

Tri-Agency Forecast Discussion for August 29, 2010

Created 1600 UTC August 29, 2010

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Summary:

Today is another active day for the GRIP field program in FLL and STX. From an operations standpoint for GRIP, Earl is the main area of interest. The storm was upgraded to a category 1 hurricane at 1230Z this morning and continues to show signs of intensification this afternoon (the official NHC intensity forecast shows Earl becoming a major hurricane at 31/00Z). The DC-8 was scheduled to takeoff at 1400Z today, but was delayed due to a bird strike while the aircraft was still on the ground. After inspection and testing of the effected engine, it was determined that the aircraft could indeed continue with a science flight. The DC-8 departed from STX at approximately 1630Z and, as of this discussion, is conducting a science flight into Hurricane Earl. Since STX is currently under a tropical storm warning and a hurricane watch, there is some uncertainty as to whether the aircraft will recover to STX or to FLL tonight. As it stands now, it will recover to STX and depart early tomorrow morning (~1200Z) for another science flight which will recover in FLL. Possible science flights into Earl from FLL in the coming days will be determined later. The WB-57 will make a final go/no-go decision regarding a suitcase flight to Tampa Monday morning. At this time, they plan to transit to Tampa on Monday and conduct science flights in Earl potentially Tuesday, Wednesday, and Thursday. PREDICT is currently evacuating from STX to Barbados. They plan to fly PGI-36L from Barbados on Monday and Tuesday. It is possible that the Tuesday flight will recover back to STX. Elsewhere, Danielle continues to weaken as it moves over colder SSTs and higher vertical shear. PGI-38L has emerged off the coast of Africa, but is not forecast to develop in the short term.

Forecast for 1600 UTC 8/29/2010:

Synoptic Overview:

Former Hurricane Frank has completely dissipated, and the area of low pressure that was previously analyzed in the northern Gulf of Mexico has moved inland. Therefore, these two areas are no longer of interest. The important systems are Hurricane Danielle, Hurricane Earl, PGI-36L/AL97, and PGI-38L (**1**, **5**). The Atlantic anticyclone is somewhat weaker than yesterday. The high consists of two centers, with Danielle moving toward the northeast between the centers of the highs (**1**).

The Gulf of Mexico, Caribbean, and area of the TCs continues to be very moist (**5**). Conversely, dry air continues to stream off the Sahara. Other dry air is associated with the deeply occluded middle latitude cyclone farther north.

The CIMSS upper level water vapor winds show several important features—anticyclonic flow over the Gulf of Mexico, a trough just off the East Coast of the U.S., ridging over the central Atlantic, and another trough over the Eastern Atlantic (2). Looking further ahead, a trough over the central U.S. will play an important role later in the week for the recurvature of Earl, and the two PGIs. Dramatic outflow is associated with Danielle. There is well defined outflow northeast of the center, and eastward and southward of the storm. The southern outflow reaches speeds of 50 kt just north of Earl (2). This strong easterly flow near Earl likely is influencing its westward movement, which has not been captured as well by the various numerical models that have indicated a more northwestward track. Weak outflow is starting to develop in the upper levels of Earl and PGI-36L (2).

Danielle is experiencing strong shear as she travels into the middle latitudes, as well as colder SSTs (6). However, Earl and the PGIs are located in regions of weaker, more favorable shear (7).

Lightning data shows that Earl experienced a burst of lightning beginning late Saturday (yesterday). The area of lightning had a north-south orientation, reminiscent of a squall line that would be associated with mid level dry air. Although the burst has now diminished, the storm continues to be highly electrified. Areas of lightning appear to be slowly rotating counterclockwise around the center of the storm.

Features of Interest:

Hurricane Danielle:

Hurricane Danielle is currently a Category 1 hurricane. It was located at 35.5N/55.5W with the minimum sea level pressure of 972 hPa and maximum sustain winds of 75 kt/85 mph at 1500Z August 29. There are two impressive outflows associated with Danielle in the northeast and the south quadrants (2). Danielle continues to quickly move northeastward due to the influence of 500-hPa trough along 63 W and a subtropical ridge along 45 W and it is predicted to make a northwestward turn in next 72-96 h (8). An eye associated with Danielle is no longer seen in microwave satellite images (9) and the deep convection has disappeared over the southern portion of the circulation. A gradual weakening trend is expected from most of the global models because it is moving over cooler waters and into a stronger wind shear environment (6,10). The official forecast from NHC suggested that Danielle will transition into a strong extratropical storm within 2 days and dissipate in 5 days.

Hurricane Earl:

Hurricane Earl was upgraded to a hurricane from tropical storm status today at 1230Z. Visible, IR (3), and water vapor (2) satellite imagery from early Sunday morning show that convection was asymmetric, located predominantly south of the cyclone center (11). Northerly outflow from Danielle, as strong as 50 kts, was creating a high shear

environment (2) acting to suppress convection to the North of Earl's center. By late morning the strong rainband-like feature had dissipated and the central convection had increased. Through this transition, Earl became heavily electrified. NOAA P3 flight level data confirmed that Earl was intensifying more quickly than the models had suggested, on the order of 2 hPa per hour. By the 11am AST forecast advisory the maximum sustained winds had reached 65 kts. There is a 15% chance of tropical storm force winds (34 kt) over St. Croix by 8 am AST Monday (12) increasing to a 40% chance by Tuesday morning. Danielle, seen to the north of Earl in the synoptic overview (1), is sandwiched between an eastern U.S. anticyclone and the central Atlantic subtropical high. These features are helping keep Earl on a westward track. At 1500Z, Earl was moving at 280 degrees at 15kts. As Danielle continues to move northward, the peripheral high pressure systems start to merge and give Earl a northward component. Model track forecasts (13) bring Earl near the US east coast in 72 hrs, possibly affecting the Carolinas in 96 hrs. In terms of intensity, Earl is currently positioned over 30 C SSTs (14) which is favorable for further intensification as it skirts St. Croix / Puerto Rico tomorrow. The depth of the 26 C degree isotherm is approximately 100 m (15). The model consensus is that Earl will increase from a weak category 1 to a moderate category 3 over the next 48 hrs (16).

AL97/PGI-36L:

AL97/PGI-36L is starting to develop hints of a low level circulation. It is located in an area of TPW reaching ~ 55 mm (5). SSTs are favorable for development, ~ 29 C (17). The system is expected to remain over warm water. Ensemble track guidance from the 12Z run (18) depicts a motion just north of due west over the next 48 to 72 hours. It is interesting that the most recent upgrade of the ECMWF is more aggressive in developing Fiona than is the GFS. Prior to the upgrade, the GFS tended to be the more aggressive model. Both ensemble runs take the system westward, and then more northwesterly. The models show the storm within ~ 100 km northeast of St. Croix at ~ 96 hrs. At 120 hrs, the models show the center near 24N, 67 W. The intensity guidance shows considerable spread; however, TS status (Fiona) is expected in the 36-48 h time frame. Hurricane status is expected between 72-84 hrs, although some models do not produce hurricane intensity during the entire 120 h period.

PGI-38L:

PGI-38L is interesting in terms of its long range prospects. The system currently has just exited Africa, and currently is very disorganized (4). It is associated with a weak area of vorticity, but even stronger vorticity is located farther north in a region of clear air. Both the GFS and ECMWF are slow to develop PGI-38L (19, 20), but they do move the system steadily toward the west.

Dust/SAL Discussion:

The Saharan Air Layer has been quite active, but quasi-static over the past two weeks. An enhanced but entirely zonal African Easterly Jet, along with strong ridging over the northeast Atlantic, have served to continually inject Saharan dust and somewhat dry air into the northeast Atlantic between 10N and 30N east of 45W. MODIS Aerosol Optical Depth from Terra yesterday afternoon confirms that the area described above is currently dust loaded (21). A GFS analysis at the 700 hPa level shows the enhanced easterly jet and a strong baroclinic zone across the jet axis. The dusty air is located in cooler potential temperatures (22). The wave disturbances which have been traveling along the jet have been responsible for ejecting Saharan dust into this area. GEOS-5 forecasts this behavior to continue, with PGI-36L recently having excited a large dust event and PGI-38L expected to do much the same (23). The other major dust feature in the Atlantic Ocean is dusty air which has wrapped Hurricane Earl. MODIS imagery confirms that moderate AOTs are present in the near Earl environment, and GEOS-5 forecasts the hurricane to carry this envelope of dust as it moves over the Bahamas and parallel to the US East coast over the next 72-96 hours (23).

