

## **DISCOVER-AQ OUTLOOK -- September 11, 2013**

The P-3B and King Air flew today in the Houston region as clouds became more cooperative. However, there was enough cirrus that the King Air descended from 28K ft to 23Kft to get below it. Ozone was expected to build today to higher mixing ratios than we have seen for the past several days with light winds and more solar radiation.

Tomorrow should be similar to today, but perhaps with somewhat less cirrus. Ozone will again build to the high end of the moderate range to near code Orange levels on the W and SW side of Houston in response to light NE winds. Therefore, Thursday appears to be a good day to fly.

Friday, the cloud situation should remain similar to today and tomorrow, but with a somewhat greater chance of more cirrus from the convection in the southern Gulf. Code Orange ozone is expected to the W and NW side of Houston. The GFS model develops the disturbance in the Bay of Campeche into a tropical cyclone on Friday, which moves very slowly WNW-ward into the coast of Mexico over the weekend. High-level outflow from this storm may reach our region on Saturday. Code Orange ozone is still expected Saturday with weak winds.

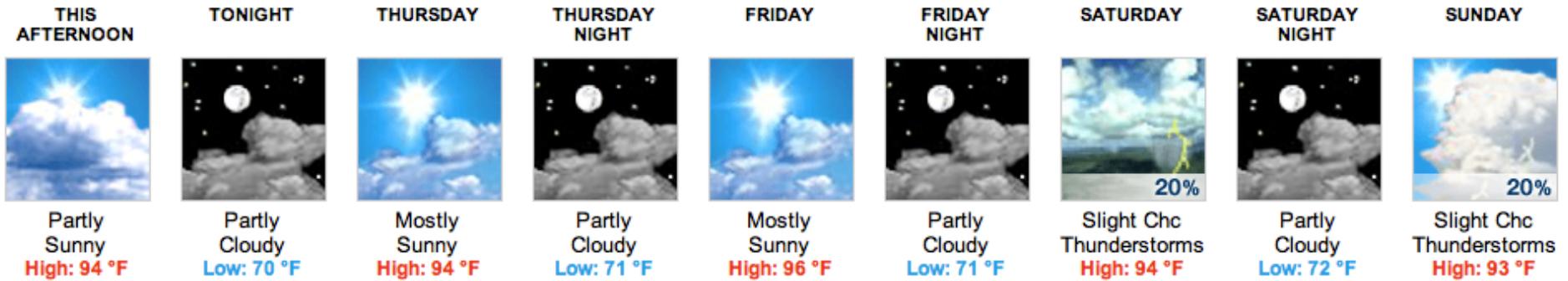
PM2.5 will be in the low moderate range Wed. through Sat. with a substantial continental background contribution.

