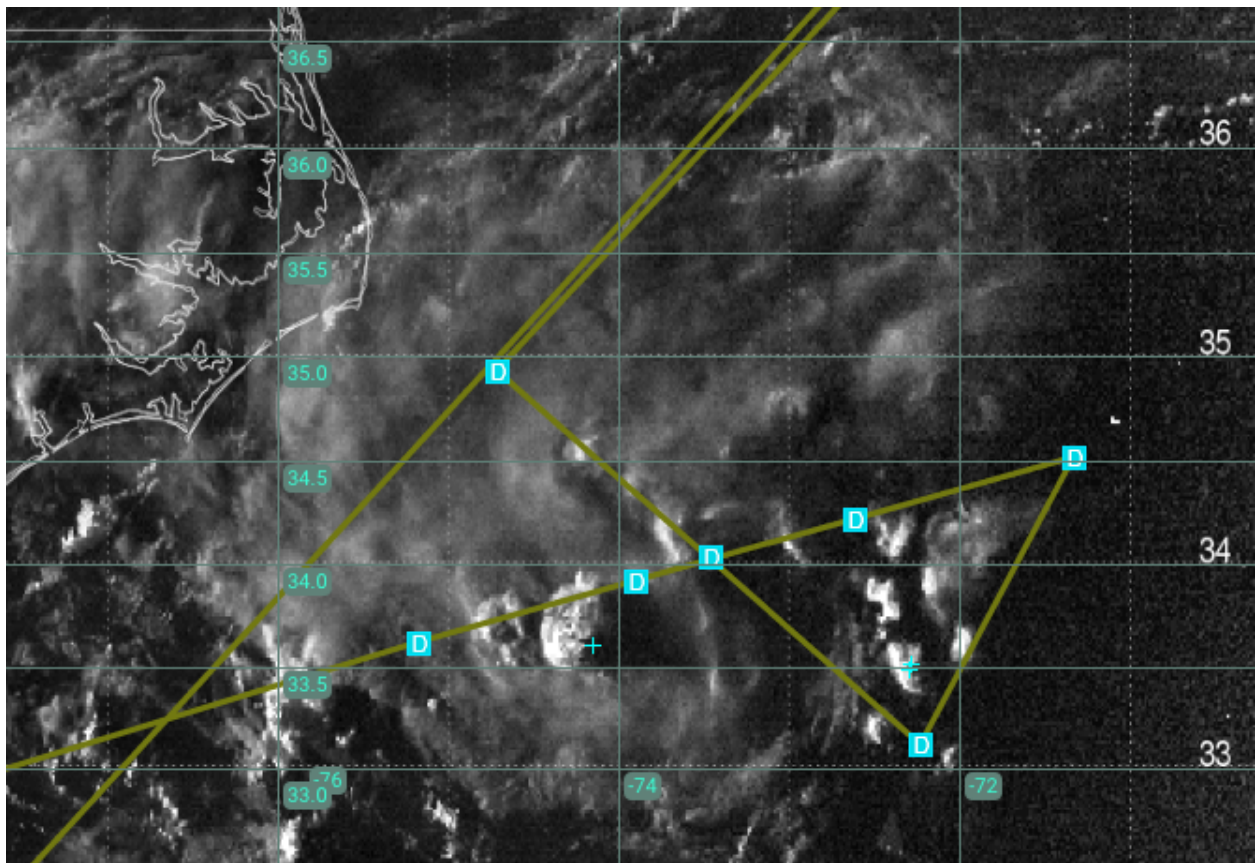
2200 UTC Cloud tops have dropped down into the 42-44 kft range. Lightning persistent in northern cell. Will make call on whether to attempt crossing as we get closer in about 1-1.5 hours.

2250 UTC: Submitted the second update to the flight plan. Changes: adjusted the track and drop points to pass and sample closer to the center of TD #8. We used a blend of satellite images and C130 vortex messages to estimate the location of TD #8.

1. Moved first sonde approximately 37 nmi NE of the original location.
2. Adjusted sondes 2-6 approximately 45 nmi NE of their original location.
3. Removed sondes 3 and 7.
3. Added two extra sondes between between sondes 6 and 7.

Sondes 3 and 7 were very close to other sondes. We decided to remove them in the interest of adding more sondes during the NE-SW transect across TD 8.

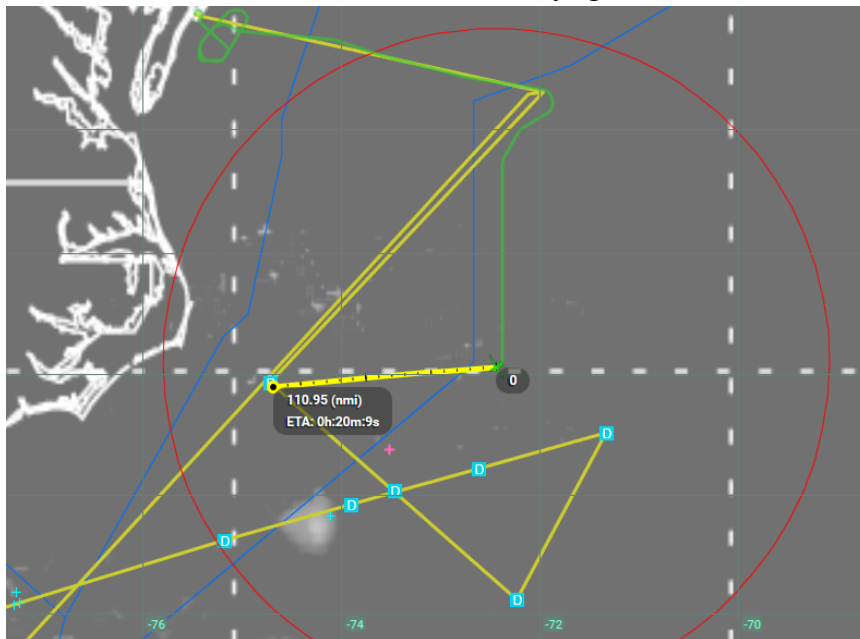
2312Z: Lightning remains moderately frequent in cell to south of the circulation of TD8. Elsewhere lightning has dropped off. (Visible image as of 2300UTC lightning at 2307-2312)



2230 UTC. Although the GH is still hours away from TD9, we are noticing new intense convection south-southeast of the 21 UTC center, with tops near 52-54 kft.



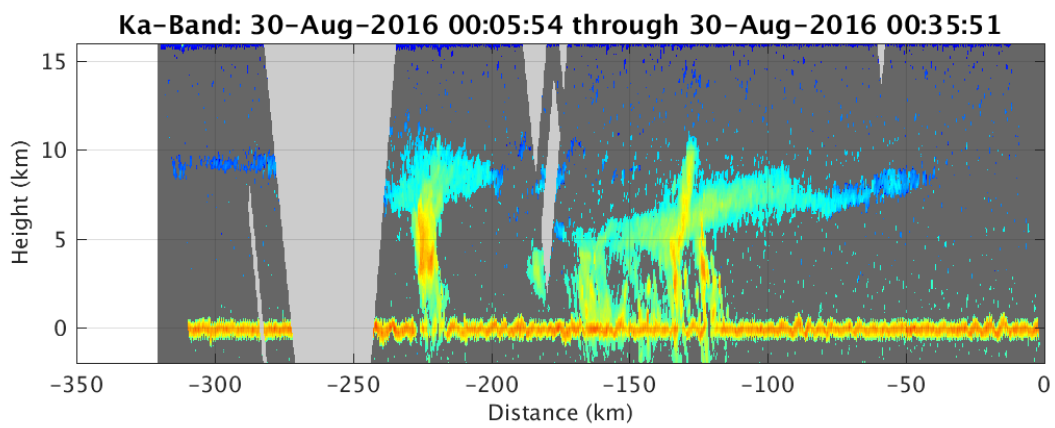
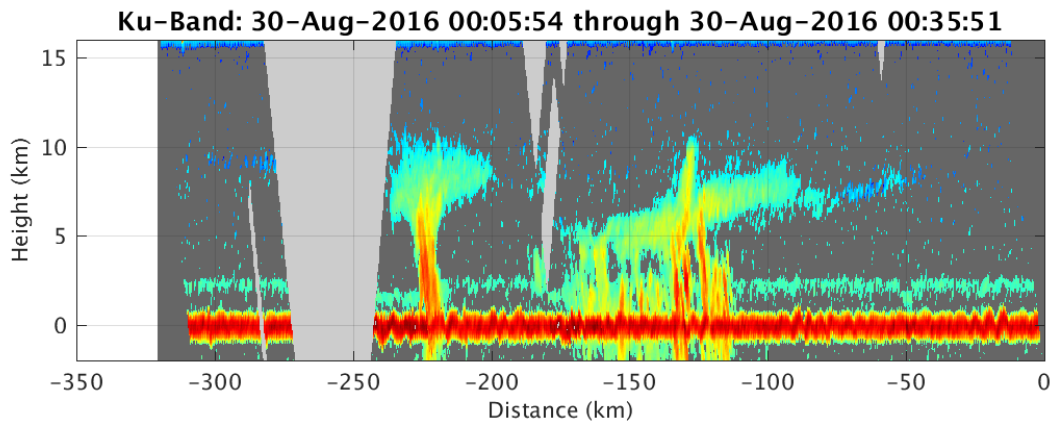
2330 UTC View of the sunset from the daylight camera.



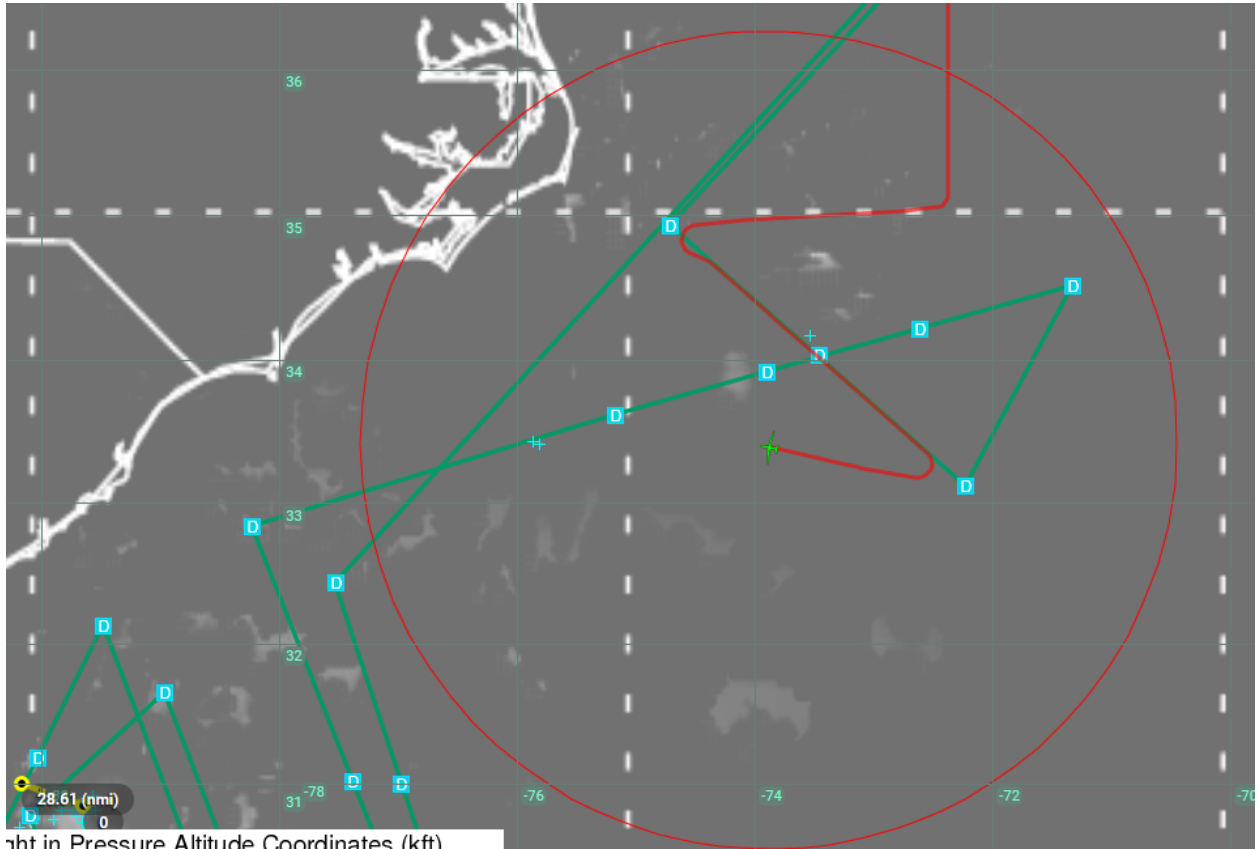
2252 UTC (CTH image from 2330 UTC): GH had to take route parallel to NY IFR until at latitude of first drop. Cleared to head west to first drop point. Delays drop time by about 30 minutes or so.

0009Z: We skipped the first sonde due to an AVAPS error.

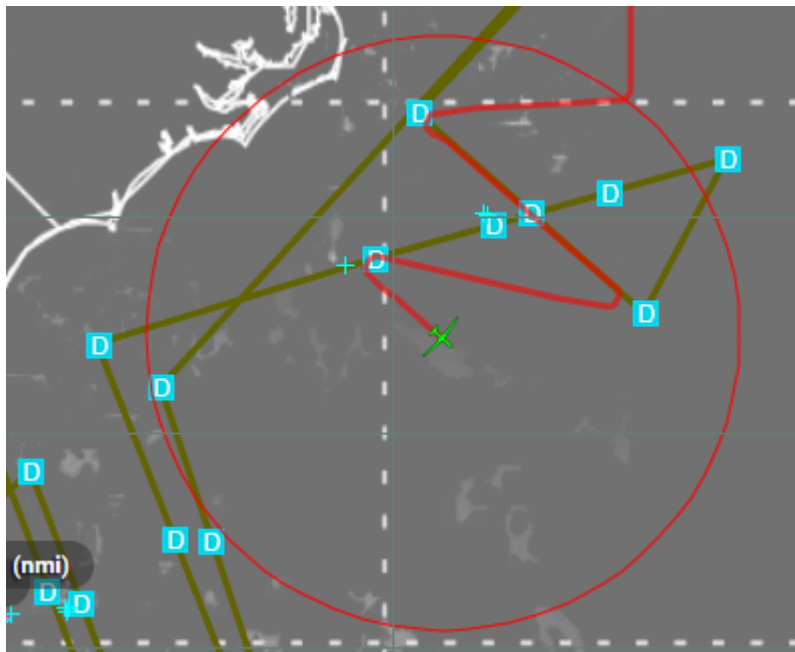
0024 UTC. Drop #1 at location #2 released. Good drop.



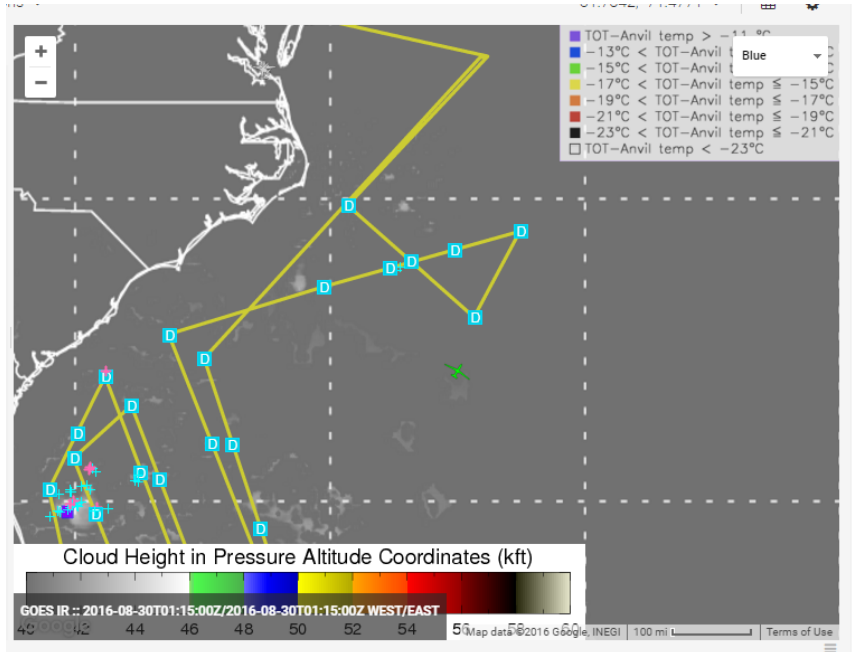
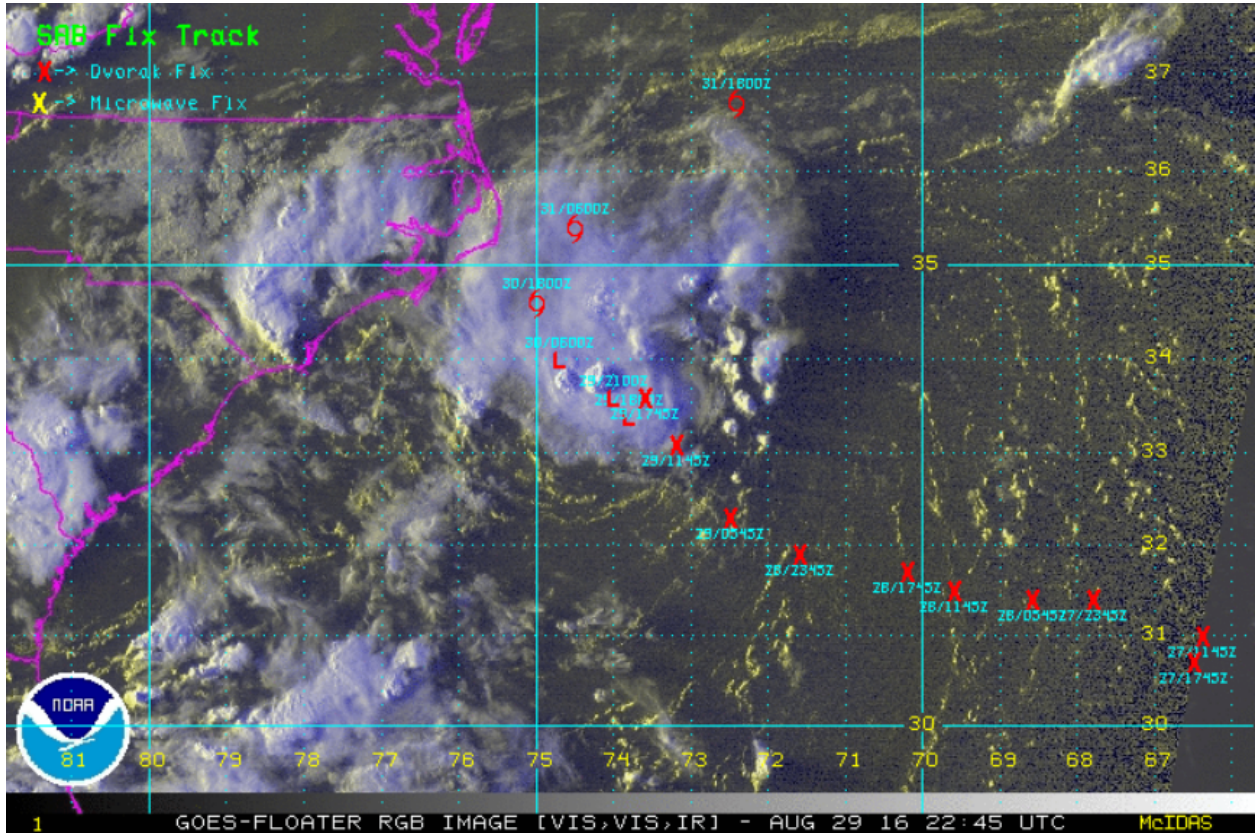
Notice there was some overshooting cloud tops.
Air traffic control, we could not continue figure-4, heading to drop location #7.



0047UTC: Sonde #2 at new location on way to drop loc #7.

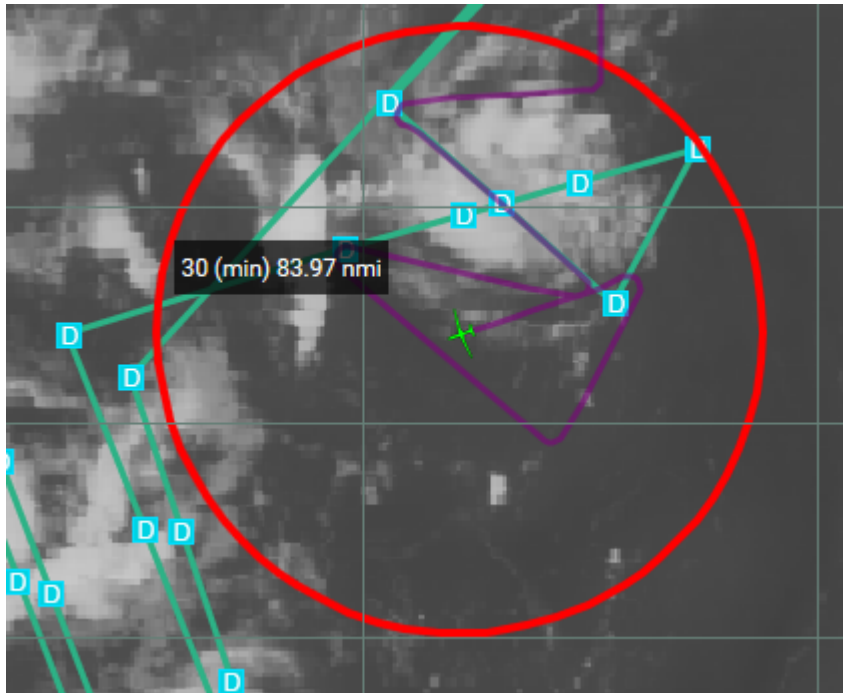


No drops at loc #7. Deviating original track.