Images used in discussion:

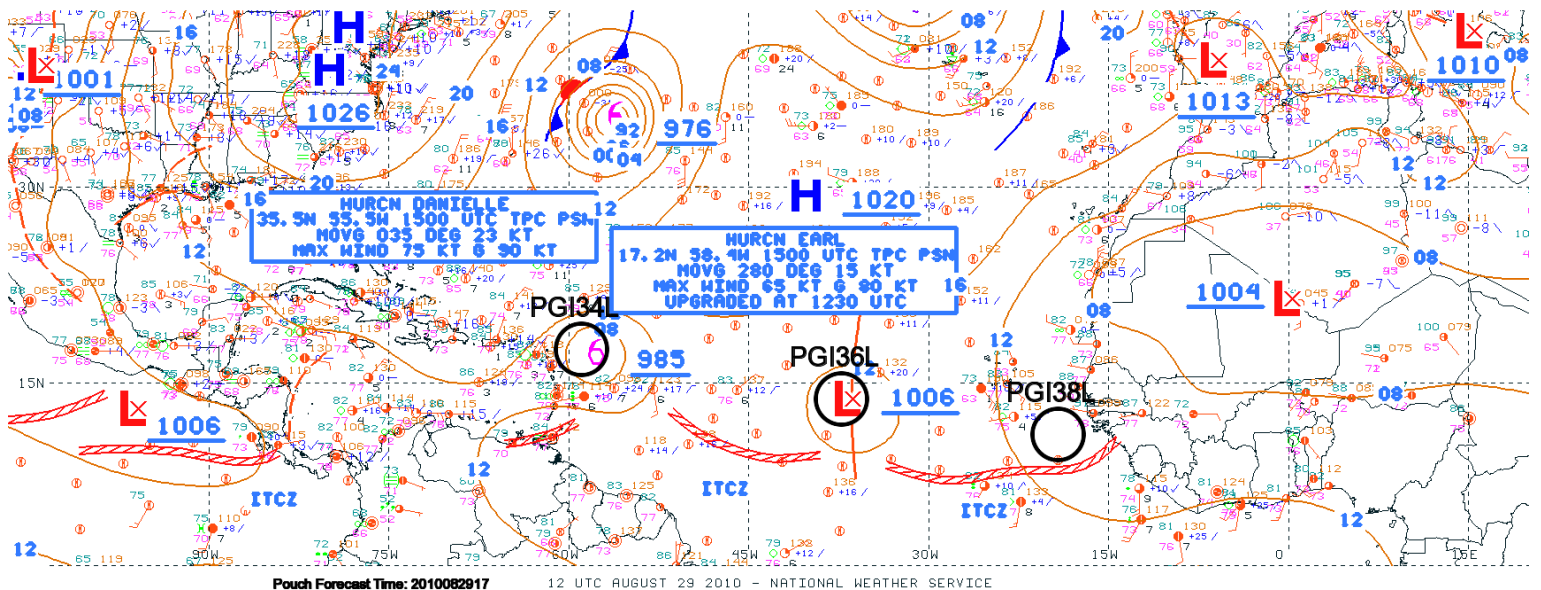


Figure 1: OPC surface analysis valid at 1200Z on 29 August 2010, with pouches overlaid

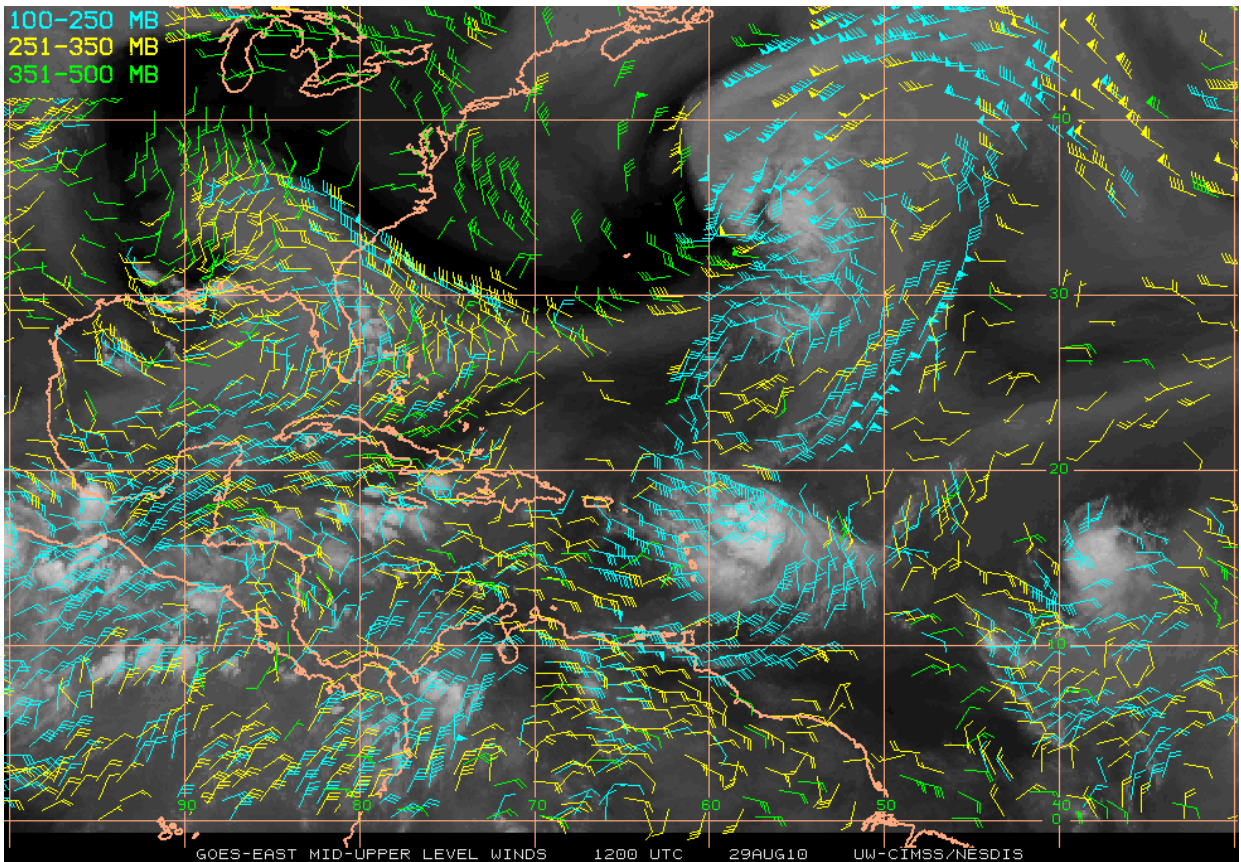


Figure 2: CIMSS analysis of mid-upper level winds and water vapor imagery valid at 1200Z 29 August 2010