# 9/11/2013 Weather Briefing

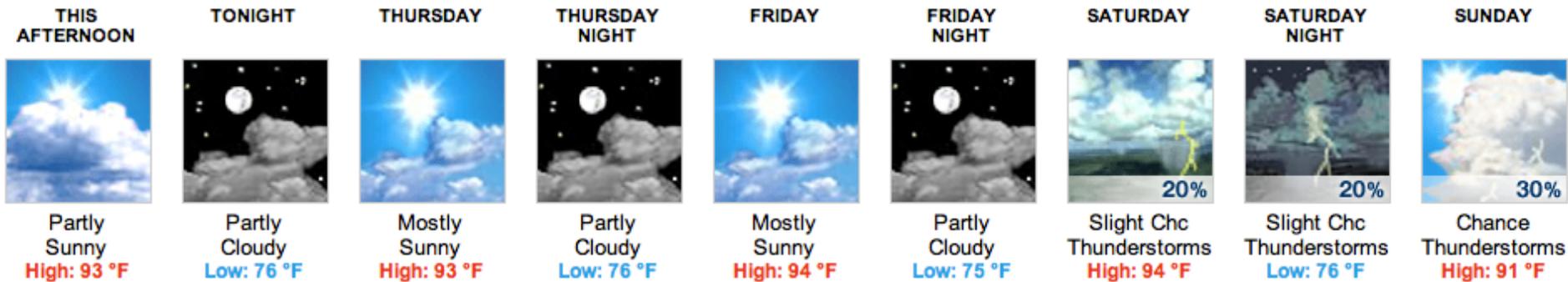
Clare Flynn

Ken Pickering

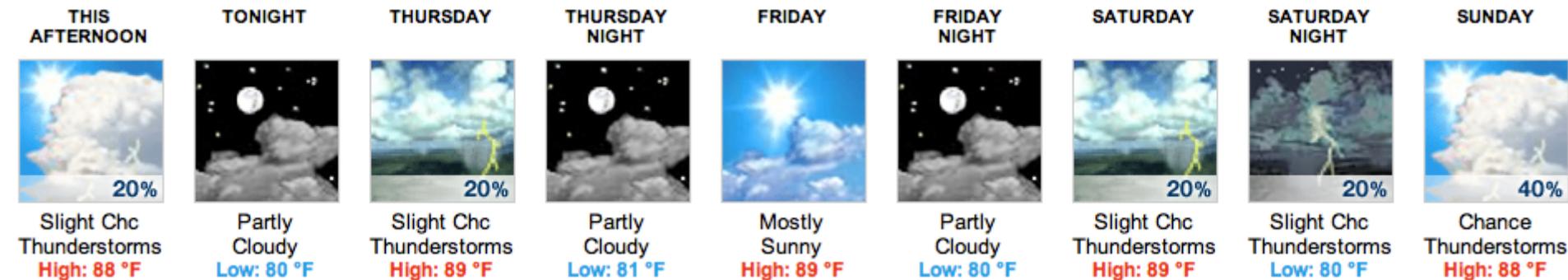
# Conroe:



# Houston Hobby:



# Galveston:



# Current Conditions

## Conroe:



A Few Clouds  
**85°F**  
 29°C

Humidity 68%  
 Wind Speed Vrbl 5 mph  
 Barometer 30.11 in (1019.3 mb)  
 Dewpoint 73°F (23°C)  
 Visibility 10.00 mi  
 Heat Index 92°F (33°C)