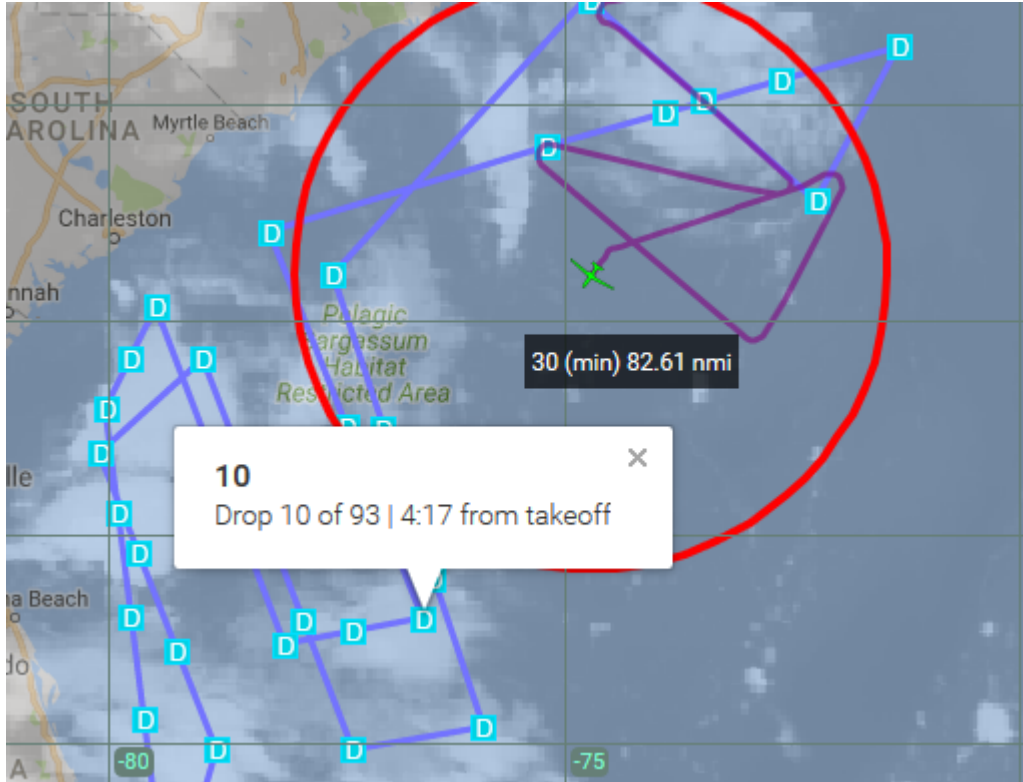
0138Z track deviation due to Air Traffic Control Issues - ATC refused changes going back to original track until new route is finalized

0207Z Track updated to avoid commercial traffic along east coast



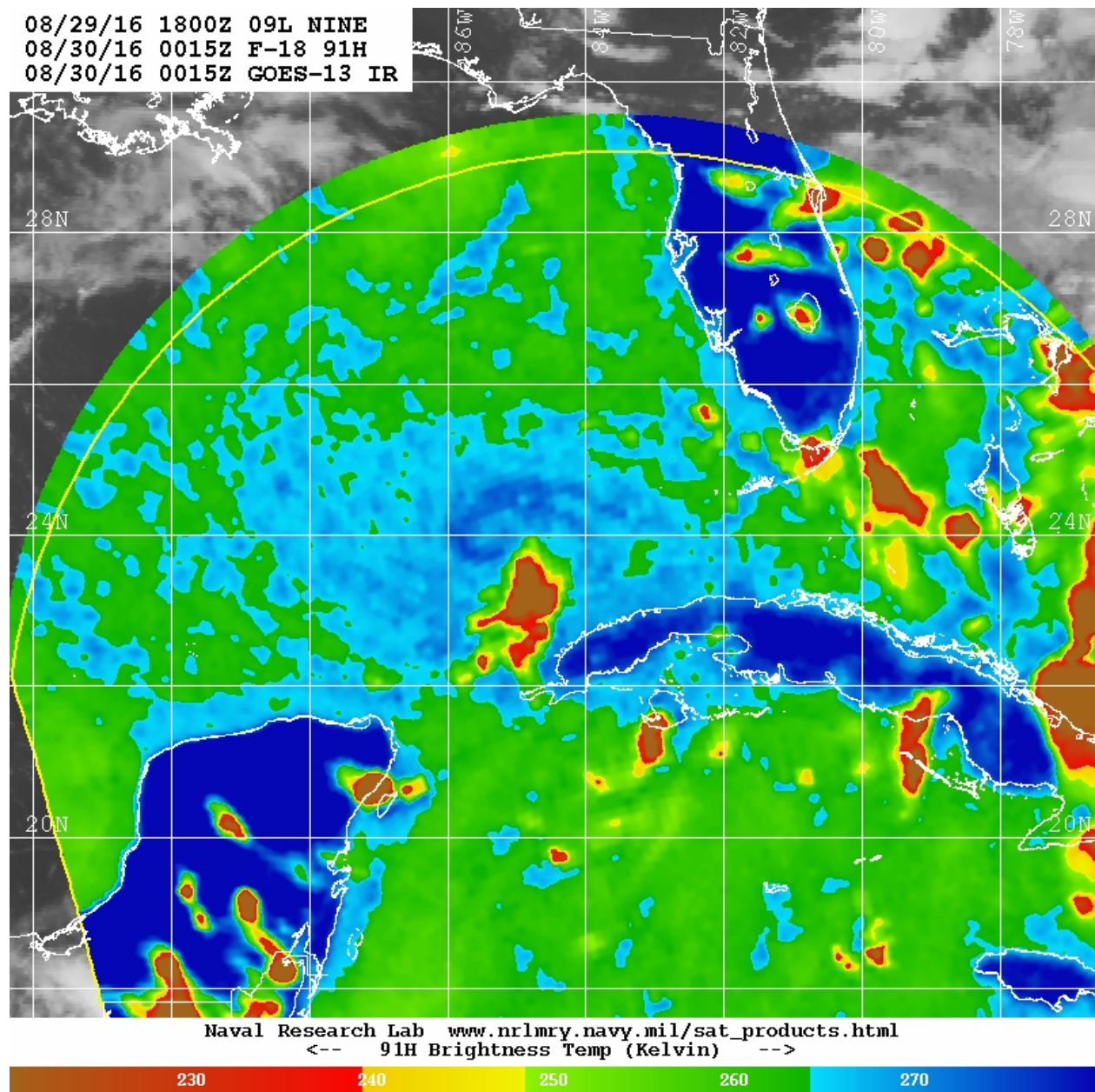
Track followed old track

0209 UTC sonde #3 at a new location (~32.81N,73.94W)



Global Hawk is heading to drop loc #10.

0015Z SSMIS image- good center for TD9 24.0N, -85.3



0300Z Tropical Cyclone Advisory

TD08L

BULLETIN

TROPICAL DEPRESSION EIGHT ADVISORY NUMBER 7

NWS NATIONAL HURRICANE CENTER MIAMI FL AL082016

1100 PM EDT MON AUG 29 2016

...DEPRESSION MOVING SLOWLY NORTHWESTWARD TOWARD THE COAST OF

NORTH CAROLINA...

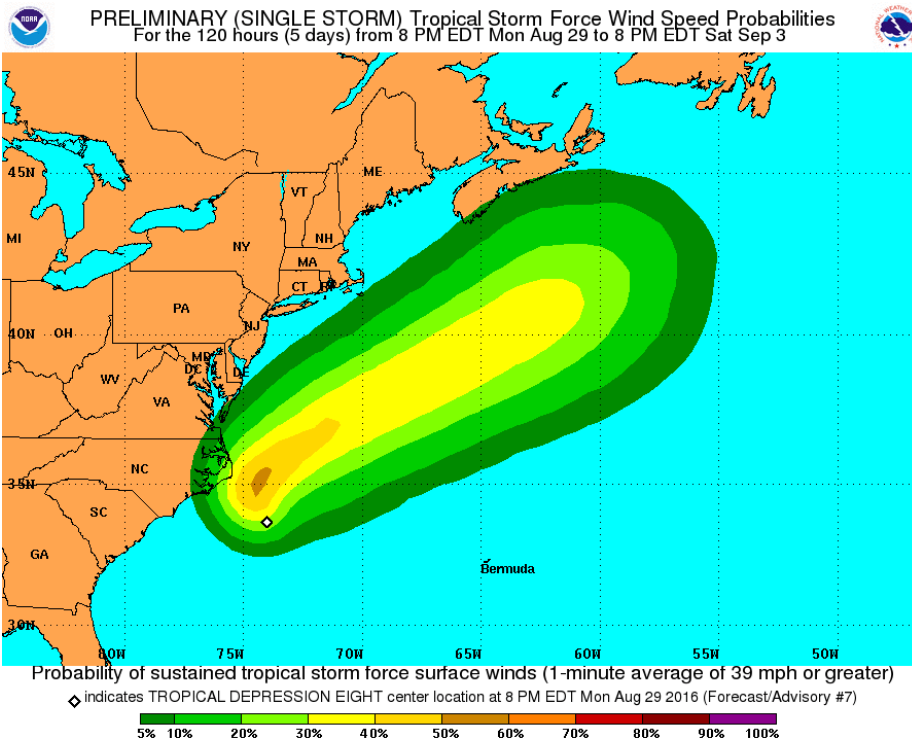
SUMMARY OF 1100 PM EDT...0300 UTC...INFORMATION

LOCATION...33.8N 74.1W
ABOUT 125 MI...200 KM SE OF CAPE HATTERAS NORTH CAROLINA
MAXIMUM SUSTAINED WINDS...35 MPH...55 KM/H
PRESENT MOVEMENT...NW OR 315 DEGREES AT 5 MPH...7 KM/H
MINIMUM CENTRAL PRESSURE...1011 MB...29.86 INCHES

WATCHES AND WARNINGS

CHANGES WITH THIS ADVISORY:

None.



TD09L

000

WTNT24 KNHC 300248

TCMAT4

TROPICAL DEPRESSION NINE FORECAST/ADVISORY NUMBER 6

NWS NATIONAL HURRICANE CENTER MIAMI FL AL092016

0300 UTC TUE AUG 30 2016

THERE ARE NO COASTAL WATCHES OR WARNINGS IN EFFECT.

TROPICAL DEPRESSION CENTER LOCATED NEAR 23.9N 85.5W AT 30/0300Z

POSITION ACCURATE WITHIN 20 NM

PRESENT MOVEMENT TOWARD THE WEST OR 280 DEGREES AT 6 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 1003 MB
MAX SUSTAINED WINDS 30 KT WITH GUSTS TO 40 KT.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL
MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 23.9N 85.5W AT 30/0300Z
AT 30/0000Z CENTER WAS LOCATED NEAR 23.8N 85.2W

FORECAST VALID 30/1200Z 24.2N 86.4W
MAX WIND 35 KT...GUSTS 45 KT.
34 KT... 30NE 30SE 0SW 30NW.

FORECAST VALID 31/0000Z 24.9N 87.1W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 50NE 30SE 0SW 40NW.

FORECAST VALID 31/1200Z 25.8N 87.0W
MAX WIND 45 KT...GUSTS 55 KT.
34 KT... 60NE 40SE 20SW 50NW.

FORECAST VALID 01/0000Z 27.2N 85.8W
MAX WIND 55 KT...GUSTS 65 KT.
50 KT... 20NE 20SE 0SW 20NW.
34 KT... 60NE 60SE 30SW 50NW.

FORECAST VALID 02/0000Z 30.1N 82.2W...INLAND
MAX WIND 50 KT...GUSTS 60 KT.
50 KT... 20NE 20SE 0SW 0NW.
34 KT... 60NE 60SE 40SW 40NW.

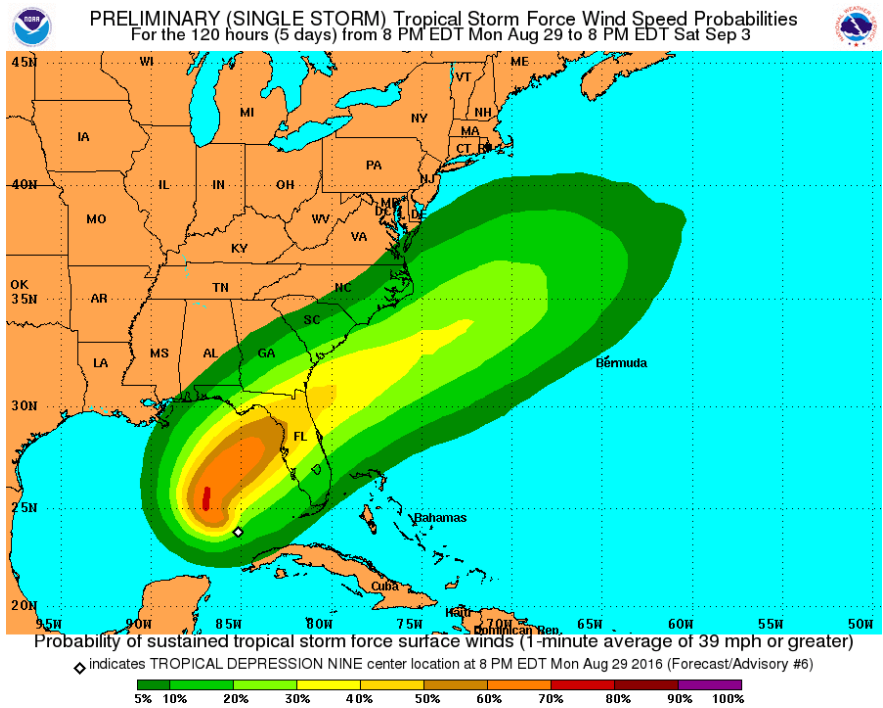
EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 150 NM
ON DAY 4 AND 200 NM ON DAY 5...AND FOR INTENSITY NEAR 15 KT EACH DAY

OUTLOOK VALID 03/0000Z 33.1N 75.5W...OVER WATER
MAX WIND 50 KT...GUSTS 60 KT.

OUTLOOK VALID 04/0000Z 35.8N 68.7W
MAX WIND 50 KT...GUSTS 60 KT.

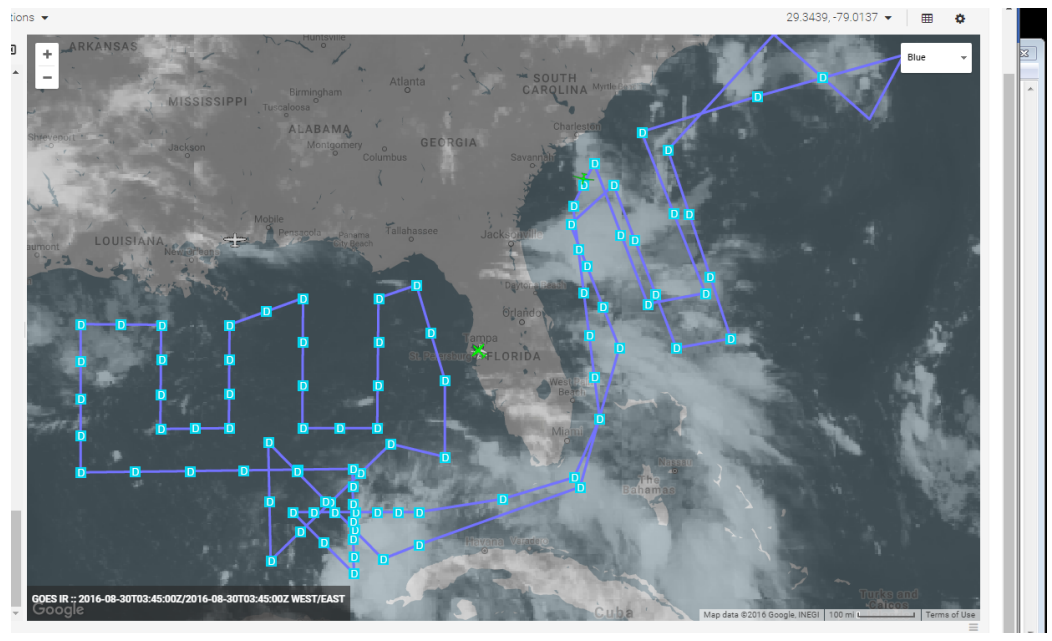
REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 23.9N 85.5W

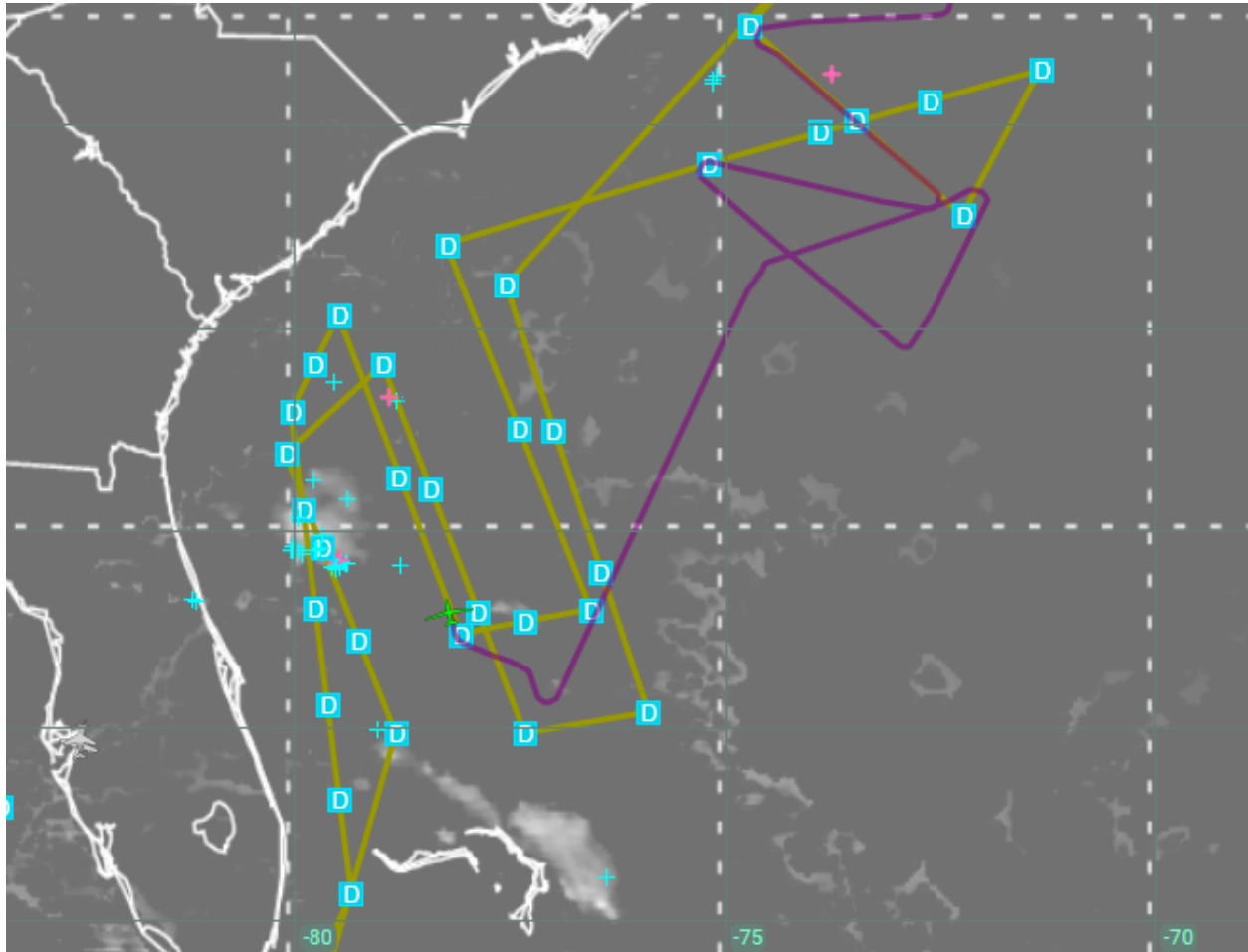
NEXT ADVISORY AT 30/0900Z



Lost coms with GH at drop pt 10: 29.2273, -76.58332: aircraft continued on fixed heading for another 60 nm before turning north NW back to drop point 12- skipped drop #11.

Track with updated drop locations :





0255UTC: sonde #5 at location #10, good drop

0321UTC: sonde #6 at location #12, good drop

0337UTC: sonde #7 at location #13, good drop

Update track to match the dropsonde location and numbering.

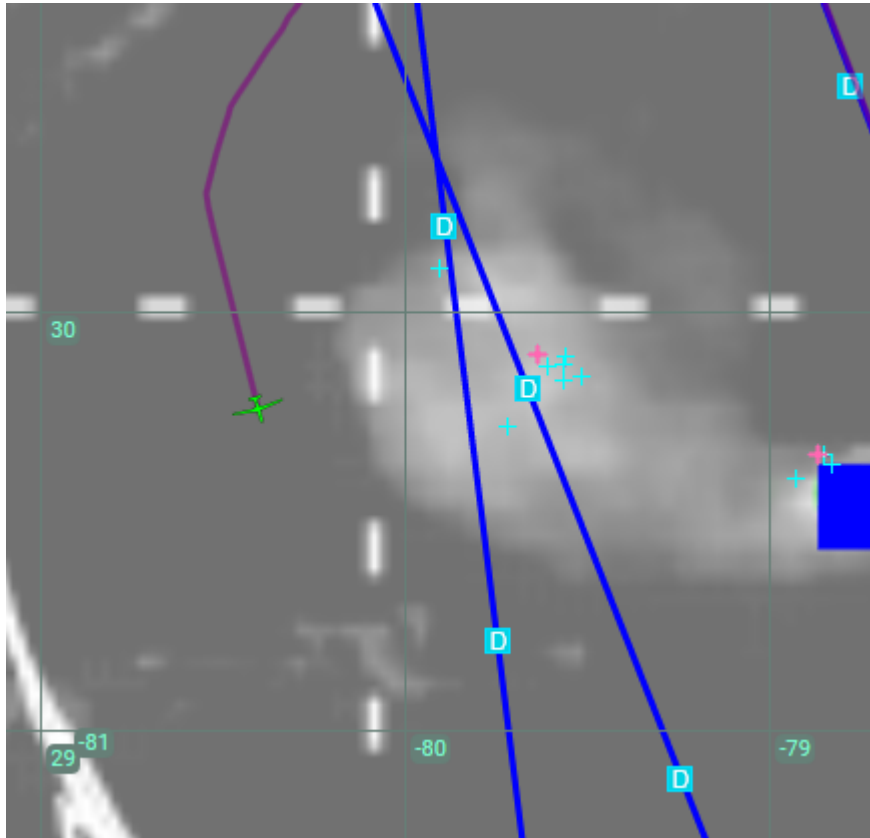
0354UTC: sonde #8 at location #8, good drop

0405UTC: sonde #9 at location #9, good drop

0409UTC: sonde #10 at location #10, good drop

0412- lost link with aircraft again: flying off track to southwest

Lost link not the issue with going off track. Pilots have a different flight plan than mission science. Supposedly flying flight track that was filed. Are pilots getting email updates?



0422UTC: sonde #11 at location #11 west (GH deviated slightly to the west of the track), good drop

Location #12 sonde skipped.

