Wednesday 8 September 2010

TRI-AGENCY Weather Summary

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Current Conditions/Review of Yesterday's Forecast:

Big Picture: The large-scale flow conditions in the middle and upper troposphere across the CONUS, Gulf of Mexico, Caribbean Sea, and North Atlantic at 1415 UTC 8 Sep are summarized by the high-resolution water vapor winds (**image 1**) and Atlantic scale IR image for 1052 UTC 8 Sep (**image 2**). Features of interest include TC Hermine located over northern Texas approaching the Red River with an anticyclonically curving outflow band extending toward the lower Great Lakes, the remnants of Gaston (PGI38L) located south of the Dominican Republic and Haiti, a weakening upper-level cold low situated to the west of PGI38L to the south of Cuba, an area of convection in the ITCZ near 10 N and 61 W, a huge area of dry air in the middle and upper troposphere over the central North Atlantic, and four disturbances [PGI39L, newly-formed TS Igor (PGI41L), PGI42L, and PGI43L] over the extreme eastern Atlantic and western Africa (**image 3**).

Hermine made landfall over extreme northeastern Mexico on Monday evening with peak wind gusts of 60-65 kt, and has continued to move northward through central Texas, with the center of circulation approaching the Red River by 1800 UTC 8 Sep. A base reflectivity image for 1645 UTC 8 Sep (**image 4**) shows that much of the stratiform precipitation has shifted to the northern flank of the circulation into Oklahoma. The bulk of the precipitation has shifted to the poleward flank of Hermine because the circulation was interacting with a low-level baroclinic zone evident across Oklahoma into northern Arkansas and stretching northeastward (**image 5**). Also, an intense band of convection extended southward from Hermine all the way to south Texas (**image 4**). This band is producing huge amounts of rain along the I-35 corridor…with 12-16 inches of rain already reported near Austin, Texas, and surrounding regions northward through Dallas (not shown). A reasonable tornado threat also exists along this band, with large low-level vertical shear in the lowest 1 km (**image 6**).

In addition to the precipitation directly associated with the Hermine circulation, a predecessor rain event (PRE) formed yesterday afternoon over eastern Oklahoma and Arkansas as deep tropical moisture (TPW values > 55 mm) moved poleward ahead of Hermine and intersected the aforementioned baroclinic zone (not shown). Widespread rainfall amounts > 4 inches were observed in this region.

At 1545 UTC 8 Sep, the remnants of Gaston (PGI38L) were located just south of the Dominican Republic (**image 7**). The low-level vorticity structure had become disorganized relative to previous days, although a pouch was still trackable in the GFS and ECMWF. Convection was located primarily on the northern and western

part of the pouch sweet spot…along the north and south shores of the Dominican and west of the pouch…mostly away from the pouch center (**image 7**). The upper-level flow above Gaston had turned to more southeasterly compared to the easterly flow observed over the last several days (**image 1**). It appears that the upper-level flow veered to southeasterly in response to the confluent southerly flow east of the upper-level cold low now situated over the central and western part of Cuba. The pouch track forecasts from the GFS and ECMWF indicate that Gaston should take a southwesterly course in the coming days, eventually making landfall along the Central American coastline in the extended range. The behavior of Gaston over the next few days may be influenced by the movement and structure of the upper-level cold low. It appears that diabatically-enhanced ridging associated with Hermine may be enhancing the northeasterly flow of the Gulf of Mexico. This northeasterly flow may act to elongate and shear out the upper-level cold low as it also advects it southwestward.

At 1200 UTC 8 Sep, a broken area of convection was present along the ITCZ between 9-14 N and 62-56 W near the north coast of South America (**image 7**). The convection was firing in conjunction with a strengthening monsoon trough that was marked by an eastward surge of surface westerly flow across northern South America (not shown). Easterly and southeasterly winds ahead of the surge veered to southwesterly and westerly behind the surge, resulting in the development of a modest low-level (850 hPa) vorticity center near 11 N and 59 W at 1500 UTC 8 Sep (not shown). A number of the global models and some ensemble members indicate that this ITCZ disturbance will strengthen and possibly reach TC status within 48-72 h (see below). The environment on the poleward periphery of this ITCZ disturbance is moistening as is evident from a comparison of the 0000 and 1200 UTC 8 Sep Barbados (78954; TBPB) soundings (**image 8** and **image 9**).

A large midlatitude anticyclonic wavebreaking event now in progress over the eastern Atlantic is leading to the downstream development of an upper-level trough off the northwest coast of Africa. As this trough develops, the observed area of high TPW values (45-50 mm) that has expanded poleward along the African coast to where it reached its "high-water" mark (so to speak) between 25-30 N has begun to shrink equatorward. Commensurate with the ongoing meridional shrinkage of the high TPW plume, African disturbances exiting the continent are again forecast to move steadily westward into the tropical Atlantic instead of turning more northward offshore.

At 1200 UTC 8 Sep, westward-moving African disturbances PGI39L, PGI41L (named TC Igor this morning and discussed more fully below), PGI42L, and PGI43L were located near 19 N and 37 W, 14 N and 24 W, 16 N and 17 W, and 10 N and 4 E, respectively (**image 3**). Quasi-comatose PGI39L, devoid of active deep convection near the center and entering an increasingly sheared environment ahead of an upper-level trough, is expected to dissipate and will not be discussed further. PGI42L, which yesterday was associated with a strong westward-propagating linear convective system over the African continent, is manifest today as a quasi linear

band of broken convection along the coast of Africa immediately to the east of TC Igor (PGI41L; **image 10**). Igor and PGI42L are close enough to one another and appear to be interacting (**image 10**). Finally, PGI43L is located on the eastern edge of an active region of continental convection beneath 15-25 kt of deep-layer shear.

Igor, a large storm that spans 5-10 of latitude (**image 11**), is developing within a large plume of high (> 50 mm) TPW values that moved off the coast of Africa the last couple of days. TPW values in this large, poleward-displaced TPW plume that exceeded five standardized anomalies according to Richard Grumm's standardized anomaly analysis page (not shown) are indicative of the unusual nature of this TPW surge. Whether the large size of the "birthing" TPW plume has played a role in the relatively large size of organizing Igor remains to be determined.

Day 1 (Next 24 hours) Outlook:

Hermine: As in yesterday's forecast, the biggest threat posed by Hermine's slow northward and eventual eastward movement will be from heavy rain-induced flooding along and to the east of the storm track in the region where the feeder bands in deep southeasterly flow are located. It is possible that additional PREs could form northeast of Hermine. No further comment on Hermine will be provided here.

Gaston: The remnants of Gaston (PGI38L) are progged by both the GFS (**image 12**) and ECMWF (**image 13**) to move southwestward through the next 24-h, reaching ~74 W by 1200 UTC 9 Sep. Gradual weakening is expected.

ITCZ Disturbance: The 36 h operational ECMWF forecast verifying 1200 UTC 9 Sep generates a 700 hPa trough and an embedded cyclonic disturbance marked by a weak layer-mean 925-850 hPa vorticity maximum along the ITCZ near 11 N and 59 W (**image 14**). This vorticity maximum is embedded in a region of high TPW (57-60 mm). The corresponding 24 h operational GFS forecast produces a disturbance with a somewhat weaker vorticity maximum farther to the east (11 N and 58 W), but in a slightly drier environment (TPW ~51-54 mm; not shown). An important difference between the two models is that the ITCZ disturbance in the ECMWF model is developing in a higher (~5 mm) TPW environment.

Igor: According to the NHC at 1500 UTC 8 Sep 2010:

FORECAST POSITIONS AND MAX WINDS

INITIAL	08/1500Z	13.7N	23.5W	35 KT
12HR VT	09/0000Z	13.7N	24.6W	40 KT
24HR VT	09/1200Z	13.8N	26.6W	45 KT
36HR VT	10/0000Z	14.0N	29.0W	50 KT
48HR VT	10/1200Z	14.5N	31.5W	55 KT
72HR VT	11/1200Z	15.5N	36.5W	65 KT

96HR VT 12/1200Z 16.8N 41.2W 75 KT

120HR VT 13/1200Z 18.0N 46.0W 85 KT

$$ FORECASTER BLAKE/PASCH

The GFS and the ECMWF models are "eager" to develop Igor through 1200 UTC 9 Sep and absorb the PGI42 vorticity into the storm circulation from the northeast in a Fujiwara-like circulation interaction.