Last Update on 11 Sep 10:53 am CDT

## Houston Hobby:



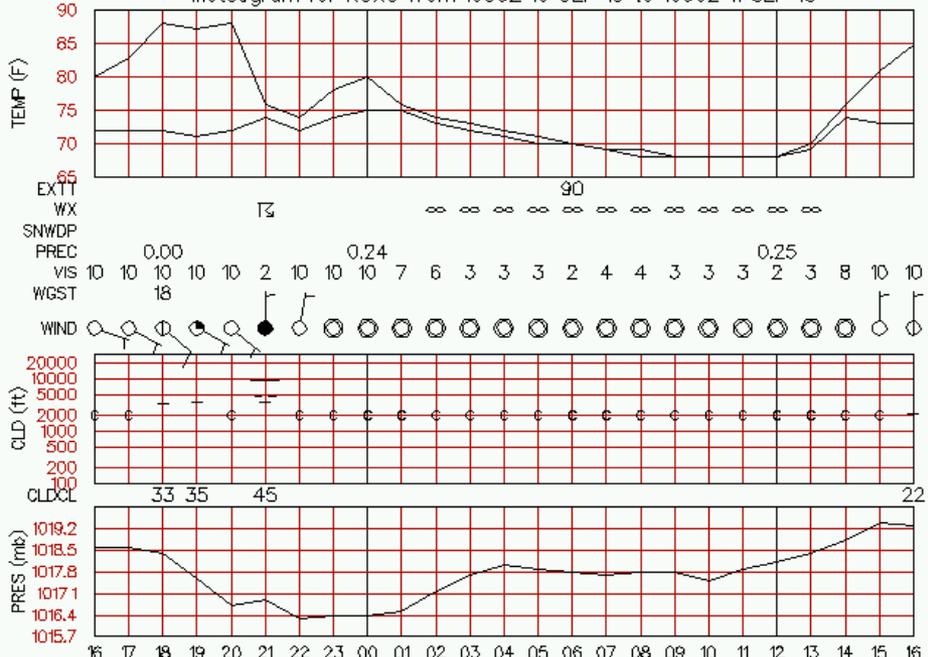
Partly Cloudy  
**86°F**  
 30°C

Humidity 63%  
 Wind Speed E 13 mph  
 Barometer 30.08 in (1019.1 mb)  
 Dewpoint 72°F (22°C)  
 Visibility 10.00 mi  
 Heat Index 92°F (33°C)