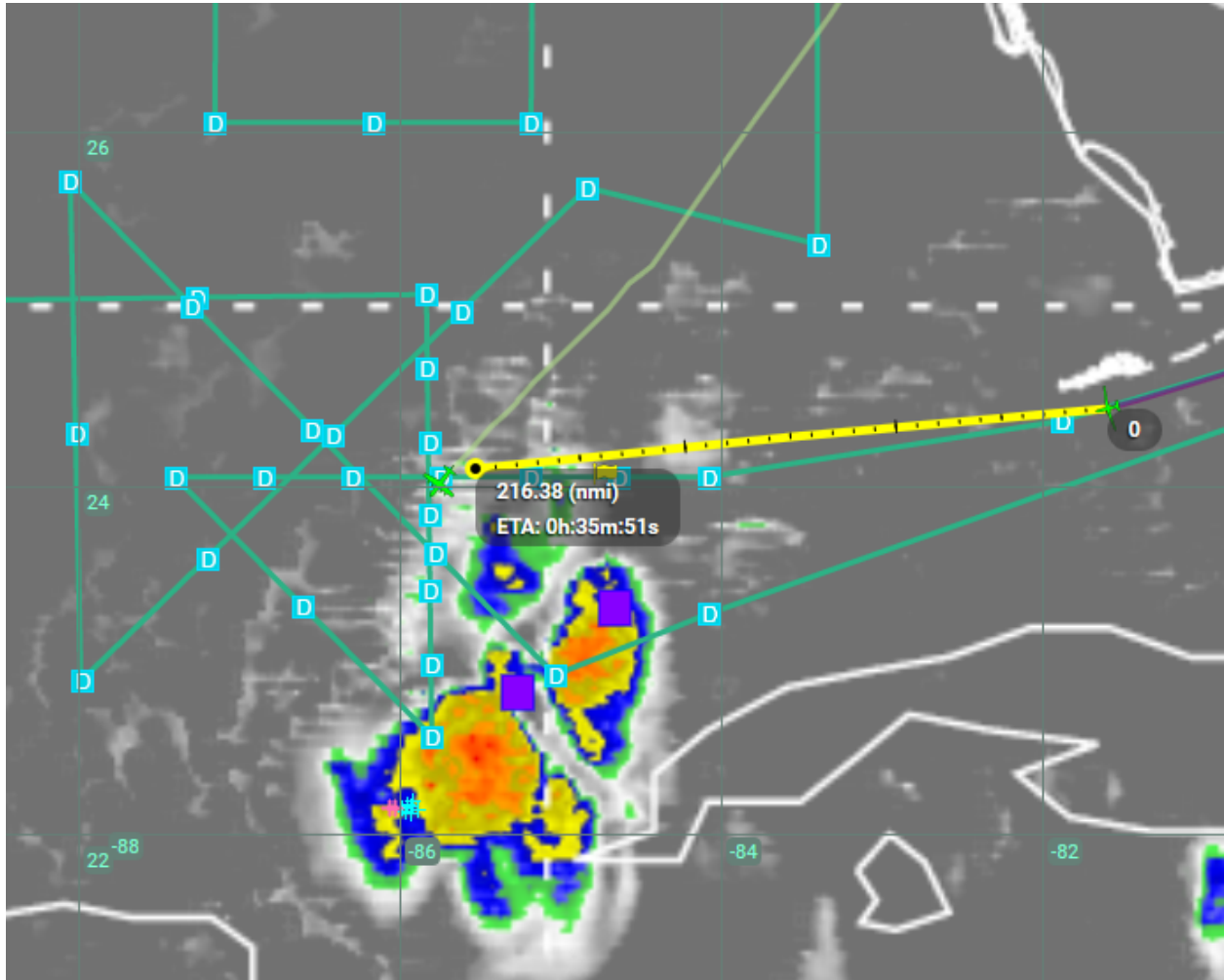
Com problem with ATC: handoff to Armstrong underway, but no comes yet. Have to hold deployment of sonde 13.

ATC disallowed any further wholesale flight pattern changes; so pilots retained prior track update with legs close to coast. But air traffic has cleared out and should be not conflict. Basically, mass confusion! Continuing on old flight track with estimated drop locations west of update 4

0445UTC: sonde #12 released between location #13 and #14 to the west; drop #13 between rev 4 pts 14 and 15. Next drop will be 15west; but no contact with ATC so holding sonde- no permission. AFRC not yet set up to take control. Links back up at Armstrong- have been lost for some time ~ 20 min. So no hand-off yet, and no ATC coms while we fly down the coast doing nothing.

0504 UTC sonde #13 at location #15 West, good drop

0517 UTC sonde #14 at location #16 west, good drop



Global Hawk is about 216 n mi away from N43RF, ready to release sonde #15
 0532 UTC: sonde #15 at location #17, good drop

000

URNT12 KWBC 300557

VORTEX DATA MESSAGE AL092016

A. 30/05:42:29Z

B. 23 deg 34 min N
 086 deg 24 min W

C. 925 mb 755 m

D. 19 kt

E. 055 deg 31 nm

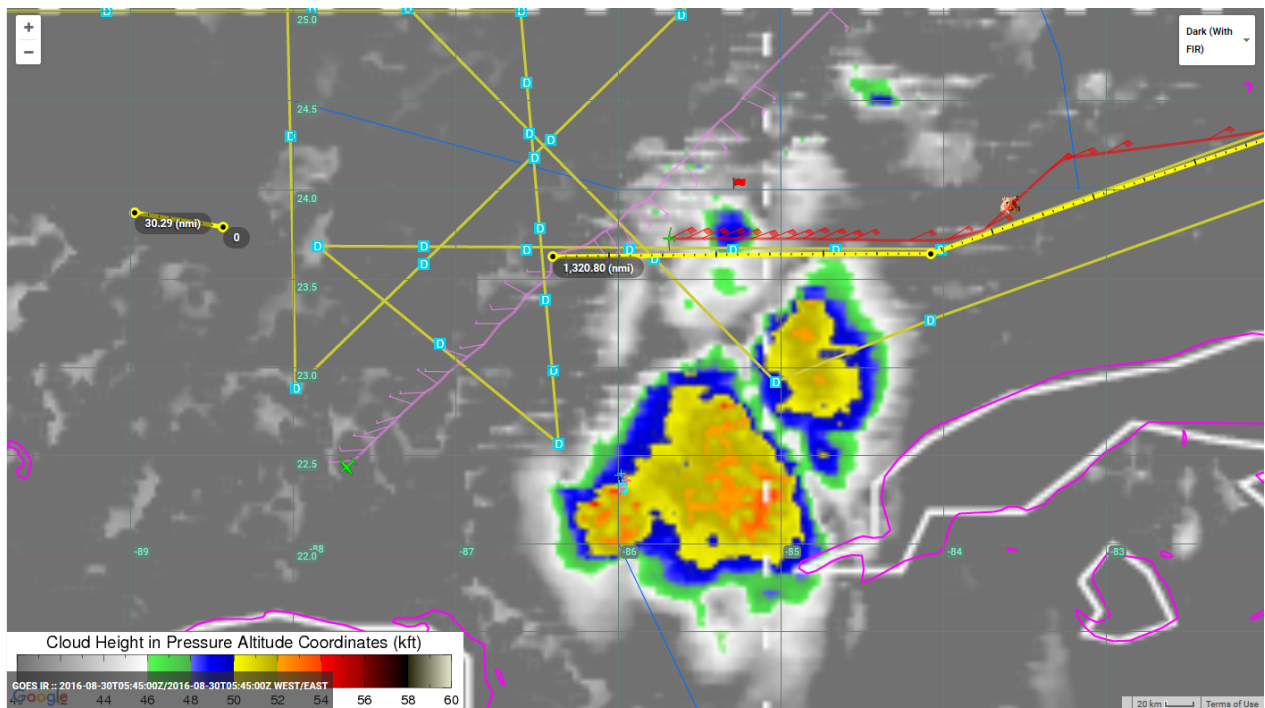
F. 129 deg 26 kt

G. 047 deg 130 nm

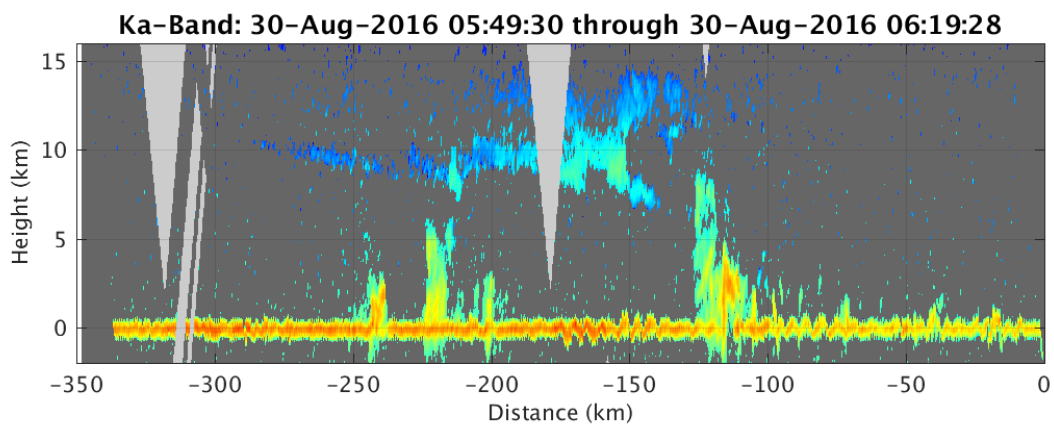
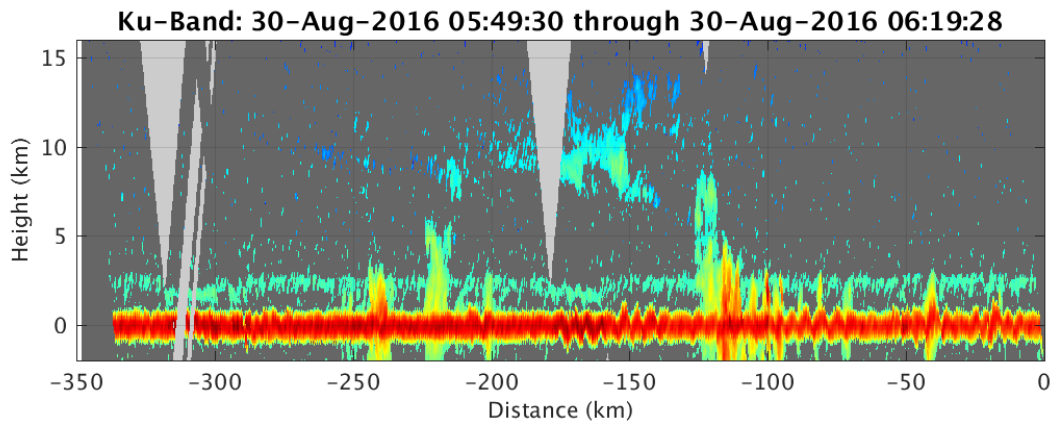
H. EXTRAP 1007 mb

I. 22 C / 771 m

J. 24 C / 777 m
K. 21 C / NA
L. NA
M. NA
N. 134 / 9
O. 0.1 / 4 nm
P. NOAA3 0809A CYCLONE OB 03
VERY BROAD AND FLAT PRESSURE AND WIND FIELD
SLP EXTRAP FROM 925 MB
MAX FL WIND 26 KT 047 / 130 NM 05:07:22Z
MAX FL TEMP 24 C 051 / 61 NM FROM FL CNTR



New track shifted 20 nm south and 25 nm west based on N43RF fix.



Update #5 to flight plan has been updated to MTS under GH plan 1(Active Track)

Changes: adjust the location #18 20n mil south, and adjust the S-N center passing 20 n mi west based on the estimated center from P3

0554 UTC: sonde #16 at location #18, good drop

0559 UTC: sonde #17 at location #19, good drop

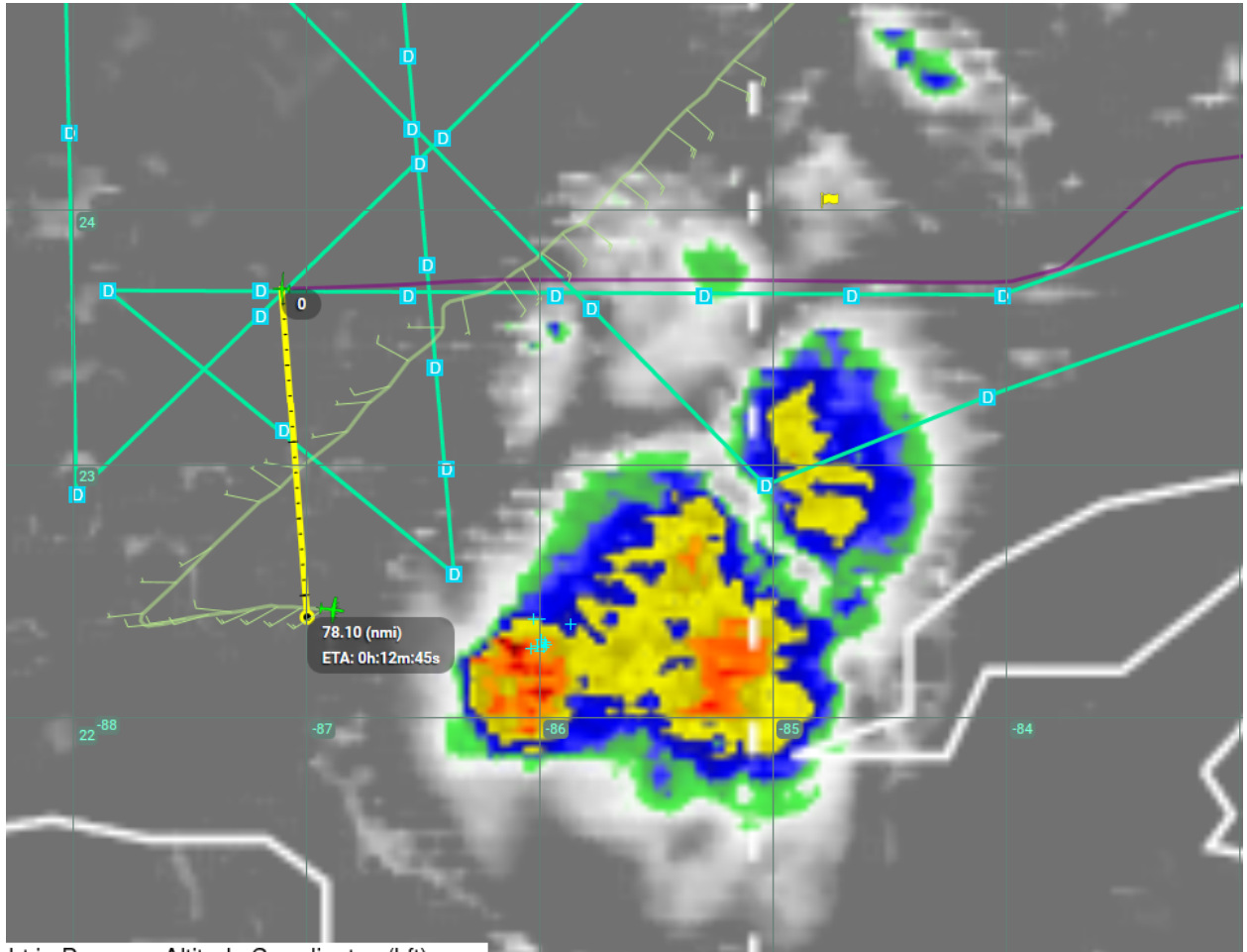
0605 UTC: sonde 18 at location #20, good drop

0611 UTC: sonde 19 at location #21, good drop

0617 UTC: sonde 20 at location #22, good drop

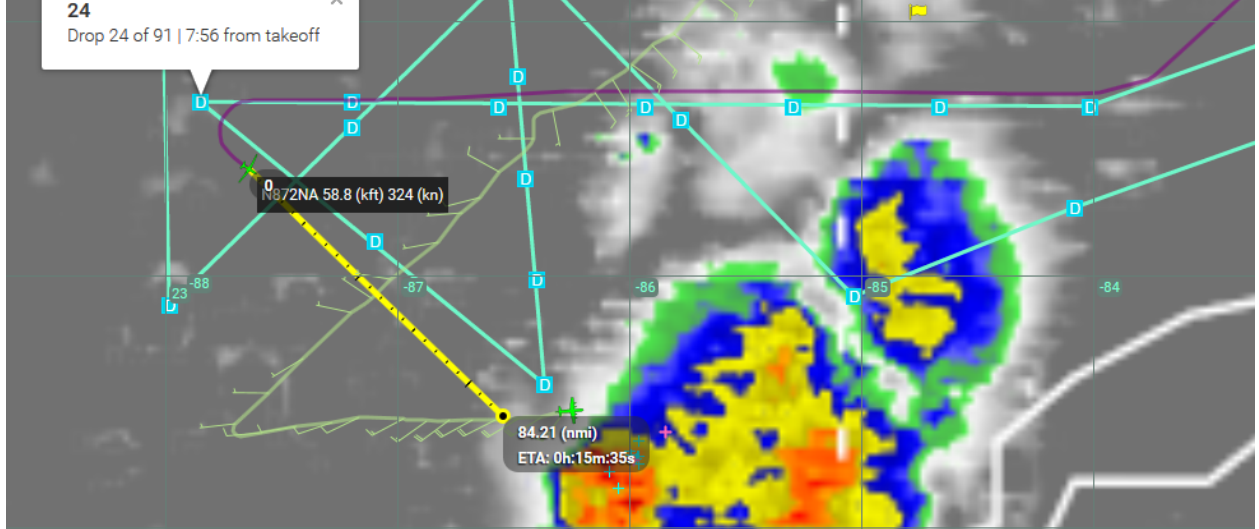
IR-Cam 30Aug2016 06:20:46 UTC
SHOUT-HRR Science-3
Temp: 13.5° C



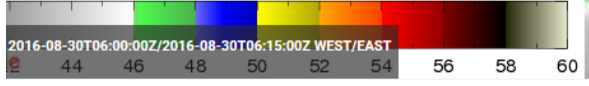


ht in Pressure Altitude Coordinates (kft)

24
Drop 24 of 91 | 7:56 from takeoff



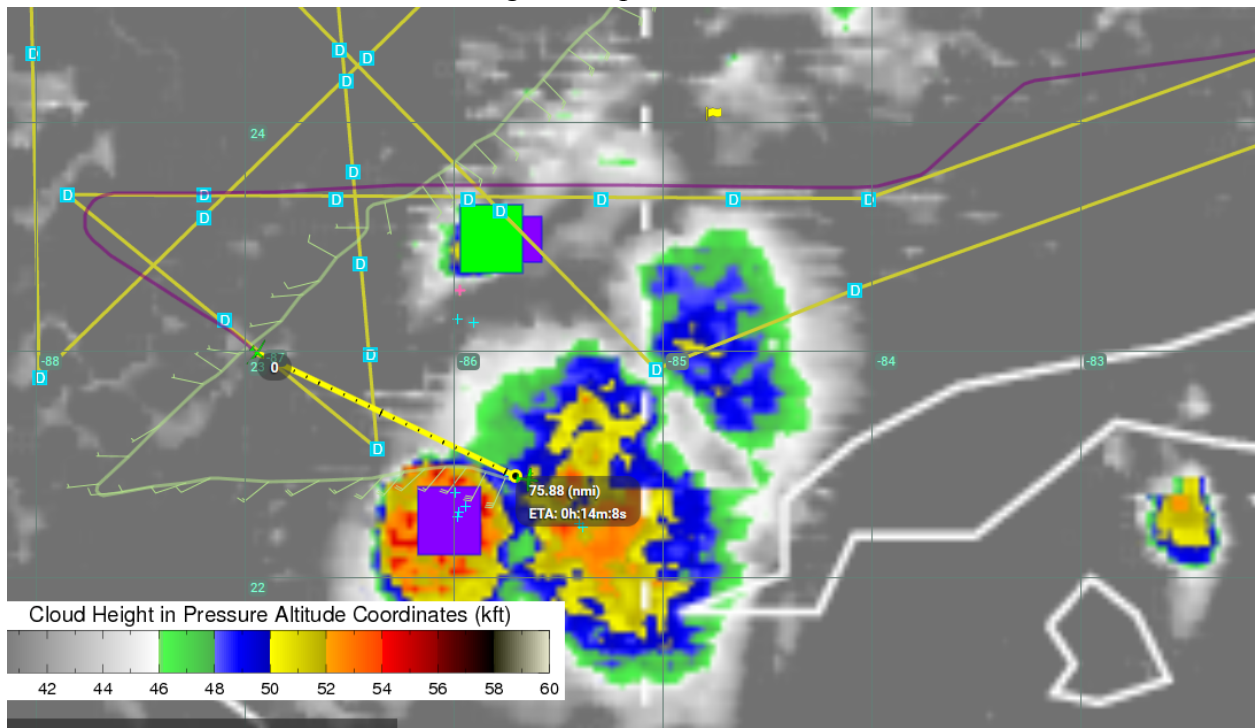
loud Height in Pressure Altitude Coordinates (kft)

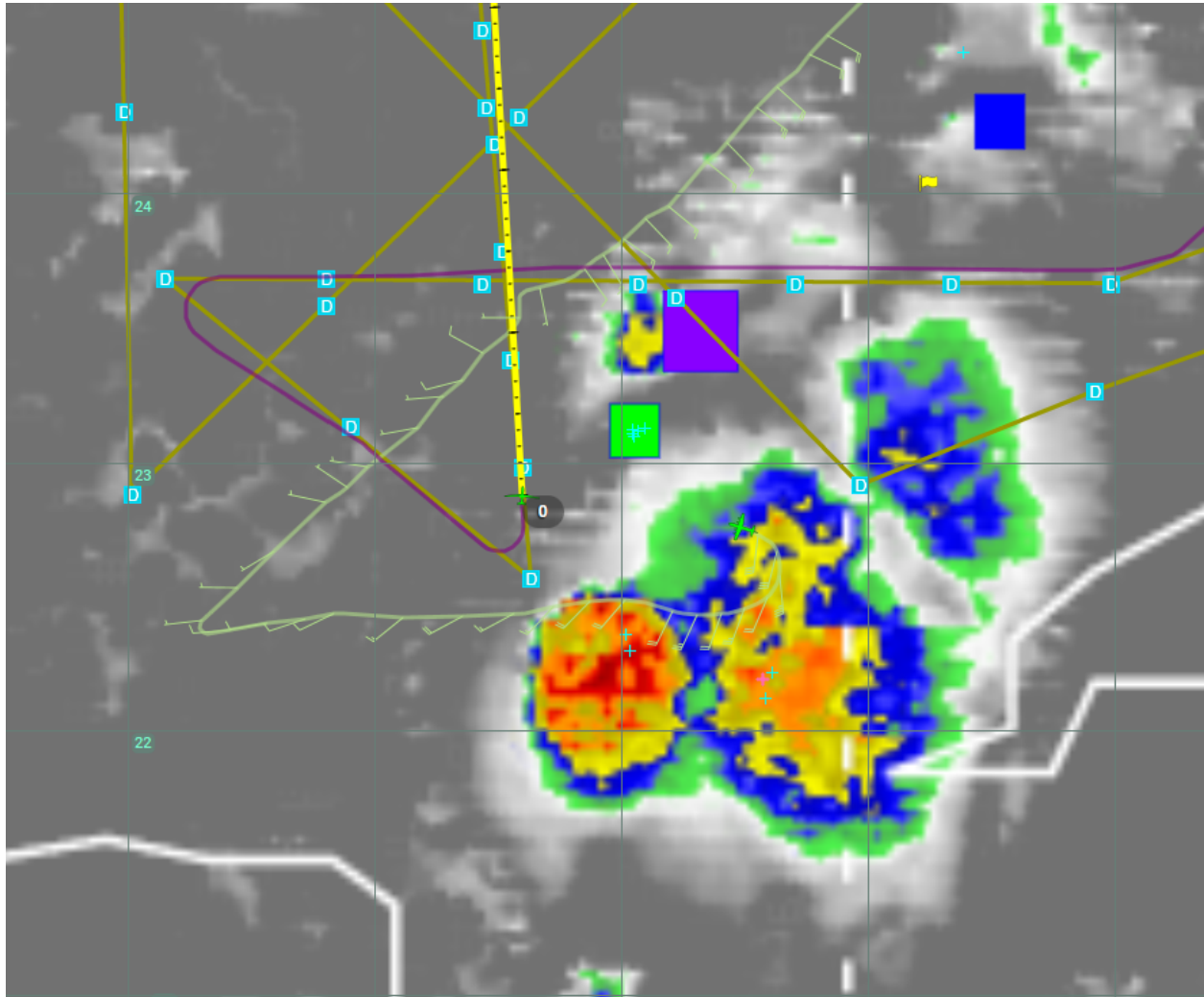


0622 UTC: sonde #21 at location #23, good drop
0629 UTC: sonde #22 at location #24, good drop

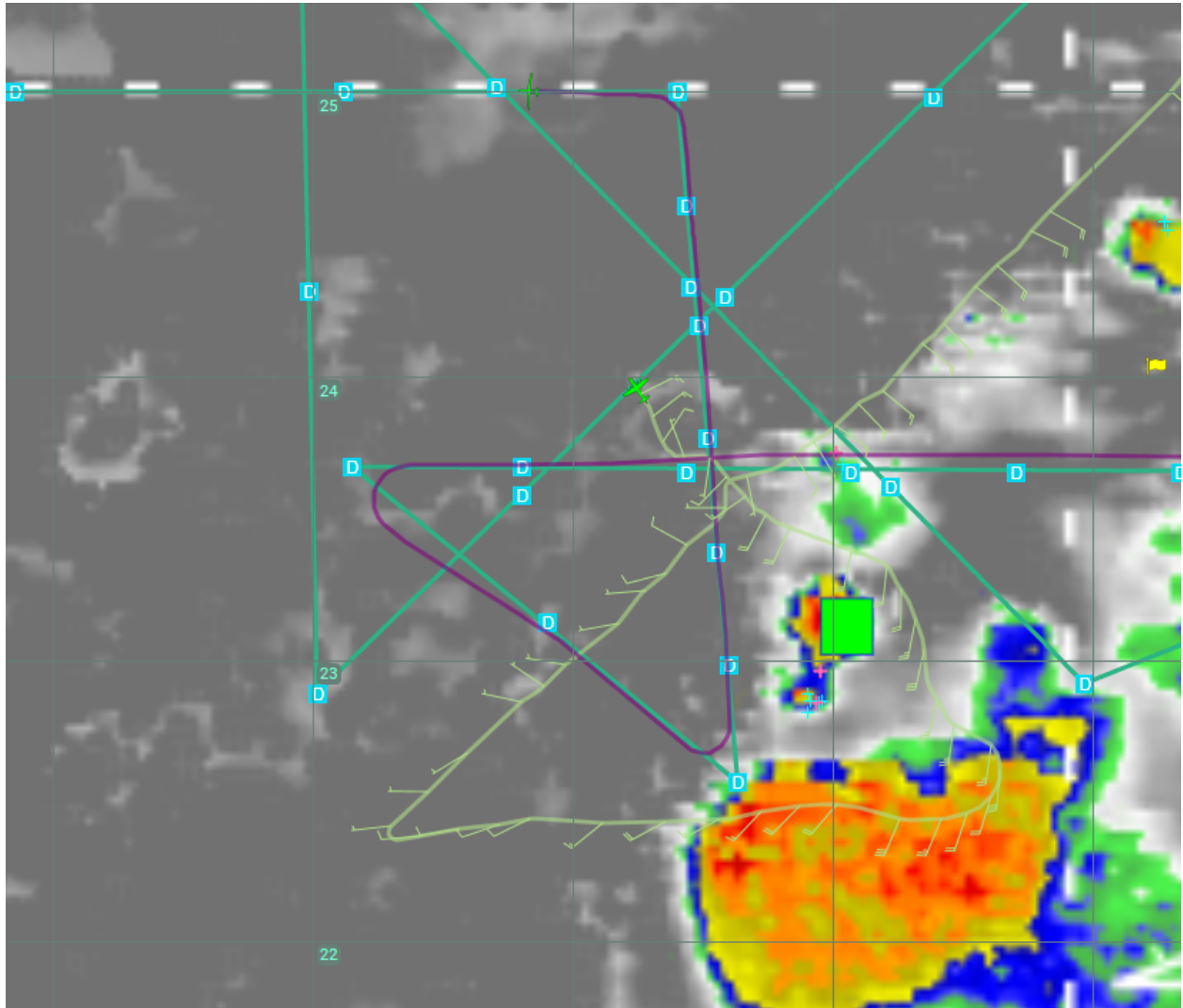
0637 UTC: sonde #23 at location #25, good drop

