Forecast for Tropical Areas of Interest
Forecast Synopsis 1600 UTC 18 August 2010
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Summary:
There are currently five systems of interest in the North Atlantic basin today (Fig. 1). From west to east, these include:

1. PGI27L: continues to fairly quickly to the west and is now located a few hundred km south of Jamaica at ~16N 78W. A SW-NE oriented trough axis northwest of the system has rotated clockwise and likely induced a slight poleward shift in the deep layer steering influencing this system. The system appears to be continuing to gradually separate from the dry air and easterly surge associated with a large SAL outbreak to its north. Vertical shear to the west of PGI27L has temporarily increased in association with a convective region located over the western Caribbean. This system will likely be out of range of the G-V tomorrow (19 Aug) and may be a marginal case for NOAA and NASA missions, since it is expected to move over central America/Yucatan Peninsula sometime Friday morning (20 Aug) or early afternoon.
2. PGI32L: is located at ~ 20.5N 49.5W in an extremely dry environment between a large-mid-latitude dry air intrusions and a region of SAL/mid-latitude air to its east and very high shear (30-50 kt). There currently is little to no convection associated with this system and it is not a viable target for any aircraft at this time.
3. PGI30L: several hundred km northwest of the Cape Verdes (~20N 30W). The system is devoid of deep convection and is currently over marginal SSTs. However, it is still associated with substantial vorticity and is embedded in an area of very high TPW. PGI30L is continuing a gradual turn to the WSW and is expected to move over warmer SSTs over the next few days. This system could be in range of the G-IV or G-V aircraft as early as Friday morning (20 Aug) when it is anticipated to cross 40W.
4. PGI31L: is located a few hundred km SW of the Cape Verdes (~12N 26W) along the western flank of a large AEW axis that is emerging from the coast of Africa. There is a long W-E oriented region of 850 mb vorticity that is likely associated with PGI31L and an area of shear vorticity being spun up by low-level westerly flow from the ITCZ to its south and low-level easterly flow just to its north. The models continue to favor development of this system and it could be in range (near 40W) of the NOAA G-IV and G-V aircraft in ~5 days (Monday 23 Aug).
5. PGI33L: is located along the African coast at ~9.5N 9.5W on the eastern flank of a large AEW. The ECMWF model is currently favoring a solution that merges the vorticity associated with PGI33L with that of PGI31L (and the W-E vorticity strip) to its west.

Discussion:

a. Synoptic

The upper-level trough that has been influencing the weather over the western Caribbean has changed orientation this morning (18 August) as illustrated by a comparison of the trough axes on 06Z/17 and 06Z/18. The change in orientation is shown on the 350-K isentropic surface in terms of total wind and potential vorticity (PV) and occurred in association with a mid-latitude anticyclonic wave break and yesterday's tropical convection over the Caribbean. These two features combined to rotate the trough axis clockwise over the western North Atlantic and to shift the trough axis poleward over the western Caribbean. The poleward shift in the trough axis

over the western Caribbean is related to yesterday's convection and the advection of low PV air by the divergent outflow (not shown, but is implied by the poleward advection of low PV air by the irrotational wind north of Hispaniola and Honduras at 00Z/18 in relative imagery). This change in the orientation of the trough axis has influenced the deep-layer steering flow in the vicinity of PGI27L and the global models have responded with poleward shifts in their tracks for the 700-hPa pouch associated with PGI27L… with the 00Z/18 solutions even more poleward than the 12Z/17 solutions (not shown; see previous days' discussion).

The synoptic-scale is similar to 17 August with a westward shift. An upper-level disturbance exists at the tail of the elongated PV streamer and was located to the south of Belize. Convection was ongoing at 06Z/18 to the east of this feature with a clear anticyclonic upper-level circulation present aloft. Outflow along the poleward edge of this convection will tend to enhance shear values over the western Caribbean today and ultimately influence convection proximate PGI27L over the next 12–24 hours. Similar to the set up at 06Z/17, a weak upper-level disturbance was present immediately to the west of PGI27L.