Last Update on 11 Sep 10:53 am CDT

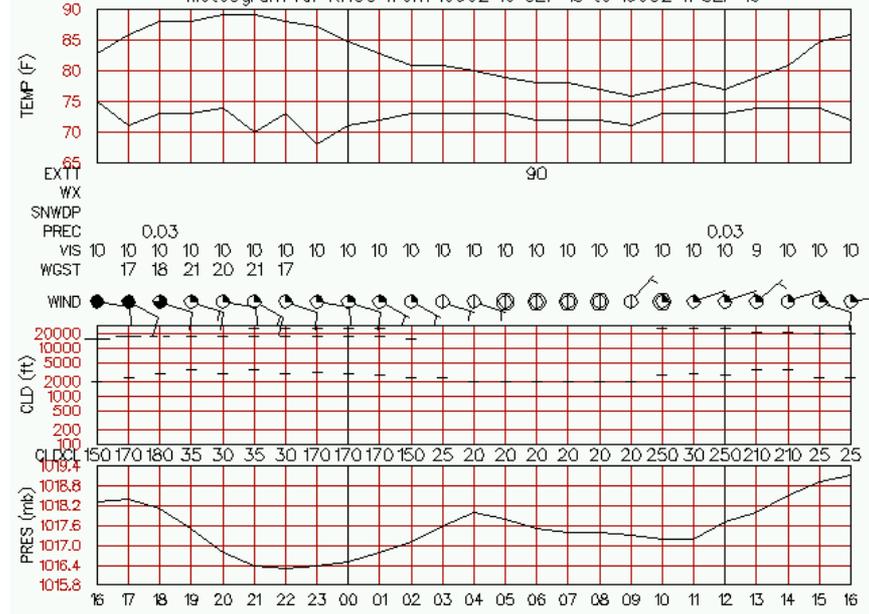
### ▼ Plymouth State Weather Center ▼

Meteorgram for KCXO from 1600Z 10 SEP 13 to 1600Z 11 SEP 13



### ▼ Plymouth State Weather Center ▼

Meteorgram for KHOU from 1600Z 10 SEP 13 to 1600Z 11 SEP 13