0644 UTC: sonde #24 at location #26, good drop



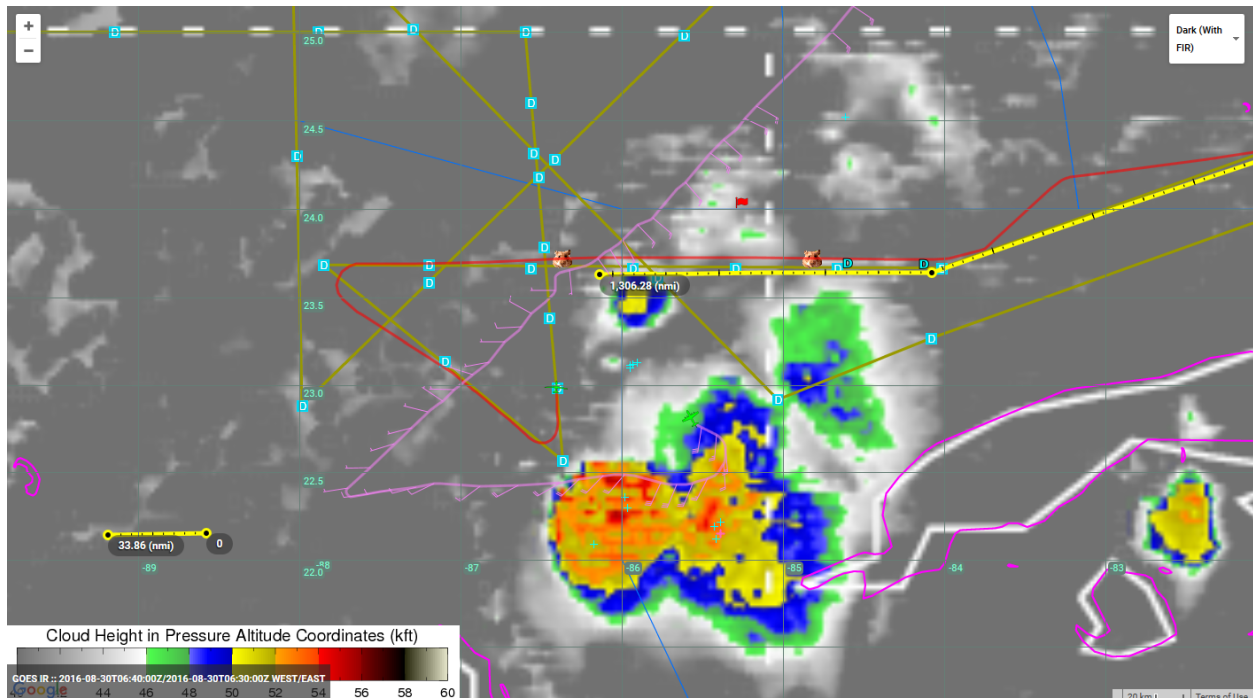


0649 UTC: sonde #25 at location #27, good drop
0653 UTC: sonde #26 at location #28, good drop
0658 UTC: sonde #27 at location #29, good drop
0702 UTC: sonde #28 at location #30, good drop



Location #31 to #33 missed due to air traffic. Request to drop one sonde between location #33 and location #34.

N43RF reports max echo height from TA Doppler radar at 18-19 km, about 57 K ft. Sat estimate shows 56 K ft in 3 pixels at center of circular overshooting top

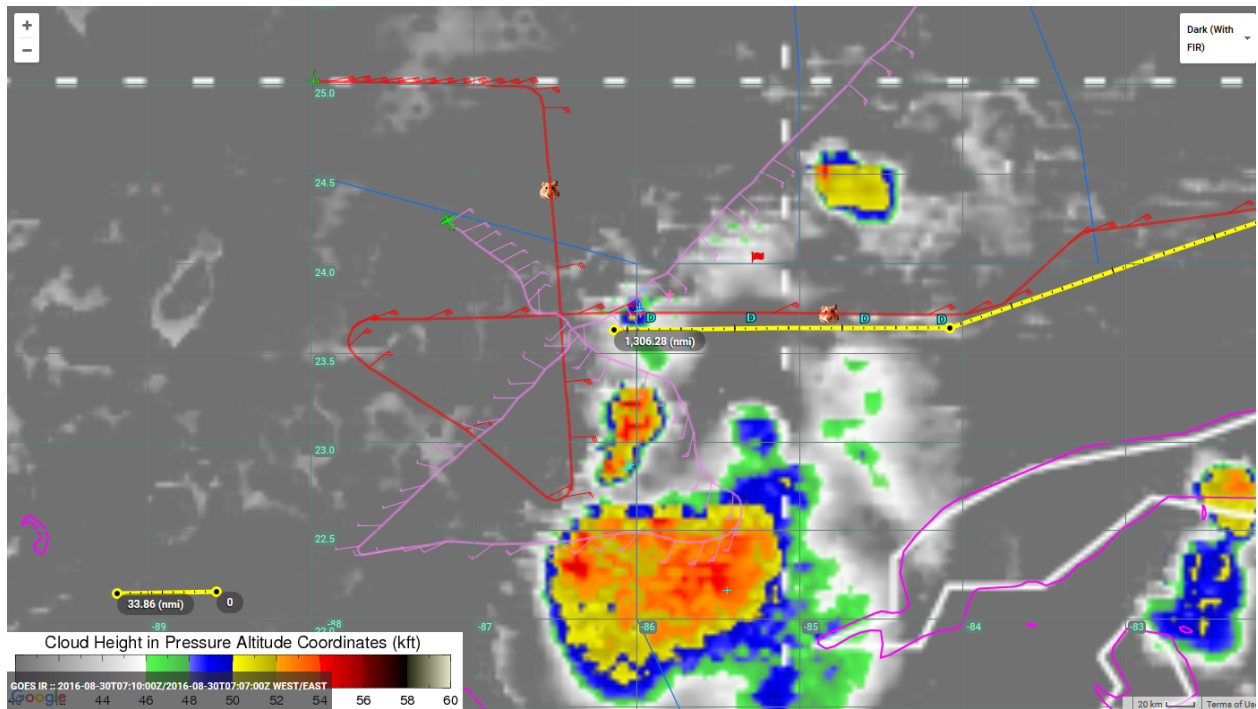


Ballet in the sky as NA872 and N43RF turn together to head inbound.

0710Z: no drops for next 24 min.- continuing track. Will loose 3 sonde deployments. convection exploding south of center. Two turrets merging into a large supercell.

Center fix at 0710Z: 23deg43min, -86deg31 min

0724Z:



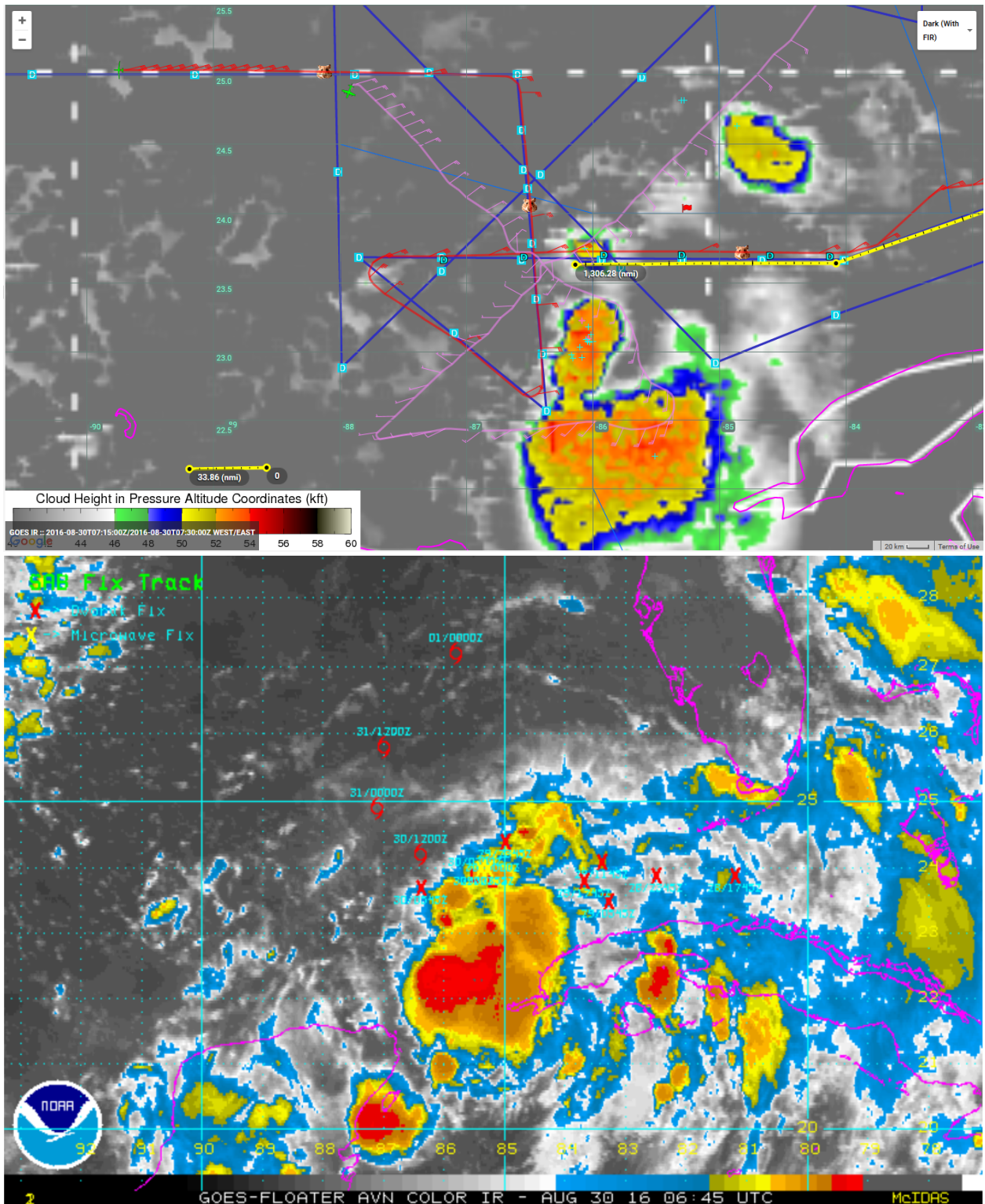
VORTEX DATA MESSAGE AL092016

- A. 30/07:10:20Z
- B. 23 deg 43 min N
- 086 deg 31 min W
- C. 925 mb 744 m
- D. 31 kt
- E. 135 deg 84 nm
- F. 190 deg 29 kt
- G. 135 deg 81 nm
- H. 1006 mb

0730 UTC: sonde #29 between location #33 and #34

0734 UTC: sonde #30 at location #34

North south band exploding with freq lightning. Looking like initial eyewall, 0740Z:



0746 UTC: sonde #31 at location #35, good drop.

0756 UTC: sonde #32 at location #36, good drop.

0811 UTC: sonde #33 at location 37, good drop

0817 UTC: sonde #34 at location 38, good drop

0822 UTC: skipping drop at location 39, ATC issue

0830 UTC: sonde #35 at location between 39 and 40, good drop. Some convection with lightning and overshooting in the area.

0835 UTC: sonde #36 at location 40, good drop

0846 UTC: sonde #37 at location 41, good drop

0855 UTC: sonde #38 at location 42, good drop

0905 UTC: Here is latest discussion from NHC highlighting global hawk contribution

TROPICAL DEPRESSION NINE DISCUSSION NUMBER 7
NWS NATIONAL HURRICANE CENTER MIAMI FL AL092016
400 AM CDT TUE AUG 30 2016

Although there has been an increase in convection over the southeastern portion of the depression's circulation, the system is still being affected by westerly shear, with the low-level center exposed to the west of the deep convection. Recent observations from a NOAA Hurricane Hunter aircraft and the unmanned NASA Global Hawk indicate that the tropical cyclone remains just below tropical storm strength. The NOAA aircraft has reported peak flight level winds in the southeastern quadrant of 32 kt, and believable SFMR winds of around 30 kt. A dropsonde from the Global Hawk reported 33 kt surface winds, but the mean-layer wind over the lowest 150 m support winds closer to 30 kt. A very recent center drop from the unmanned aircraft indicate that the minimum pressure is 1003 mb.

The westerly shear over the depression is forecast to decrease somewhat during the next day or so, however dry mid-level air is expected to remain near and to the west of the system. As a result of the marginal environment, only gradual strengthening is predicted during the next couple of days. This is supported by the global models which do not significantly deepen the system until it moves over the western Atlantic and interacts with an upper-level trough. The NHC intensity forecast is unchanged from the previous advisory and remains near the intensity consensus model IVCN.

The aircraft fixes show that the depression has moved westward

since the previous advisory, and the initial motion estimate is 275/6 kt. The cyclone is forecast to turn west-northwestward, then northwestward tonight around a low- to mid-level ridge over the western Atlantic and Florida. After that time, a deepening mid-latitude trough over the southeastern United States should cause the system to turn northeastward toward the Florida Big Bend region. The dynamical models continue to agree on this scenario, but there are some differences in the forward speed of the system after 36 hours, and the NHC track is near the consensus of the GFS and ECMWF models. The more westward initial position has required a westward adjustment to the track through 24 hours, but otherwise, the new NHC track forecast is similar to the previous advisory.

Given the current forecast, a tropical storm or hurricane watch may be required for a portion of the Florida Gulf coast later today.

FORECAST POSITIONS AND MAX WINDS

INIT	30/0900Z	23.8N	86.6W	30 KT	35 MPH
12H	30/1800Z	24.2N	87.3W	35 KT	40 MPH
24H	31/0600Z	24.9N	87.6W	40 KT	45 MPH
36H	31/1800Z	26.2N	86.9W	45 KT	50 MPH
48H	01/0600Z	27.7N	85.5W	55 KT	65 MPH
72H	02/0600Z	30.7N	81.1W	50 KT	60 MPH
96H	03/0600Z	33.2N	74.0W	50 KT	60 MPH
120H	04/0600Z	35.5N	67.5W	50 KT	60 MPH

\$\$

Forecaster Brown

000

URNT12 KWBC 300847

VORTEX DATA MESSAGE AL092016

A. 30/08:25:59Z

B. 23 deg 46 min N
086 deg 29 min W

C. 850 mb 1472 m

D. 22 kt

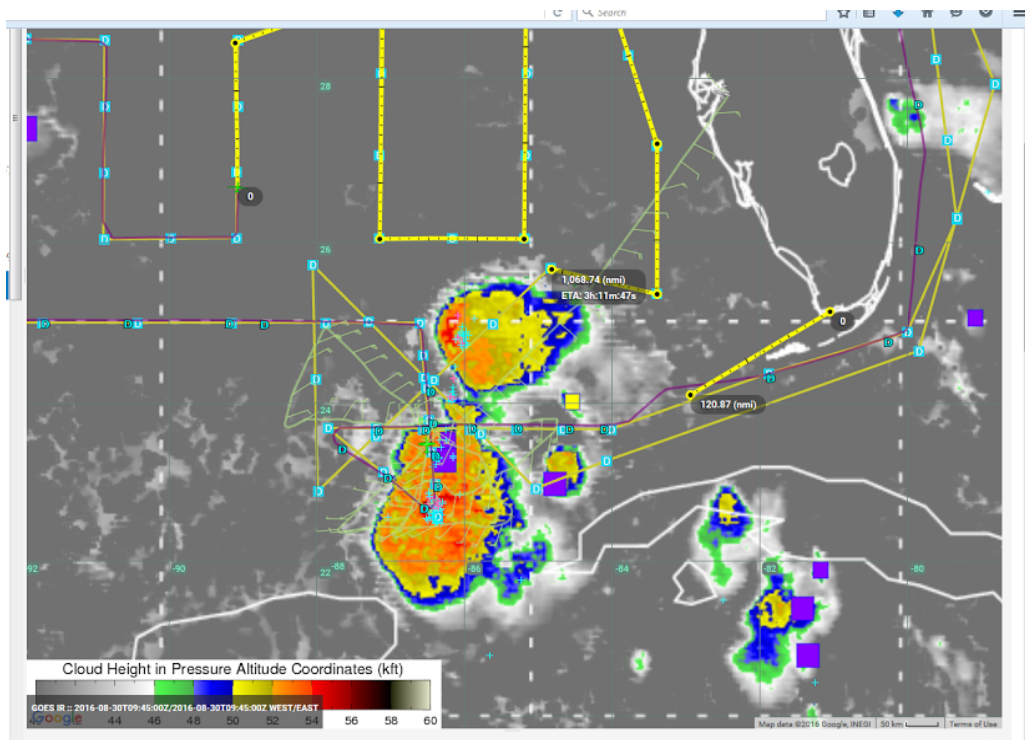
E. 269 deg 56 nm

F. 020 deg 15 kt

G. 270 deg 56 nm
H. 1004 mb
I. 20 C / 1533 m
J. 20 C / 1534 m
K. 18 C / NA
L. NA
M. NA
N. 134 / 8
O. 0.1 / 2 nm
P. NOAA3 0809A CYCLONE OB 12
MAX FL WIND 32 KT 137 / 93 NM 06:44:22Z
MAX OUTBOUND FL WIND 26 KT 097 / 43 NM 08:37:19Z
MAX FL TEMP 21 C 258 / 8 NM FROM FL CNTR
CNTR DROPSONDE SFC WIND 130 / 02 KTS

0906 UTC, sonde #39, location 43, good drop
0913 UTC, sonde #40, location 44, good drop
0923 UTC, sonde #41, location 45 (a little past it due to ATC issue), good drop
0931 UTC, sonde #42, location 46, good drop
0938 UTC, sonde #43, location 47, good drop
0949 UTC, sonde #44, location 48, good drop

0954 UTC, Convection south and east of DP9



AVAPS dropsond profiles east, west, south and north of center showing depression circulation:

East TD09

1006 UTC, sonde #46, location 50, good sonde

1010 UTC, We have been without an MTS update for the past 15 minutes.

1014 UTC, sonde #47, location 51, good sonde

1023 UTC, sonde #48, location 52, good sonde

1034 UTC, sonde #49, location 53, good sonde

1043 UTC, sonde #50, location 54, good sonde

1053 UTC, sonde #51, location 55, good sonde

1105 UTC, sonde #52, location 56, good sonde

1114 UTC, sonde #53, location 57, good sonde

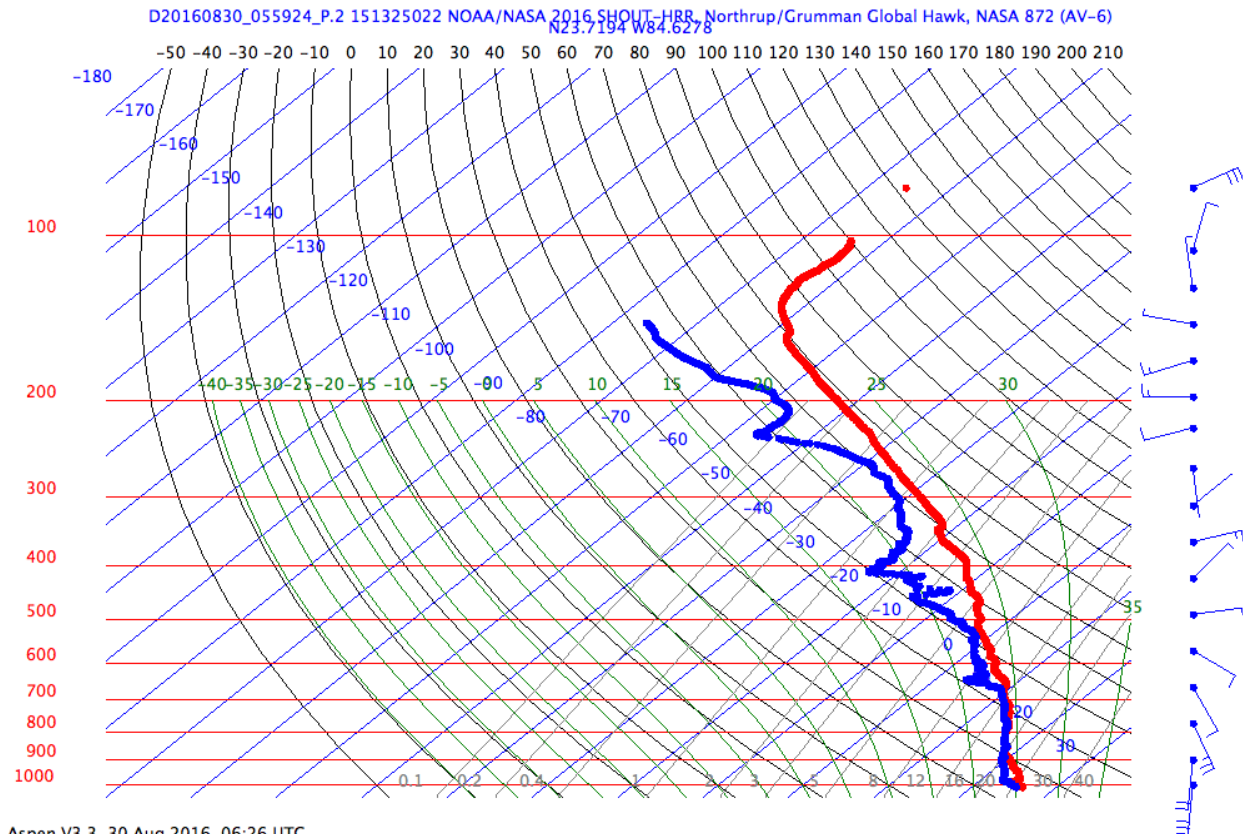
1125 UTC, sonde #54, location 58, good sonde