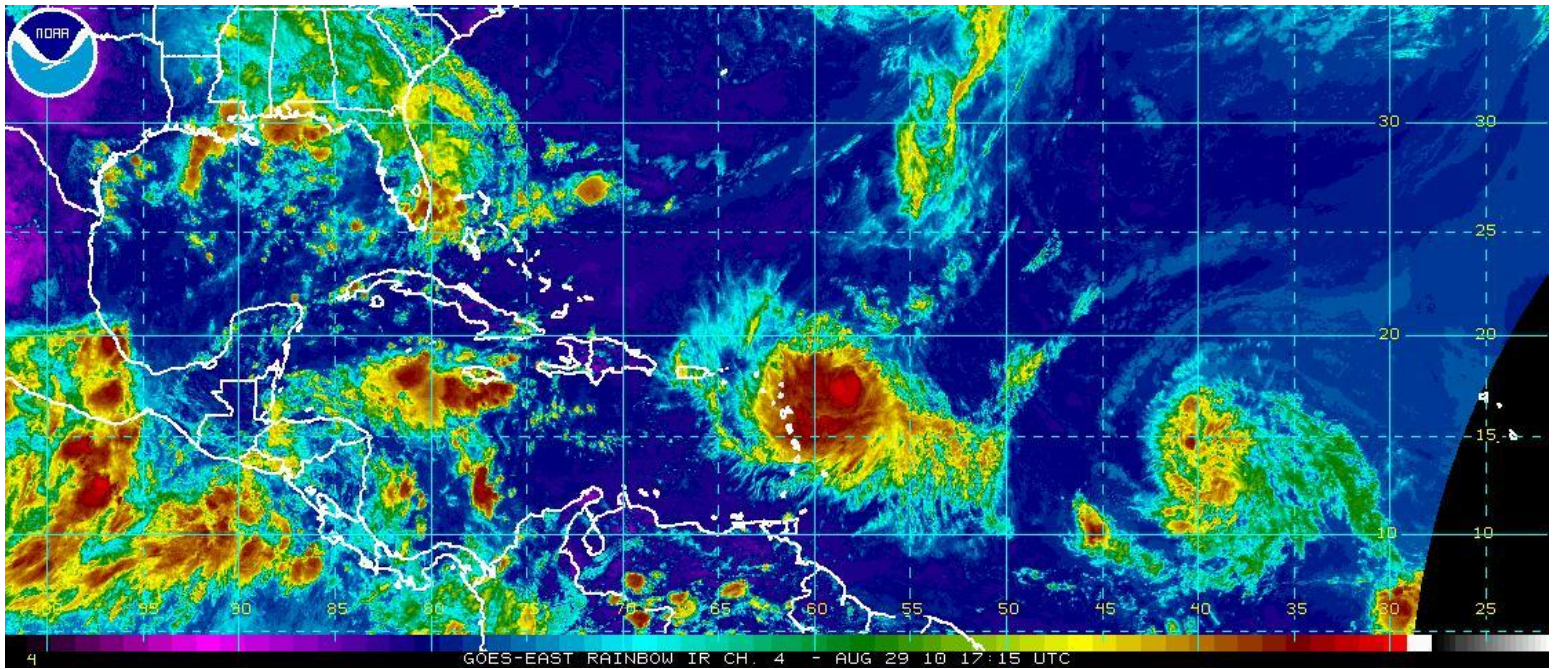


Figure 3: GOES-EAST IR imagery valid at 1715Z 29 August 2010

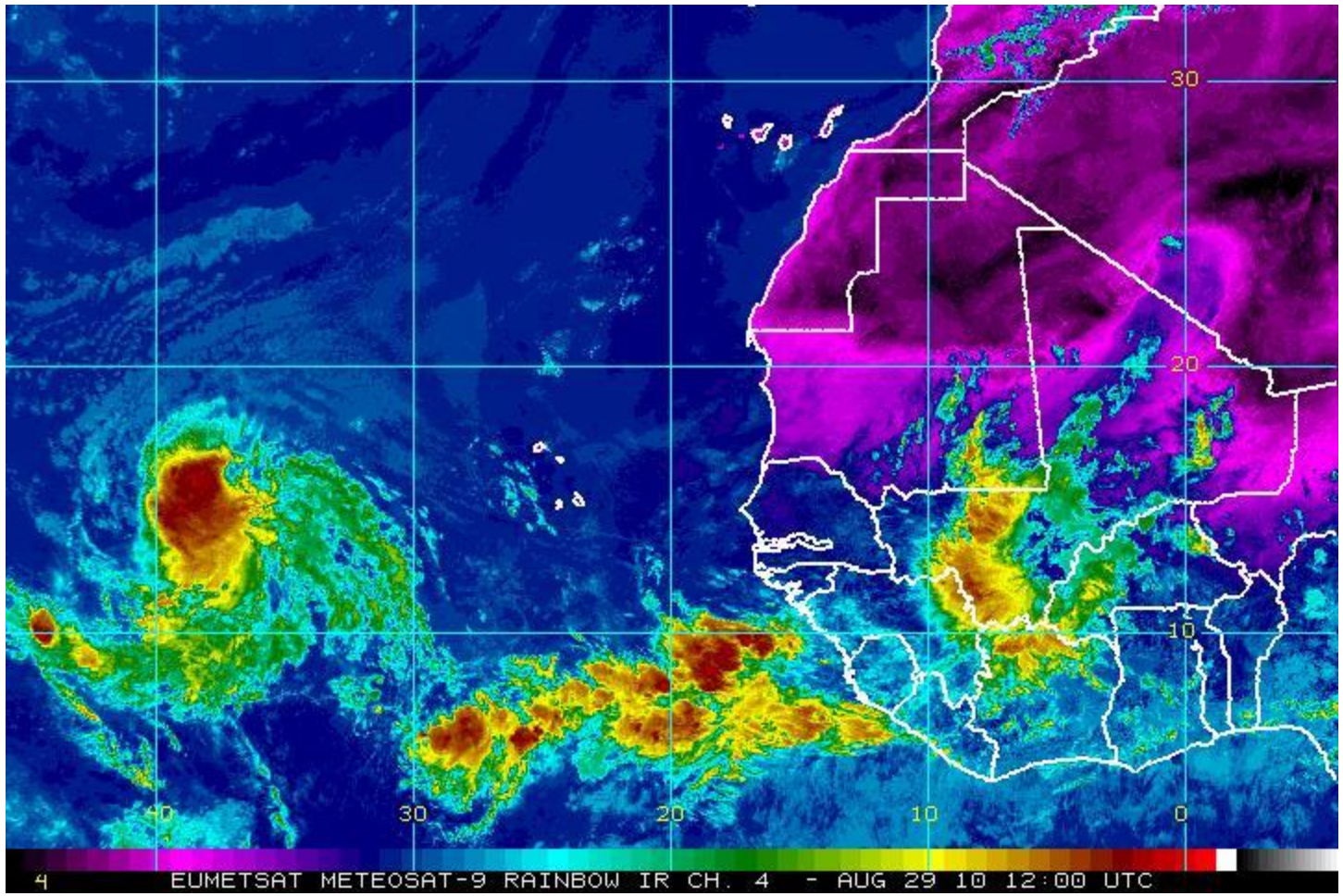


Figure 4: METEOSAT-9 IR imagery valid at 1200Z 29 August 2010

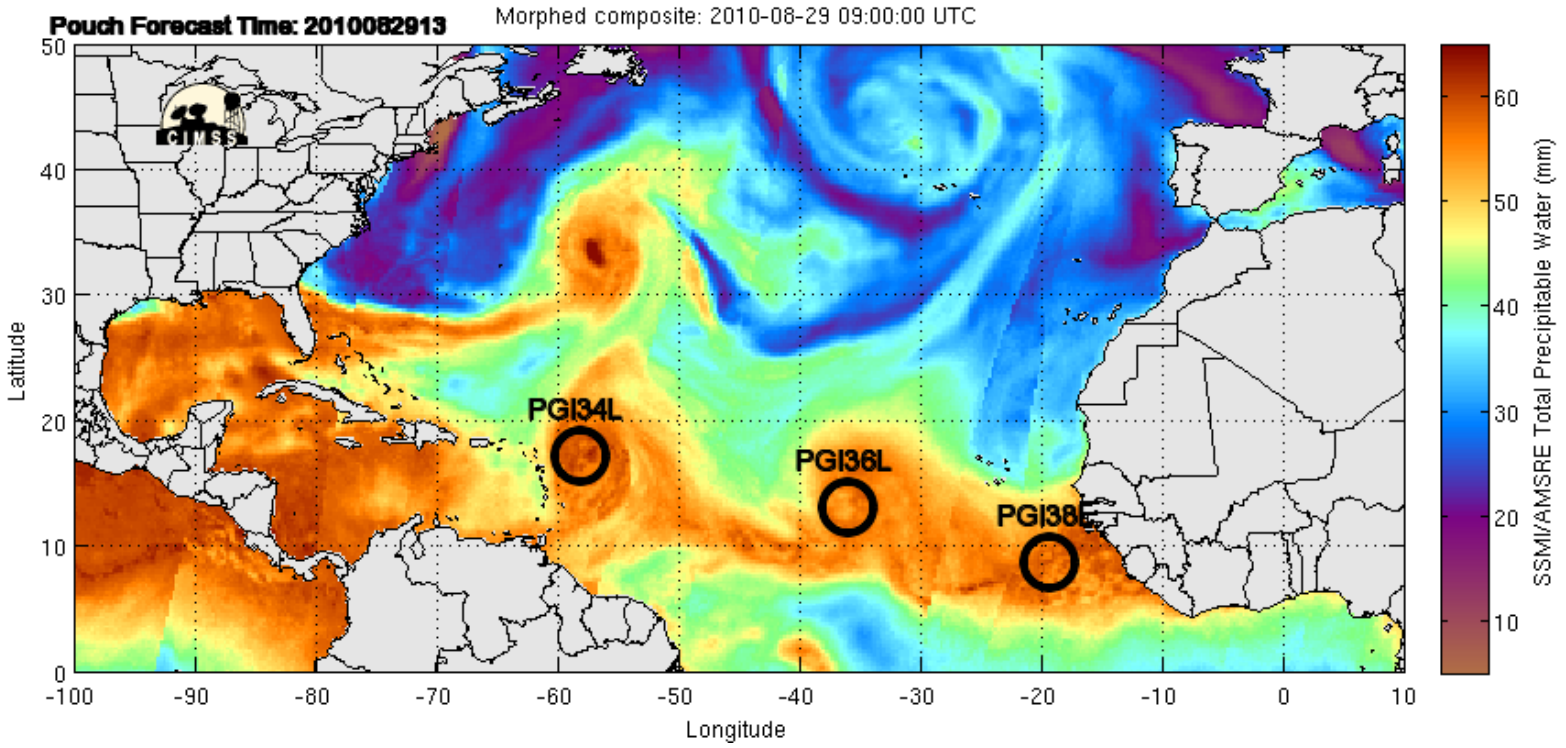


Figure 5: CIMSS TPW analysis valid at 0900Z on 29 August 2010, with pouches overlaid

