Tropical Areas of Interest Discussion for August 22, 2010

Created 1600 UTC August 22, 2010

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Summary:
Today is another no fly day for the GRIP field program in FLL. The maintenance issue that was reported yesterday with the DC-8 has been resolved and the aircraft is once again ready to fly. It is on alert for a 1900Z takeoff on Monday, targeting an area of potential development in the northern Gulf of Mexico. The models have indicated possible development there for the past few days, albeit on an inconsistent basis. Regardless, it appears as though there will be an area of convection strong enough to warrant at least one flight between Monday and Wednesday. Also of interest is TD6/PGI-31L which is forecast to gradually intensify into a hurricane over the next few days and curve to the northwest between 50 and 60W by most of the models. At this time, there are no plans for GRIP to fly TD6/PGI-31L. We also continue to monitor a persistent upper-level low, which could be interacting with the aforementioned Gulf of Mexico convection, PGI-30L, which PREDICT has been flying, newly designated PGI-34L (which is still over Africa), and current SAL areas.

Forecast for 1600 UTC 8/22/2010:

Synoptic Overview:
The high pressure system in place over the central / north Atlantic has built westward and is interacting with a frontal boundary draped ENE off the coast of S. Carolina (**1A**); the boundary is more or less stationery. TD-6 continues to slowly strengthen south of the ridge in the northeast Atlantic, and is currently heading west/northwest. As long as the subtropical high is maintained we expect to see the E-W progression of tropical disturbances (both PGI-31L and 34L). The two upper-level lows over the Yucatan and the Bahamas that were suppressing convection in the vicinity of Cuba yesterday have consolidated into a stronger upper-level circulation over the Bahamas. Additionally, a new upper-level cyclonic PV anomaly is present near 42W/28N that is very clear in water vapor imagery (**2B, 3A**), as well as the 200 hPa relative vorticity (**3D**). These lows have initiated some convection; however, convection is generally suppressed in the central Atlantic with drying aloft to the north and east of the Antilles. The most active convection is associated with PGI-31L. The 850 hPa relative vorticity (**3C**) reveals that TD-6 has spun up and deepened since yesterday, while a new low-level vorticity maximum has emerged in the north central Gulf. This event is significantly more noticeable than yesterday as seen in

TPW analysis (**4**). Off the coast of, and over, Western Africa, IR imagery (**5**) shows increased and more organized convection for PGI-34L. This is being monitored for further development.

Features of Interest:

Possible Frontal Development

A 1010 hPa surface low is currently located over Pennsylvania with a cold front extending toward the SW over Arkansas and Northern Texas. This southward moving cold front is associated with a strip of low-level vorticity, enhanced moisture and precipitation. An upper-level low is currently located between Cuba and Hispaniola at 22N/73W. The upper-level low has been interacting with a remnant stationary front over the last few days resulting in enhanced convection off-shore from 34N/65W southwestward to 30N/80W and in the far NE Gulf of Mexico. This region of enhanced convection is associated with a secondary band of enhanced low-mid level vorticity and moisture.

The trough currently at 82W is forecast to become significantly amplified over the NE US over the next 24 hrs. During this time the cold front should push into the Atlantic so that the two maxima of convection off East Coast (**1A**) should merge into one by that time. However, the cold front which currently extends down toward Arkansas and Texas has been weakening over the last 24 hrs and the southward progression has been slowing.

Over the next 24 hrs the upper-level low currently NE of Cuba is forecast to slowly drift northward. By 8/24 0000 the 0600 UTC GFS run and other model guidance suggests that the upper-level low will then be picked up by the amplifying upper-level trough digging down the East coast. The upper-level low should continue to aid the development of convection in the NE Gulf and off the coast Florida and the Carolinas. As the cold front weakens, it appears that the northwesterly flow will jump toward the convection in the NE Gulf leading to a more elongated, intense, thinner strip of enhanced convection over the next 48 hr. As the convection deepens, a weak trough of surface pressure will extend from the amplifying cyclone of the East Coast into the NE Gulf of Mexico.

Following 8/25, and especially 8/26, the trough off of the east coast will begin to lift up into the Atlantic. It appears that Tuesday into Wednesday will be the period during which the upper-level low and trough will be forcing convection, especially in the NE Gulf. Should a low to mid-level vorticity maxima be produced by the enhanced convection during this period, it may be able to sustain convection throughout the diurnal cycle. However, there is considerable uncertainty in the timing, position, and eventual track of any such disturbance.

The 0000 UTC NCEP and ECMWF ensembles are forecasting a cluster of possible disturbances especially in the NE Gulf (**5**). The 1200 UTC WRF has an envelope of enhanced precipitation

extending from 24.5N/89W to 27N/82.5W (**6**). As northwesterly flow transitions from the cold front to the disturbed weather in the Gulf, the precipitation becomes increasingly frontal and oriented from 24N/94W to 27.75N/82.75W (**6**). Embedded vortices developing along this region of enhanced precipitation may initially be present and intensifying through Tuesday, although considerable uncertainty exists with regard to this.

PGI-30L

At 1200 UTC Aug. 22, PGI-30L was analyzed at 18N/56.5W. There is still a hint of broad cyclonic curvature in the satellite derived lower level winds, but the signature is not as impressive as it was yesterday (**8**). Some scattered convection is still firing near the pouch, but it is not organized (**1A/8**). The environment for PGI-30L has not changed much since yesterday. The wave is well-embedded in the deep layer mean easterly flow on the southern side of the subtropical ridge and a general WNW motion is expected to continue for the next 24 hours. While SSTs are sufficiently warm (**9**) and vertical wind shear is minimal, development of this wave is still not expected. Convection should have a hard time maintaining itself as the wave interacts with some drier air to its west and loses its low- and mid-level moisture as indicated by the global models over the next 36-48 hours. In fact, the global models continue to struggle to analyze the pouch for much longer. The GFS and ECMWF drop the system after 36 hours and the UKMET drops it after 24 hours (**9**). As such, TC formation is not expected, but the system will continue to be monitored.

TD6/PGI-31L

TD6 (classified 2100 UTC yesterday evening, 21 Aug. 2010)/PGI-31L is located near 34W/13N (**10**). The depression has organized deep convection; however, most convection is in the western quadrants of the storm (**10**). Another deep convective burst occurred overnight to the northeast of the depression and does not appear to be directly related to TD6 (**10**), but could be associated with Ex-PGI33L. Some upper-level anticyclonic outflow was seen in the IR imagery; however, the upper-level wind analysis indicates 20kt easterly/southeasterly vertical wind shear over the disturbance (**2B**), thus accounting for the convective initiation downshear of the center (to the west). So, while SSTs are certainly sufficient, the vertical wind shear may be somewhat of a hindrance to the depression intensifying today. One feature that may influence the vertical wind shear is an upper-level cold low centered to the northwest of the depression at 40W/26N (2B). Similar to yesterday, the 850 hPa vorticity maximum is somewhat elongated SW to NE (**2C**) (may account for the initiation to far northeast of TD6) and is strongest at low-levels (warm core). The vorticity maximum is also vertically stacked. The GFS MSLP center forecast for 0600UTC initialization is as follows:

22/0600UTC: 33W/13N; 22/1200UTC: 35W/14N; 22/1800UTC: 36W/14N; 23/0000UTC: 37W/14N; 23/0600UTC: 38W/14N; 23/1200UTC: 39W/14N; 23/1800UTC: 40W/15N; 24/0000UTC: 41W/15N; 24/0600UTC: 42W/15N; 24/1200UTC: 44W/16N; 24/1800UTC: 45W/16N; 25/0000UTC: 47W/17N; 25/0600UTC: 48W/17N; 25/1200UTC: 49W/18N; 25/1800UTC: 51W/19N; 26/0000UTC: 52W/20N; 26/0600UTC: 53W/21N; 26/1200UTC: 54W/22N; 26/1800UTC: 55W/23N; 27/0000UTC: 56W/24N; 27/0600UTC: 56W/25N (984hPa); 27/1200UTC: 55W/25N; 27/1800UTC: 56W/26N; 28/0000UTC: 57W/26N; 28/0600UTC: 57W/27N; 28/1200UTC: 58W/27N; 28/1800UTC: 59W/28N; 29/0000UTC: 59W/28N (<980hPa); 29/0600UTC: 60W/29N (<980hPa).

As has been forecast consistently over the past days, the disturbance is expected to re-curve northward around 55W. The main steering flow at this time (+6-7 days) is ridging centered over the east coast and over the northeast Atlantic (**12**). PGI-34L looks like it will be caught up by the developing TD6 and trail behind (**12**); however, there is some indication that it could move westward, separating from TD6.

The ECMWF 0000UTC initialization has the following track forecast: 22/0000UTC: 32W/13N; 23/0000UTC: 35W/14N; 24/0000UTC: 42W/16N; 25/0000UTC: 48W/18N; 26/0000UTC: 52W/18N; 27/0000UTC: 56W/22N; 28/0000UTC (now develops) 57W/23N; 29/0000UTC: 62W/23N.

NOGAPS has slow movement with not much intensification; however it does track all the way to 60W. CMC track forecast has re-curvature much farther east and develops a weaker hurricane than the GFS. Somewhat surprisingly, the HWRF only develops tropical storm strength winds. The location in HWRF at 27/12000UTC is 24N/57W. So, in general the GFS is the most aggressive for development in the 5-7 time period, but this is later than previous days would indicate. Various model tracks are show in (**13,14**). Note that NOGAPS has a track that is farther south.