Farther east in the North Atlantic Basin, an upper-level trough is present near 18N 55W that is characterized more by a strong upper-level cyclone circulation and PV values > 2.0 PVU. This feature is currently moving slowly westward toward the Windward Islands and Puerto Rico. A large WSW-ENE oriented anticyclonic circulation is present farther east centered on ~25N 30W with upper-level easterly flow extending from the West Africa Coast through 40W at lower latitudes. This anticyclonic circulation will ultimately influence the tracks of PGI's 30, 31, and 33 (Fig. 2). An upper-level trough has been digging south over the western Sahara with a deep layer anticyclone to its east (~30N 12E).

b. PGI27L

The pouch associated with PGI27L was located to the south of Jamaica at 12Z/18 and was immediately east of highest deep-layer (850–200-hPa) shear values > 20 m/s (Fig. 3b). An in situ dropsonde observation by the G-V aircraft shortly after this time period confirms that the magnitude of the deep-layer shear in this region was strongly influenced by the convective outflow above 300-hPa (not shown; available from the EOL catalog under "Research Products"). The large deep-layer shear values influenced the structure of the convection proximate PGI27L, observed surrounding the pouch at 1200 UTC in Fig. 3b. As a result of the increased shear, 24-hr shear tendency values were > 20 knots/day to the west of PGI27L (Fig. 3c).

The 5-day Lagrangian Pouch diagnostic for the 00Z/18 initializations of the ECMWF and GFS differ with respect to the latitudinal location of PGI27L beyond 12Z/18. The ECMWF initializes PGI27L near 12N south of Hispaniola with an ultimate solution favoring the northern coast of Honduras and south-central Belize by 00Z/21. The GFS initializes PGI27L further north near 15N south of Hispaniola with an ultimate solution favoring the Yucatan Peninsula south of Cozumel by 00Z/21 (Fig. 4). Subsequent 12Z initializations of these systems retain the split latitudinal position. Both the ECMWF and GFS solutions are consistent with moderate intensification of PGI27L over the next 24-36 hours with increasing low-level relative vorticity and Okubo-Weiss parameter values. The initially sheared environment is forecasted to weaken and high precipitable water and relative humidity values should remain. These forecasts, however, take PGI27L west of ~83W by 12Z/19, beyond a reasonable range for the GV and

beyond the F.I.R. border between Kingston and Central America. PREDICT will turn its focus to PGI30L in the East Atlantic.

c. PGI32L

PGI32L is located at ~ 20.5N 49.5W in an extremely dry environment between a large-mid-latitude dry air intrusions and a region of SAL/mid-latitude air to its east and very high shear (30-50 kt). There currently is little to no convection associated with this system and it is not a viable target for any aircraft at this time.

d. PGI30L

PGI30L is located several hundred km northwest of the Cape Verdes (~20N 30W, Fig. 5). The system is devoid of deep convection and is currently over marginal SSTs. However, it is still associated with substantial vorticity and is embedded in an area of very high TPW. There is an interesting thin (~3-4 degrees in the N-S) plume of Saharan dust with associated negative vorticity currently to its north and northeast. This dust plume is associated with enhanced easterlies and vertical shear. As the deep layer ridge to its north has continued to take on a WSW-ENE orientation, PGI30L has begun a gradual turn to the WSW (Fig. 6). This turn will bring the system over warmer waters over the next few days. Though the 06 UTC GFS doesn't track this system and has an unrealistic pouch track to the northwest over the next 12-24 hr, the ECMWF brings it in range of the G-IV or G-V aircraft as early as Friday morning (20 Aug) when it is anticipated to cross 40W.

e. PGI31L

PGI31L is located a few hundred km SW of the Cape Verdes (~12N 26W) along the western flank of a large AEW axis that is emerging from the coast of Africa (Fig. 7). There is a long W-E oriented region of 850 mb vorticity that is likely associated with PGI31L and an area of shear vorticity being low-level westerly flow from the ITCZ to its south and low-level easterly flow just to its north (Fig. 5). Convection associated with this system is not consolidated and the low-level vorticity is quite elongated. This would favor a slower development of PGI31L over the next few days. GFS and ECMWF ramp up OW values rapidly in the 12-24 hr time frame and RH (TPW) in the pouch is forecast to be 80-90% (60-70 mm, Fig. 7). However, shear is forecast to be moderate to high (~20-25 kt) over the next several days. The 00 UTC ECMWF is even suggesting a merger of the vorticity of PGI31L with that of PGI33L to its east. The GFS and ECMWF models continue to favor development of this system and it could be in range (near 40W) of the NOAA G-IV and G-V aircraft in ~5 days (Monday 23 Aug).