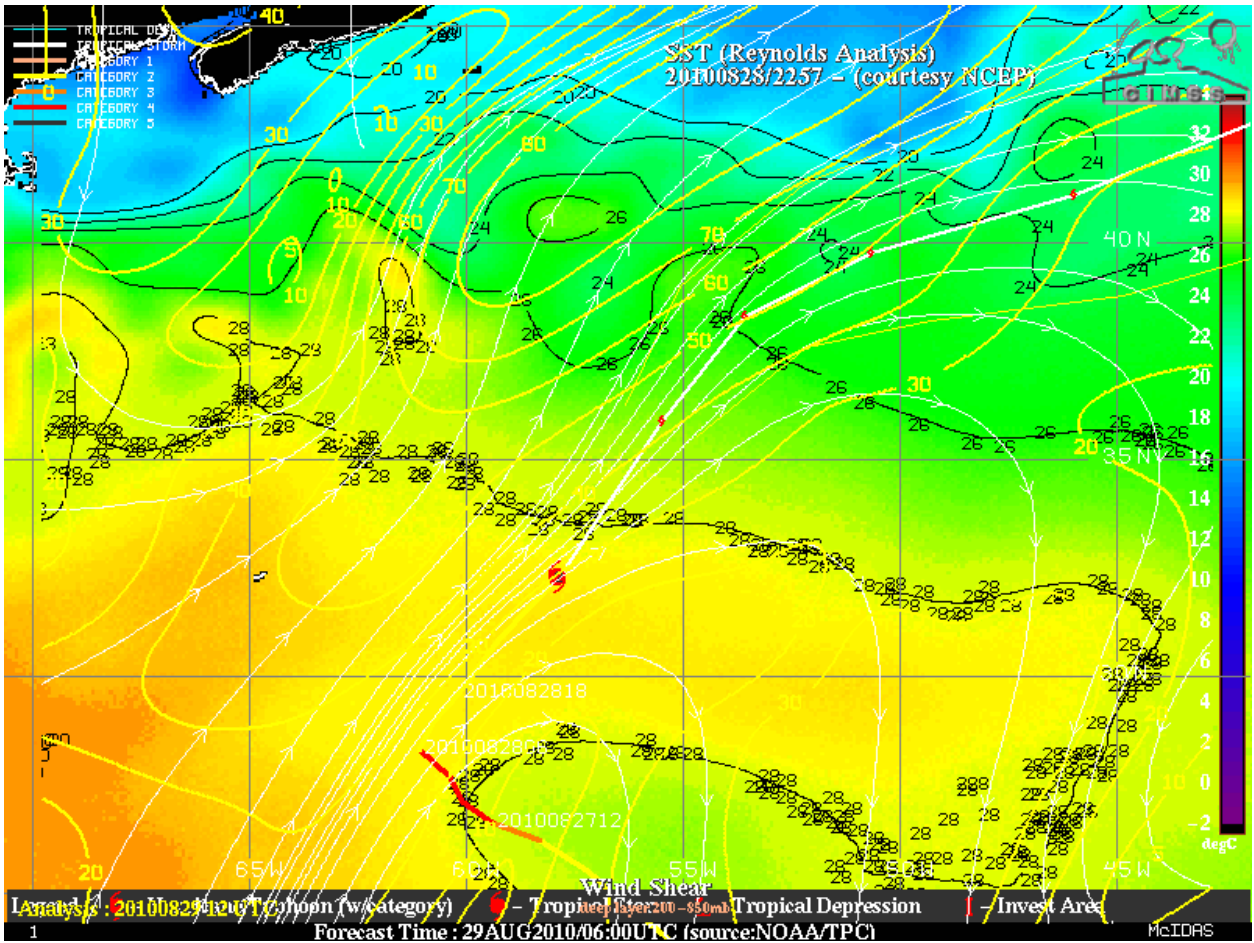


Figure 6: CIMSS analysis of vertical wind shear (yellow contour) valid at 1200Z on 29 August 2010, sea surface temperature (shaded, °C) valid at 2257Z on 28 August 2010, and the forecast track for Hurricane Danielle (white line with a hurricane symbol) valid at 0600Z 29 August 2010.

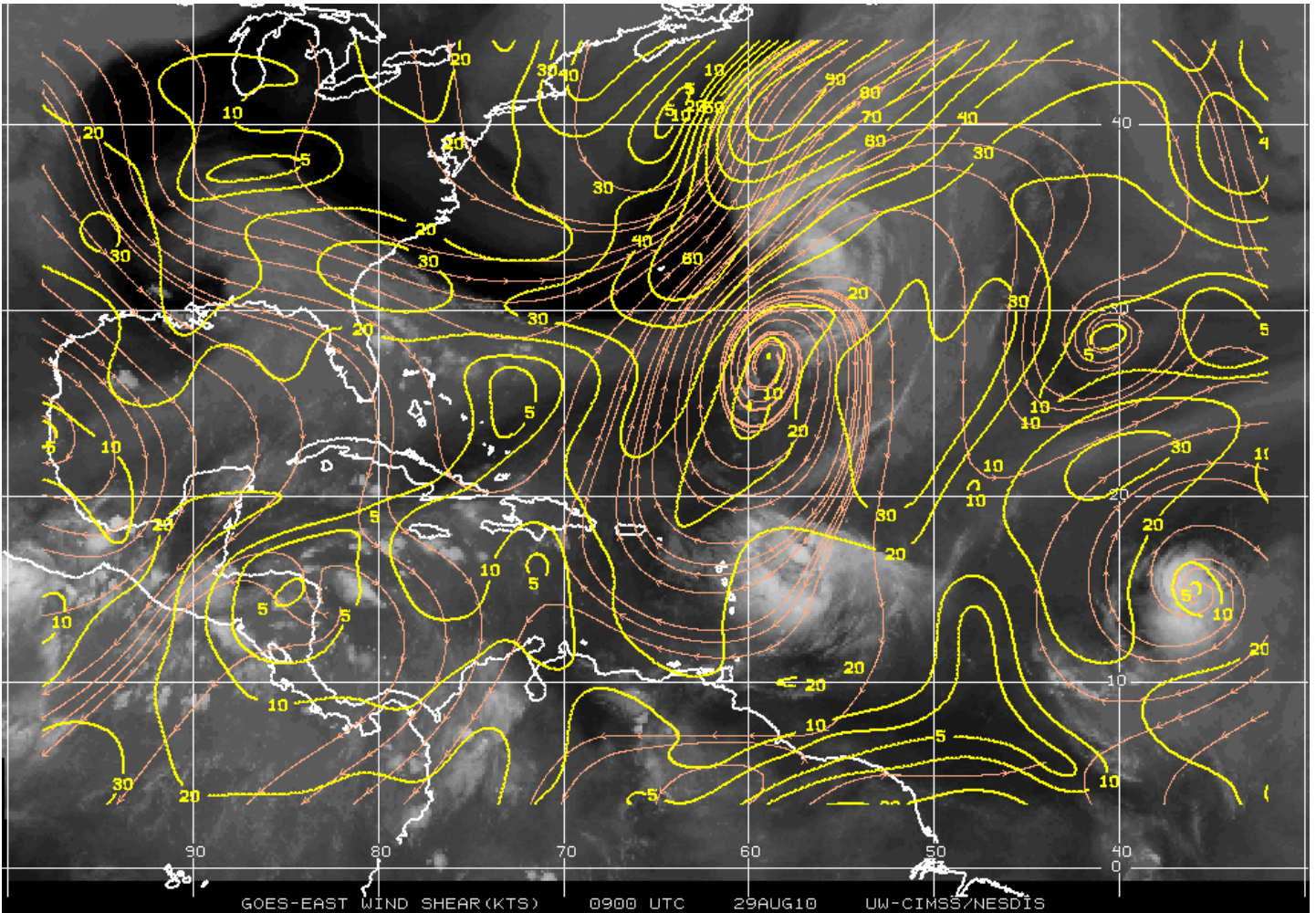
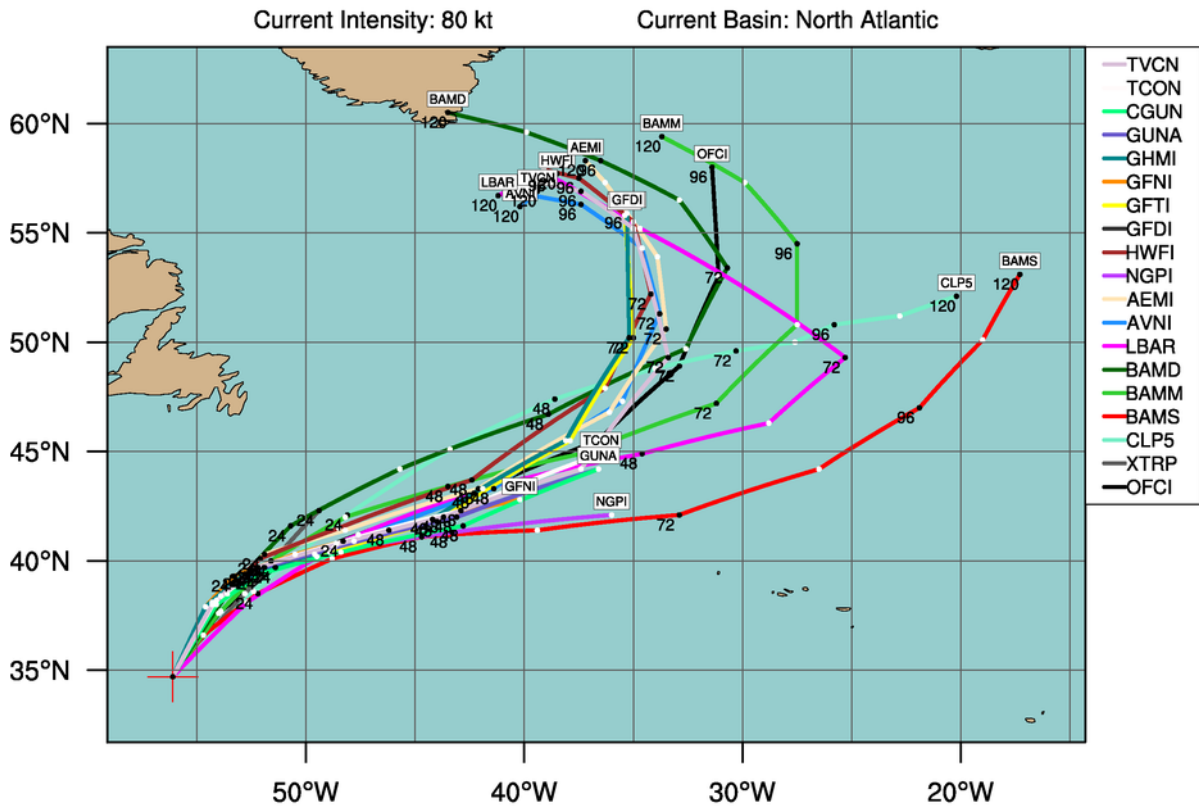