Dust/SAL discussion

As of 1200 UTC on 8/22, the dust outbreak in the Caribbean, which has been present the last few days is dissipating. The MODIS instrument on the Terra spacecraft suggested that high AOT values have diminished greatly in the north central Caribbean. (**15**) Dry low level air is still present in a slot from 83W/20N southeast to 68W/16N. (**18**) However, the upper-levels over the central Caribbean are becoming more moist as evident in water vapor imagery. (**1B**) A surface trough near the lesser Antilles is producing convective shower activity there today, and a surge of moisture from the convection off the Columbian coast is moving into the Caribbean

from the southwest. These factors should lead to a recovery of the usual moist environment seen this time of year in the Caribbean. Elsewhere in the Atlantic basin, a surge in dry dusty air is moving westward near 45W from 10N to 25N. The leading edge is evident in visible GOES imagery as a strip of shallow clouds. The dry dusty air dominates a significant portion of the northeast GRIP domain. AOT values are greater than 1.0 in this area. (**15**) Drying is being enhanced by a surge in northeasterly flow from the mid-latitudes across 30N. In addition, an upper level low is located near 42W/19N, which is enhancing upper convergence and subsidence above the area directly to its southeast. GEOS-5 forecasts a new SAL outbreak to exit the African coast early on 8/23. This event is being forced by a high amplitude easterly wave (PGI-34L), which has produced an impressive mesoscale convective systems along the African monsoon trough over the last couple of days. GEOS-5 forecasts high dust AOTS to dissipate after 8/26 on 0000 UTC near 50W. (See GEOS-5 forecast for dust mass at 700 hPa valid at 0000 UTC on 8/26)

PGI-34L

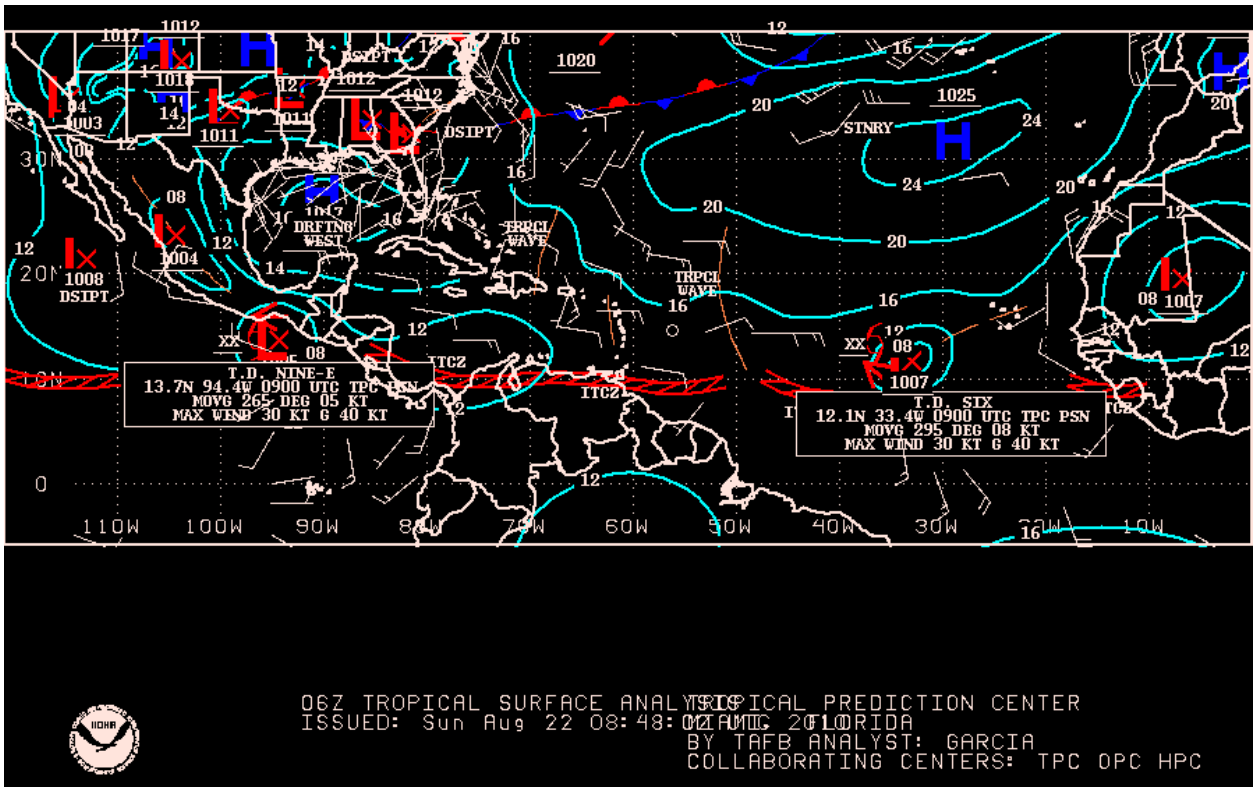
At 1200 UTC on 8/22 PGI-34L was located near 4W/11N. The easterly wave associated with this system has been producing impressive convection, with an MCS forming near the wave late on 8/20 and moving west. This MCS is still apparent in IR imagery having just moved off the coast of Senegal (**1A**). Low-level vorticity near this system is still dominated by the African monsoon trough. At the current analyzed location of the pouch, low-level winds are southerly as they wrap around the west end of the trough. Shear in the vicinity is completely due to this low-level southerly wind flow, and will decrease to very low values as the pouch moves westward toward the African coast. (**17**) Global models forecast the pouch to move slowly to the west-northwest. Vorticity at 925, 850 and 700 hPa are expected to stack as the system moves off the coast after 36 hours. From this point, the GFS has the system rapidly becoming a closed low and gradually intensifies the system as it takes a northwestward track. Currently, neither the GFS or ECMWF forecasts initialized at 0000 UTC today suggest that PGI-34L will become any more than a tropical depression. The maximum intensity is likely to occur on 8/26 between 0000 UTC and 1200 UTC. The following is the MSLP forecast from the GFS initialized at 0600 UTC today:

24/0600 UTC: 20W/13N; 24/1200 UTC: 23W/14N; 24/1800 UTC: 25W/15N; 25/0000 UTC: 25W/15N; 25/0600 UTC: 26W/15N; 25/1200 UTC: 27W/15N; 25/1800 UTC: 28W/16N; 26/0000 UTC: 30W/17N; 26/0600 UTC: 30W/17N. (See GFS SLP forecast valid 8/26 at 0600 UTC)

The following is the MSLP forecast from the ECMWF initialized at 0000 UTC today:
25/0000 UTC: 27W/15N; 26/0000 UTC: 32W/16N.