1134 UTC, sonde #55, location 59, good sonde

1145 UTC, sonde #56, location 60, good sonde

1150 UTC

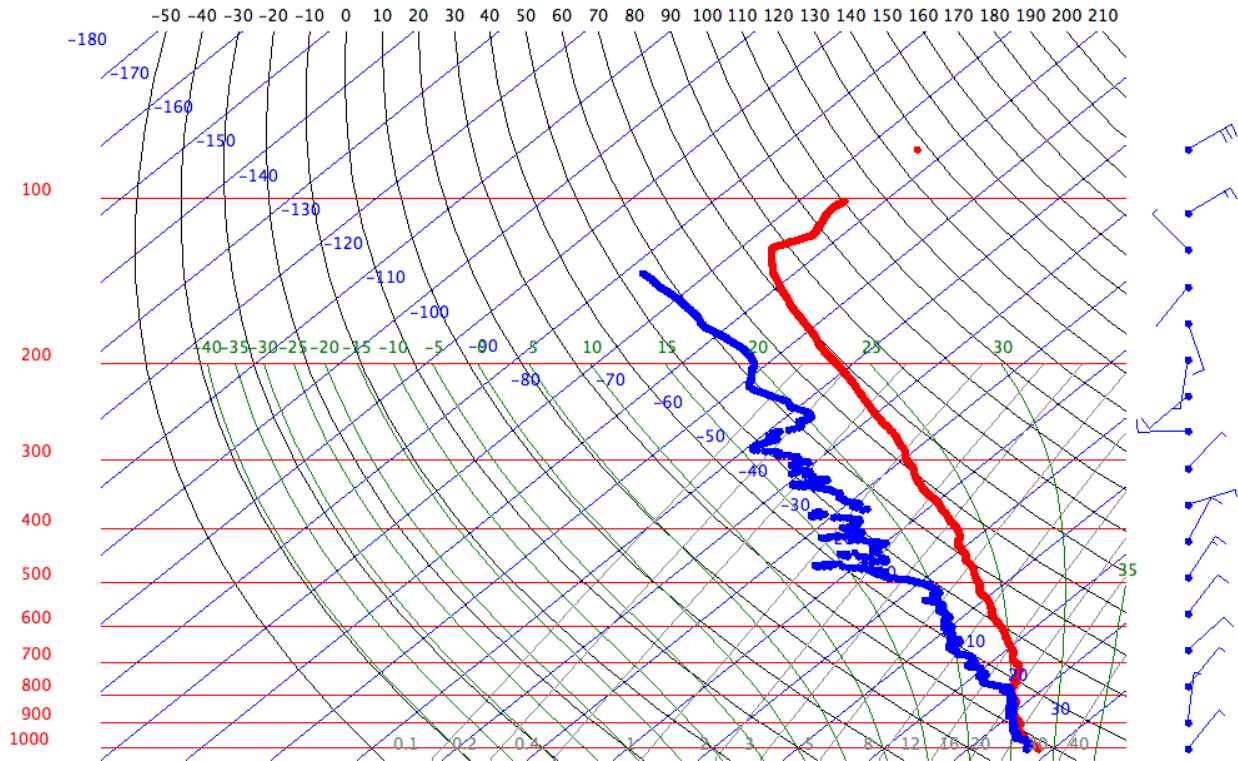
Update to the flight plan (#6) was made for second alpha pattern crossing of TD9. The legs were moved to the south of original pattern. TD9 is moving slowly in a mainly northerly direction and for now has stopped moving to the west. Convection remains vigorous to the northeast and south of the center. Survey pattern in the northern Gulf is going well.



Center

1156 UTC, sonde #57, location 61, good drop.
 1206 UTC, sonde #58, location 62, good drop
 1217 UTC, sonde #59, location 63, good drop
 1230 UTC, sonde #60, location 60, good drop. Note locations values changed with latest update.
 Tkmap glitch required us to remove 4 interpolated sondes earlier in the flight so we could add 4 more sondes during overpass of TD9.

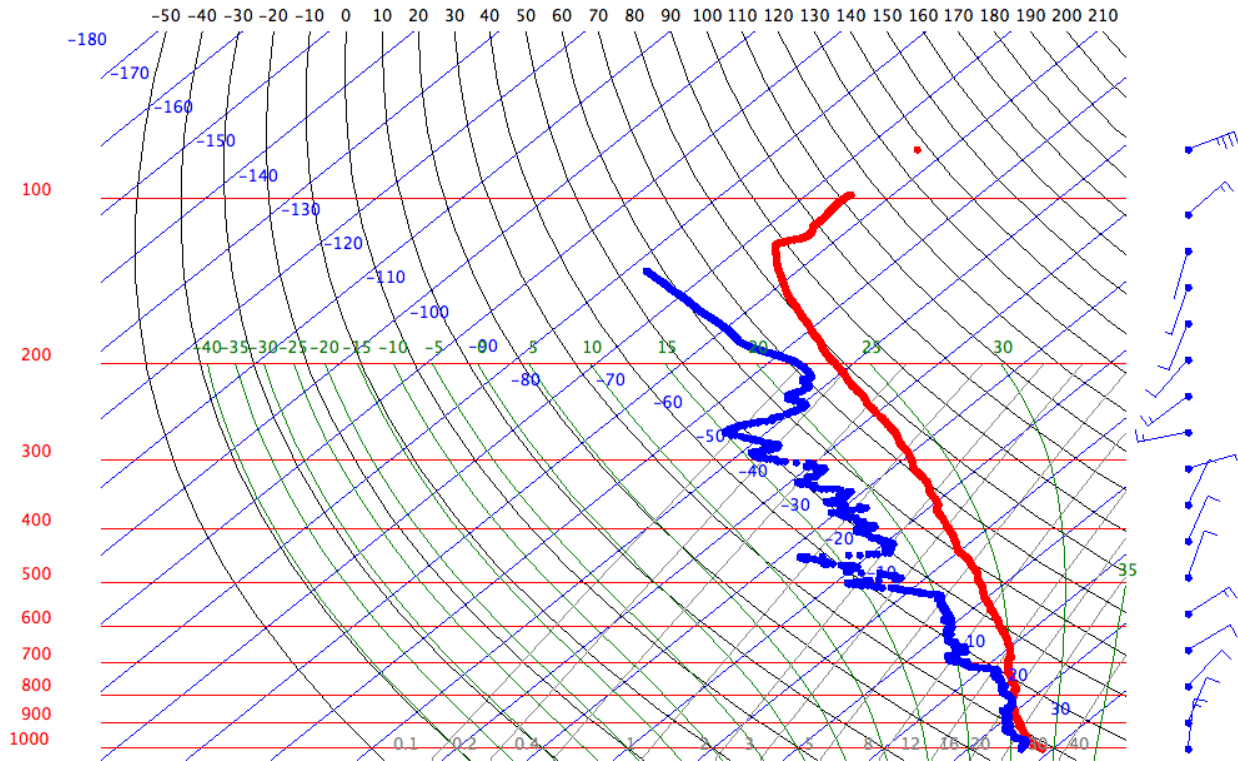
D20160830_061705_P.5 150815060 NOAA/NASA 2016 SHOUT_HRR, Northrup/Grumman Global Hawk, NASA 872 (AV-6)
N23.7095 W86.5737



Aspen V3.3, 30 Aug 2016 07:10 UTC

West

D20160830_062251_P.1 144535032 NOAA/NASA 2016 SHOUT-HRR, Northrup/Grumman Global Hawk, NASA 872 (AV-6)
N23.6899 W87.2065

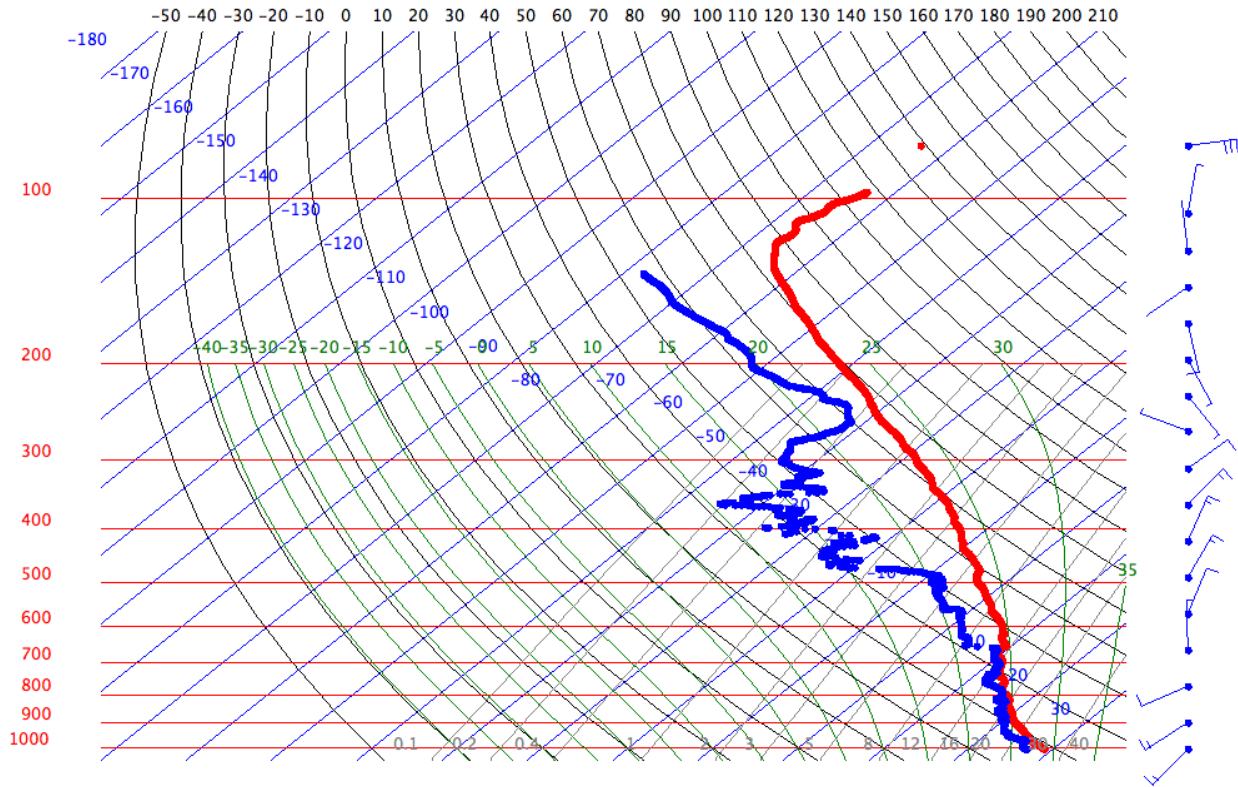


Aspen V3.3, 30 Aug 2016 07:29 UTC

South

1258 UTC

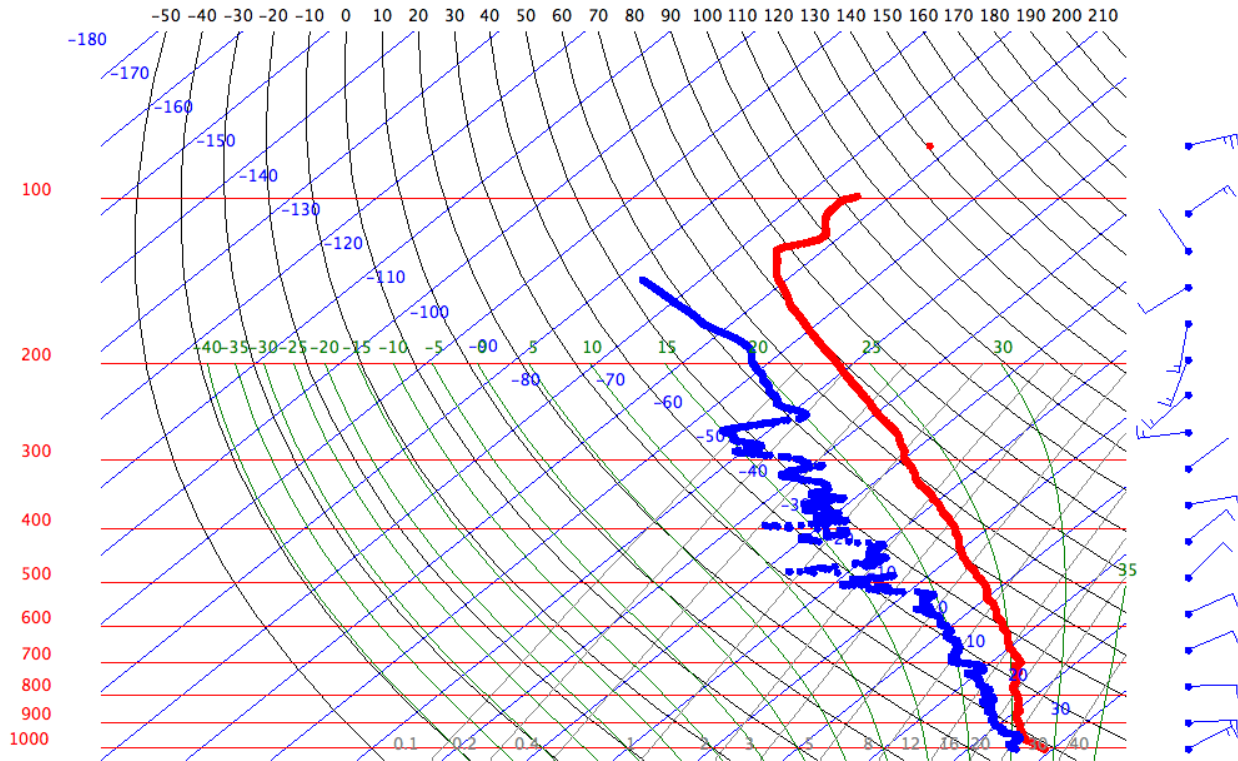
D20160830_064919_P.1 150845191 NOAA/NASA 2016 SHOUT_HRR_Northrup/Grumman Global Hawk, NASA 872 (AV-6)
N22.9841 W86.4066



Aspen V3.3, 30 Aug 2016 08:07 UTC

North

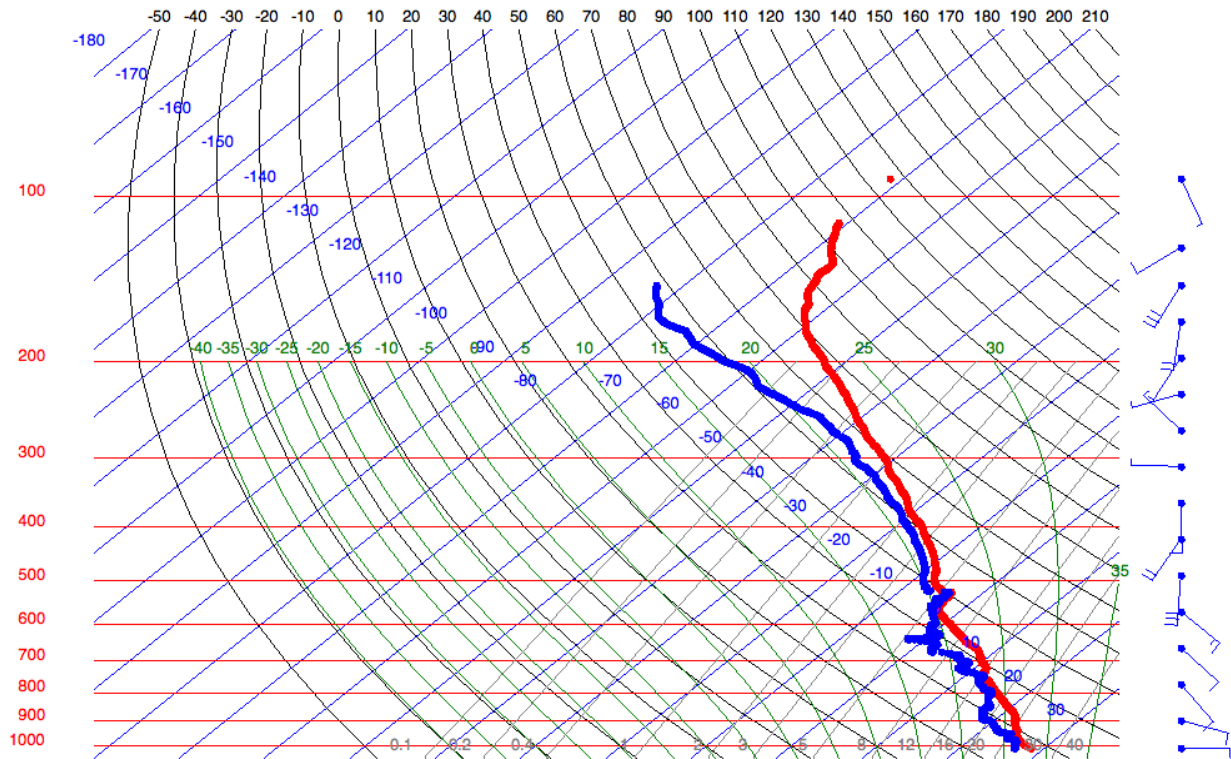
D20160830_070233_P.3 151255173 NOAA/NASA 2016 SHOUT_HRR_Northrup/Grumman Global Hawk, NASA 872 (AV-6)
N24.1883 W86.5068



Aspen V3.3, 30 Aug 2016 08:28 UTC

TD08
North

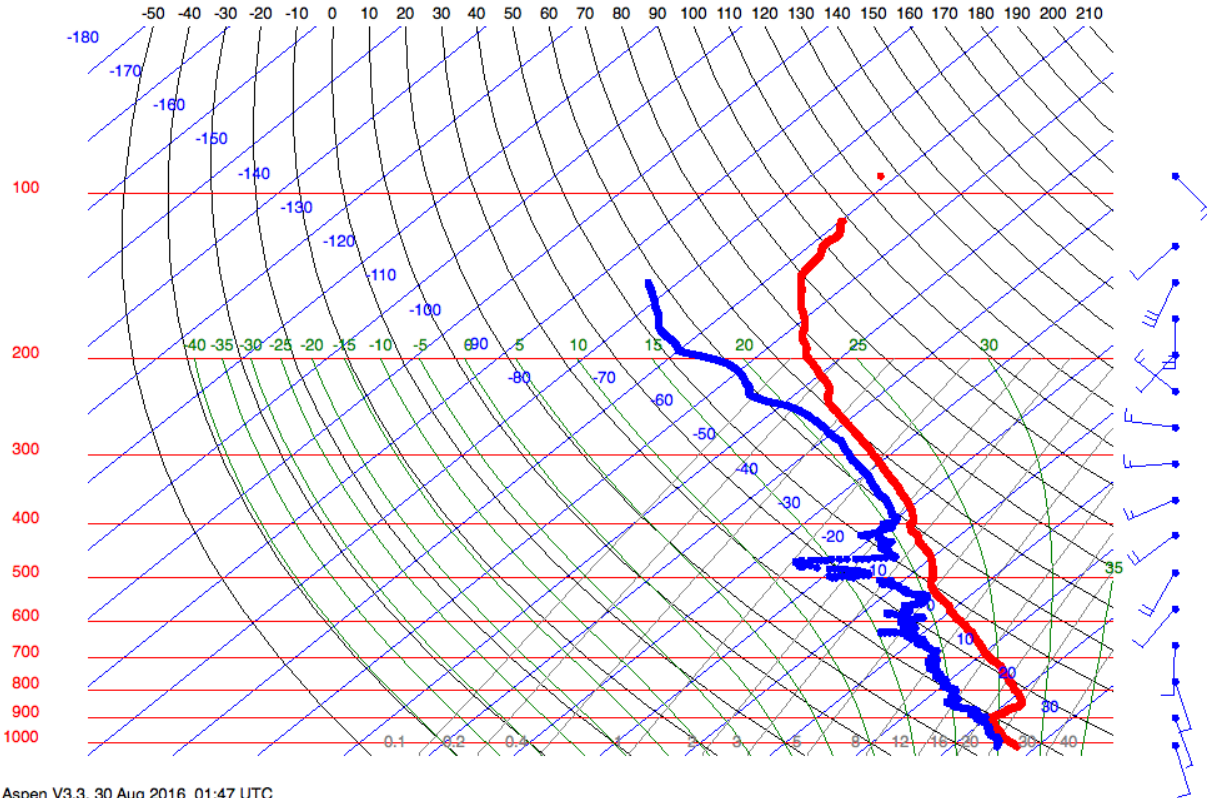
D20160830_002436_P.1 151255170 NOAA/NASA 2016 SHOUT-HRP, Northrup/Grumman Global Hawk, NASA 872 (AV-6)
N34.0155 W73.4846



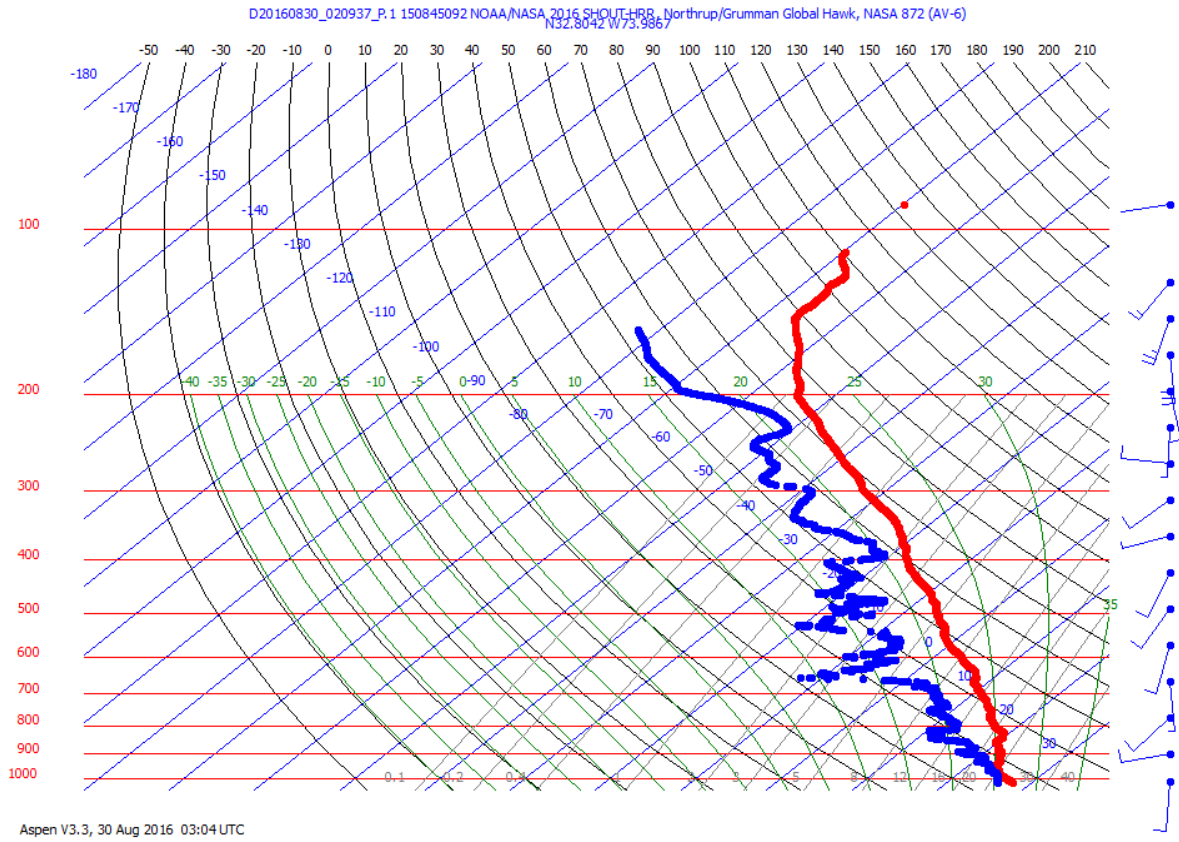
Aspen V3.3, 30 Aug 2016 00:53 UTC

Central-East

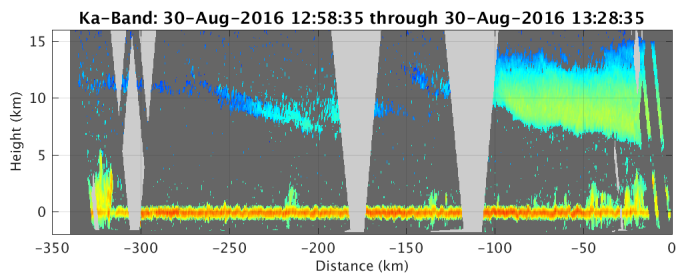
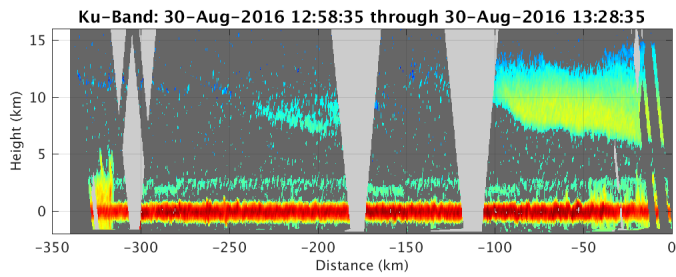
D20160830_004719_P2 140155248 NOAA/NASA 2016 SHOUT-HBB_Northrup/Grumman Global Hawk, NASA 872 (AV-6)
N33.3428 W73.6427



Southeast



1330Z: Approaching TD-9. HIWRAP shows the cirrus outflow.