Figure 7: CIMSS analysis of wind shear and water vapor imagery, valid at 0900Z on 29 August 2010

HURRICANE DANIELLE (AL06)

Early-cycle track guidance valid 1200 UTC, 29 August 2010



This plot does not display official storm information. Use for information purposes only.
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Figure 8: Early-cycle track guidance valid at 1200Z on 29 August 2010

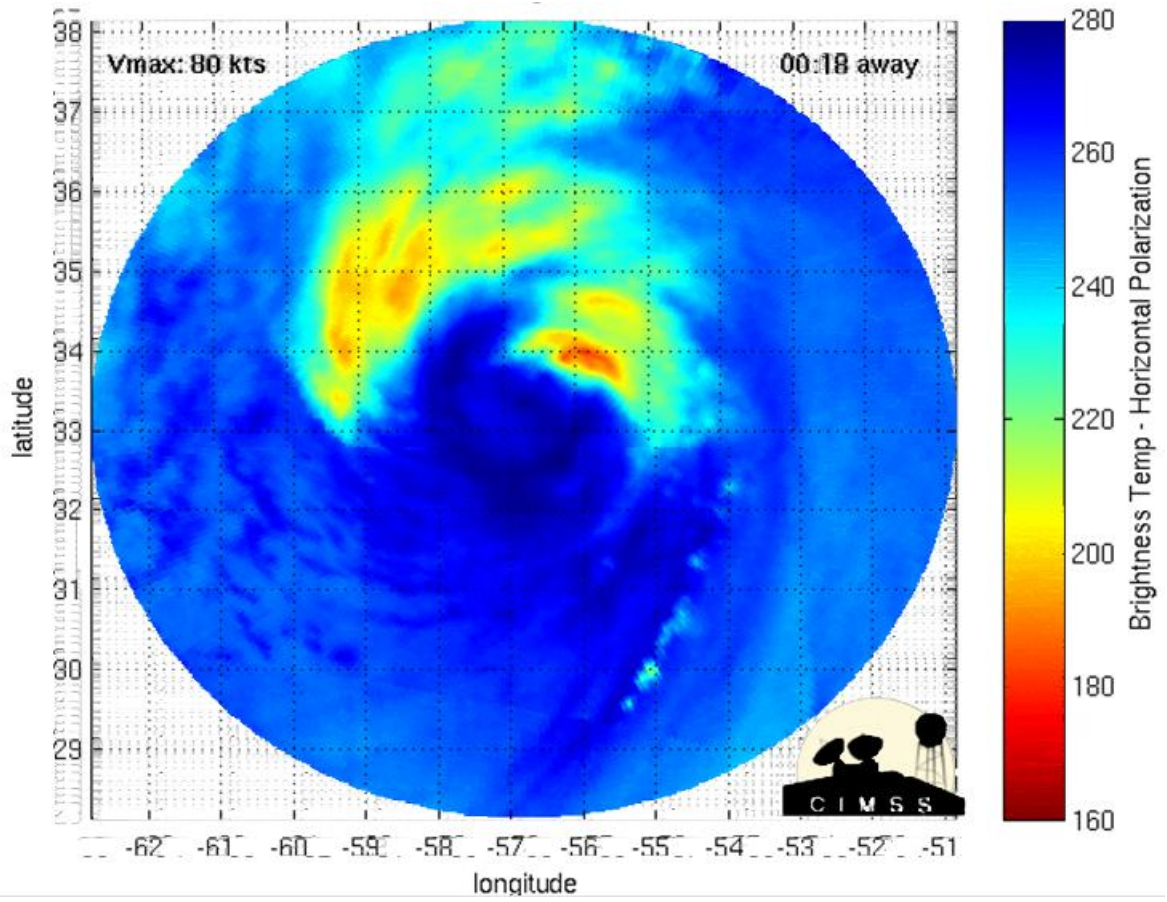
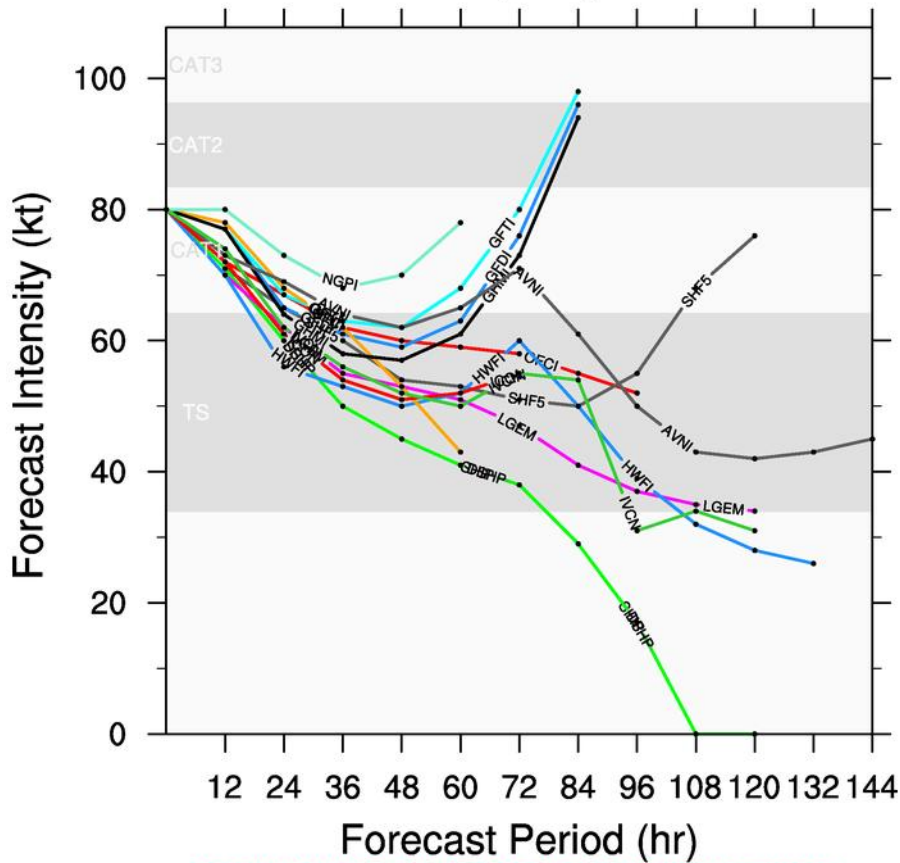


Figure 9: Brightness temperature from morphed integrated microwave imagery at CIMSS at 0930Z on 29 August 2010

HURRICANE DANIELLE (AL06)

Early-cycle intensity guidance

valid 1200 UTC, 29 August 2010



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Figure 10: Early-cycle intensity guidance valid at 1200Z on 29 August 2010