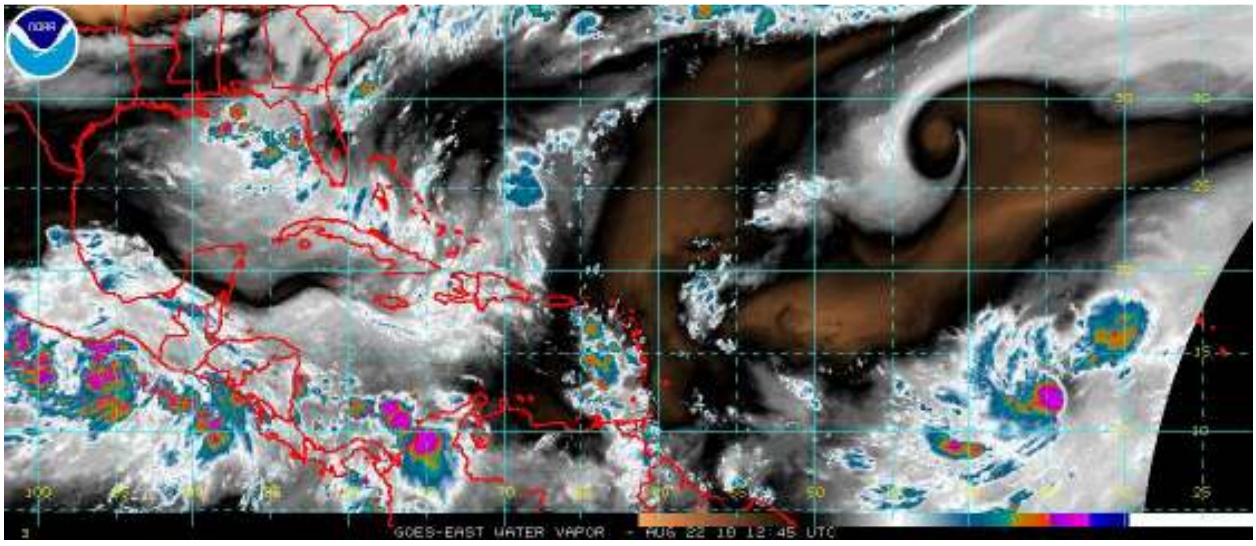
Figures of Interest

(1) 0600 UTC Surface Analysis from the Tropical Prediction Center, Aug 22, 2010

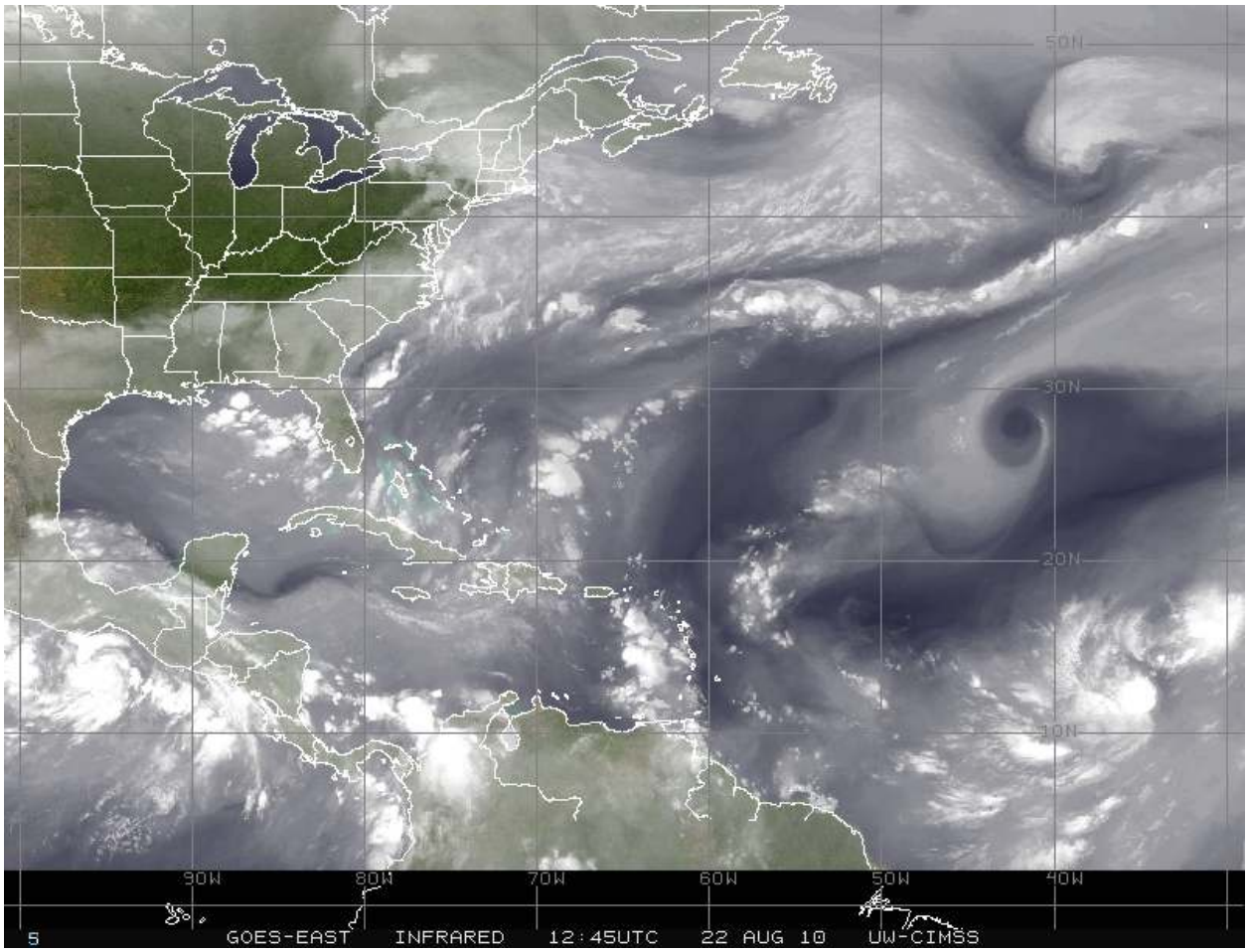


(A) Atlantic Wide View IR Imagery 1215 UTC Aug 22, 2010

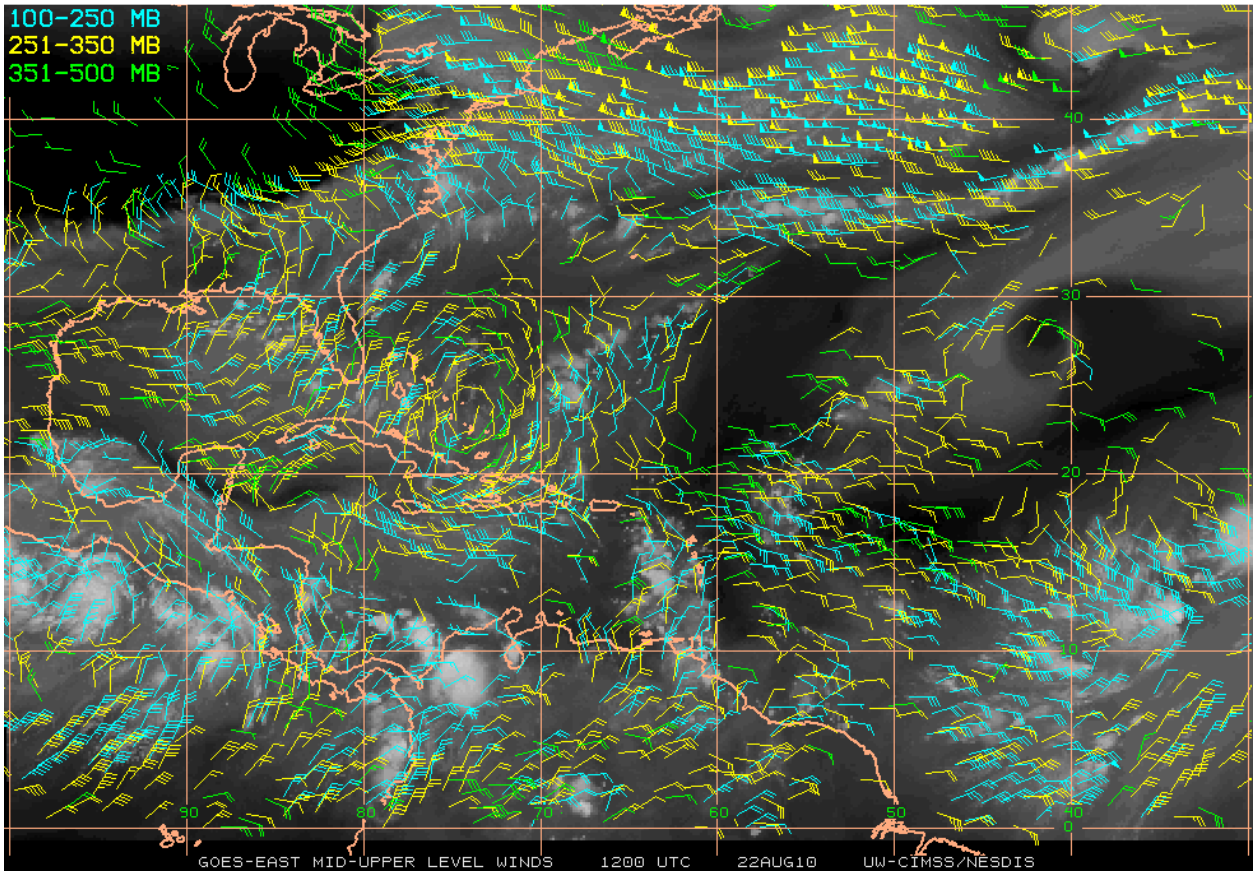
B) Atlantic Wide View Water Vapor Imagery 1215 UTC Aug 22, 2010:



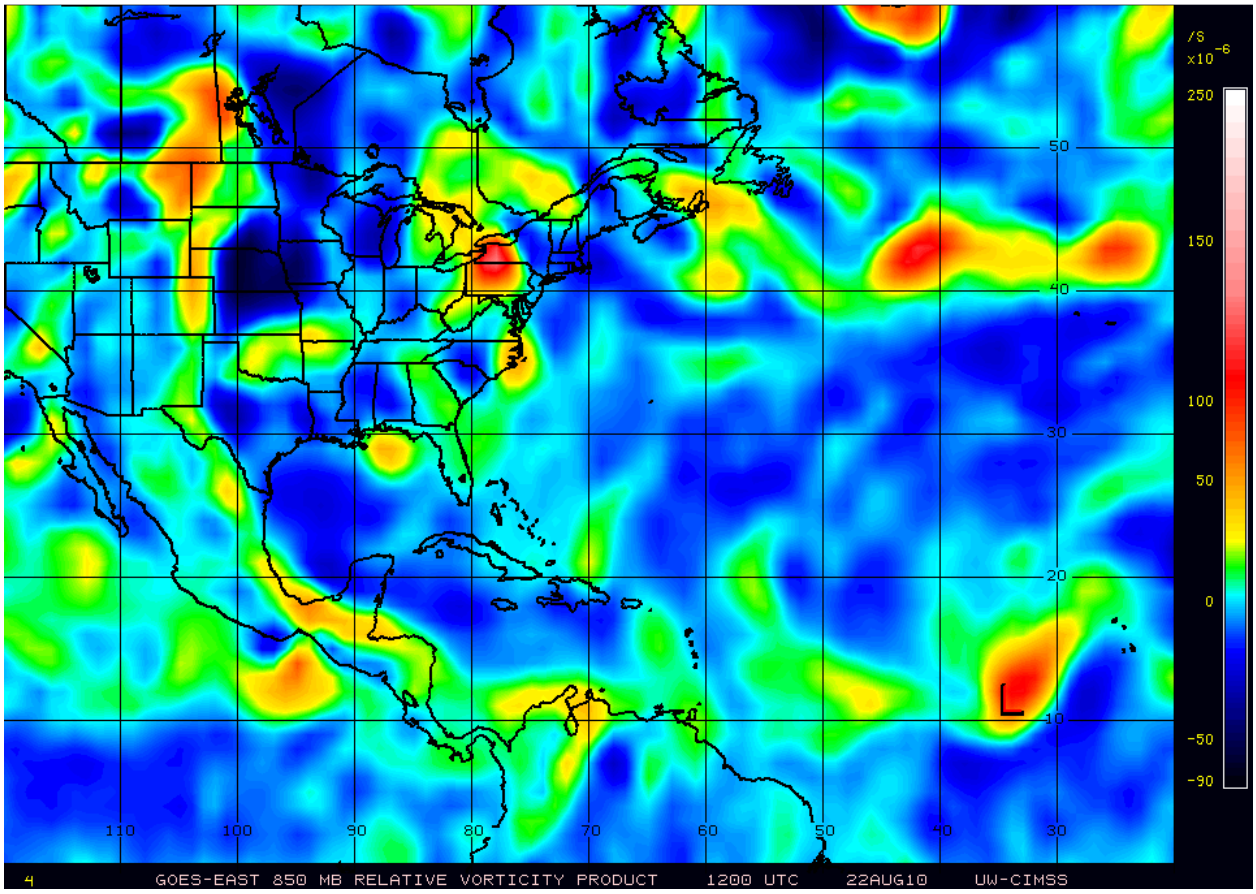
(2) CIMSS Tropical Analysis of A) IR at 1245 UTC Aug 22, 2010



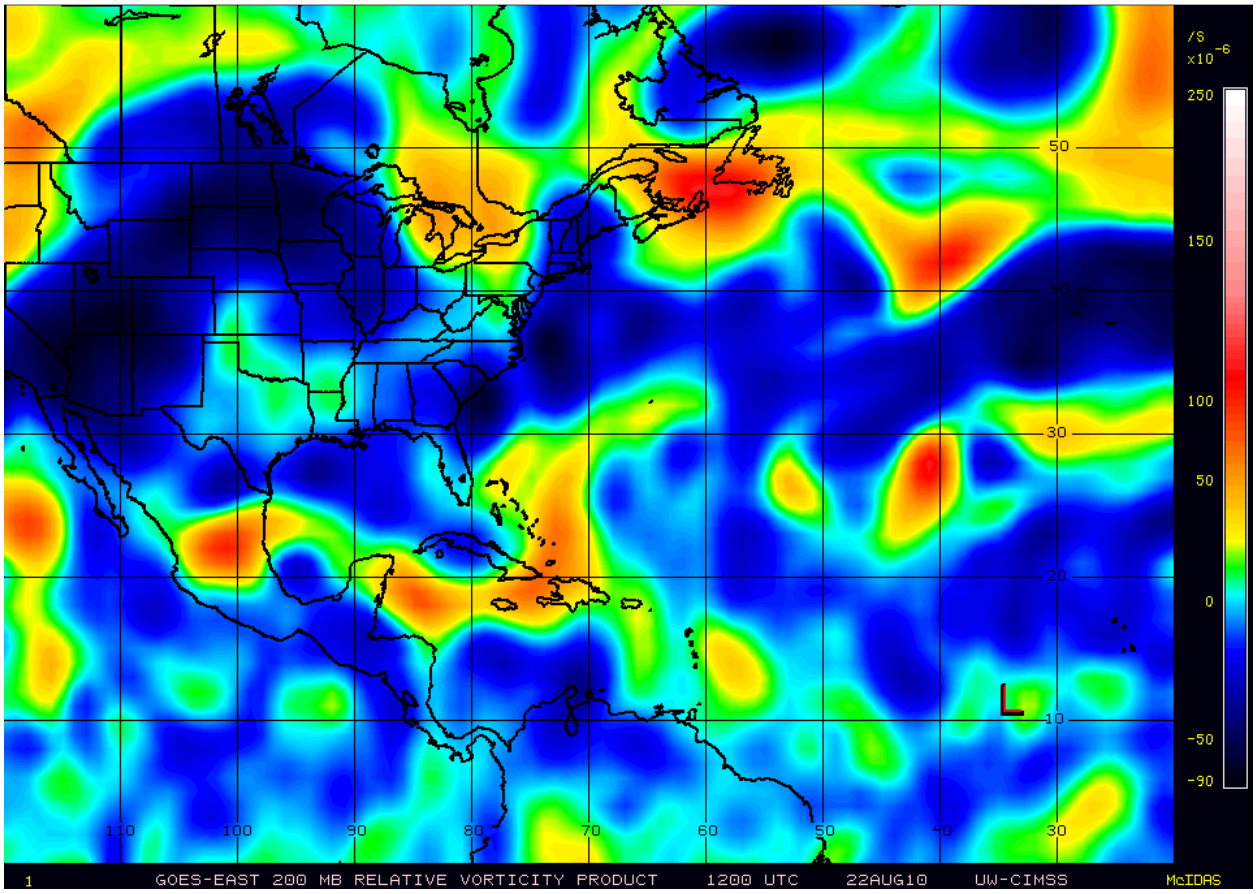
B) Upper Level Winds at 1200 UTC Aug 22, 2010