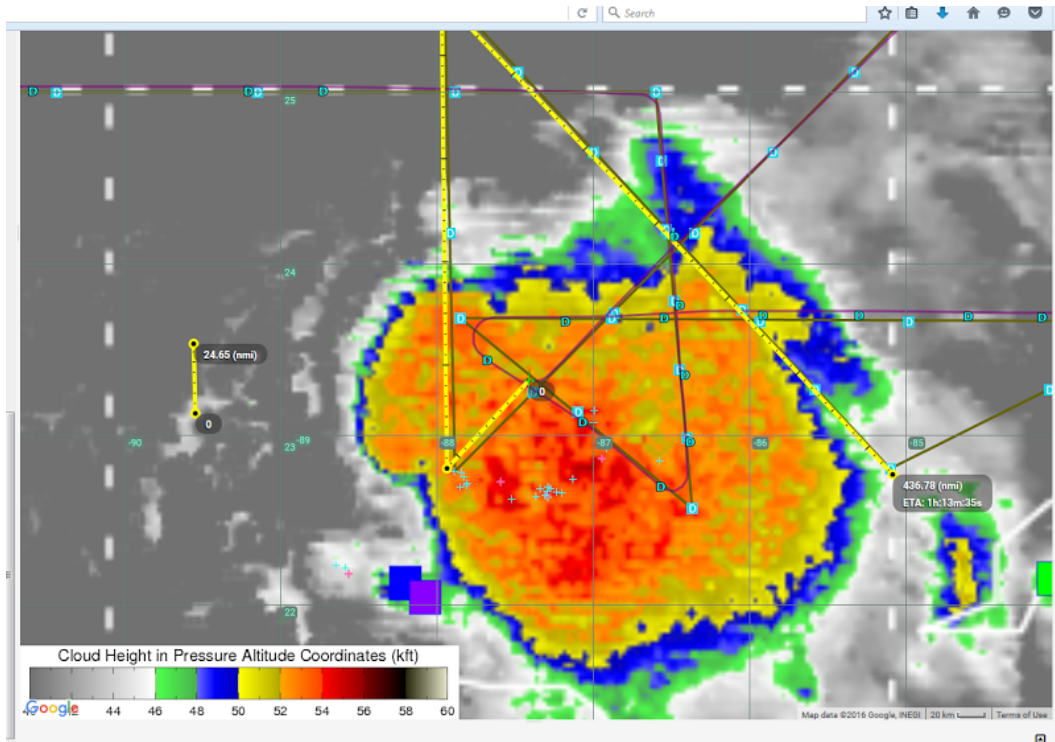


Daylight camera view of the outflow:

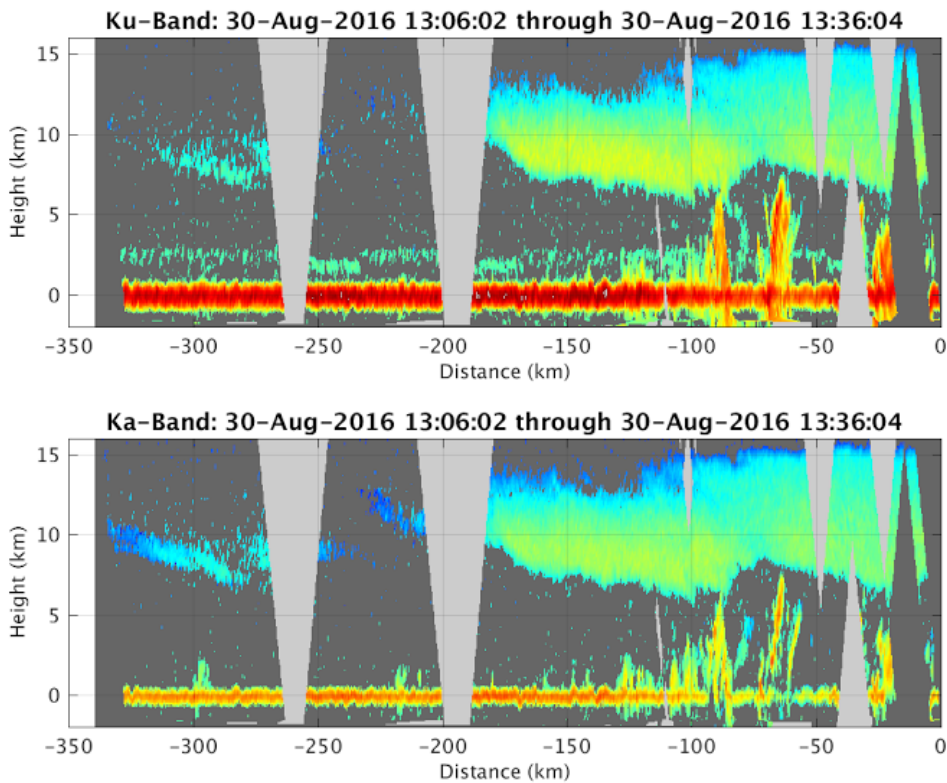


1336Z:

Diverting GH from flying to last SW point due to lightning and convection. We will make drop at turn to the west and a drop at turn to the north.



Another HIWRAP figure



1401 UTC

ATC issues so drops have been suspended for 15 minutes. May miss drop at turn for leg of final overpass of TD9.

1406 UTC

Skipped drops at locations 70 and 71 due to air traffic. Also losing drop location 72 for the same reason.

1424 UTC, sonde #70, location 73, good drop. Drop made a little past this location due to ATC issues and handover of pilot from Armstrong to Wallops.

1430 UTC, sonde #71, location 74, good drop

1436 UTC, sonde #72, location 75, good drop

1444 UTC, sonde #73, location 76, good drop

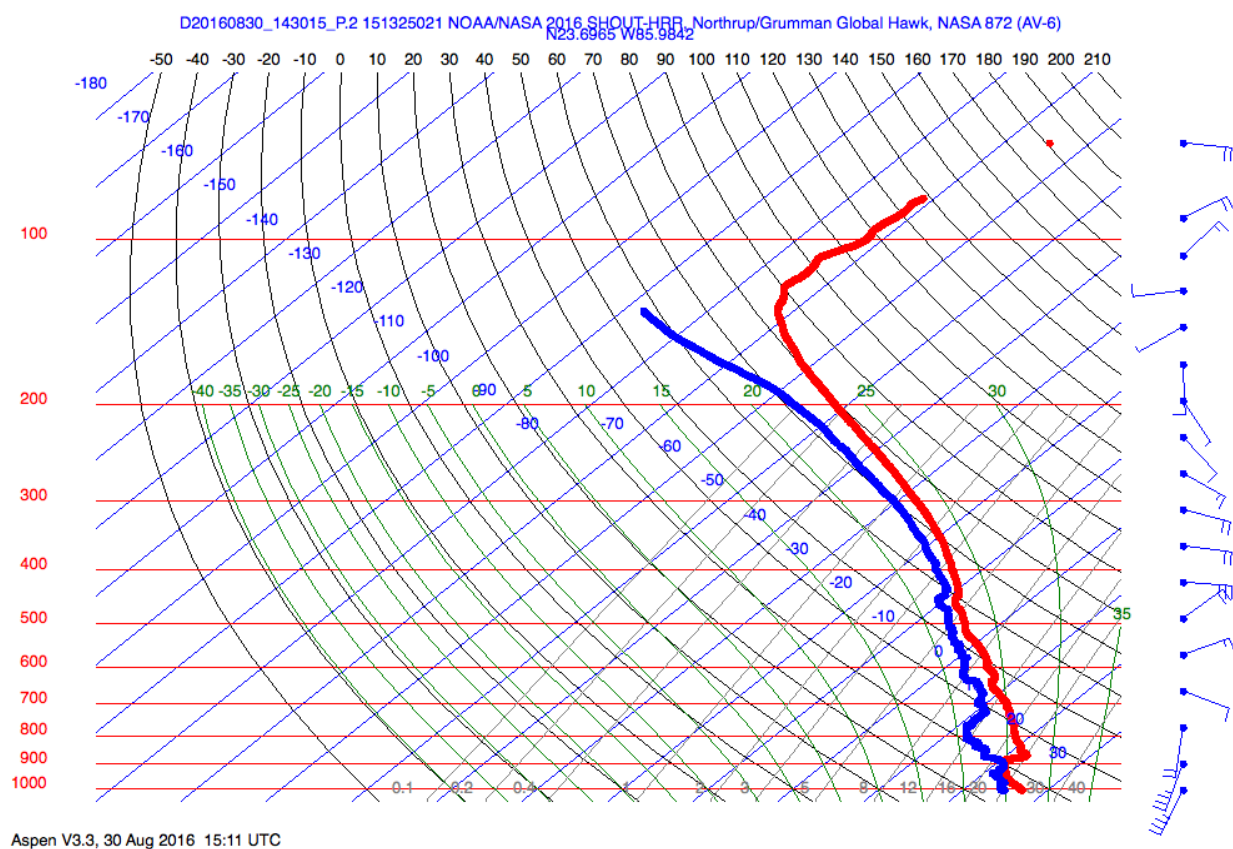
1455 UTC, sonde #73, location 77, good drop. Interlock was turned off since next drop point is 45 minutes away. The next drop will look at trying to retrieve a dropsonde from bin #1 from AVAPS since the next few drop locations are less critical than the drop locations in the lawnmower pattern further to the northeast.

1520 UTC, Drops at locations 78 and 79 will not occur because of air traffic. A point before location 78 will be used to test using sonde from bin #1

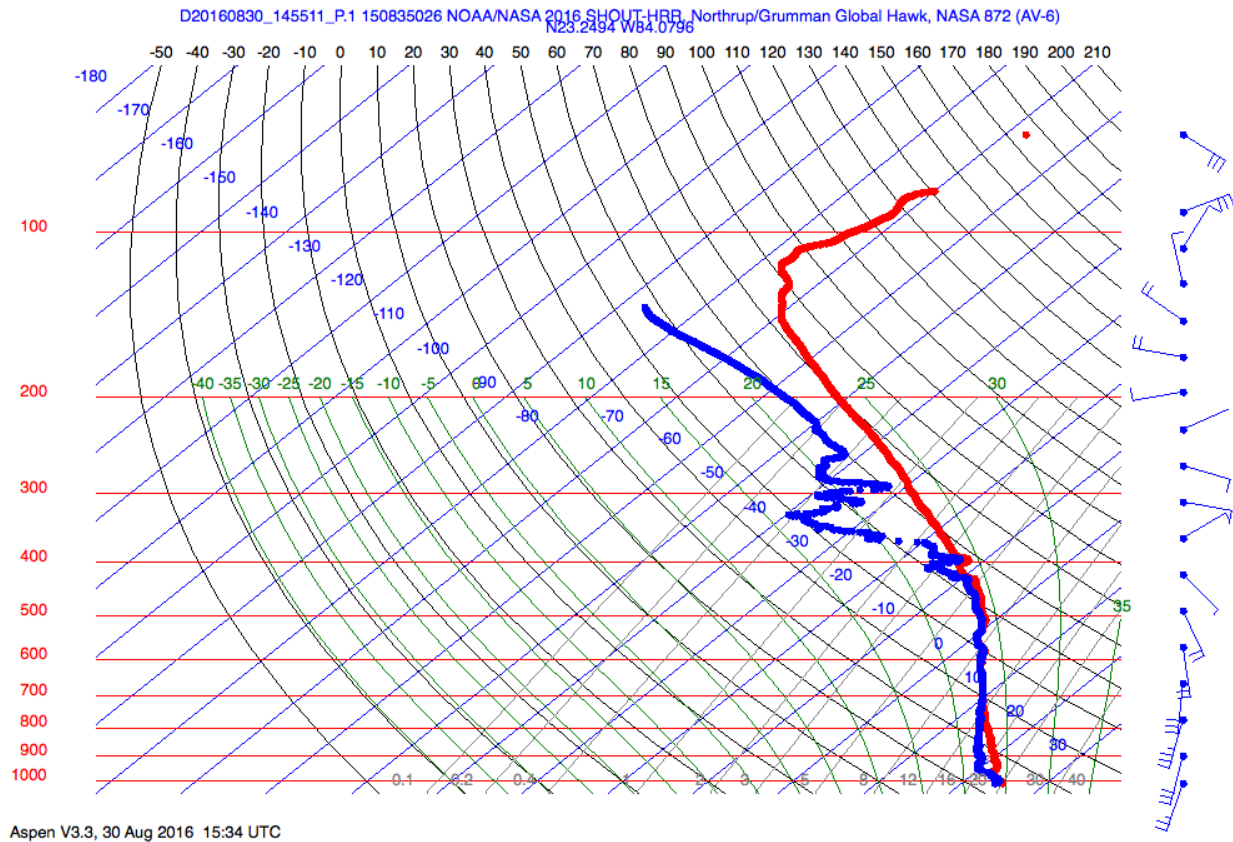
1535 UTC, sonde from bin #1 loaded without problems; however, ATC is now having us hold the sonde due to air traffic. We will need to hold it for a while.

1545 UTC: Two dropsondes released over TD9 had WL150 winds of 35 kt... Sent to NHC for review!

Sonde #71 showing 35-kt winds



Second sonde with 35-knot winds (~800 mb)



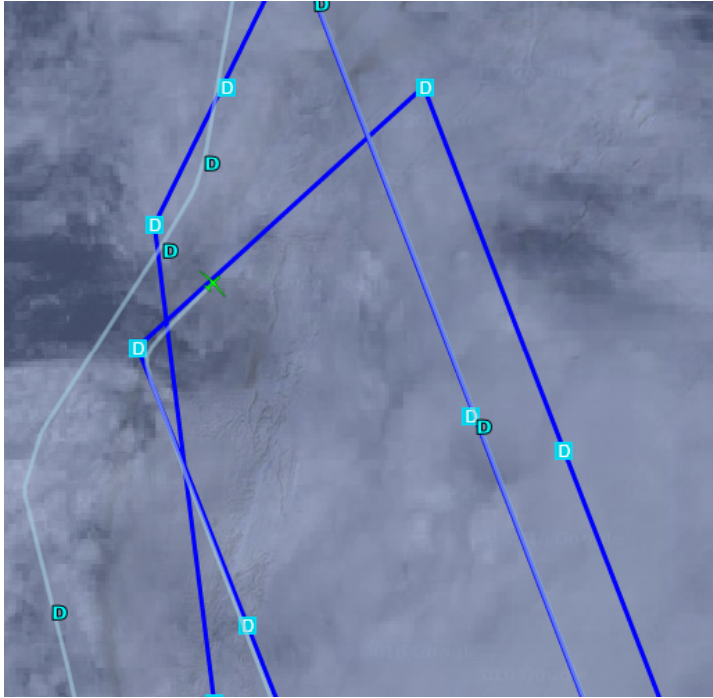
1601 UTC: Scott, Rosimar, and David taking over mission science shift

1612 UTC Mission tells us we won't likely be able to do drops on the first leg of the lawnmower east of Florida due to air traffic. Will look for holes to squeeze in a drop.

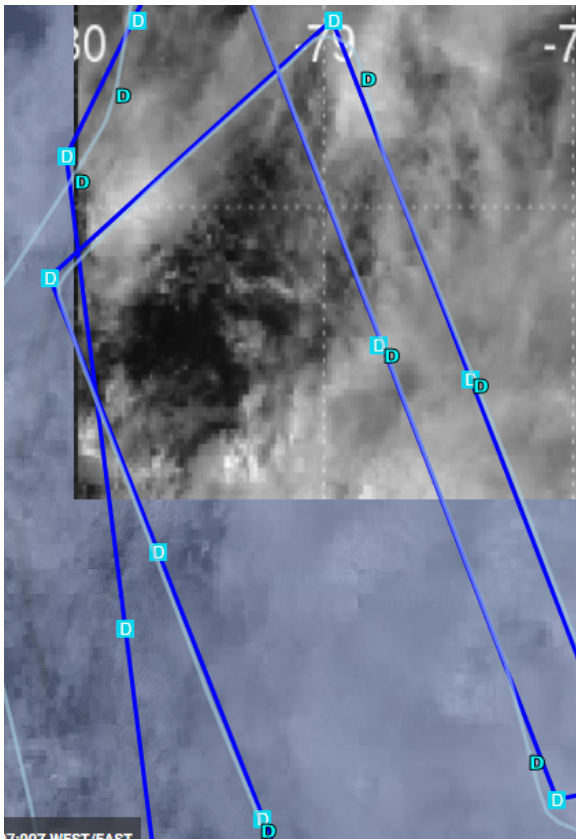
1627 UTC Finally got clearance to drop. Releasing within 3 minutes.

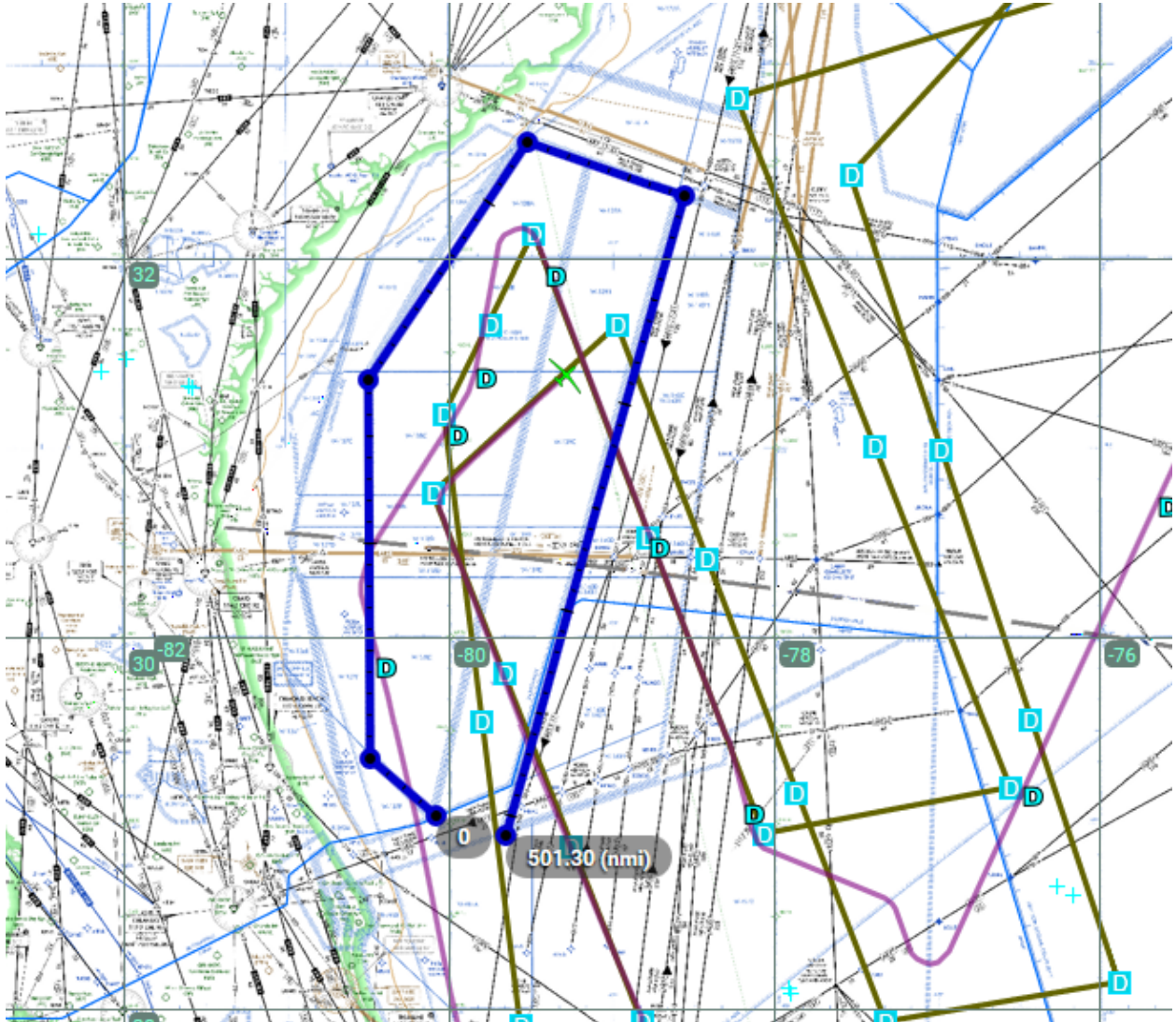
1630 UTC sonde 75 released at location 81. Good drop.