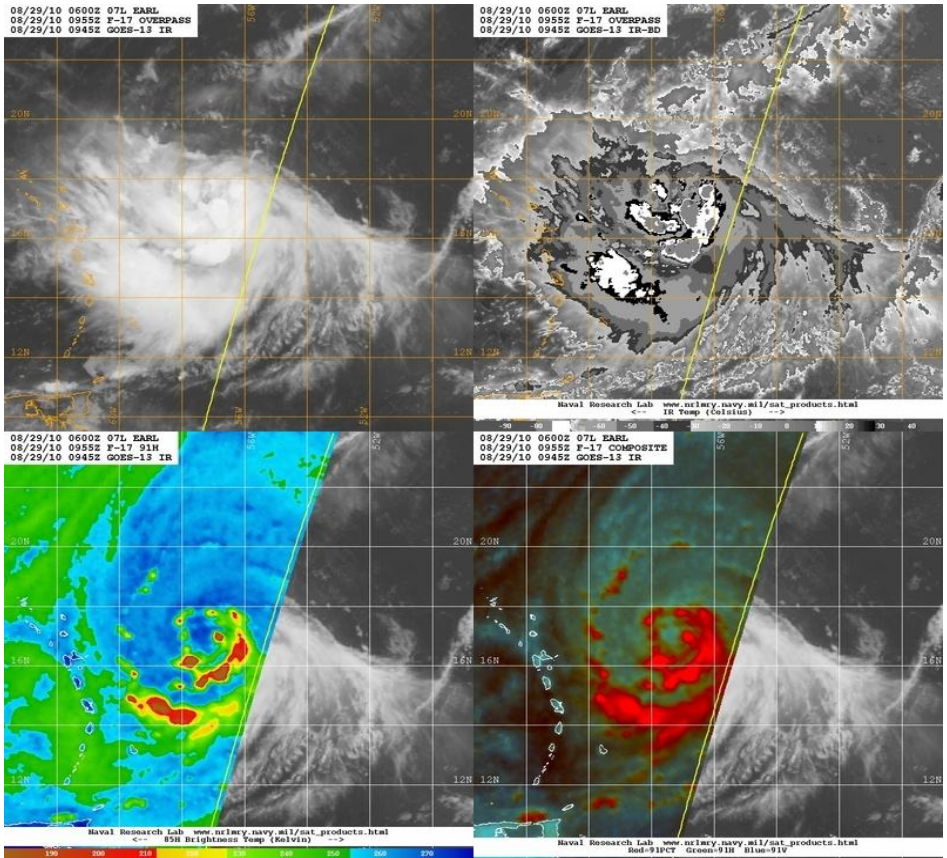


Figure 11: Multi-sensor imagery from NRL

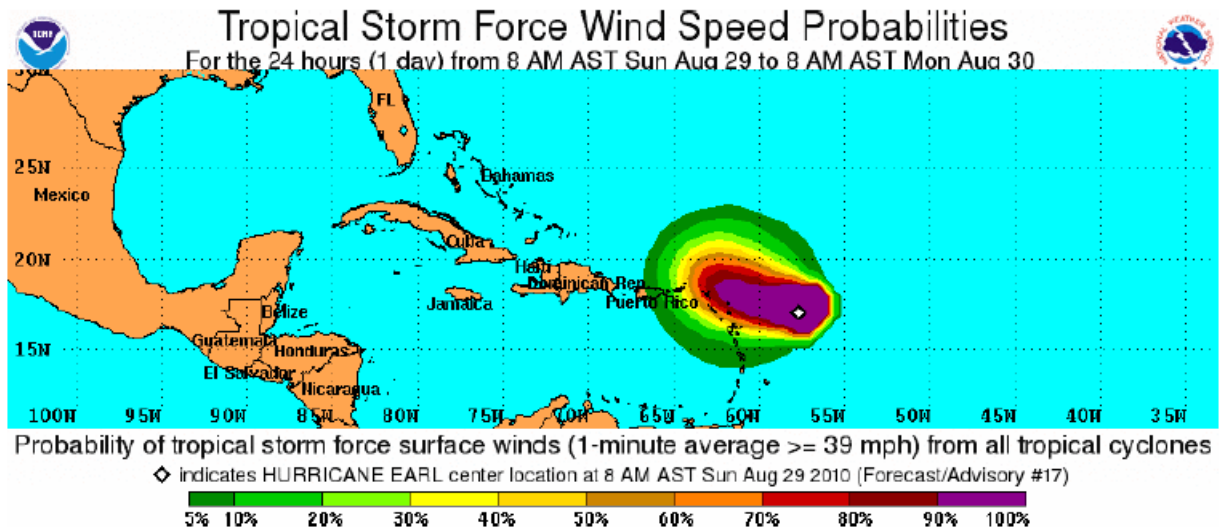
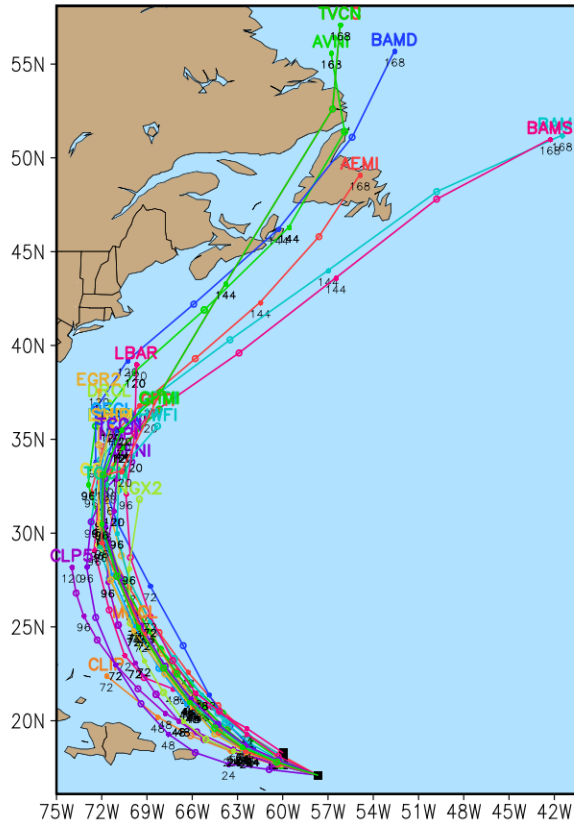


Figure 12: 24 hr TS wind speed probabilities from the Tropical Prediction Center valid at 1200Z on 29 August 2010. Image valid for forecast time (1200Z on 30 August 2010).

Atlantic HURRICANE EARL Model Tracks
Valid Time: 1200 UTC 29 August 2010



MODELS
DISPLAYED

- AEMI
- AVNI
- BAMD
- BAMB
- BAMS
- CGUN
- CLIP
- CLP5
- DRCL
- DSHP
- EGR2
- GFDI
- GFNI
- GFTI
- GHMI
- GUNA
- HWFI
- LBAR
- LGEM
- MRCL
- NGPI
- NGX2
- OFCI
- SHIP
- TCCN
- TCON
- TVCC
- TVCN

Tropical Cyclone Model Plots
<http://moa.met.fsu.edu/~acevans/models/>
Redistribution of these images is prohibited.

DISCLAIMER: Do not use this image in place of official sources!
The official NHC forecast is always available at <http://www.nhc.noaa.gov>.
Forecast points above are shown in 12 hr increments. Initial points denoted by black squares.