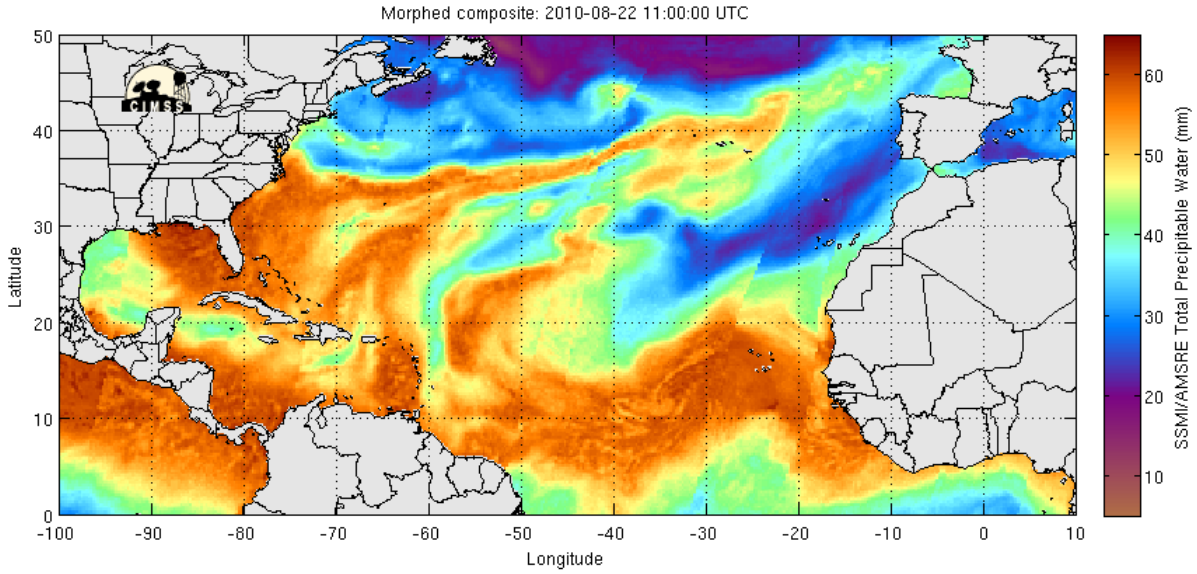
C) 850 hPa relative vorticity



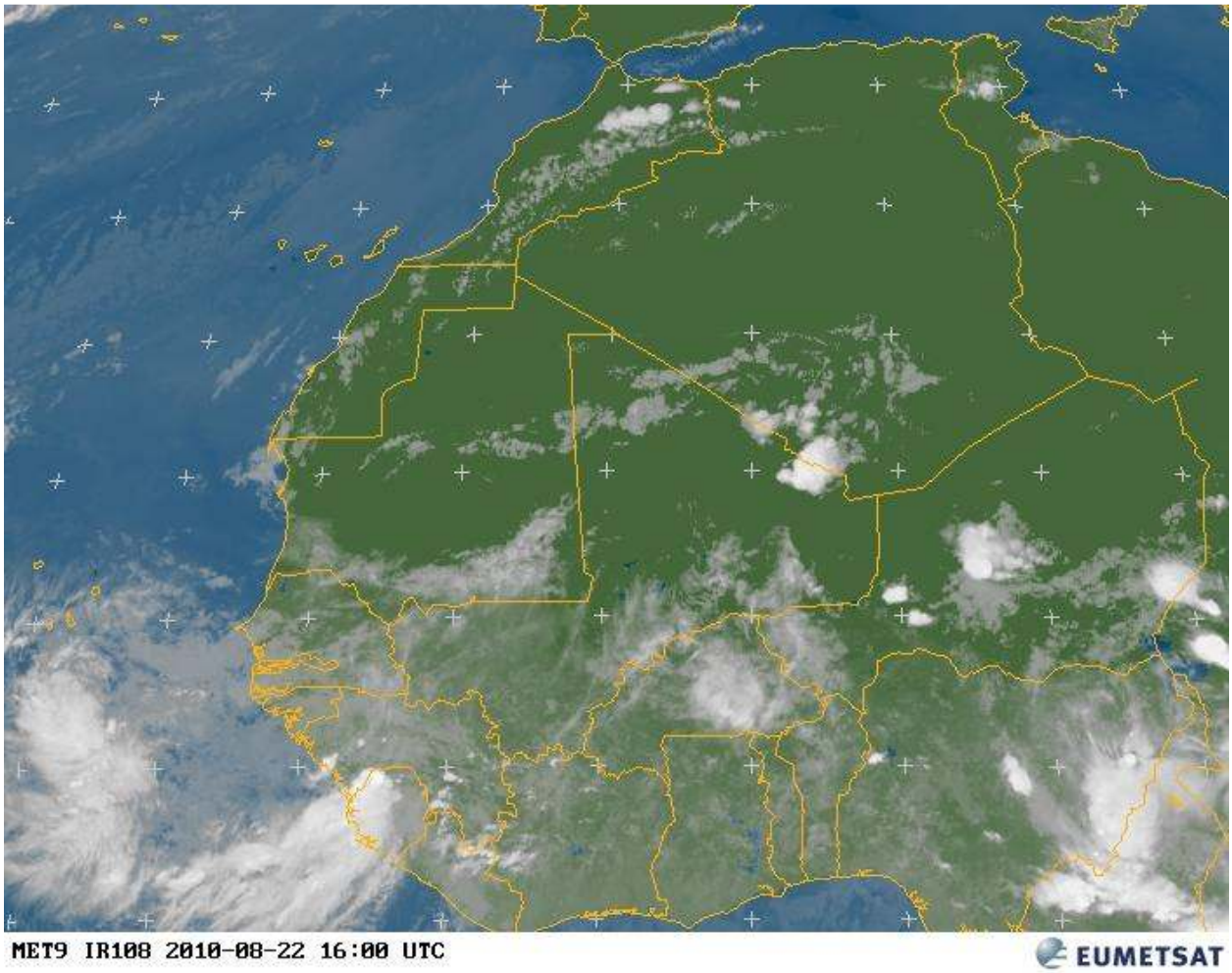
d) 200 hPa relative vorticity



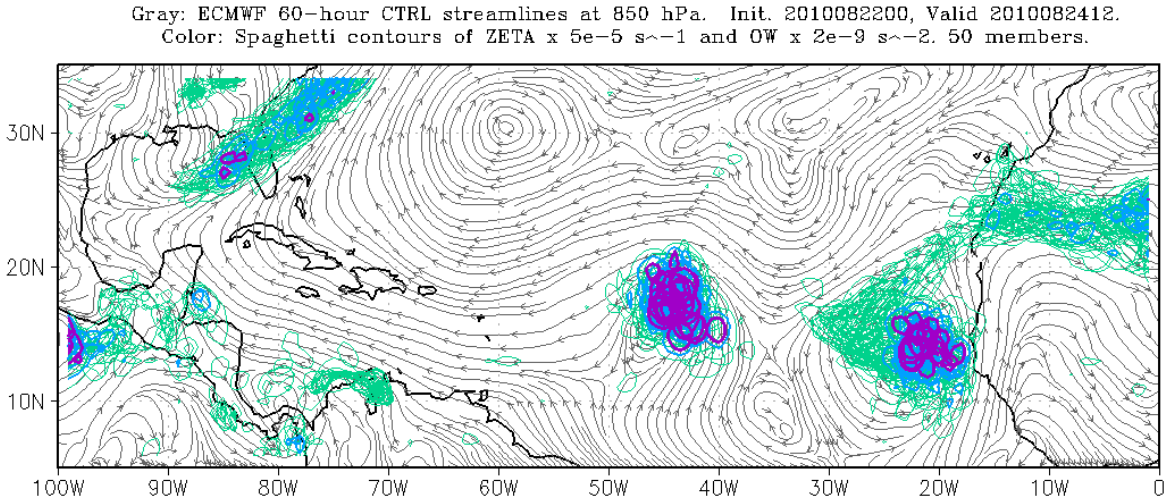
(3) TPW at 1100 UTC, Aug. 22, 2010

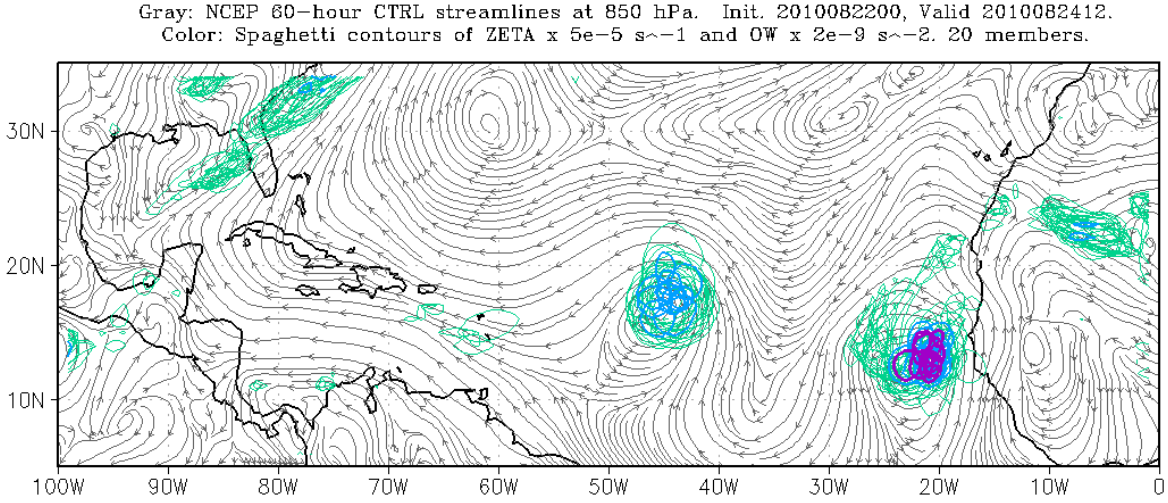


(4) EUMETSAT IR 10.8um Imagery

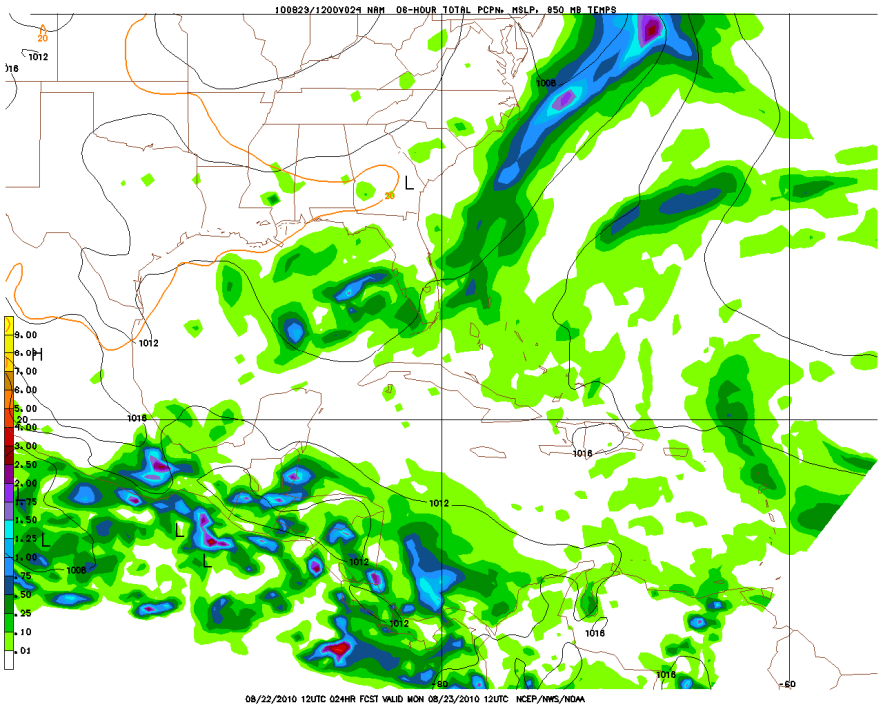