f. PGI33L

PGI33L is located along the African coast at ~9.5N 9.5W on the eastern flank of a large AEW. Recent evolution of this system appears similar to that of PGI30 and PGI31: a large MCS is moving quickly to the northwest away form the parent wave and PGI33L (Fig. 8). Dry air has likely entrained into the north side of this MCS as large arc clouds can be seen emanating from that side of the convection. Deep (-70 to -80C) convection has also rapidly collapsed as these arc clouds have been pushing out from the MCC. It is unclear at this time how PGI33L and this MCS will evolve over the next 12-24 hrs, but both features warrant close monitoring. The ECMWF model is currently favoring a solution that merges the vorticity associated with PGI33L with that of PGI31L (and the W-E vorticity strip) to its west. This merged system could be in range (near 40W) of the NOAA G-IV and G-V aircraft in ~5 days (Monday 23 Aug).

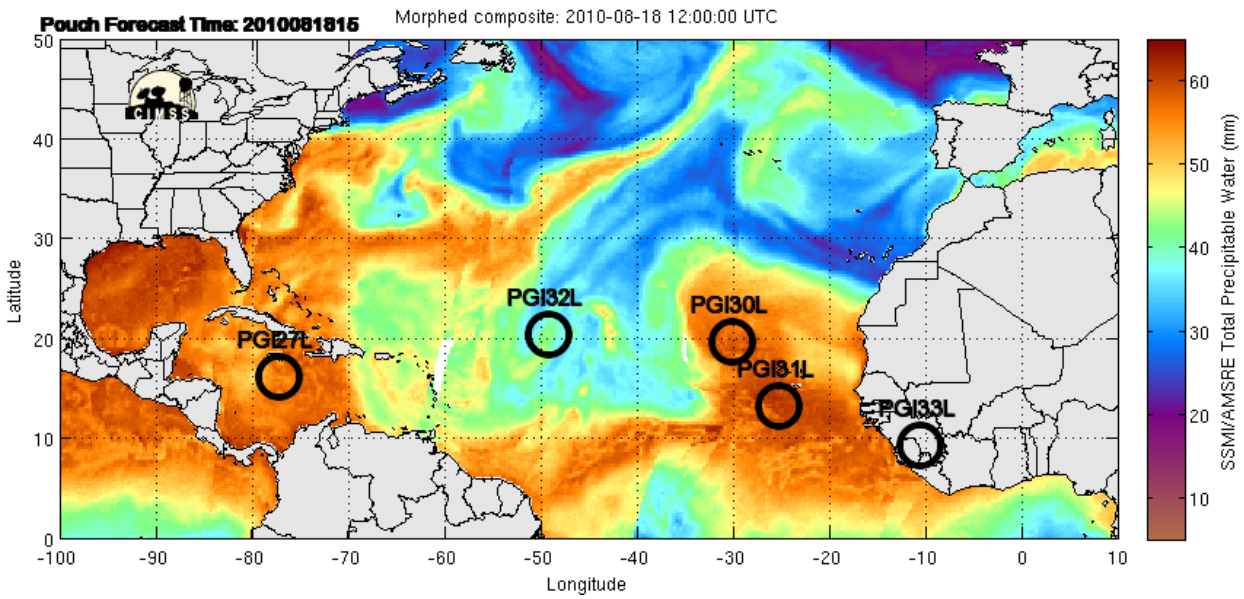
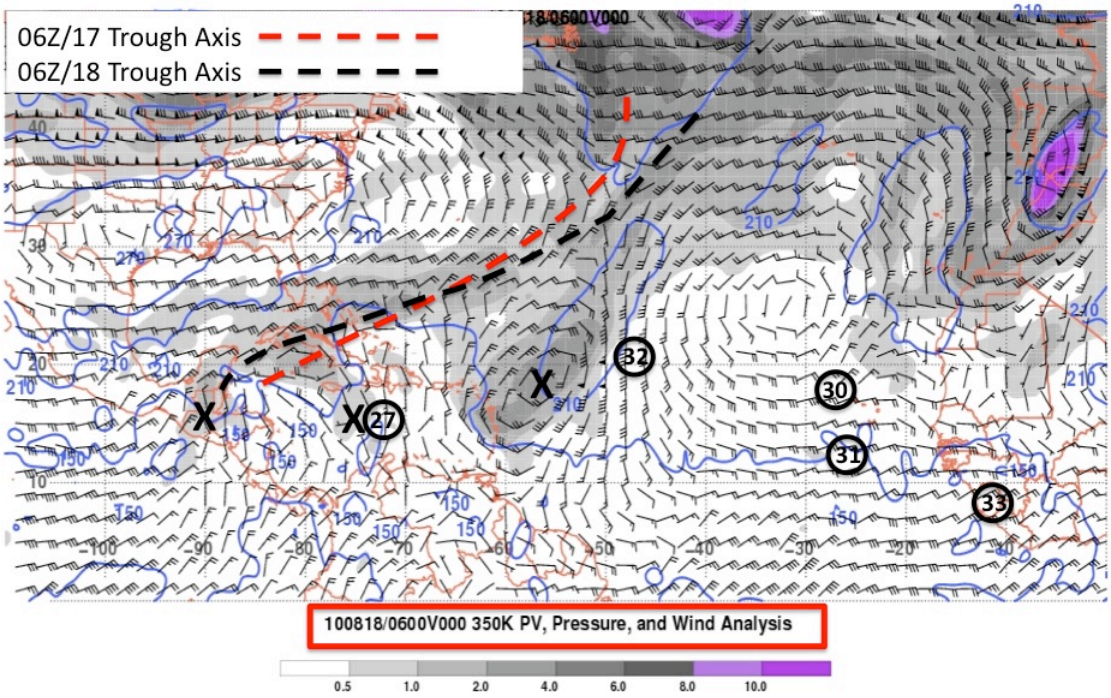