PGI43L is forecast to continue moving steadily westward and be located near 12 N and 1 W at 1200 UTC 9 Sep according to the ECMWF forecast (The GFS forecast is slower and farther south, indicative of reduced deep layer mean wind speeds farther south; not shown).

Day 2 (24-48 h) Outlook:

The remnants of Gaston (PGI38L) are expected to continue southwestward over the next 48-h, reaching ~ 76 W by 1200 UTC 10 Sep. Continued weakening is expected (**image 12** and **image 13**).

ITCZ Disturbance: The ECMWF 36-h forecast from 0000 UTC 8 Sep shows a "balloon-shaped" layer-mean 925-850 hPa vorticity maximum between 11-14 N along 60 W at 1200 UTC 9 Sep (**image 14**). The shape of the vorticity maximum is indicative of the model's attempt to launch a "trial balloon" to get the attention of forecasters. This vorticity maximum is embedded in a region of high TPW values (57-60 mm) along the edge of the ITCZ boundary that is located near 13 N. Although we anticipate that this disturbance will continue to develop slowly, whether it will become a TC is still problematical because the growth in layer-mean 925-hPa vorticity is not matched by a significant negative sea level pressure perturbation in the ECMWF forecast from 0000 UTC 8 Sep (not shown).

Igor: The NHC forecasts Igor to strengthen to 55 kt by 1200 UTC 10 Sep as it moves (relatively) slowly westward in a weak deep-layer mean shear environment south of a strong subtropical ridge axis. Track agreement among the various statistical and dynamical models is pretty good (not shown). The statistical models are more bullish in making Igor a Cat 1 TC between 48-60 h whereas the dynamical models take an additional day to reach this threshold (not shown).

PGI42L/PGI43L: PGI42L is forecast to be absorbed into Igor's circulation by the end of this period. PGI43L is forecast to be located near 13 N and 11 W by 1200 UTC 10 Sep.

Extended Outlook:

Gaston (PGI38L): Both the GFS (**image 12**) and ECMWF (**image 13**) take Gaston southwestward as a weak vorticity center, making landfall along the Central American coast after 108 h.

ITCZ Disturbance: The ECMWF operational forecast from 0000 UTC 8 Sep shows this disturbance making its closest approach to STX by 1200 UTC 10 Sep when it is forecast to be located at 16 N and 65 W (not shown; this forecast position is close enough to STX to be a concern should the storm develop more quickly and strongly than expected). This storm is not forecast to be a TC in the operational ECMWF forecast from 0000 UTC 8 Sep based on the forecast SLP distribution despite the presence of a concentrated layer-mean 925-850 hPa vorticity maximum. Subsequently, this storm is forecast to continue moving slowly westward without undergoing significant intensification. The ECMWF model forecasts the storm to reach the Yucatan Peninsula by 1200 UTC 16 Sep. The ECMWF forecast also suggests that the storm may struggle to retain its concentrated vorticity structure as it interacts with drier air between Cuba and Hispaniola in the 96-20 h time frame. Sharanya Majumdar's ensemble vorticity/OW forecasts for 60 h and 120 h are supportive of continuing storm development (**images**). Prof. Fuging Zhang provided by the following statement about this disturbance based upon his most recently available ensemble forecasts from 0000 UTC 8 Sep: "Please look at our ensemble run initialized at 00Z/Sept8 at the 96-120h lead range. The 13.5-km grid shall be the most useful. The control runs initialized from the GFS analysis and EnKF analysis both develop the low from South America, along with more than 1/3 of the ensemble members."

Igor (PGI41l): The ECMWF and GFS operational models forecast Igor to move slowly westward before beginning to recurve to the northwest near 50 W by 0000 UTC 15 Sep. The pouch vorticity/OW time series from the ECMWF and GFS forecasts from 0000 UTC 8 Sep suggest that Igor will become a significant TC (**image 15** and **image 16**). Our interpretation of the northwestward jog in the GFS forecast pouch track for Igor between 60-96 h is that this motion reflects the interaction of Igor with PGI42L as discussed above. Sharanya Majumdar's 120 h 700hPa ensemble vorticity/OW forecast is also bullish on Igor's continued strengthening (**image 16**).

PGI43L: Both the operational ECMWF and GFS model runs from 0000 UTC 8 Sep forecast PGI43L to become a westward-moving TC by 120 h. The ECMWF is faster (by ~5 deg of longitude) and farther south (by ~3 latitude) than the GFS. Sharanya Majumdar's 120 h 700hPa ensemble vorticity/OW forecast is bullish on PGI43L's continued strengthening (**image 16**).

From the Tropics with Love: The operational ECMWF 240 h forecast verifying 18 Sep shows TCs running amok in the Atlantic Ocean in a cyberland fantasy (**image 17**).