# Current Conditions

## Galveston:



Partly Cloudy

# 88°F

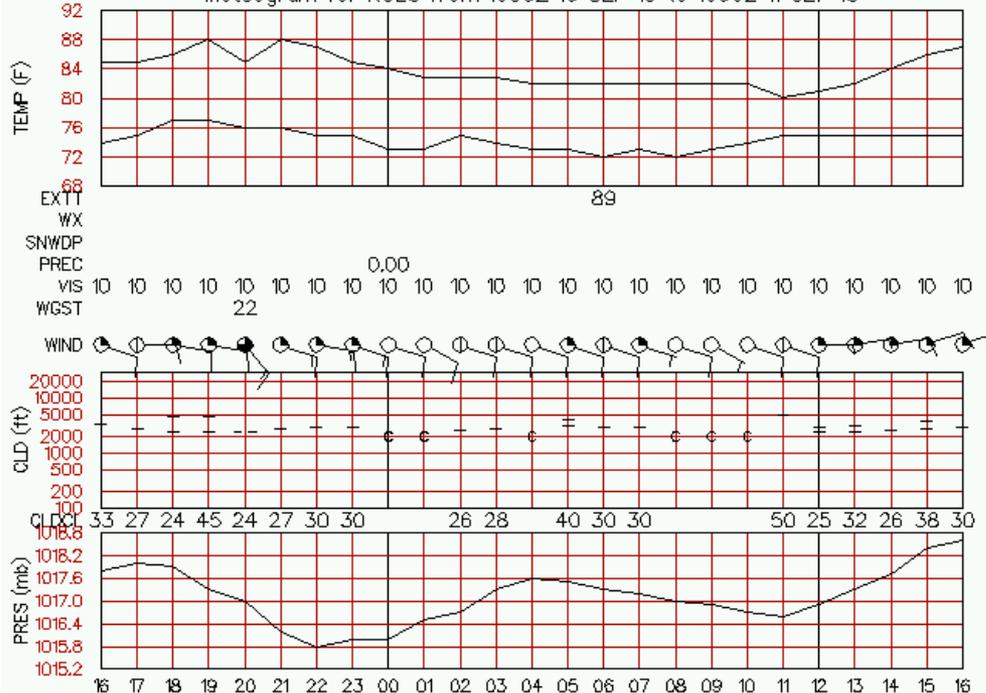
## 31°C

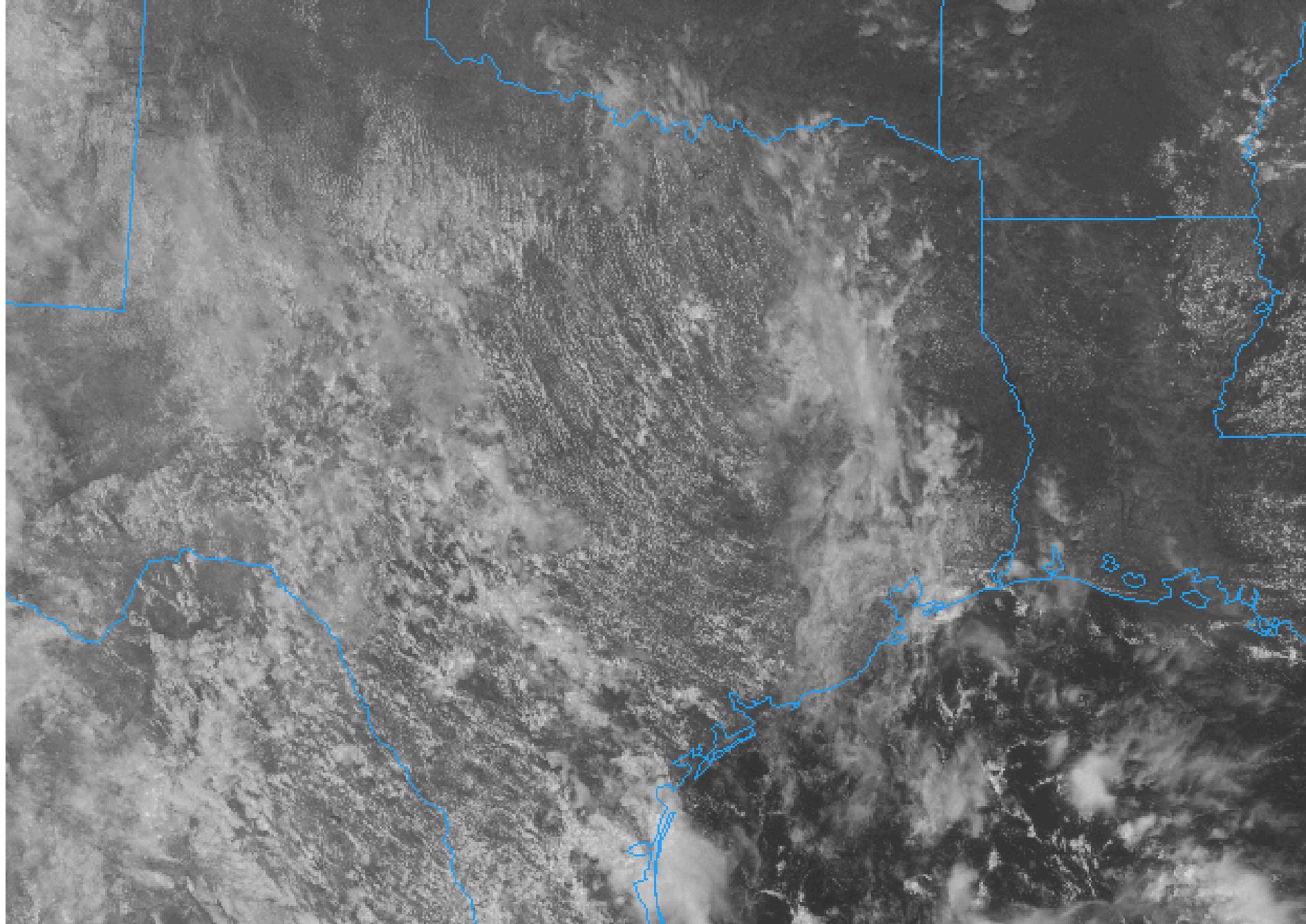
Humidity 70%  
Wind Speed E 14 G 21 mph  
Barometer 30.08 in (1018.7 mb)  
Dewpoint 77°F (25°C)  
Visibility 10.00 mi  
Heat Index 100°F (38°C)