Fig. 1



350-K Isentropic Potential Vorticity (PVU, shaded), Pressure (hPa, contours), and wind (barbs)
source: http://www.atmos.albany.edu/student/cordeira/WEB/PREDICT/prod/ISEN/isen_350.html

Fig. 2

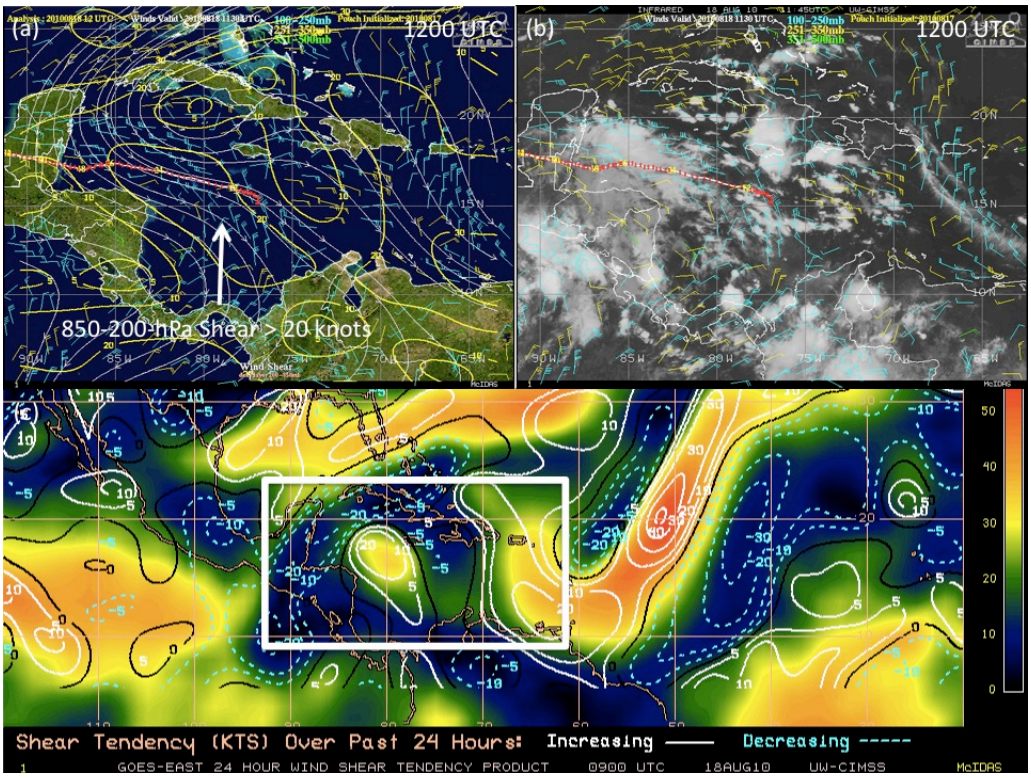

(a)
1200 UTC
850-200 hPa Shear > 20 knots
(b)
1200 UTC
Shear Tendency (KTS) Over Past 24 Hours: Increasing —— Decreasing -----
GOES-EAST 24 HOUR WIND SHEAR TENDENCY PRODUCT 0900 UTC 18AUG10 UW-CIMSS McIDAS

Fig. 3

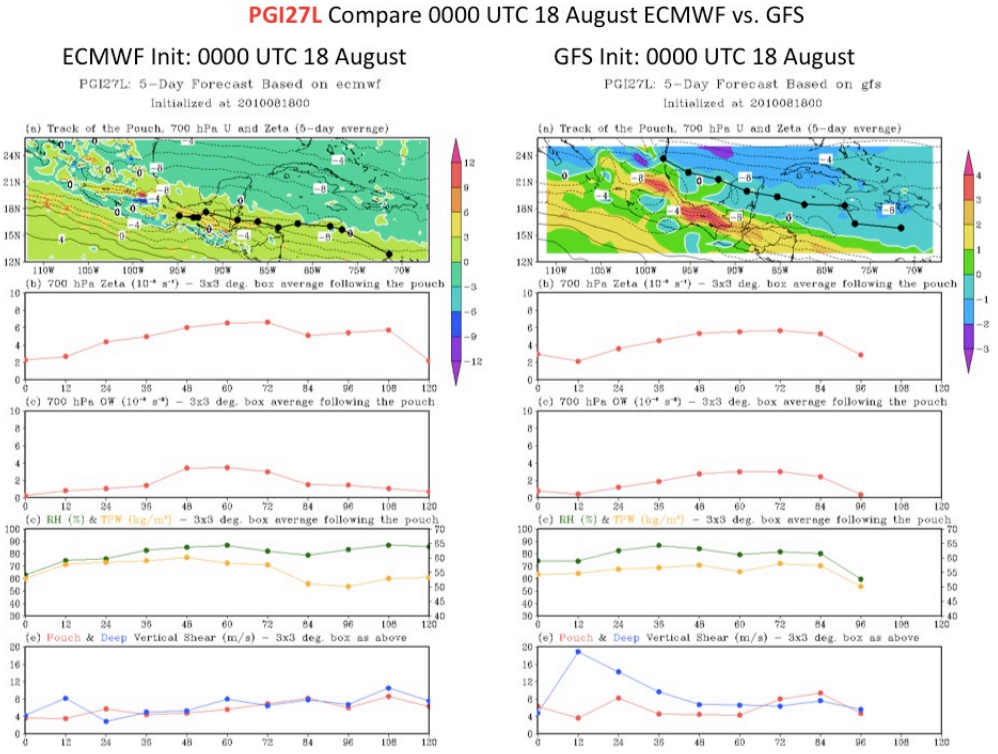

PGI27L Compare 0000 UTC 18 August ECMWF vs. GFS
ECMWF Init: 0000 UTC 18 August
PGI27L: 5-Day Forecast Based on ecmwf
Initialized at 2010081800
GFS Init: 0000 UTC 18 August
PGI27L: 5-Day Forecast Based on gfs
Initialized at 2010081800
(a) Track of the Pouch, 700 hPa U and Zeta (5-day average)
(b) 700 hPa Zeta (10⁻⁶ s⁻¹) – 3x3 deg. box average following the pouch
(c) 700 hPa OW (10⁻⁶ s⁻²) – 3x3 deg. box average following the pouch
(e) RH (%) & TPW (kg/m²) – 3x3 deg. box average following the pouch
(e) Pouch & Deep Vertical Shear (m/s) – 3x3 deg. box as above