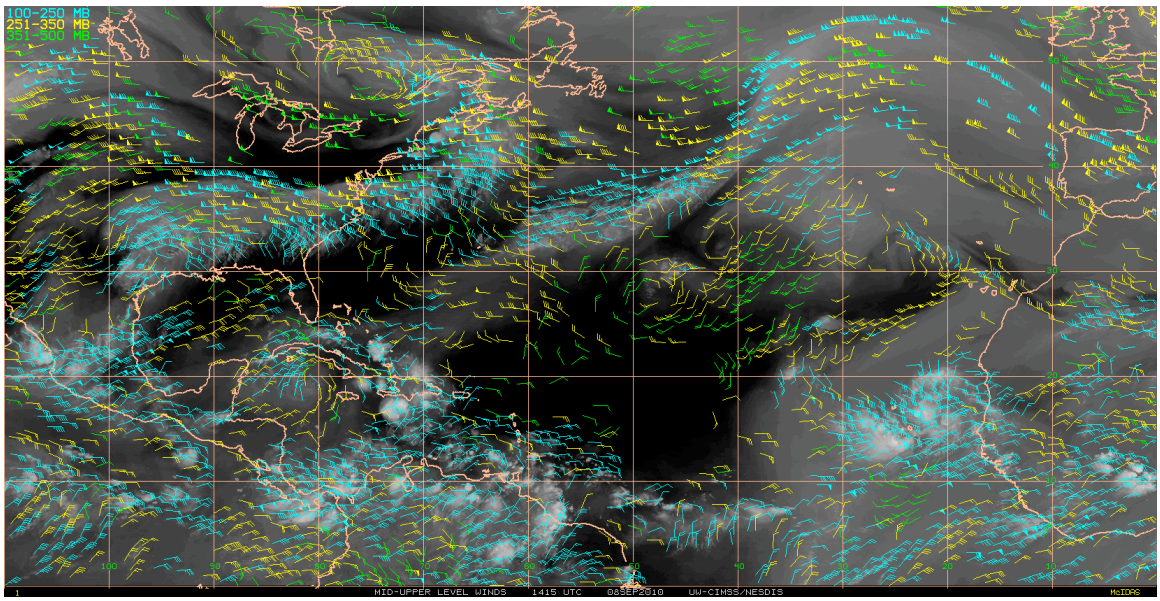


Image 1

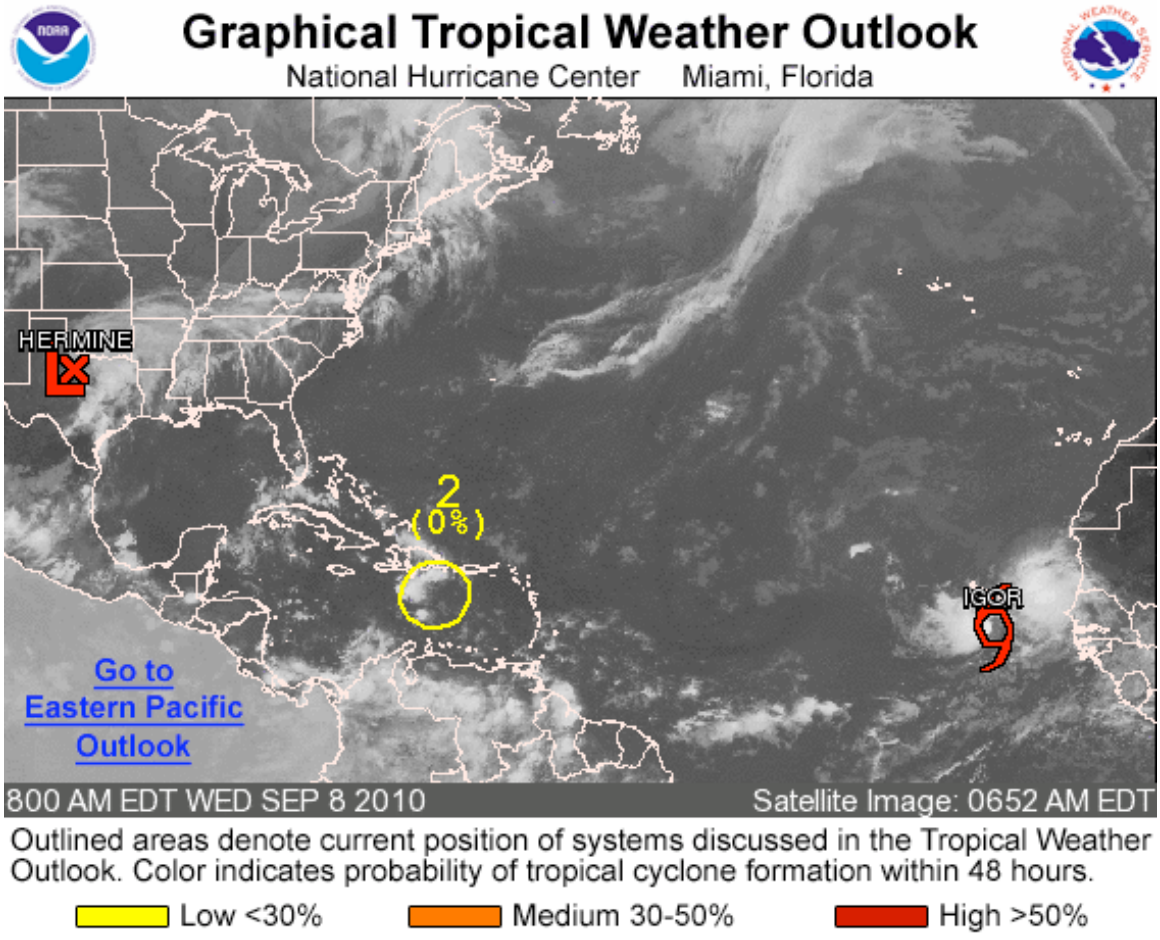


Image 2

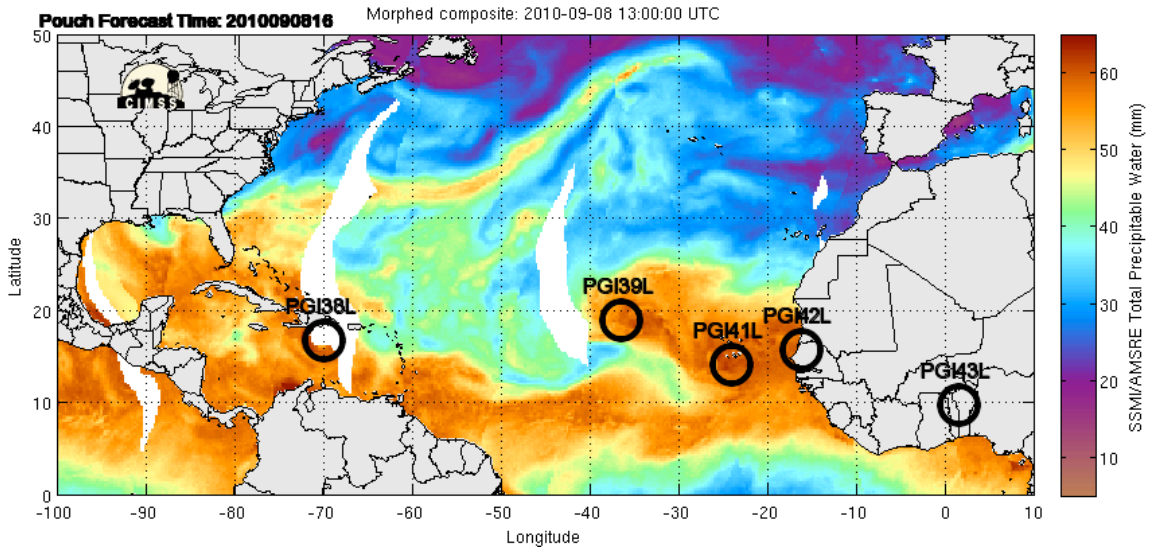


Image 3

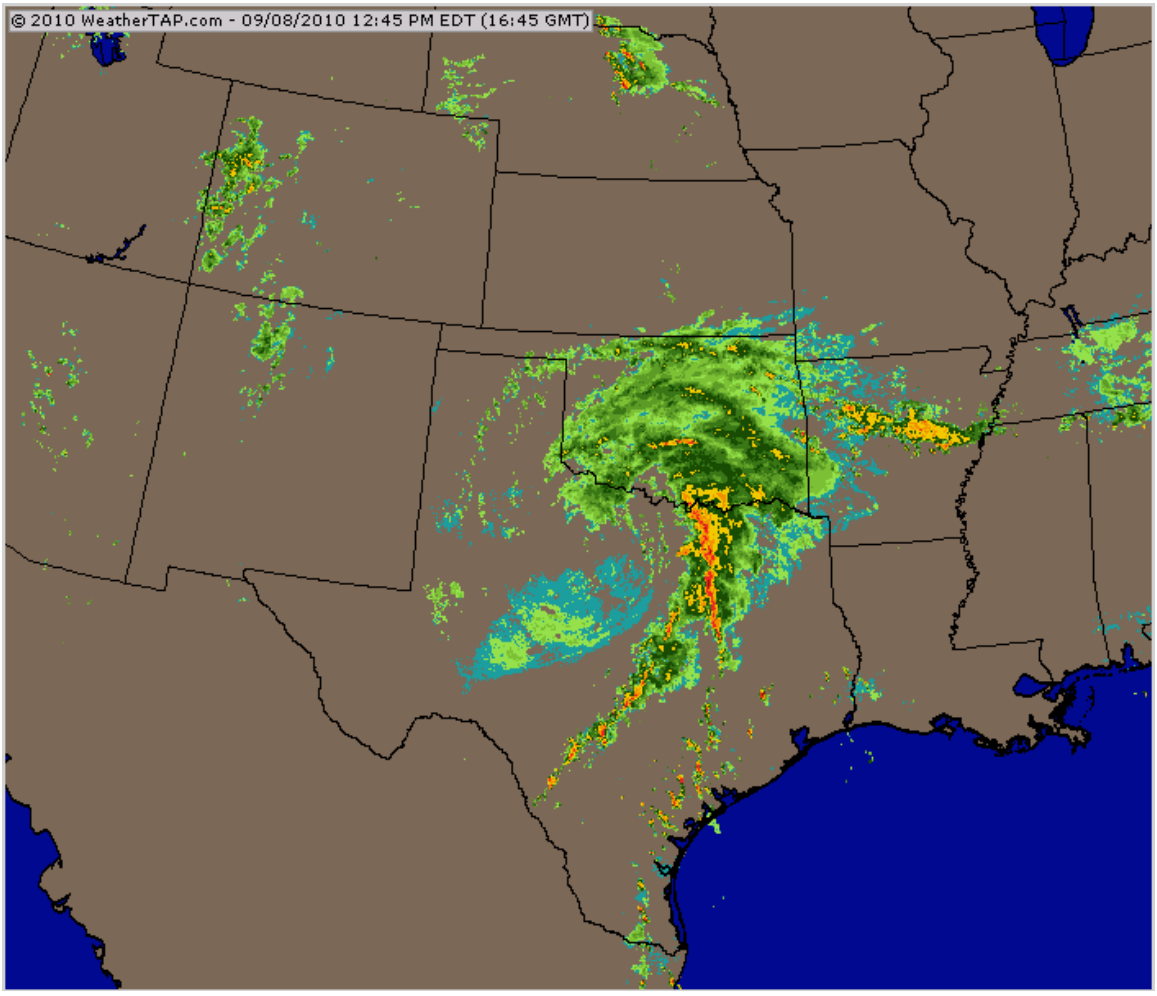