1647 UTC D82 skipped, next two drops also missed due to air space conflicts.



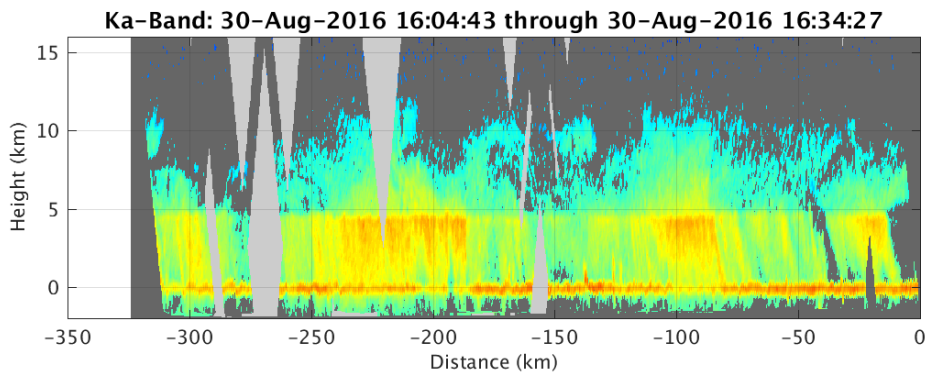
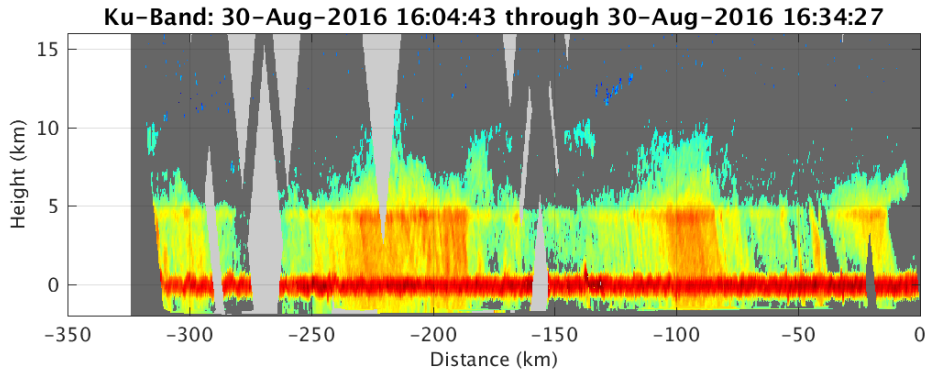
Actual drop locations. Note two missed on northbound NNW leg. First makeup drop east of 79 W.





The military airspace off the coast of Florida is highlighted in blue. We just (1700 UTC) got permission to do a drop in the northeastern portion of it.

We couldn't release sondes, but we got a nice HIWRAP pass depicting convection during the path:

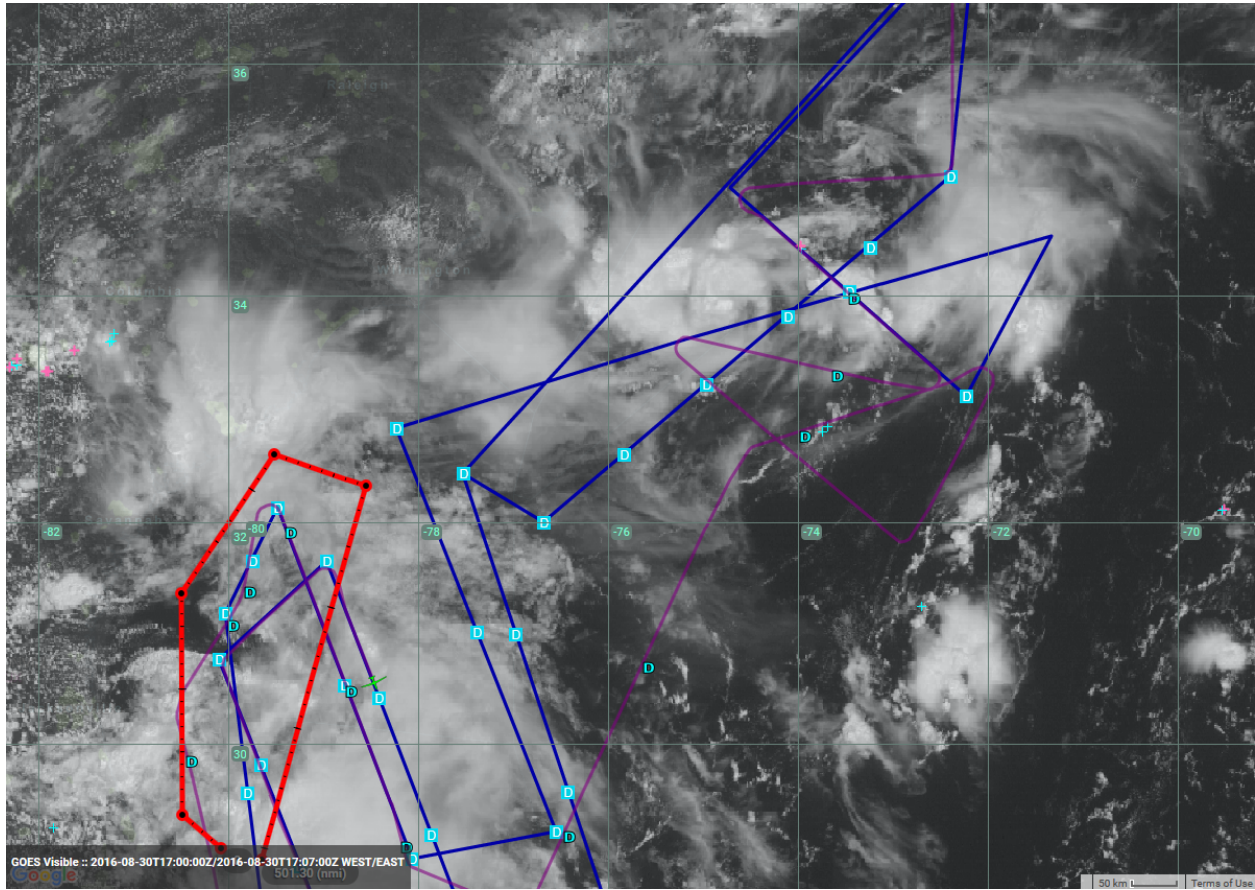


Accompanying photo from the Global Hawk camera:



1706 UTC Drop 76 released at location 84. Good drop.

1717 UTC Drop 77 released at location 85. Good drop.

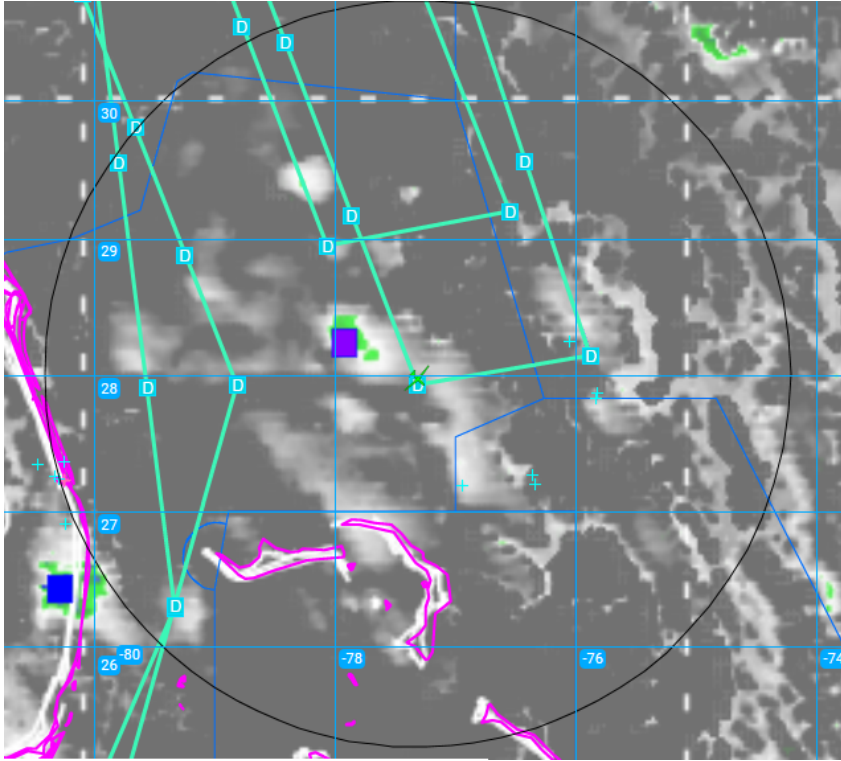


Six dropsondes have been added to the route home after drop location 82. Roughly 10 minute spacing.

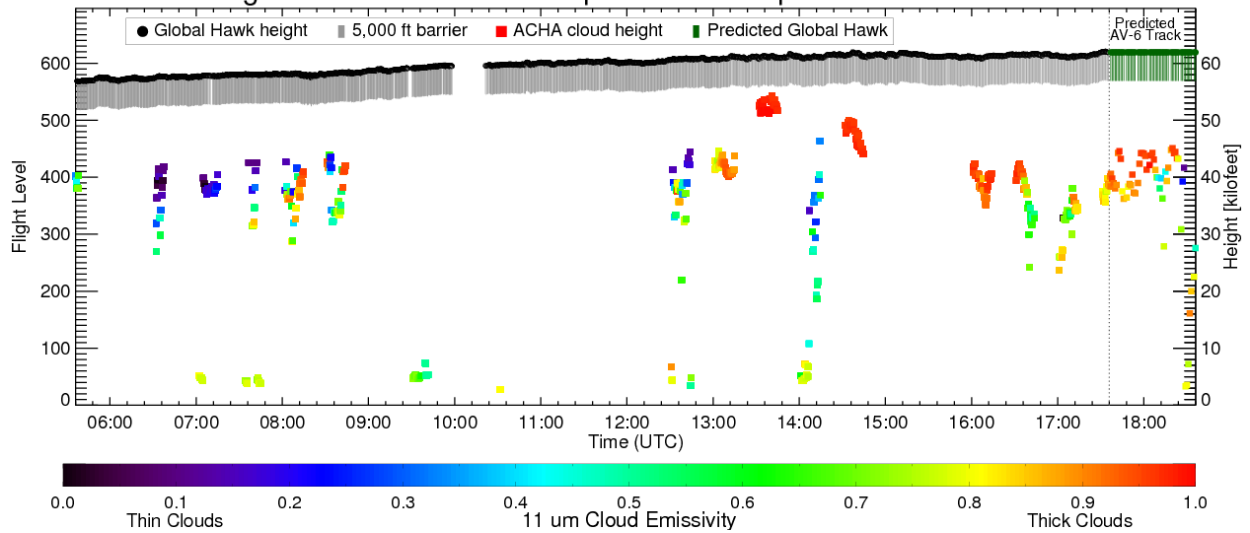
1731 UTC Drop 78 released at location 86. Good drop.

1747 UTC Drop 79 released at location 87. Good drop.

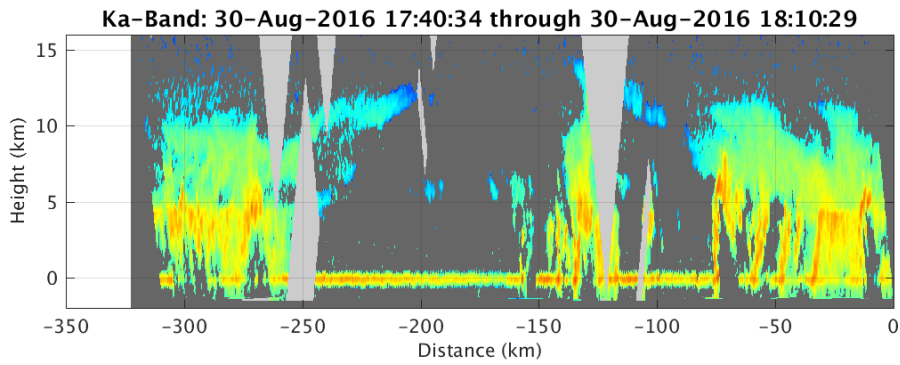
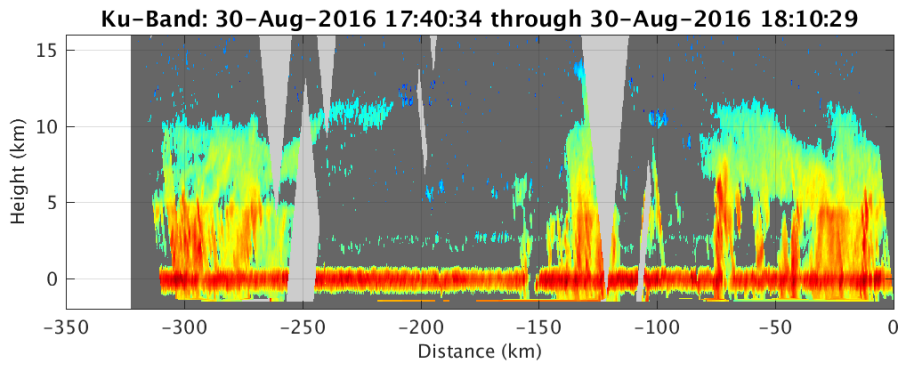
Cloud top heights have increased near the aircraft, but there is no lightning and the aircraft is well above the threshold to fly.



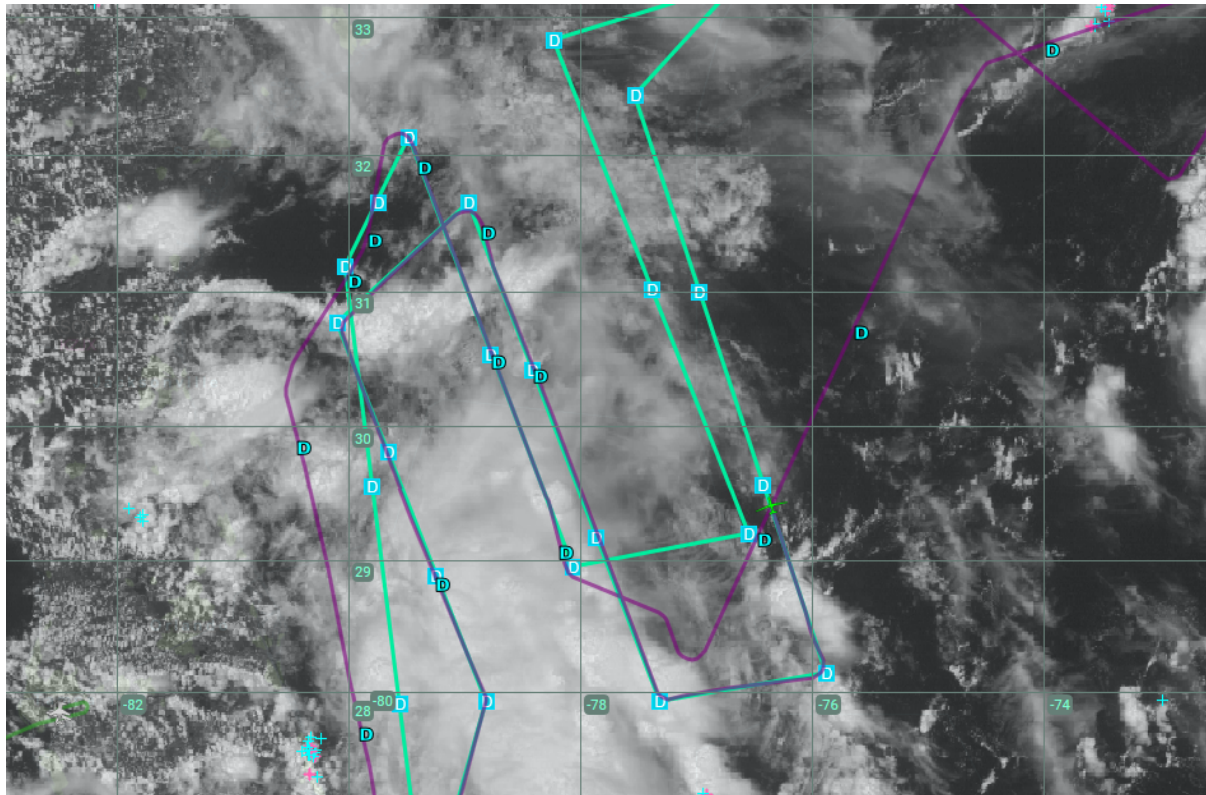
ACHA cloud height and AV-6 altitude comparison: Last updated at 1736 UTC on 20160830



1755 UTC: sonde is loaded, but it's having communication issues.
 Sonde was released at 1804, but is not expected to collect data.



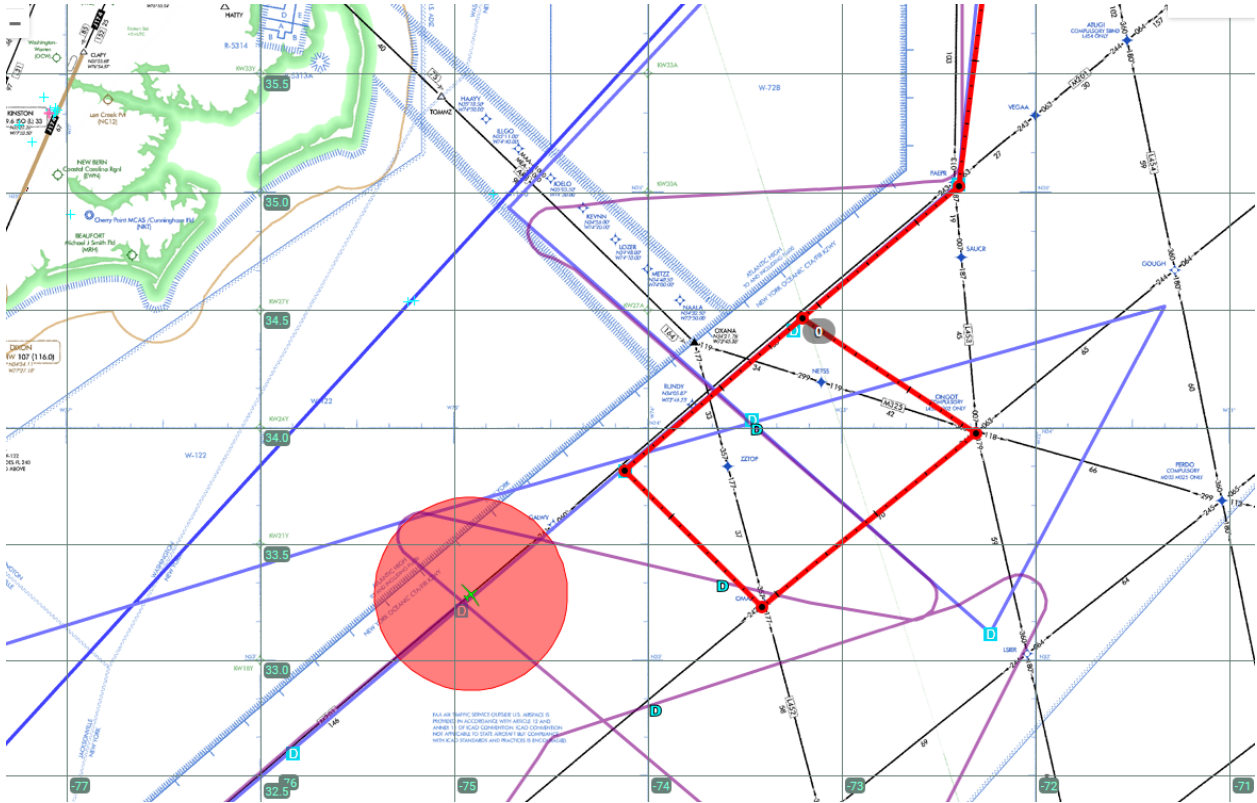
HIWRAP data at the southern end of the lawnmower (see below). Tops to over 10 km at times.



1815 UTC Drop 81 released at location 89. Good drop.

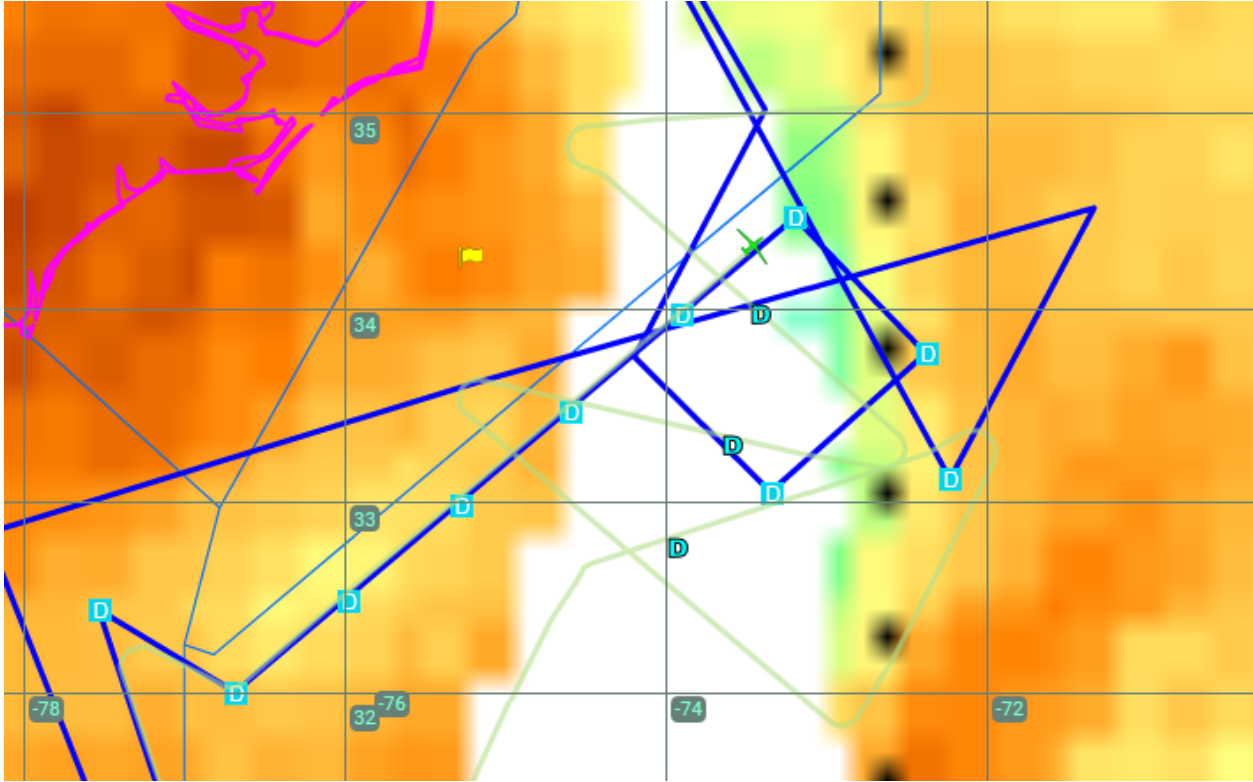
1831 UTC Drop 82 released at location 90. Good drop.

1847 UTC Drop 83 released at location 91. Good drop.
 1852 UTC Drop 84 released at location 92. Good drop.
 1901 UTC Drop 85 released at location 93. Good drop.
 1912 UTC Drop 86 released at location 94. Good drop.