Fig. 4

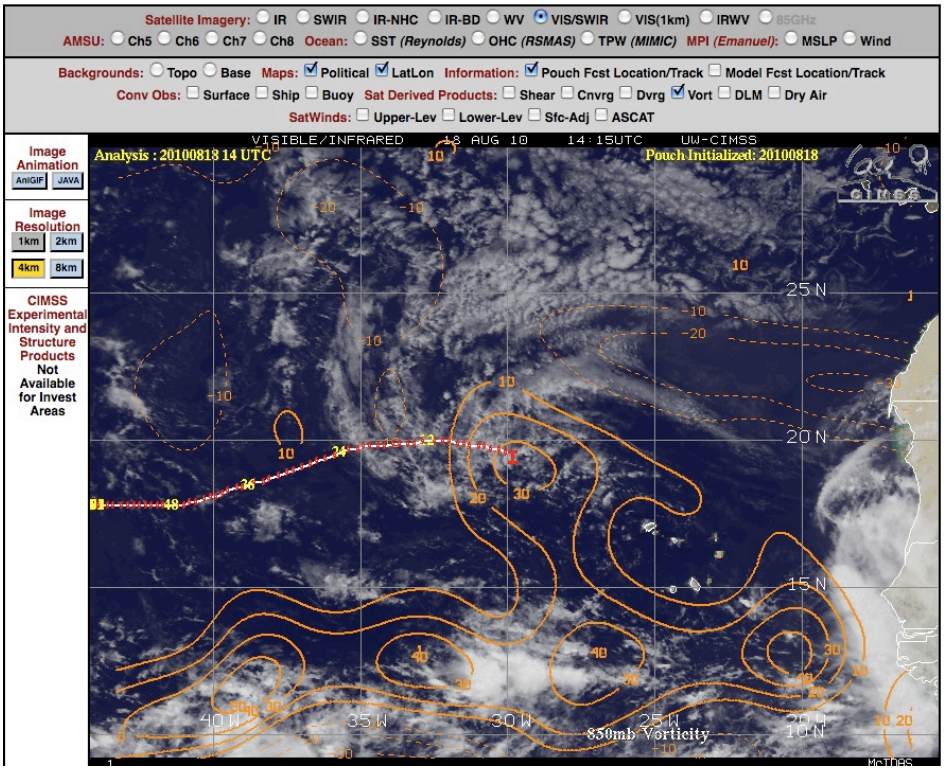

Satellite Imagery: IR SWIR IR-NHC IR-BD WV VIS/SWIR VIS(1km) IRWV 85GHz
AMSU: Ch5 Ch6 Ch7 Ch8 Ocean: SST (Reynolds) OHC (RSMAS) TPW (MIMIC) MPI (Emanuel): MSLP Wind
Backgrounds: Topo Base Maps: Political LatLon Information: Pouch Fcst Location/Track Model Fcst Location/Track
Conv Obs: Surface Ship Buoy Sat Derived Products: Shear Cnvrg Dvrg Vort DLM Dry Air
SatWinds: Upper-Lev Lower-Lev Sfc-Adj ASCAT
Image Animation
AniGIF JAVA
Image Resolution
1km 2km 4km 8km
CIMSS Experimental Intensity and Structure Products Not Available for Invest Areas
VISIBLE/INFRARED 18 AUG 10 14:15UTC UW-CIMSS
Analysis : 20100818 14 UTC
Pouch Initialized: 20100818
25 N
20 N
15 N
40 W
35 W
30 W
25 W
20 W
850mb Vorticity
MeTOBS