Image 4

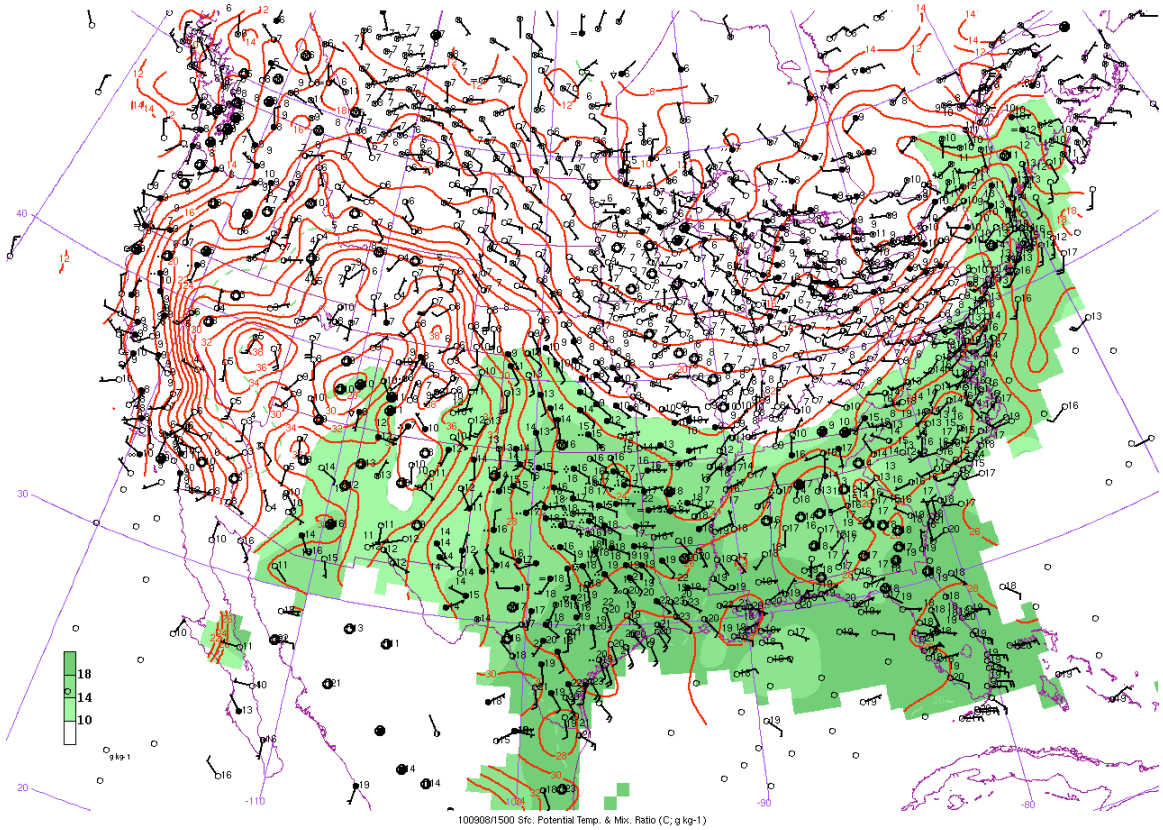
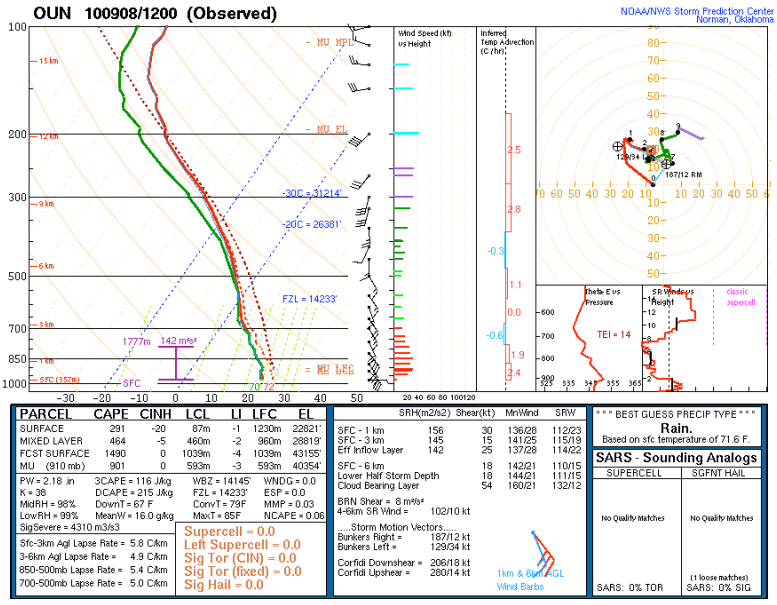


Image 5



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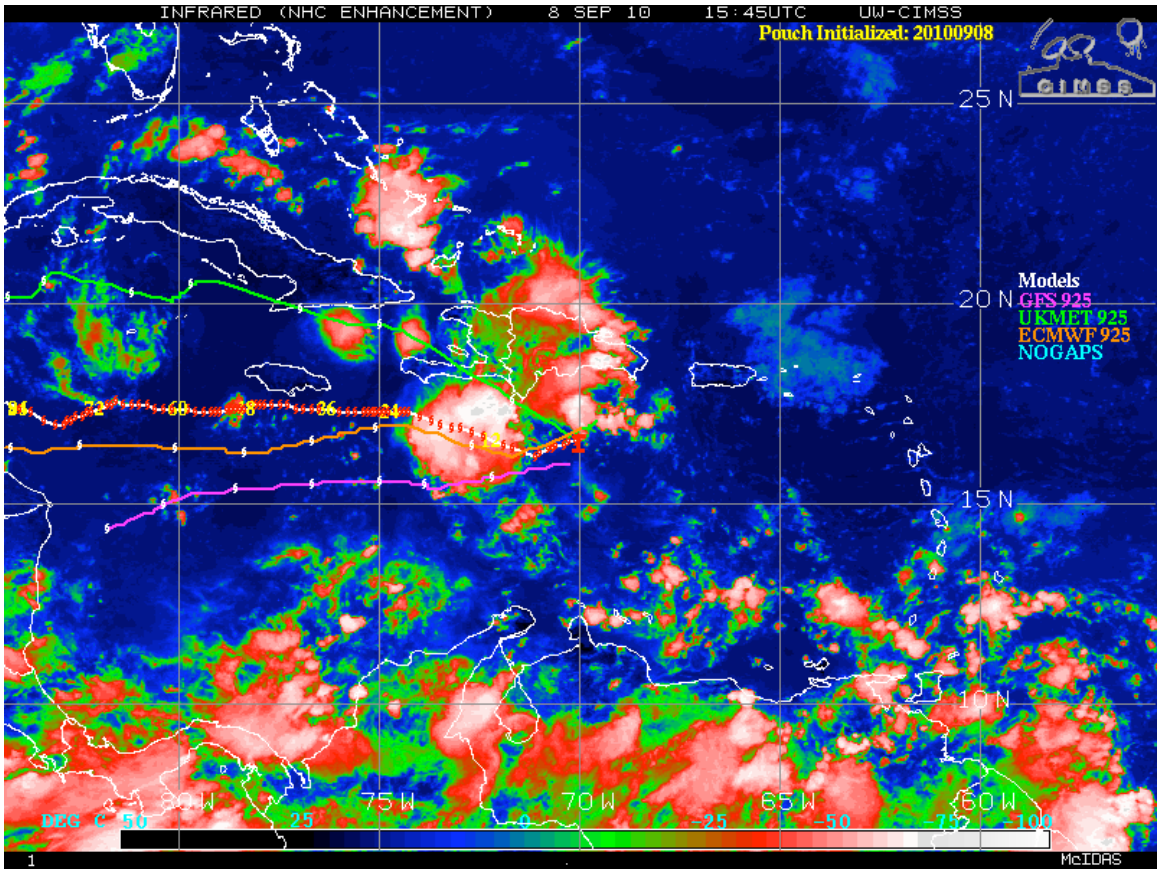