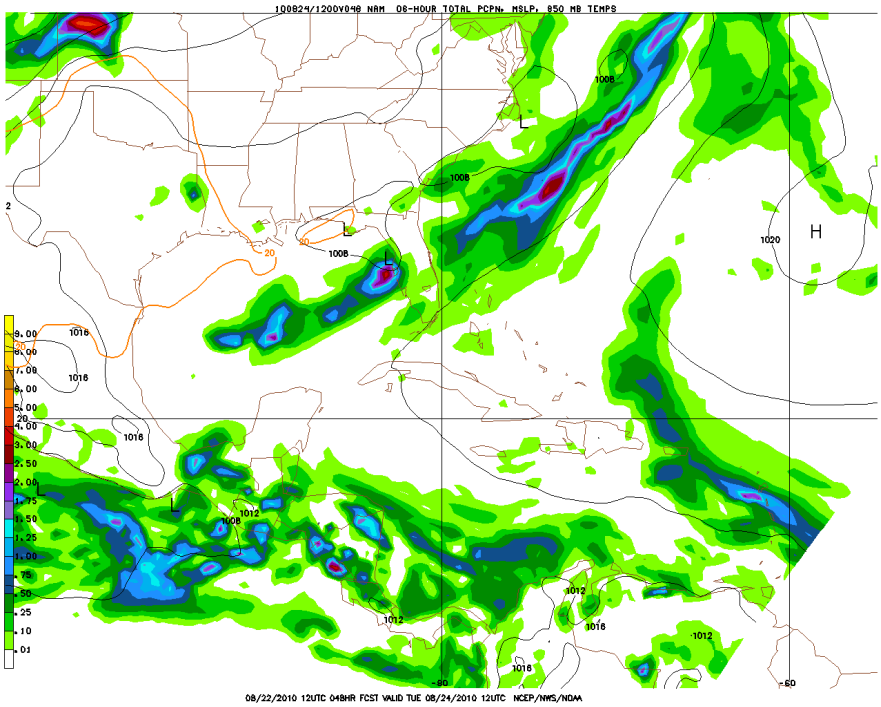
(5) Spaghetti plot of vortex maxima valid Tuesday at 8/24 1200 UTC



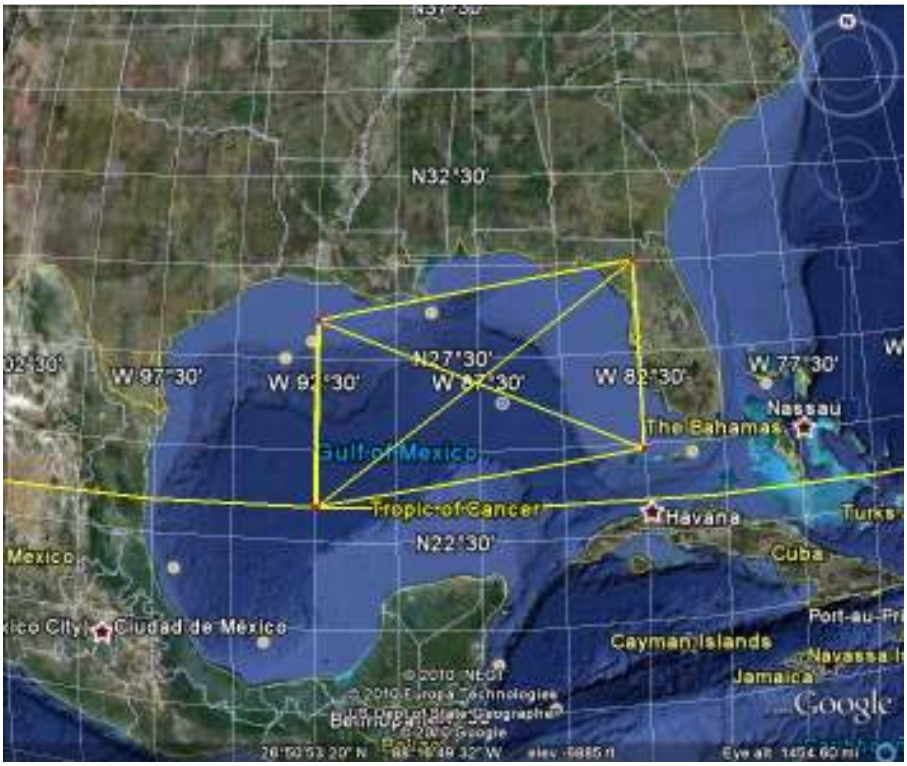


(6) 8/22 1200 UTC NAM 6hr precipitation, MSLP, 850 hPa temp





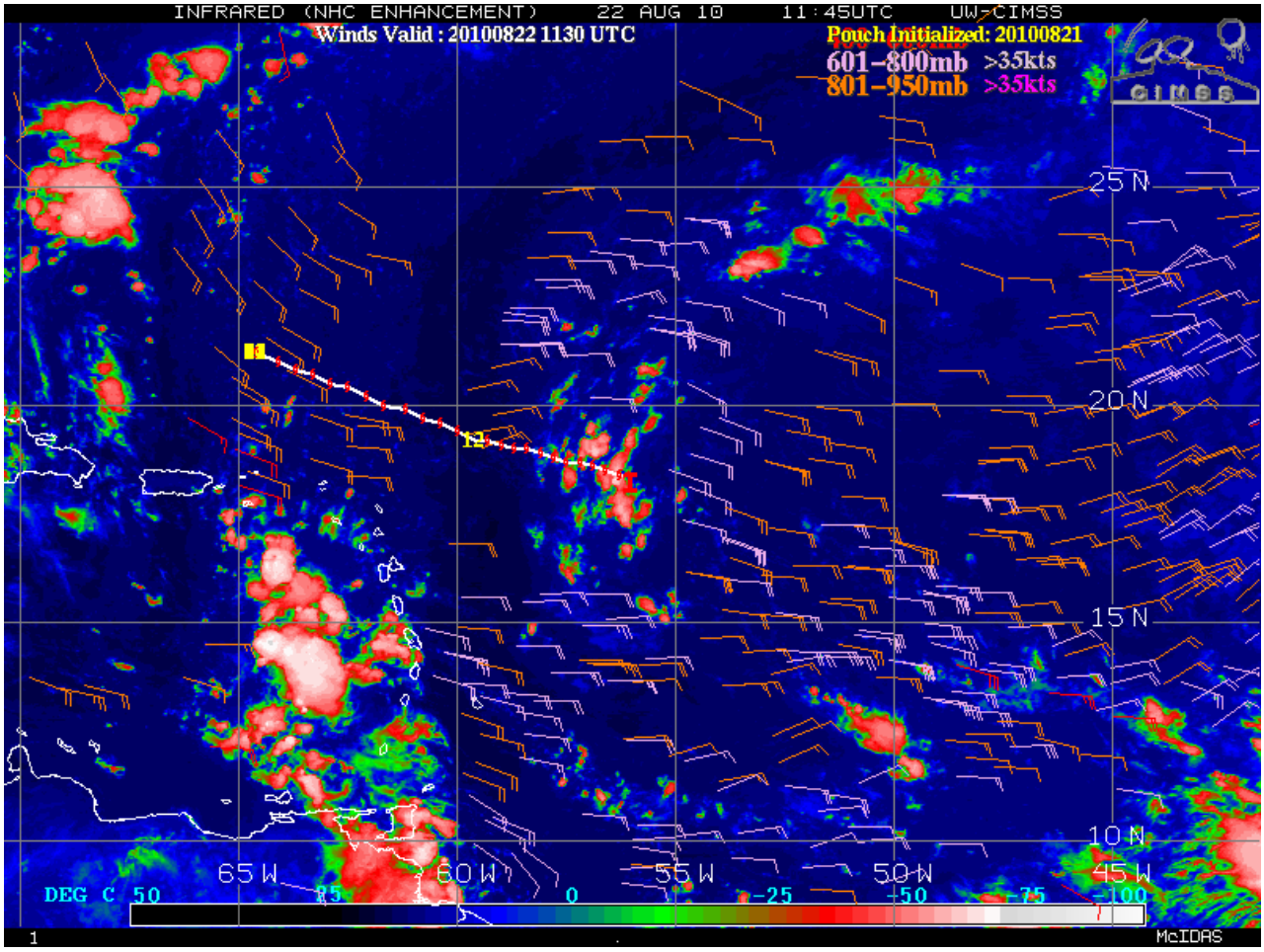
(7) NOTAM boxes for possible Mon. 8/23 and Tue. 8/24 DC-8 Research Flights