Fig. 5

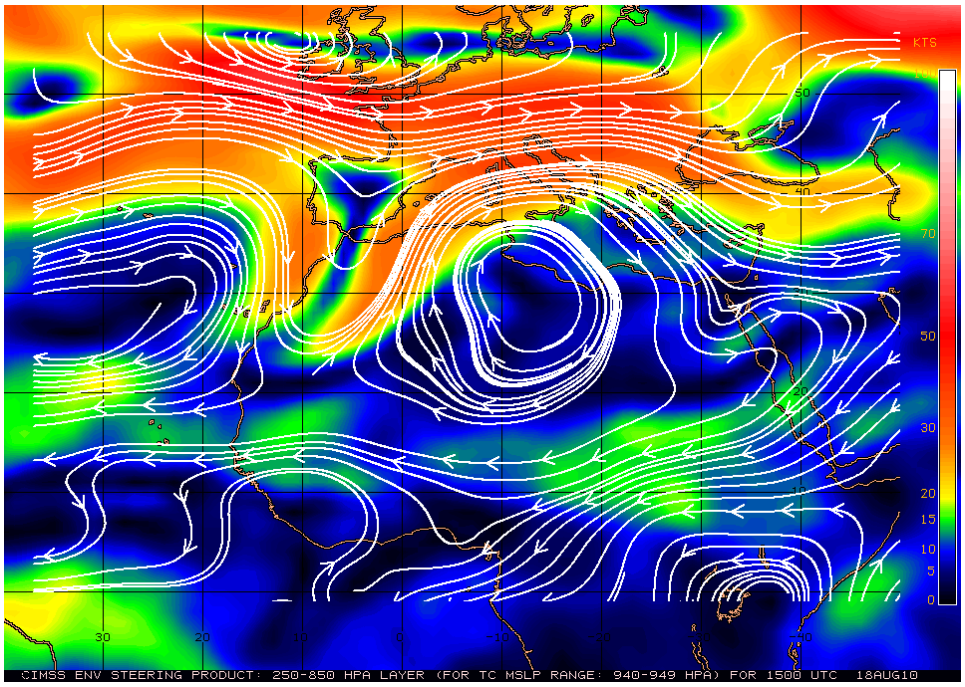
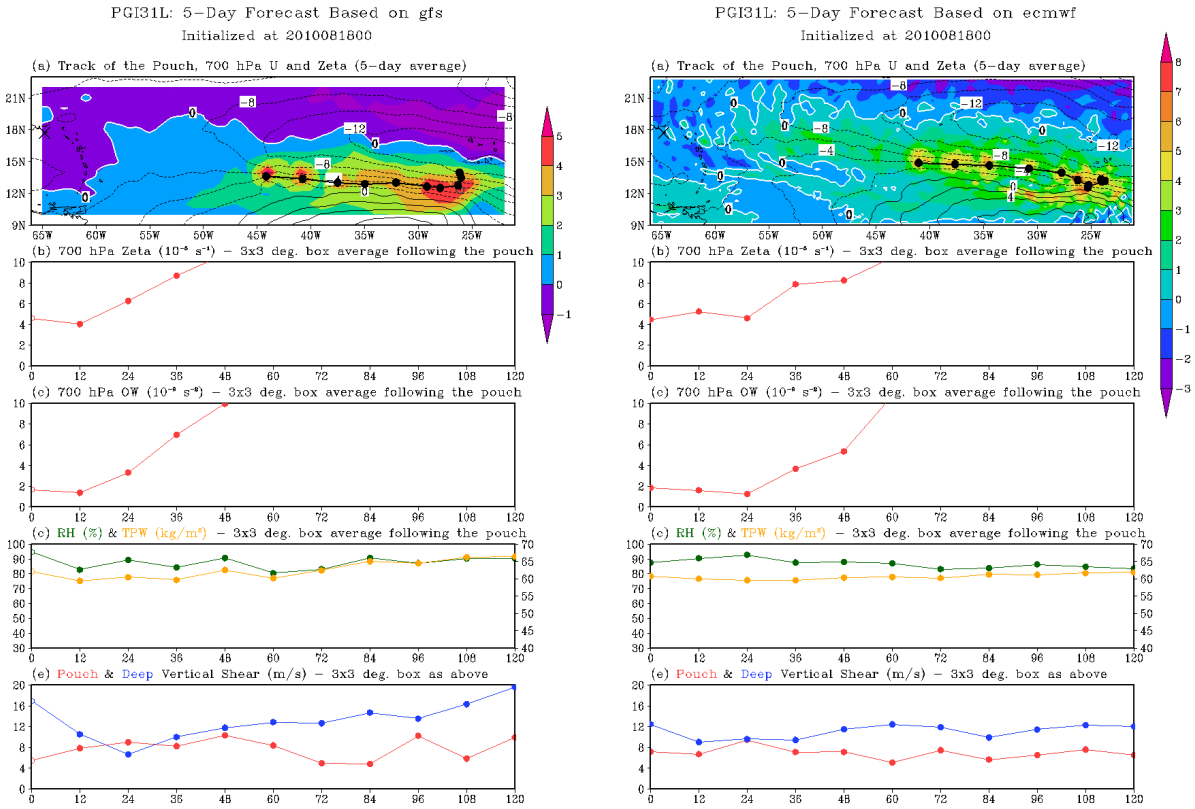