Image 7

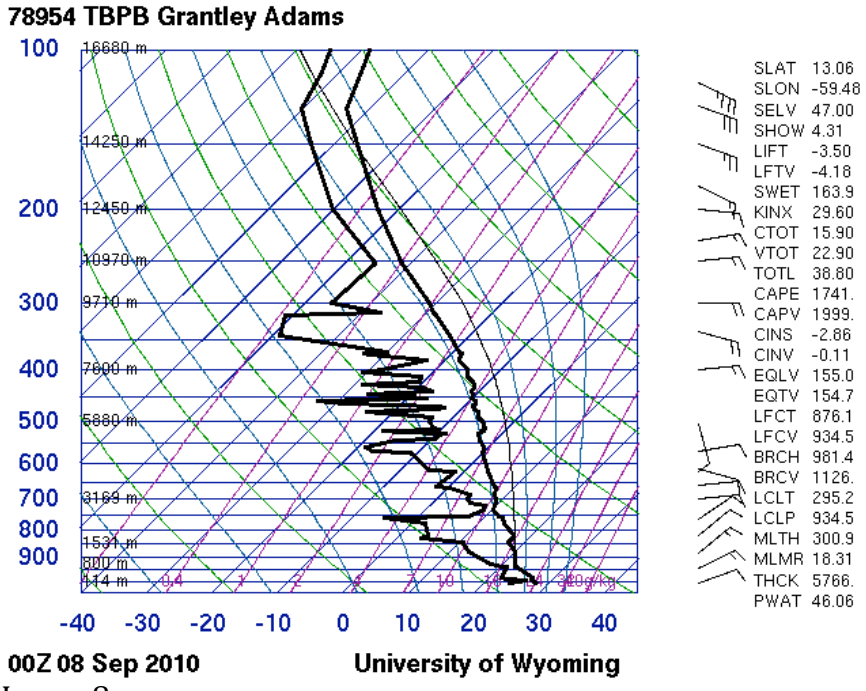


Image 8

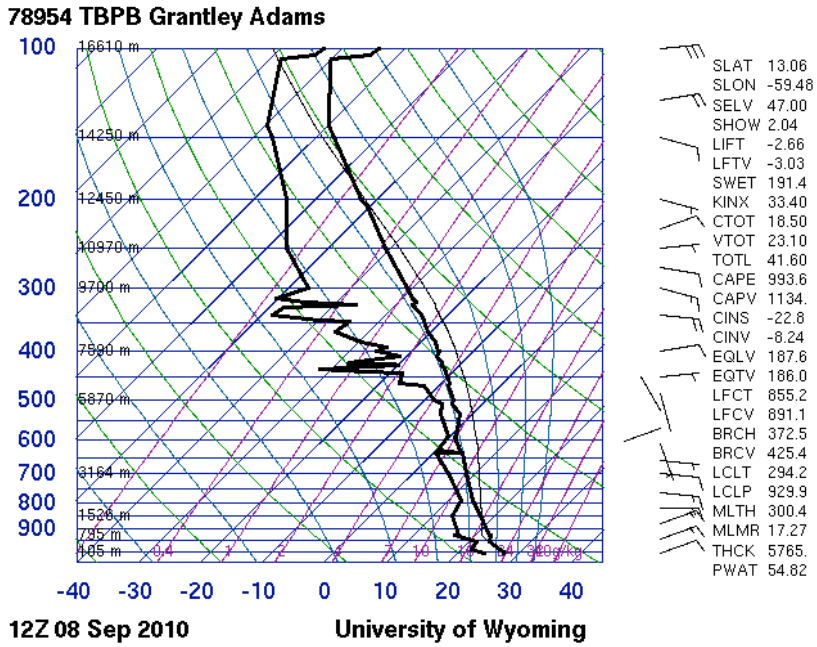


Image 9

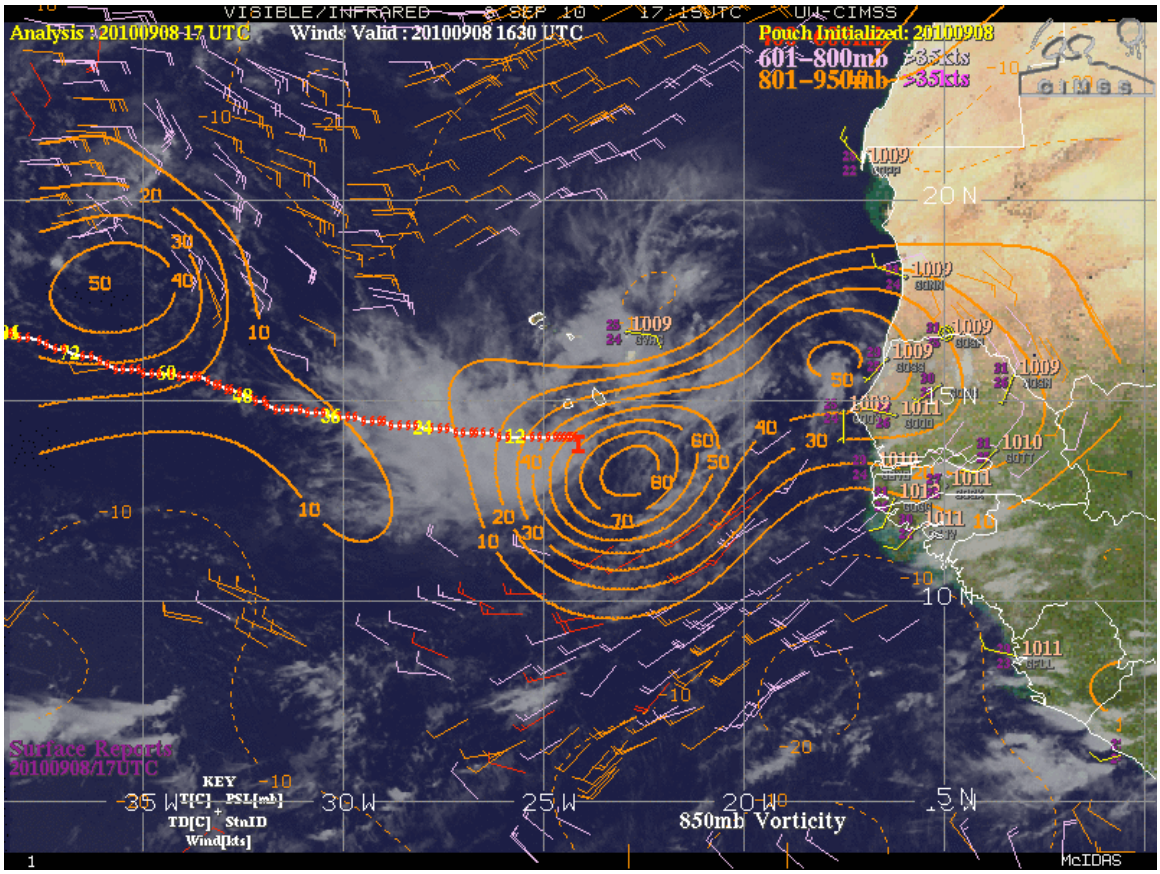
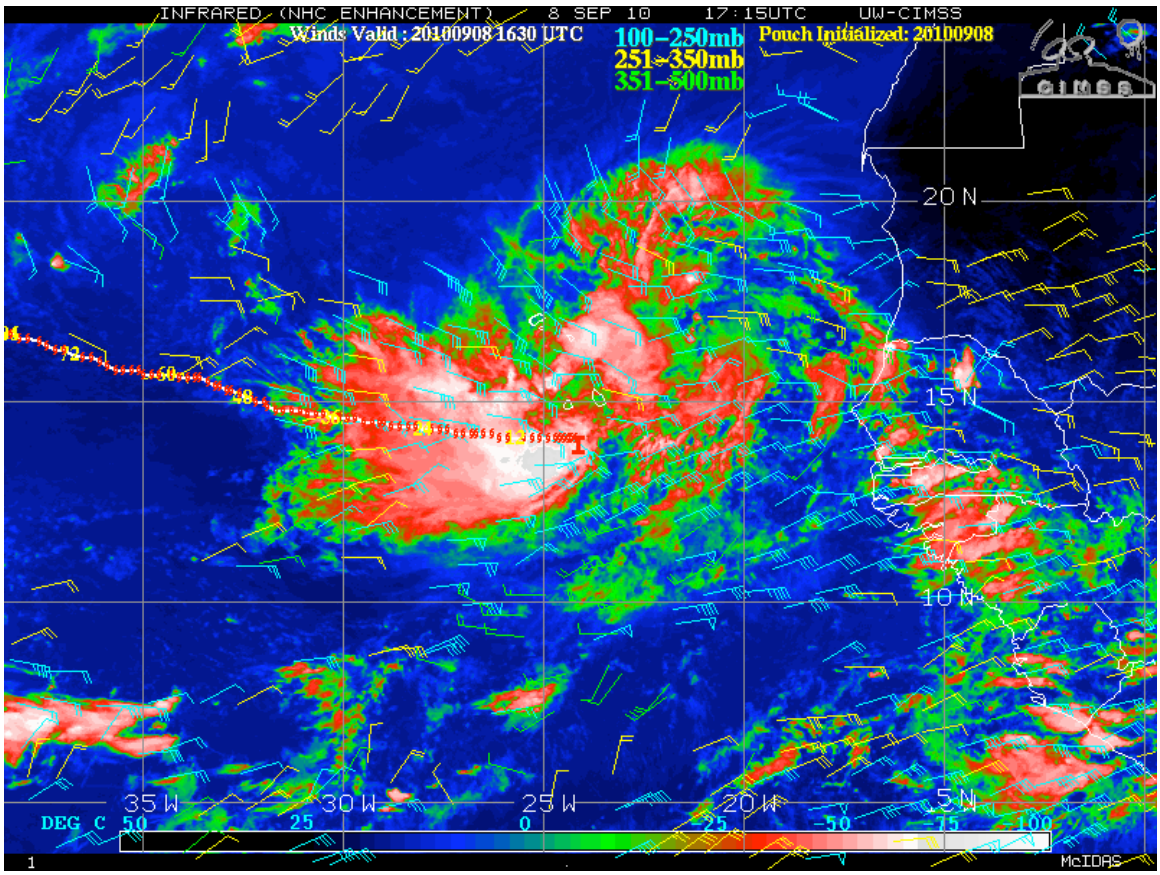