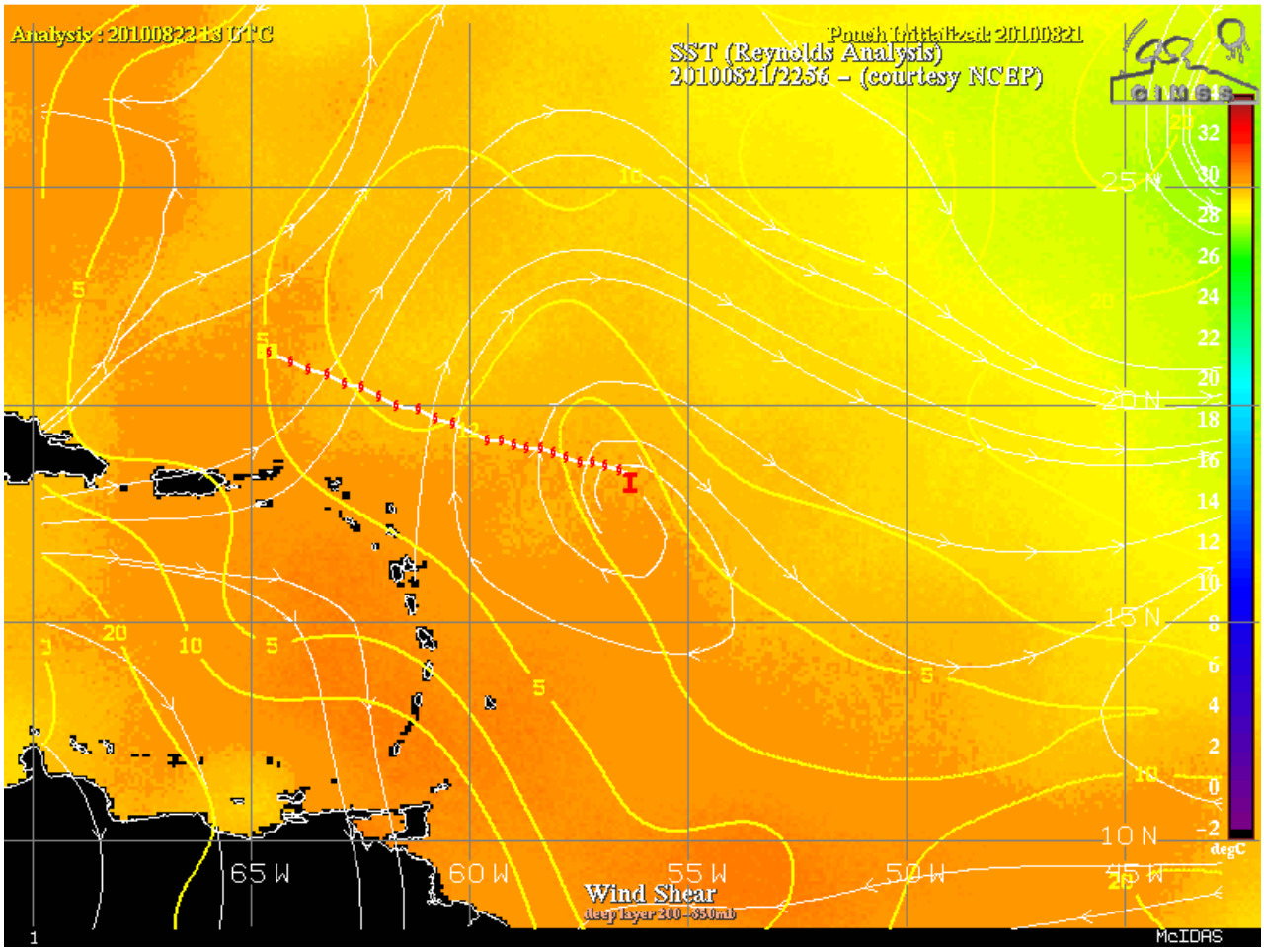
Monday Box

Tuesday Box

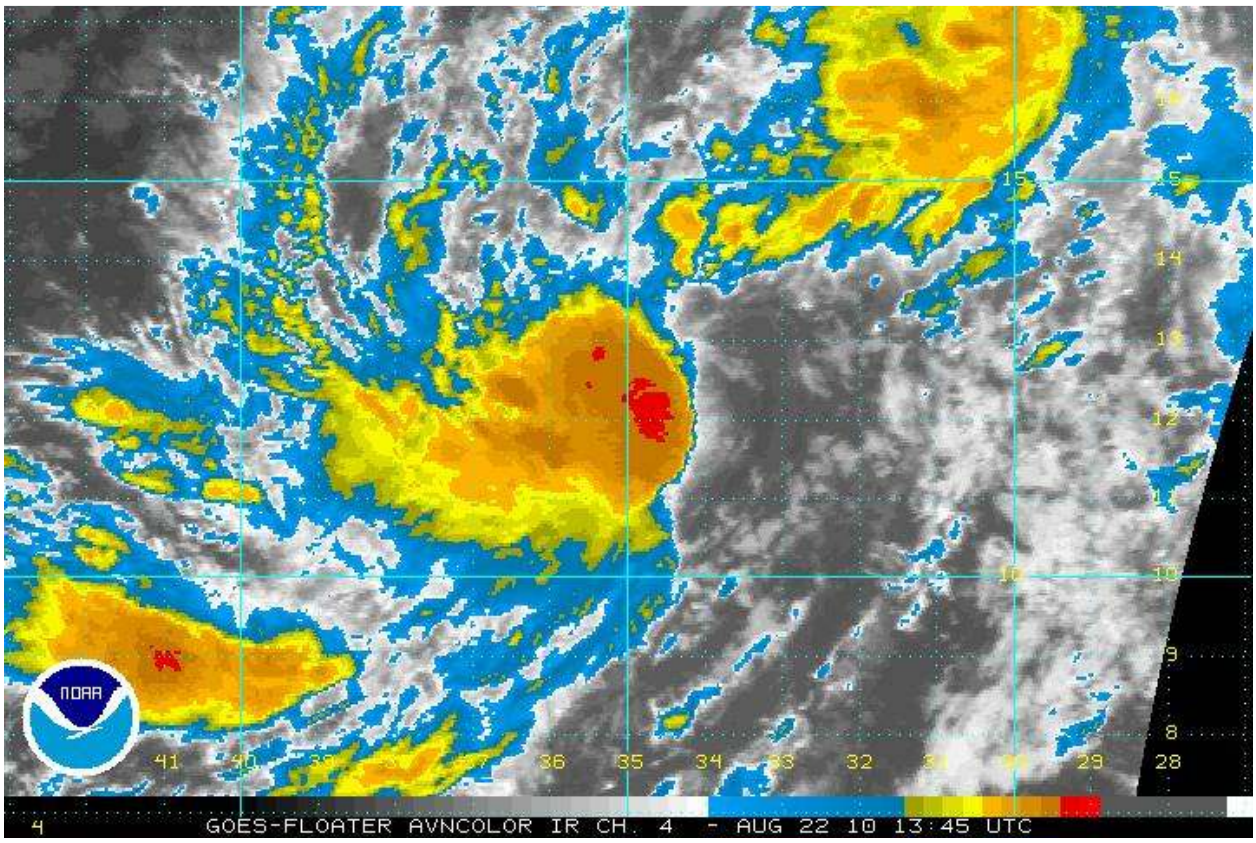
(8) CIMSS analysis of pouch forecast track; IR with NHC enhancement; satellite-derived lower level winds



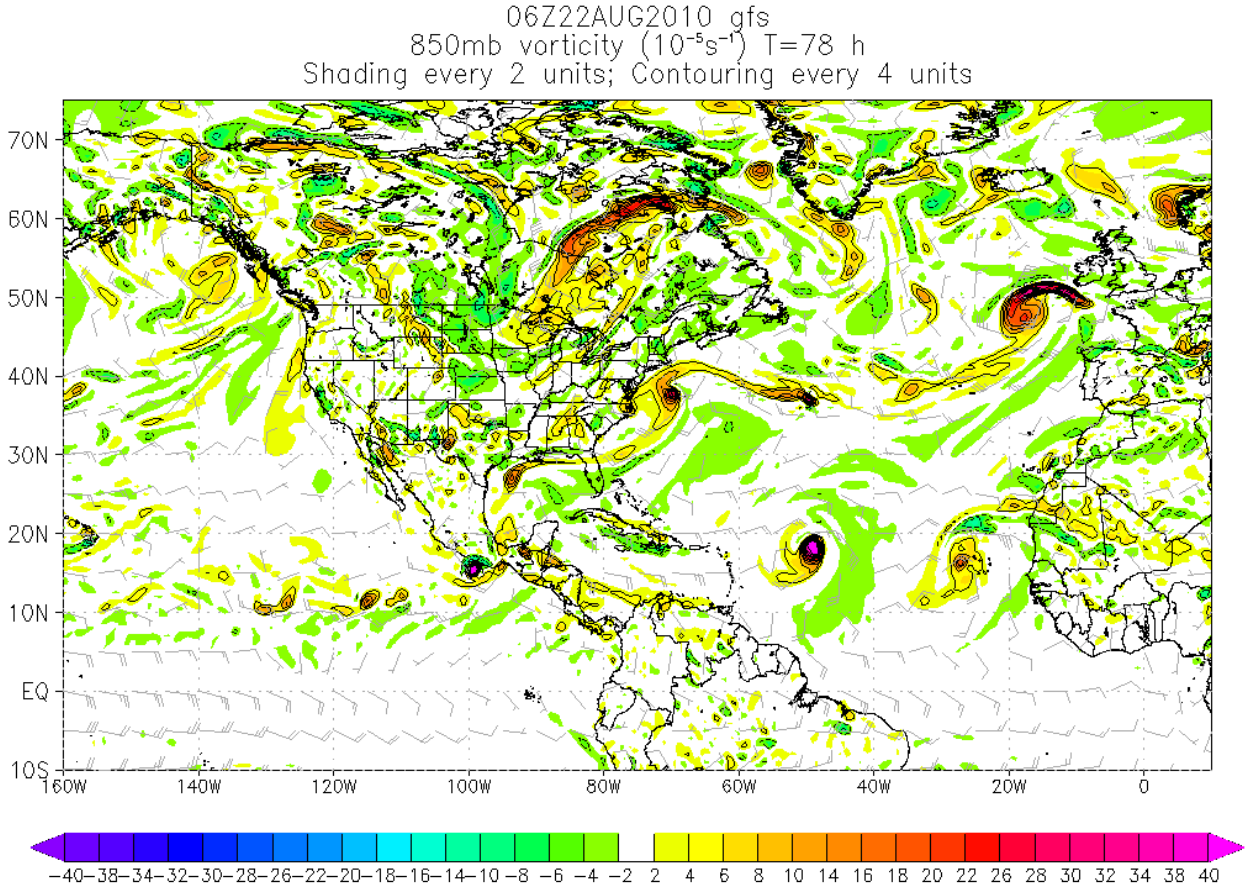
(9) CIMSS analysis of pouch forecast track; SSTs; wind shear