KTS
70
50
30
20
15
10
5
0
CIMSS ENV STEERING PRODUCT: 250-850 HPA LAYER (FOR TC MSLP RANGE: 940-949 HPA) FOR 1500 UTC 18AUG10

Fig. 6


PGI31L: 5-Day Forecast Based on gfs
Initialized at 2010081800
(a) Track of the Pouch, 700 hPa U and Zeta (5-day average)
(b) 700 hPa Zeta (10⁻⁵ s⁻¹) - 3x3 deg. box average following the pouch
(c) 700 hPa OW (10⁻⁵ s⁻²) - 3x3 deg. box average following the pouch
(c) RH (%) & TPW (kg/m²) - 3x3 deg. box average following the pouch
(e) Pouch & Deep Vertical Shear (m/s) - 3x3 deg. box as above
PGI31L: 5-Day Forecast Based on ecmwf
Initialized at 2010081800
(a) Track of the Pouch, 700 hPa U and Zeta (5-day average)
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(c) RH (%) & TPW (kg/m²) - 3x3 deg. box average following the pouch
(e) Pouch & Deep Vertical Shear (m/s) - 3x3 deg. box as above

Fig. 7

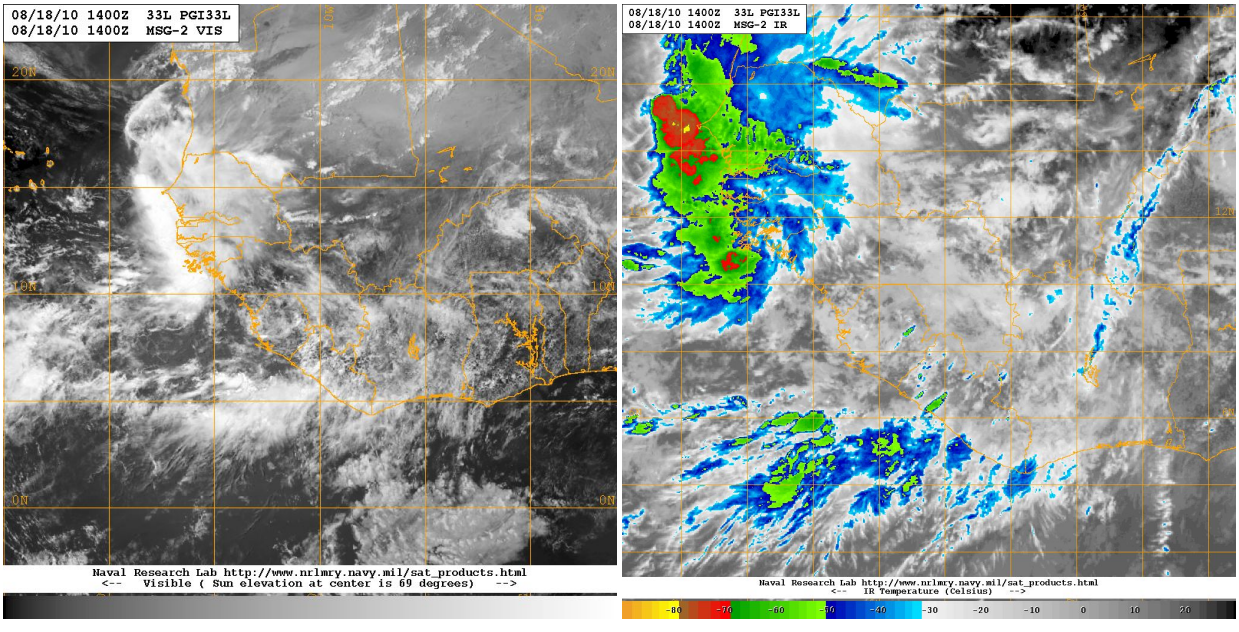
08/18/10 1400Z 33L PGI33L
08/18/10 1400Z MSG-2 VIS
Naval Research Lab http://www.nrlmry.navy.mil/sat_products.html
<-- Visible (Sun elevation at center is 69 degrees) -->
08/18/10 1400Z 33L PGI33L
08/18/10 1400Z MSG-2 IR
Naval Research Lab http://www.nrlmry.navy.mil/sat_products.html
<-- IR Temperature (Celsius) -->

Fig. 8