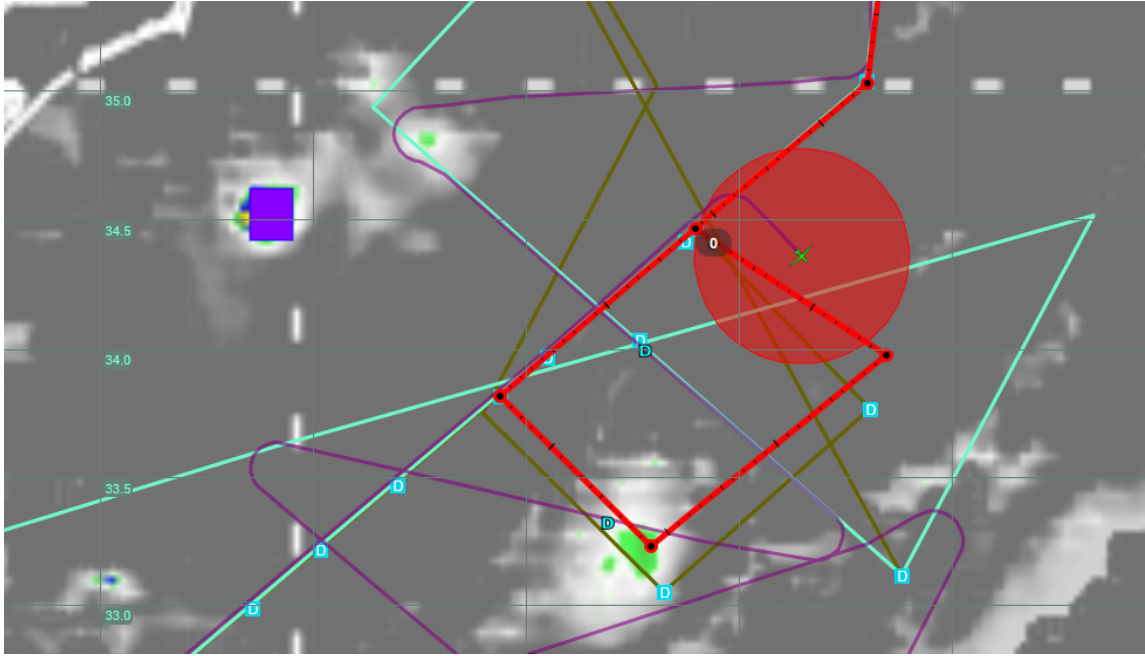
Pilots told us we have an extra hour. We can't go west into TD8 due to restricted air space, so we are going to do a box to the right of the current track (red box above), with drops at the two northern and the southeastern corners. That will make 90 drops (with one bad drop). So this will set a new world record for drops!

Added sondes will sample a region of missing satellite data (per CIMSS TPW analysis shown below) :-)



1921 UTC Drop 87 released at location 95. Good drop.

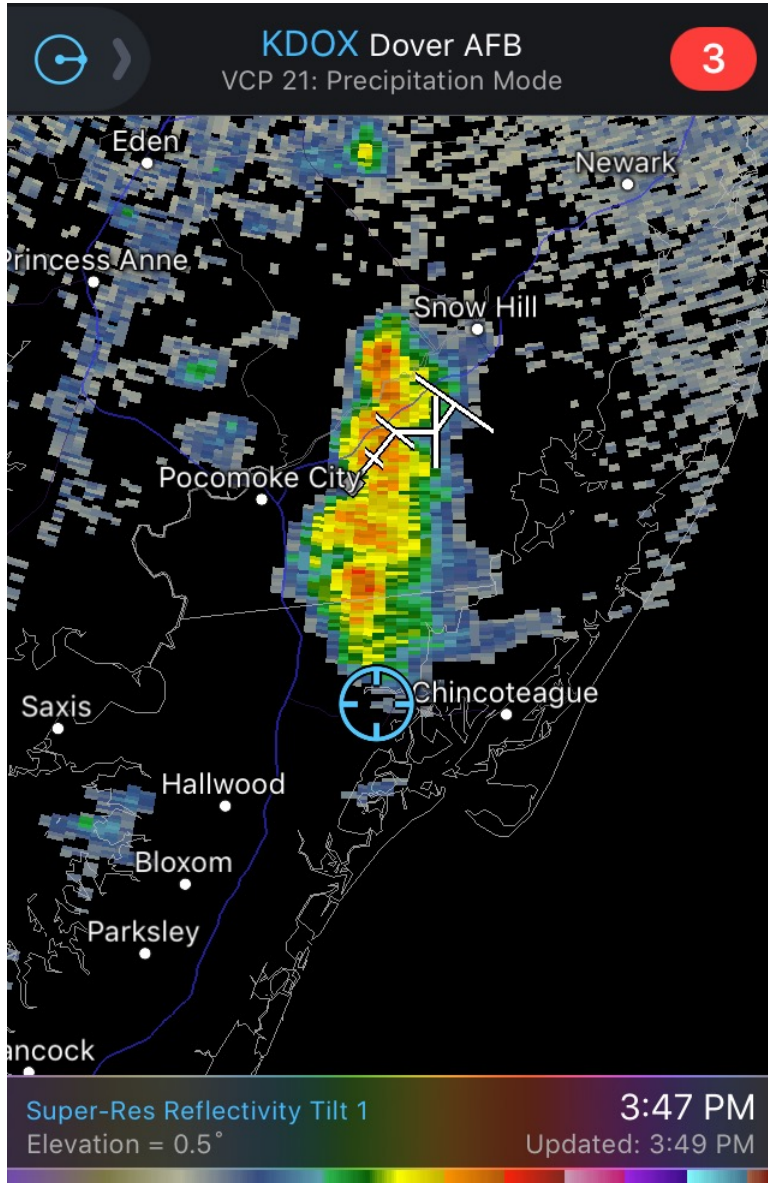
1935 UTC Drop 88 released at location 96. Good drop.



Next drop sets the record for number of drops released from plane!

1945 UTC Drop 89 released at location 97. Good drop. New record for drops released. Next one give record for good drops.

1953 UTC: Current local radar depicts an isolated storm in the region.

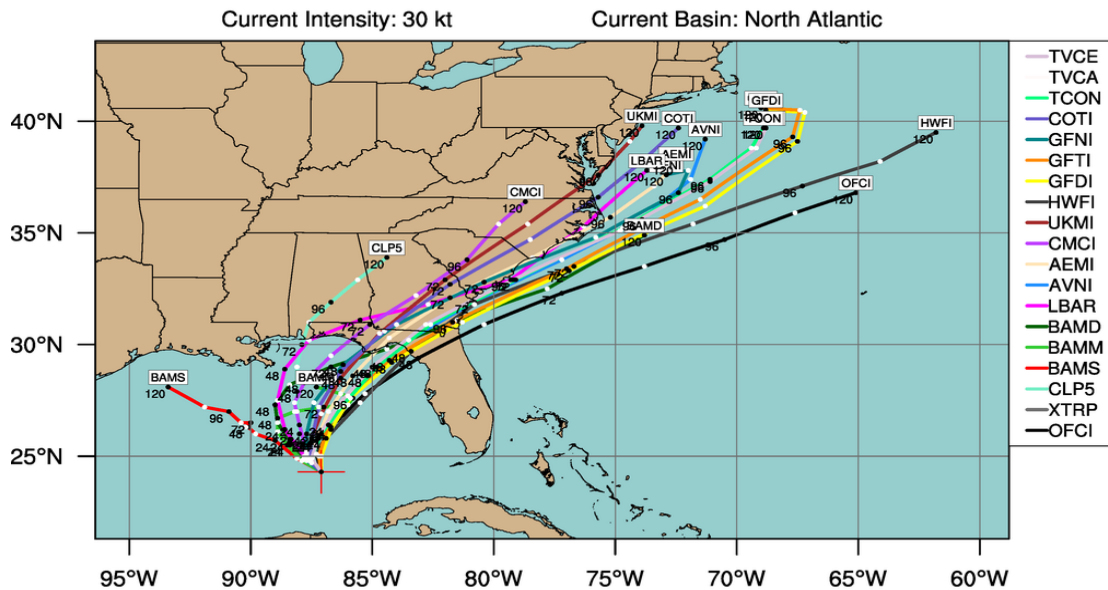


1957 UTC: Sonde #90 was just released! Good drop! The Global Hawk initiates its transit back to Wallops.

2027 UTC: Planning to land on runway 04.

TROPICAL DEPRESSION NINE (AL09)

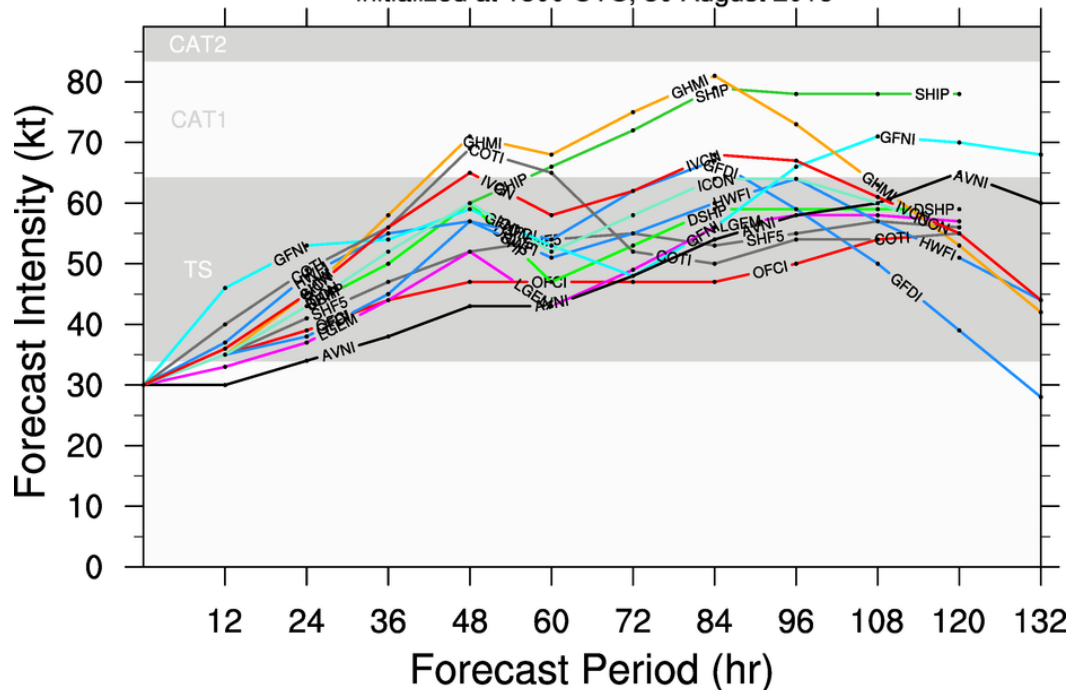
Early-cycle track guidance initialized at 1800 UTC, 30 August 2016



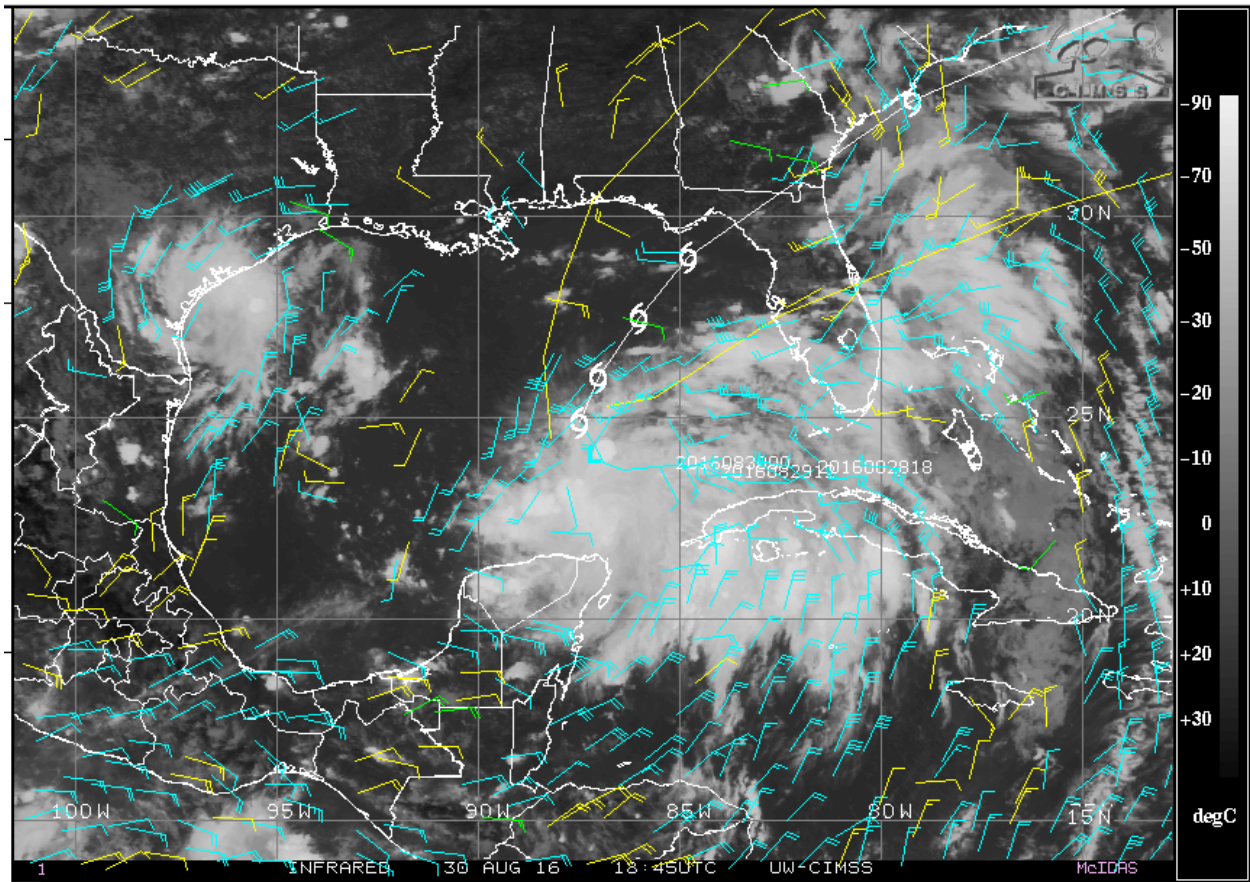
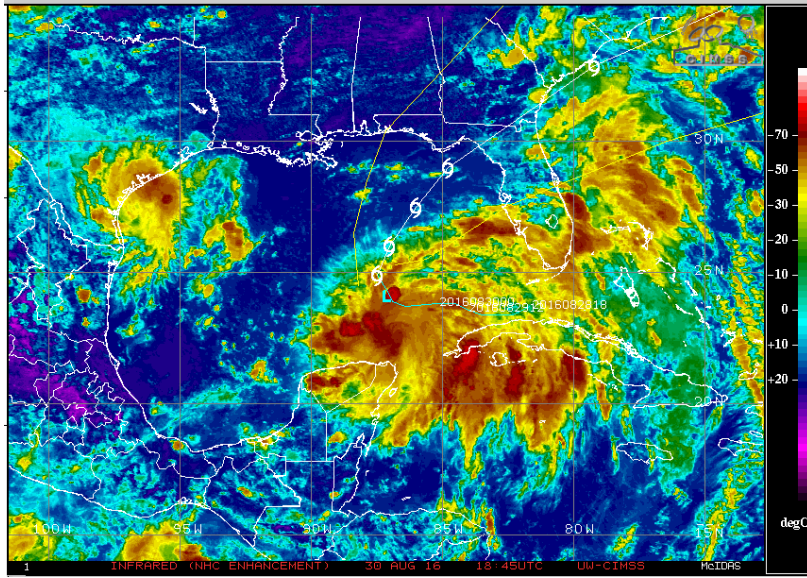
Here are the latest track forecasts for TD9. Comparable to yesterday's 18Z forecast.

TROPICAL DEPRESSION NINE (AL09)

Early-cycle intensity guidance
initialized at 1800 UTC, 30 August 2016



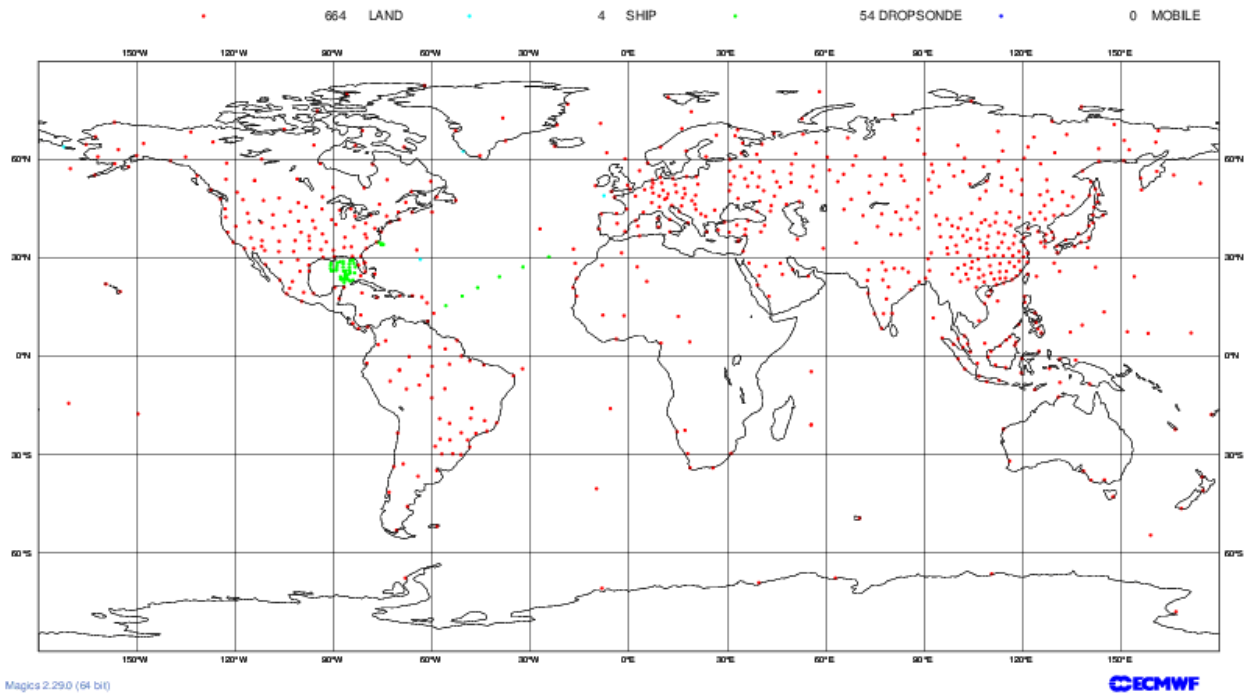
Intensity forecast is also about the same as this time yesterday, getting TD9 up to a strong TS or weak hurricane.



IR imagery at 1845 UTC. Broad cloud shield compared to the beginning of flight. Well-defined anticyclonic outflow above the storm and extending farther to the south.

Dropsonde data from the Global Hawk contributed to 54 total dropsondes assimilated into the 1200 UTC 30 Aug 2016 initialization of the ECMWF model. Note that not all dropsondes were released by the Global Hawk as the Air Force C-130 and the NOAA P-3 aircraft were conducting reconnaissance missions into TD8 and TD9, respectively.

ECMWF Data Coverage (All obs DA) - Temp
30/Aug/2016; 12 UTC
Total number of obs = 722



Current intensity forecast trends from the ECMWF model appear to indicate that the added dropsonde data influenced the intensity forecast towards a stronger system:

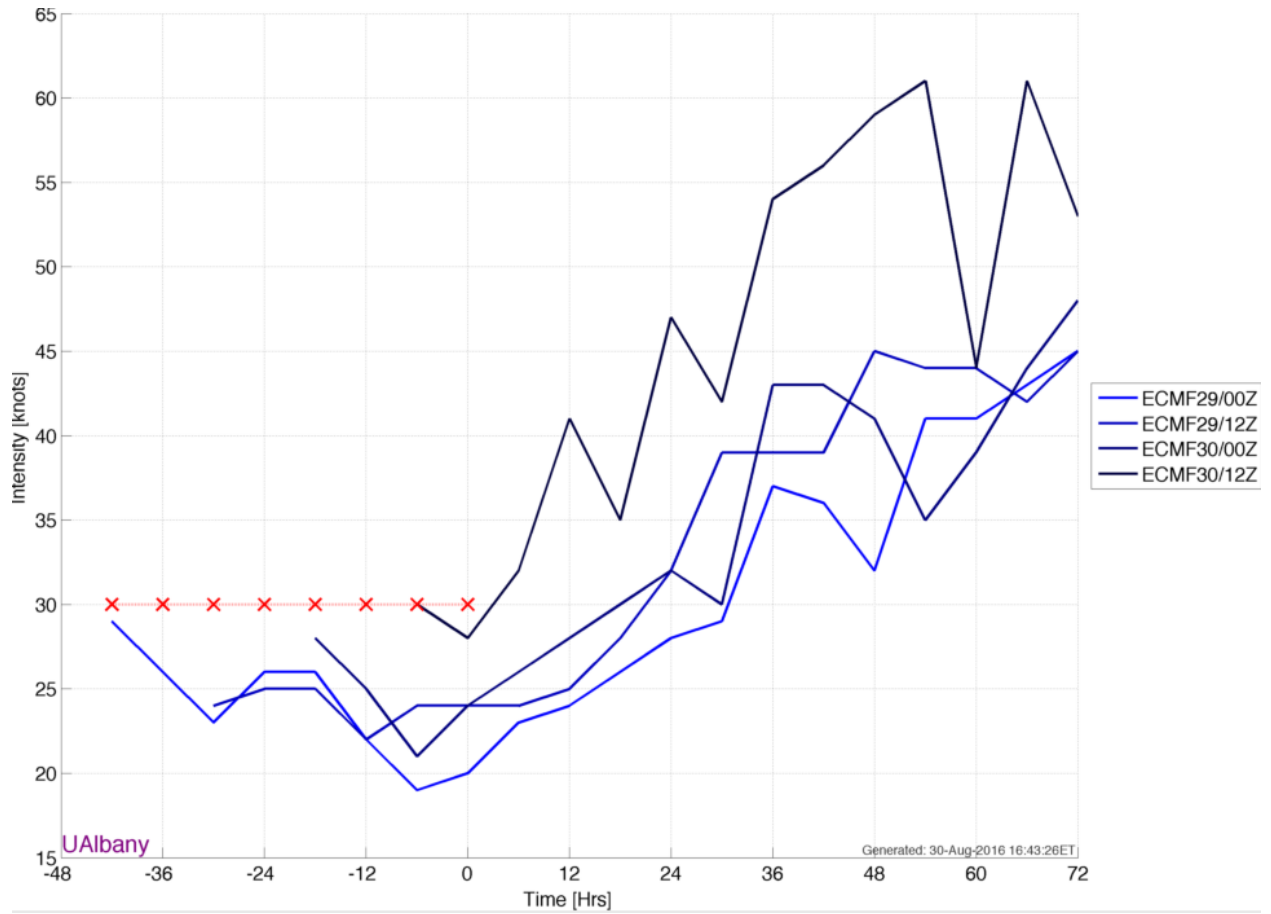


Figure provided by Brian Tang

(<http://www.atmos.albany.edu/facstaff/tang/tcguidance/al092016/>)

2136 UTC: Convection in the area has cleared.