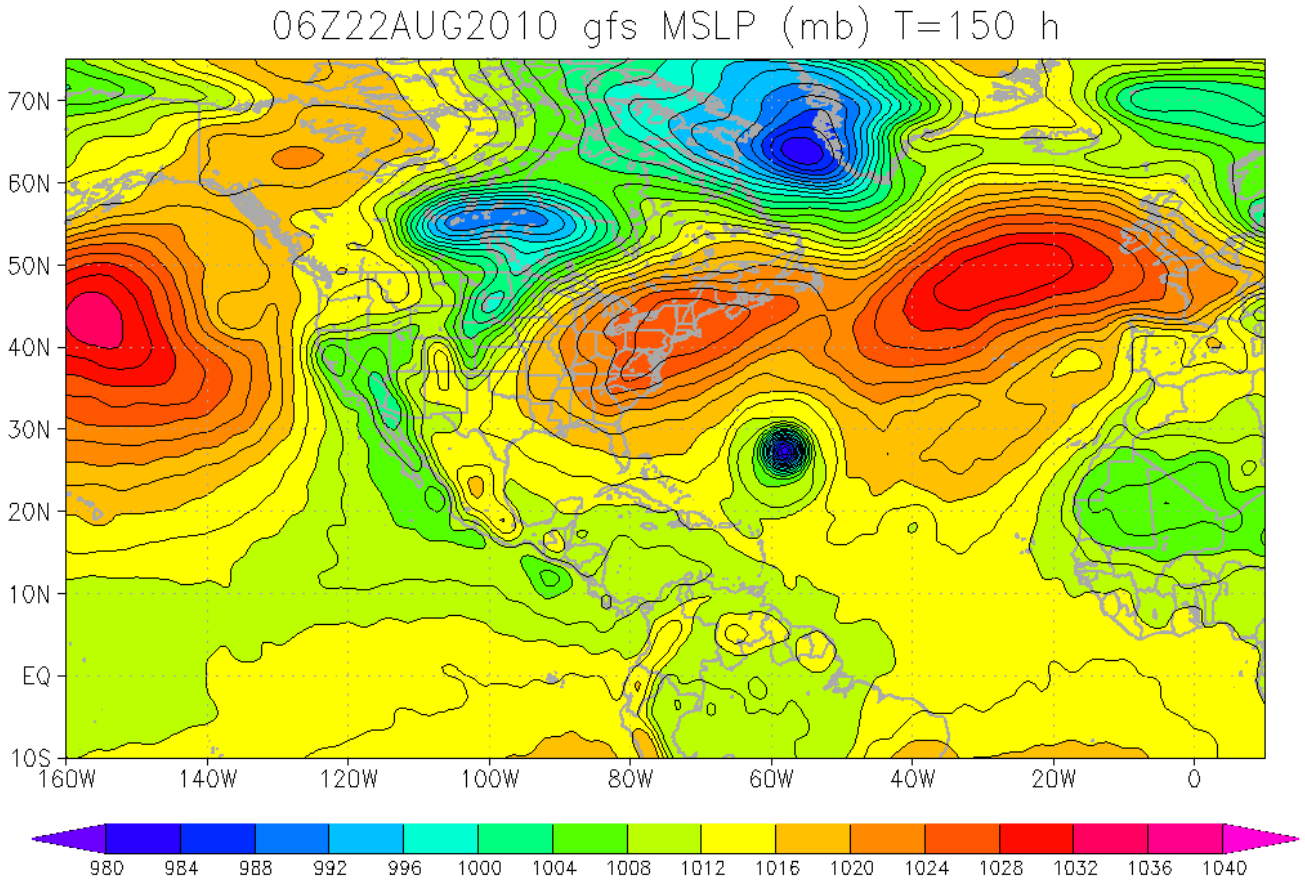
(10) IR satellite floater imagery of TD 6 1345UTC 22 August



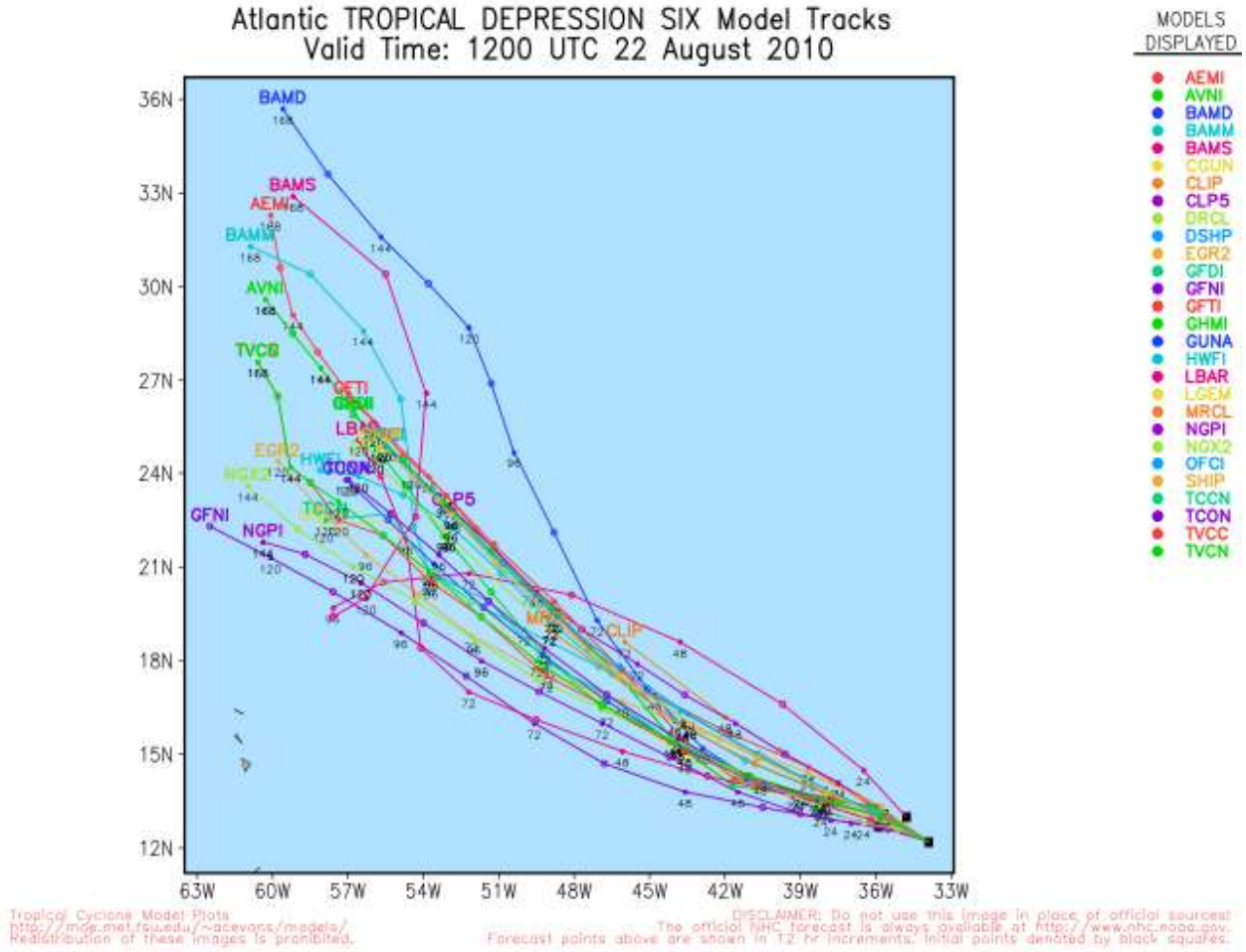
(11) GFS forecast for 850 hPa relative vorticity, valid 1200UTC 25 Aug 2010, initialized 0600UTC 25 Aug. 2010



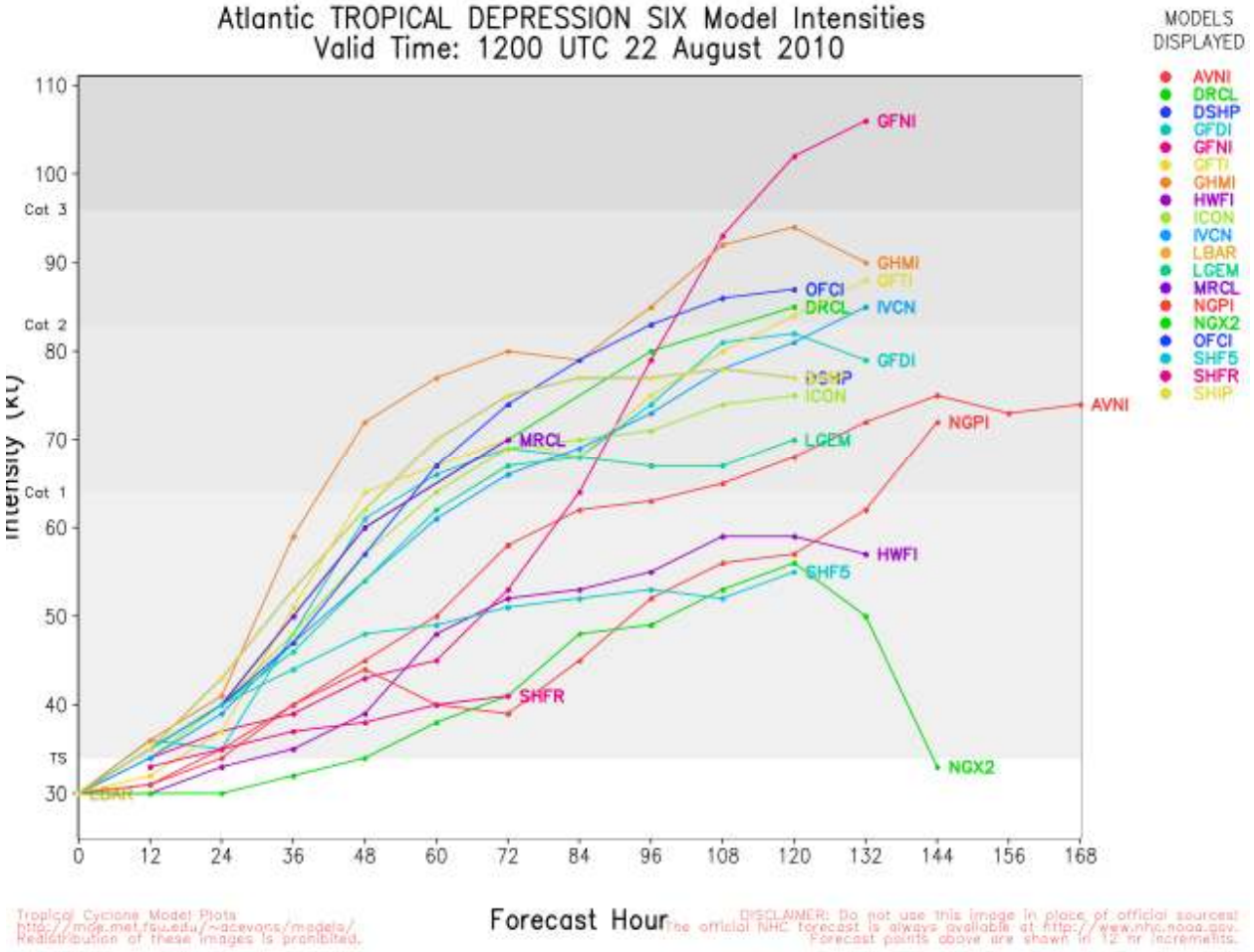
(12) GFS forecast for MSLP, valid 1200UTC 27 Aug 2010, initialized 0600UTC 22 Aug. 2010