Figure 13: Model tracks for Earl valid at 1200Z on 29 August 2010

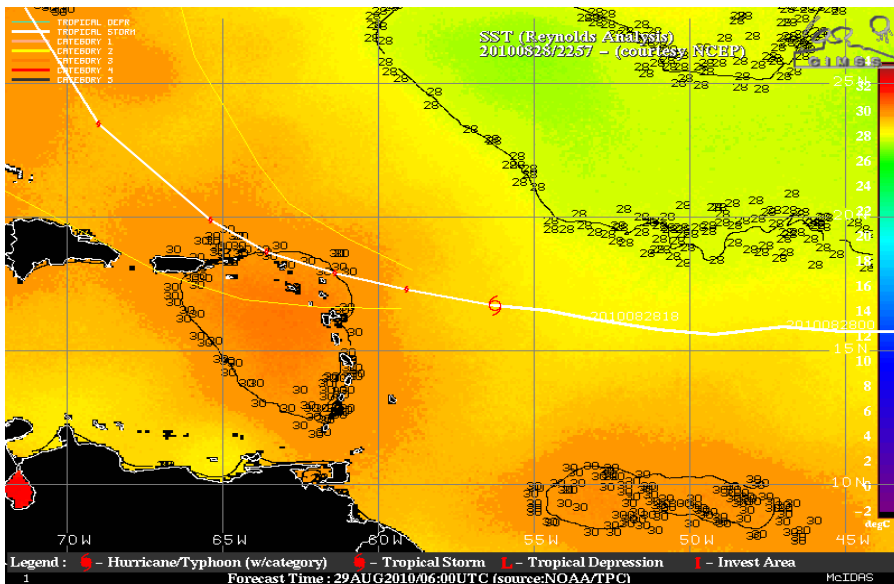


Figure 14: CIMSS analysis of SSTs valid at 2257Z on 28 August 2010

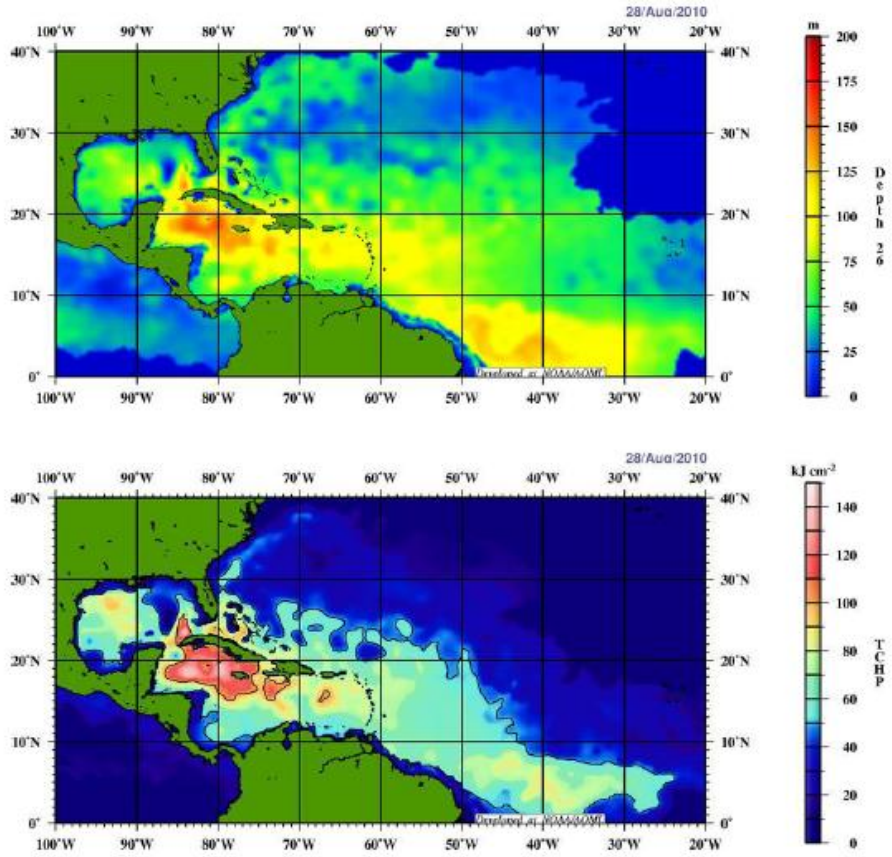


Figure 15: NOAA 26 C degree isotherm depth and ocean heat potential valid 28 August 2010

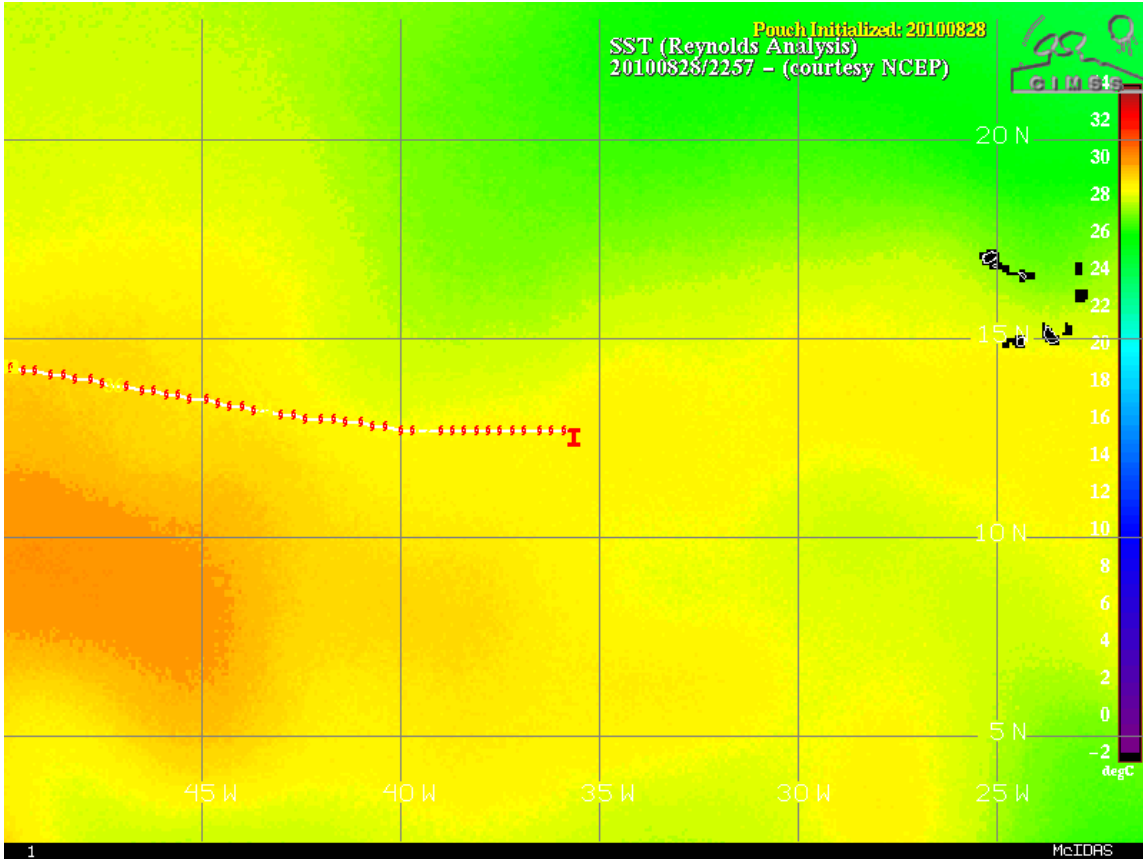
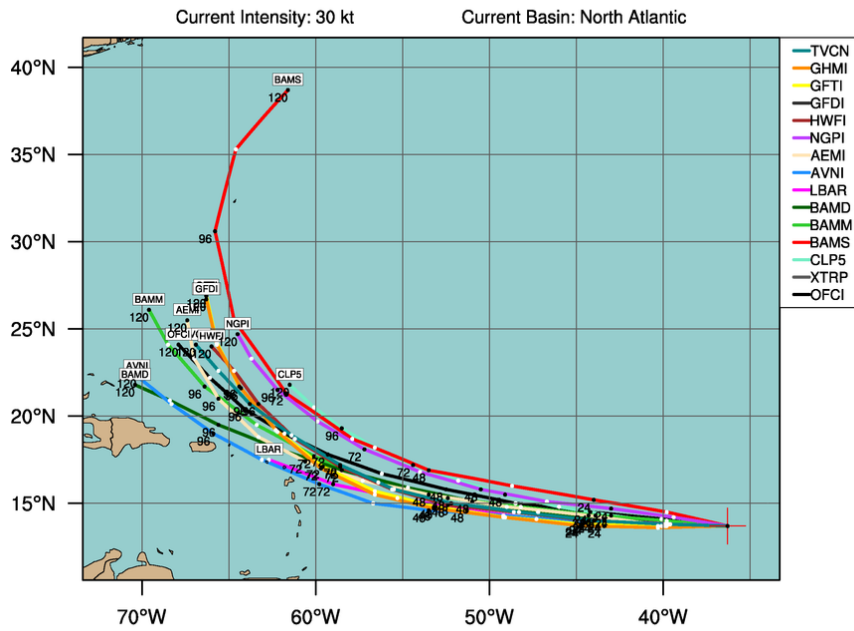


Figure 17: CIMSS analysis of SSTs valid at 2257Z on 28 August 2010

LOW INVEST (AL97)

Early-cycle track guidance valid 1200 UTC, 29 August 2010



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Figure 18: Early-cycle track guidance valid at 1200Z on 29 August 2010