Image 10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100-250mb
251-350mb
351-500mb
Pouch Initialized: 20100908
CIMSS
20 N
15 N
10 N
5 N
35 W
30 W
25 W
20 W
DEG C 50 25 0 -25 -50 -75 -100
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McIDAS
Image 11

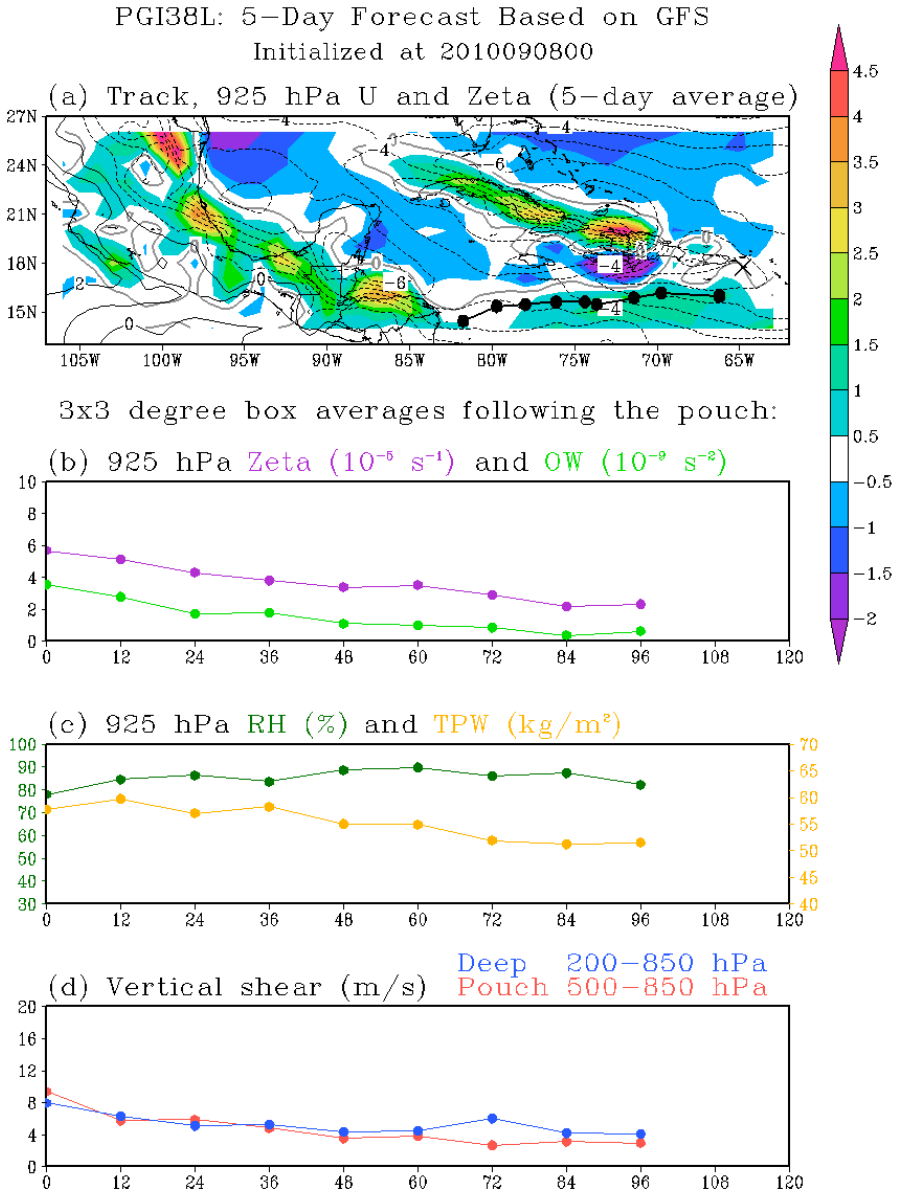

PGI38L: 5-Day Forecast Based on GFS
Initialized at 2010090800
(a) Track, 925 hPa U and Zeta (5-day average)
27N
24N
21N
18N
15N
105W
100W
95W
90W
85W
80W
75W
70W
65W
4.5
4
3.5
3
2.5
2
1.5
1
0.5
-0.5
-1
-1.5
-2
3x3 degree box averages following the pouch:
(b) 925 hPa Zeta (10⁻⁵ s⁻¹) and OW (10⁻⁹ s⁻²)
(c) 925 hPa RH (%) and TPW (kg/m²)
(d) Vertical shear (m/s)
Deep 200-850 hPa
Pouch 500-850 hPa