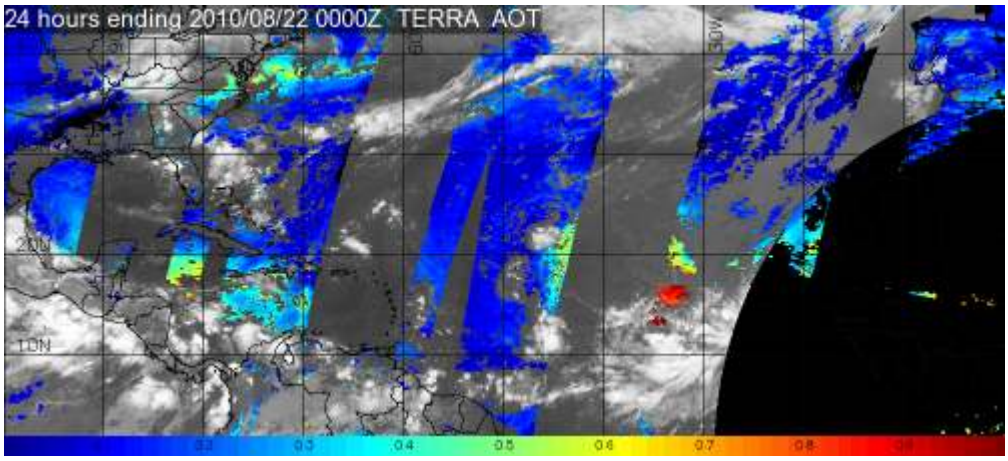
(13) Track forecasts for TD6 from 1200UTC Aug 22, 2010



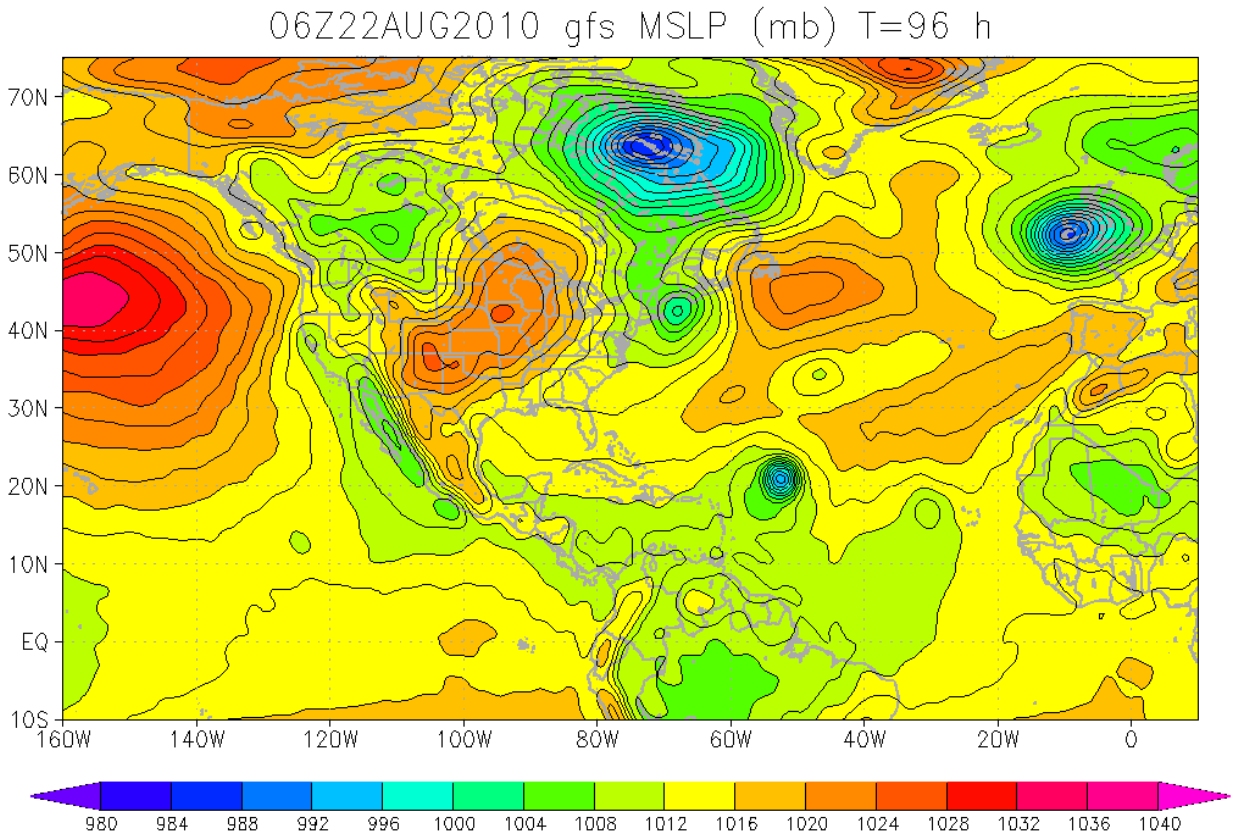
(14) Intensity forecasts for TD6 from 1200UTC Aug 22, 2010



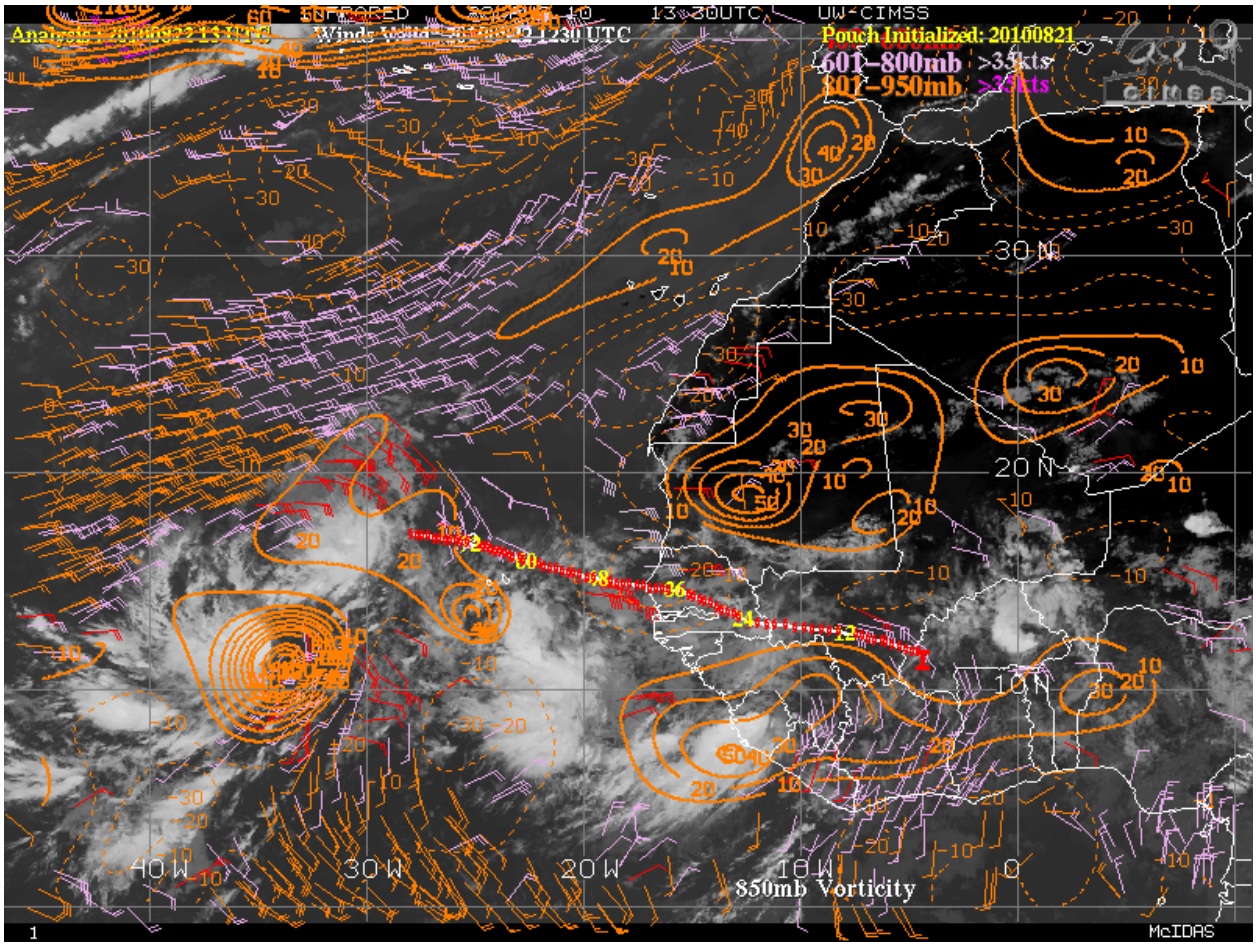
(15) TERRA AOT 22 Aug. 2010



(16) GFS forecast for MSLP, valid 0600UTC 26 Aug 2010, initialized 0600UTC 22 Aug. 2010



(17) CIMSS PGI-34L



(18) AMSU TPW