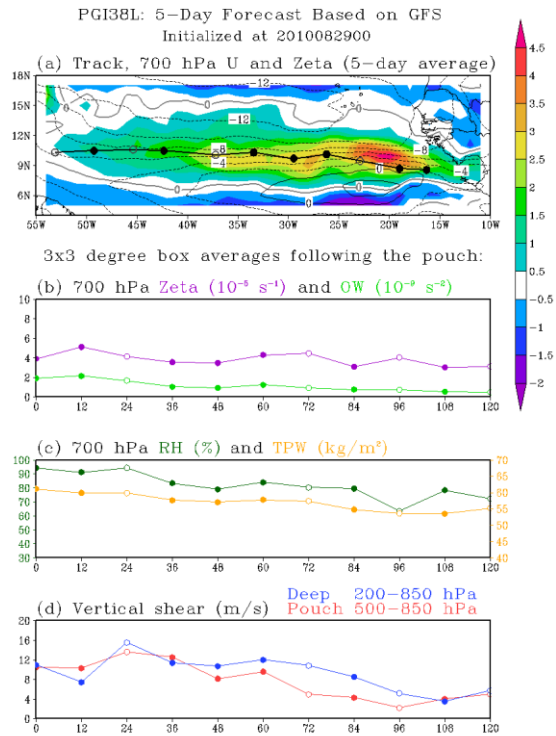


Figure 19: GFS based pouch forecast initialized at 0000Z on 29 August 2010

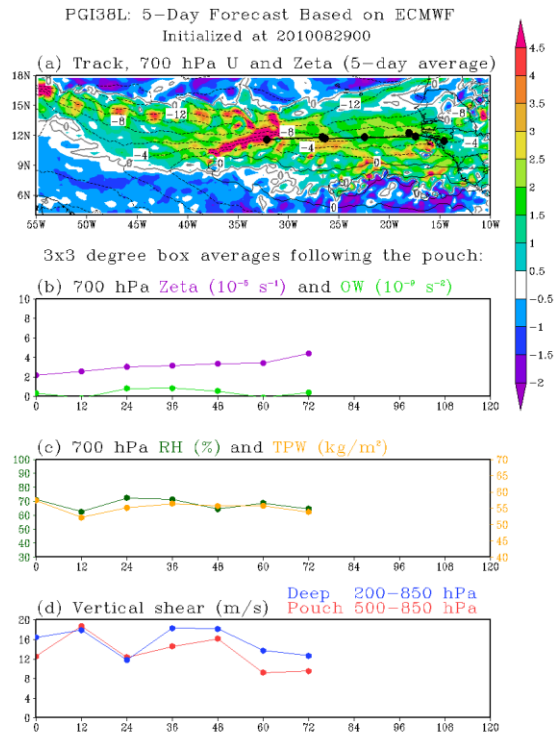


Figure 20: ECMWF based pouch forecast initialized at 0000Z on 29 August 2010

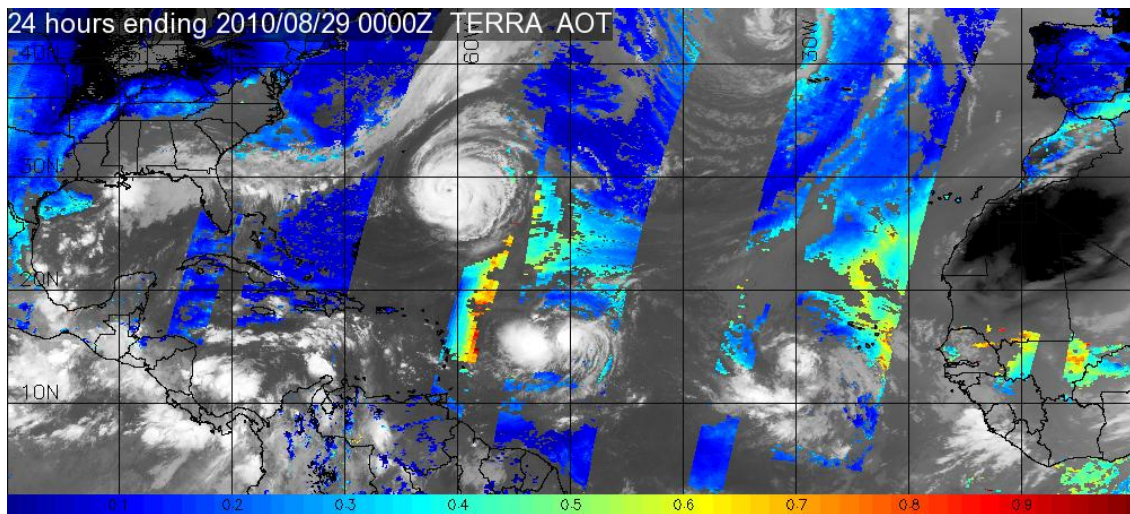


Figure 21: Terra AOT composite from the 24 hours ending at 0000Z on 28 August 2010

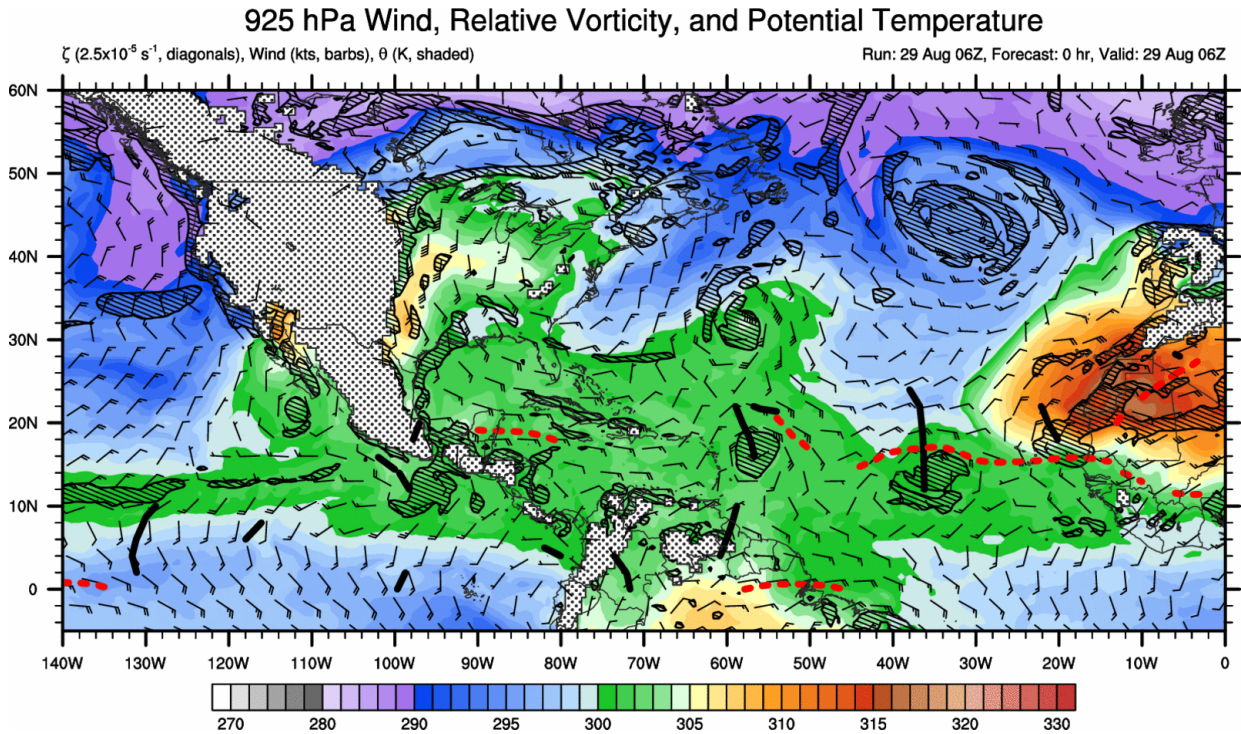


Figure 22: GFS analysis from 0600Z on 29 August 2010 with 925 hPa wind, vorticity and potential temperature (700 hPa jet location is red dotted line)

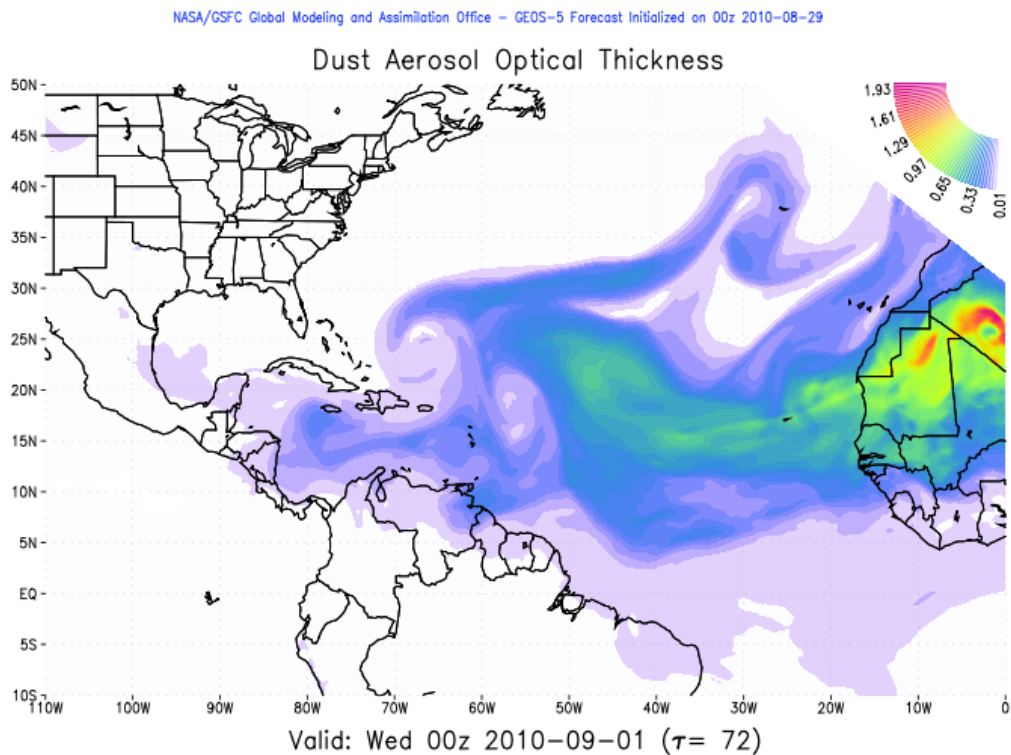


Figure 23: GEOS-5 forecast for Dust AOT valid at 0000Z on 1 September 2010