Image 12

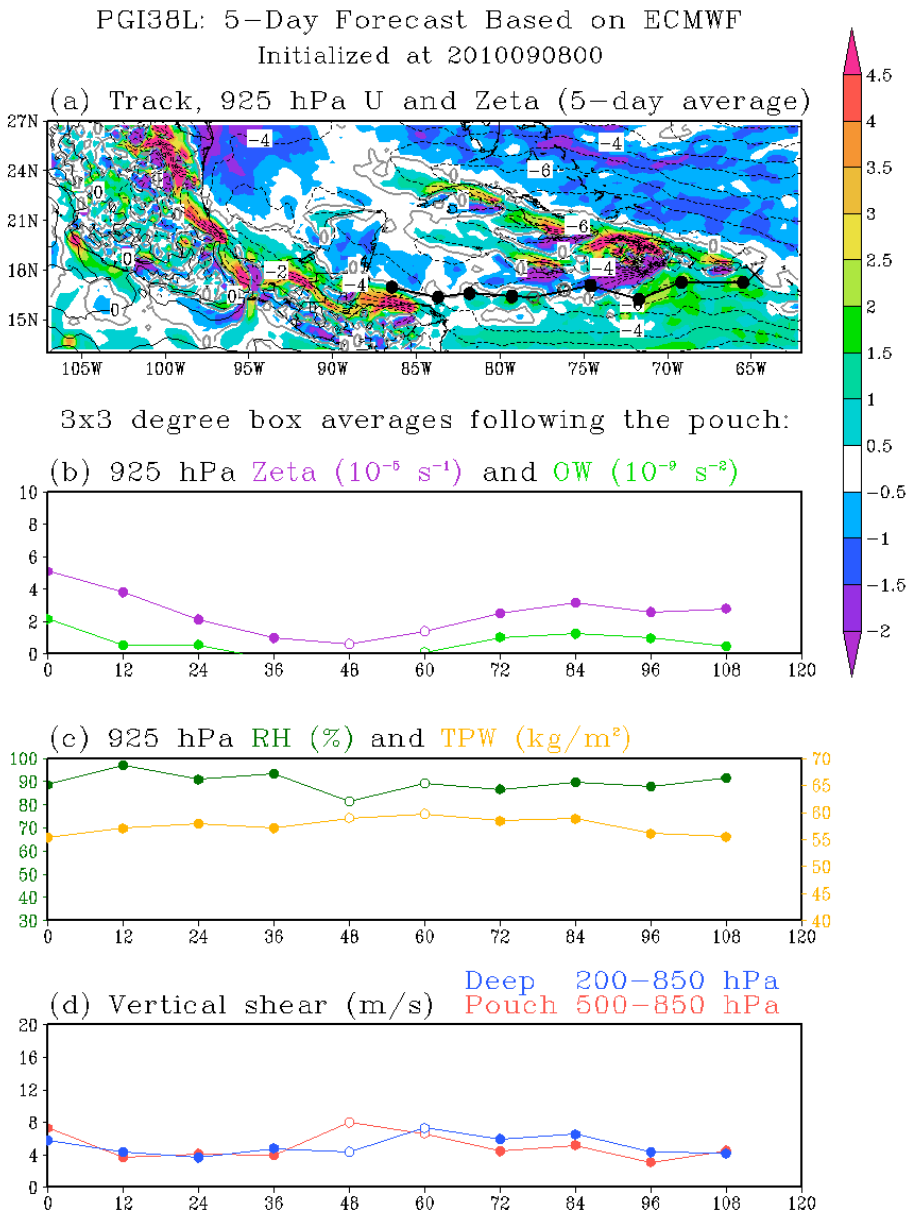
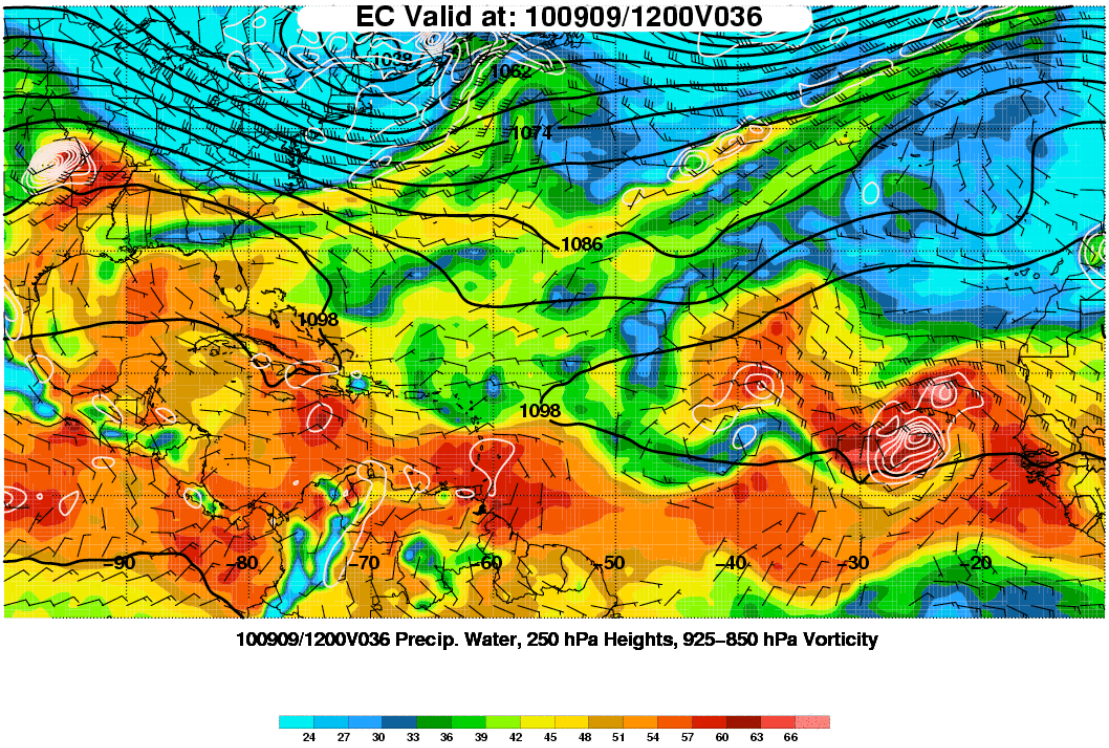

PGI38L: 5-Day Forecast Based on ECMWF
Initialized at 2010090800
(a) Track, 925 hPa U and Zeta (5-day average)
27N
24N
21N
18N
15N
105W
100W
95W
90W
85W
80W
75W
70W
65W
4.5
4
3.5
3
2.5
2
1.5
1
0.5
-0.5
-1
-1.5
-2
3x3 degree box averages following the pouch:
(b) 925 hPa Zeta (10⁻⁵ s⁻¹) and OW (10⁻⁹ s⁻²)
(c) 925 hPa RH (%) and TPW (kg/m²)
(d) Vertical shear (m/s)
Deep 200-850 hPa
Pouch 500-850 hPa

Image 13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1098
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-60
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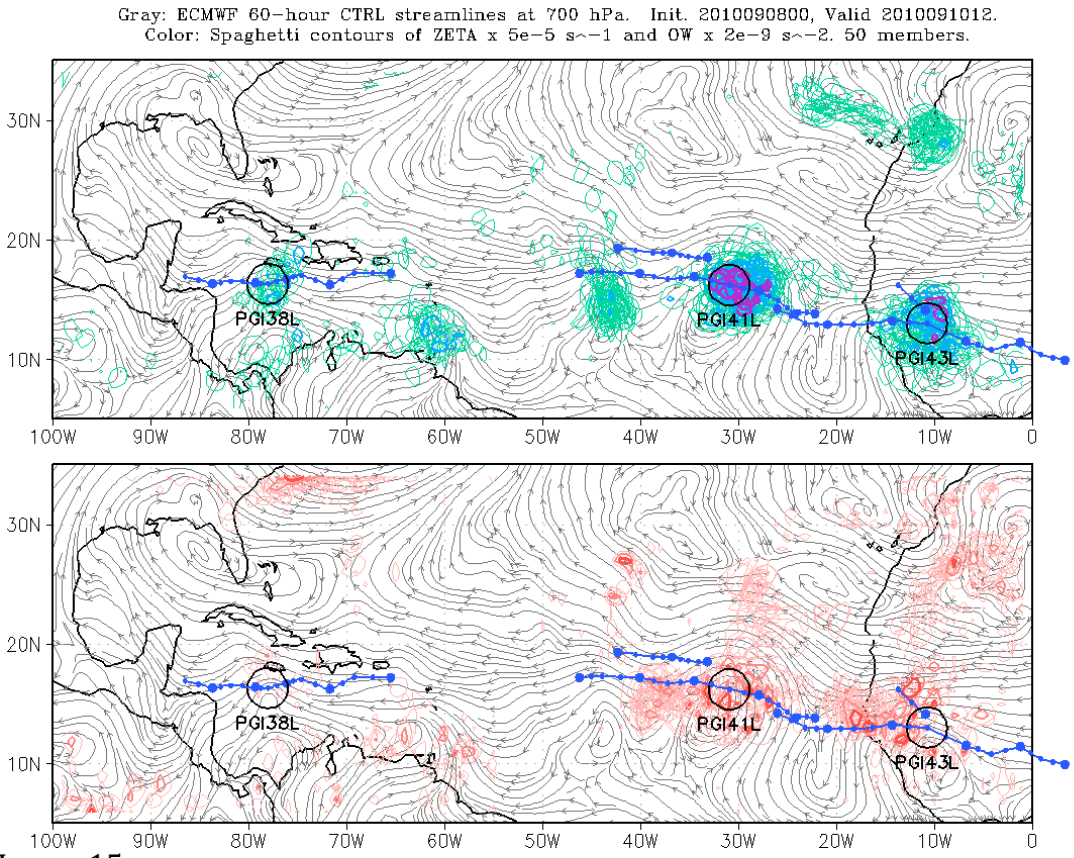
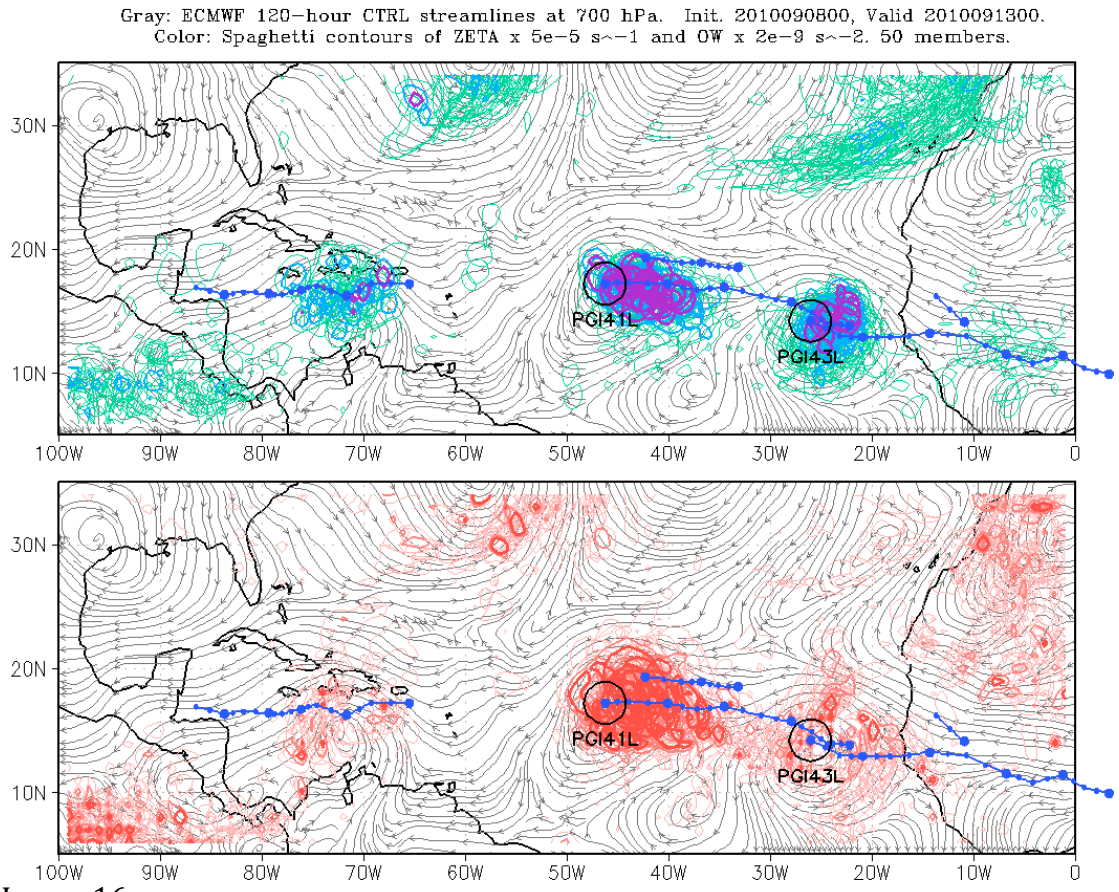
100909/1200V036 Precip. Water, 250 hPa Heights, 925–850 hPa Vorticity
24 27 30 33 36 39 42 45 48 51 54 57 60 63 66

Image 14


Gray: ECMWF 60-hour CTRL streamlines at 700 hPa. Init. 2010090800, Valid 2010091012.
Color: Spaghetti contours of ZETA x 5e-5 s^-1 and OW x 2e-9 s^-2. 50 members.
30N
20N
10N
100W
90W
80W
70W
60W
50W
40W
30W
20W
10W
0
PGI38L
PGI41L
PGI43L
30N
20N
10N
100W
90W
80W
70W
60W
50W
40W
30W
20W
10W
0
PGI38L
PGI41L
PGI43L
Image 15


Gray: ECMWF 120-hour CTRL streamlines at 700 hPa. Init. 2010090800, Valid 2010091300.
Color: Spaghetti contours of ZETA x 5e-5 s^-1 and OW x 2e-9 s^-2. 50 members.
30N
20N
10N
100W
90W
80W
70W
60W
50W
40W
30W
20W
10W
0
PGI41L
PGI43L
30N
20N
10N
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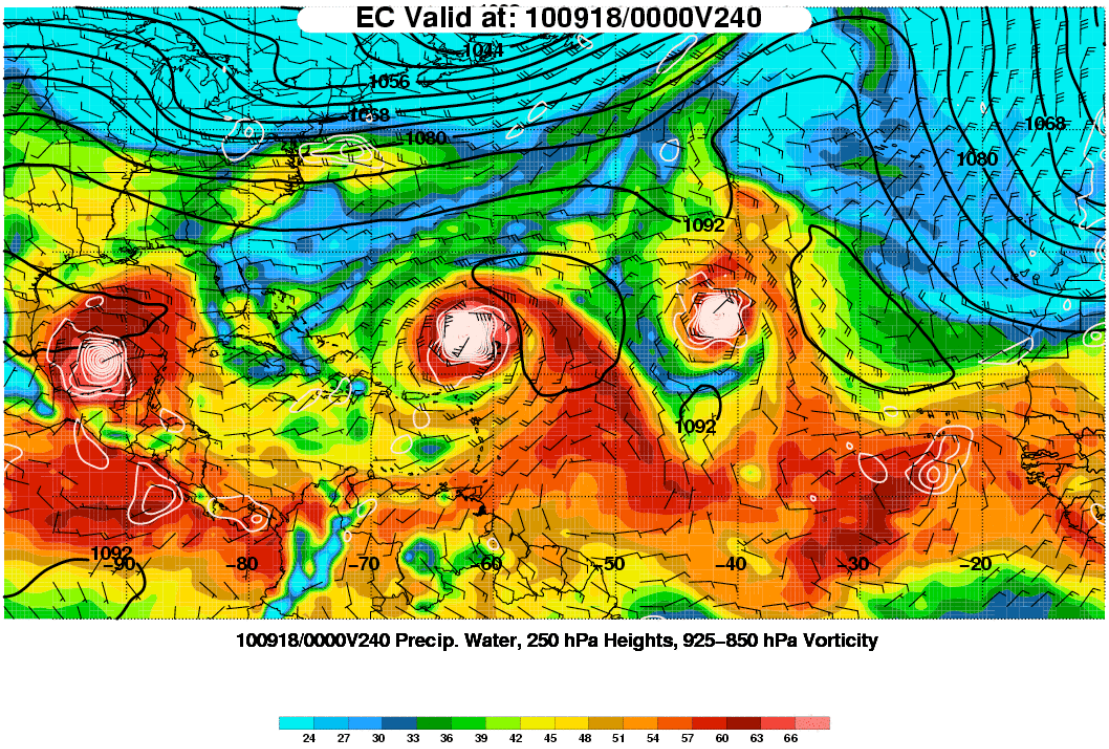
20W
10W
0
PGI41L
PGI43L
Image 16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1080
1092
1092
1092
1080
1068
-90
-80
-70
-60
-50
-40
-30
-20
100918/0000V240 Precip. Water, 250 hPa Heights, 925–850 hPa Vorticity
24 27 30 33 36 39 42 45 48 51 54 57 60 63 66

Image 17