Last Update on 11 Sep 11:52 am CDT

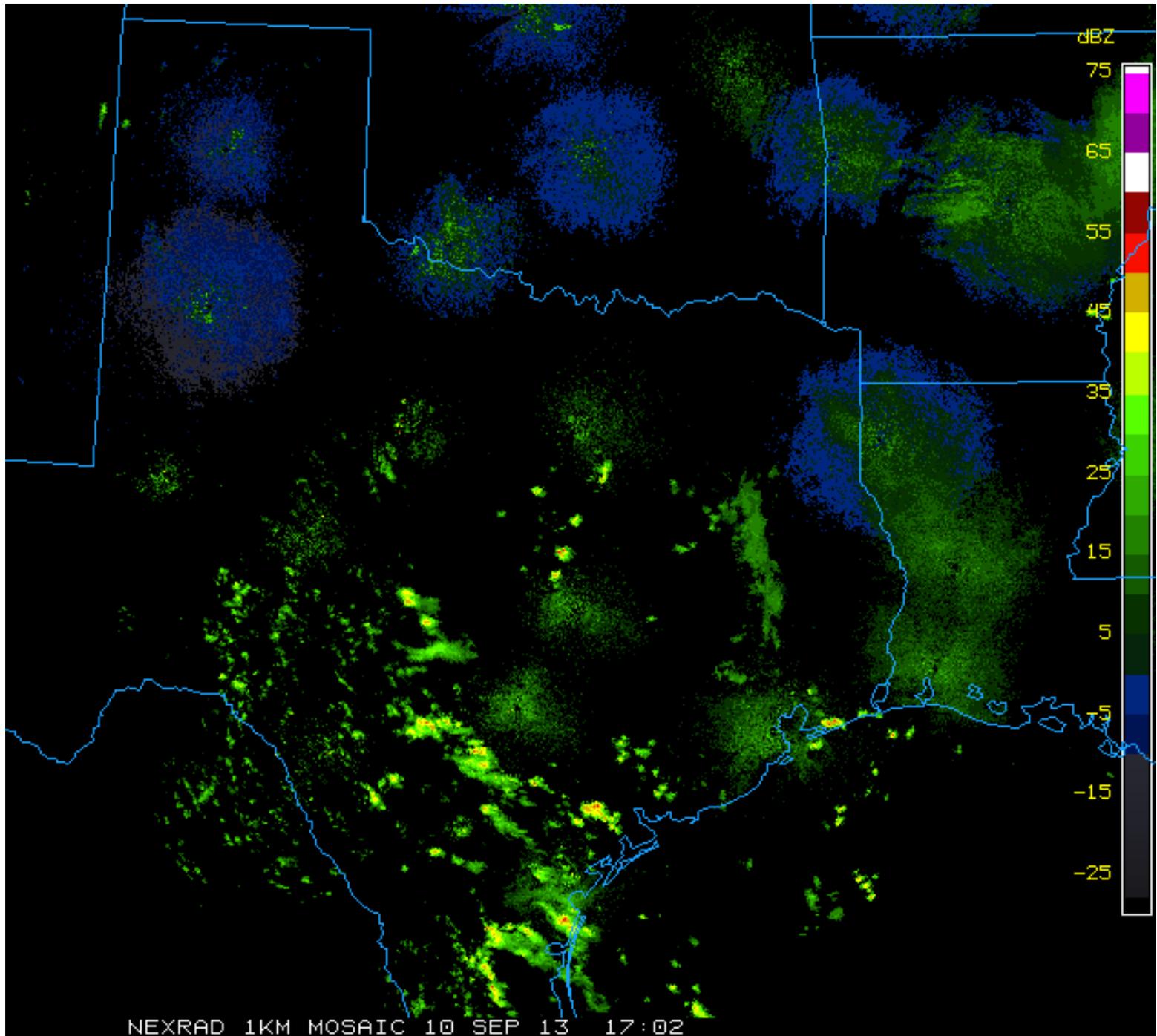
### ▼ Plymouth State Weather Center ▼

Metogram for KGLS from 1600Z 10 SEP 13 to 1600Z 11 SEP 13



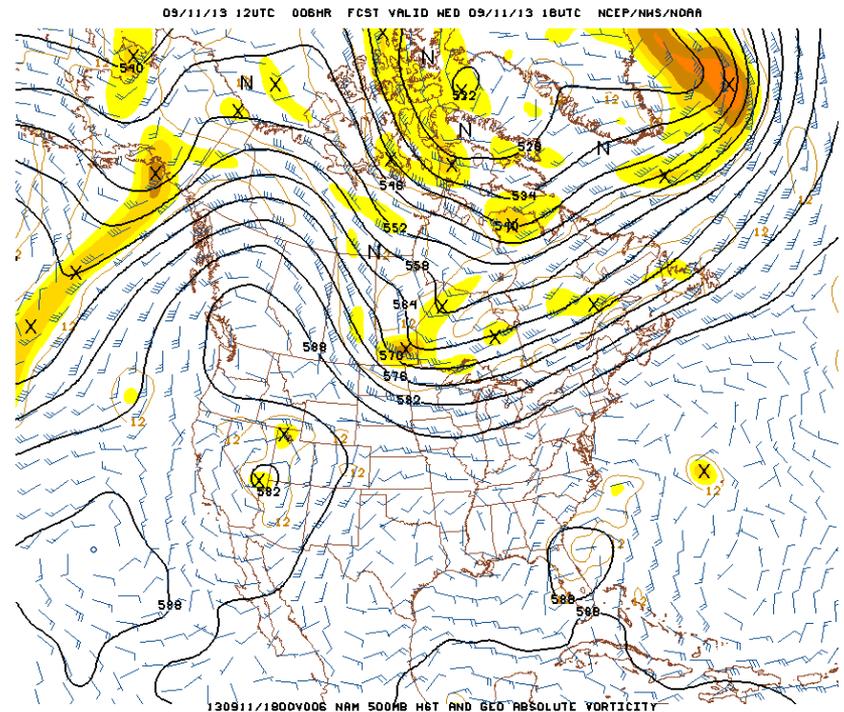
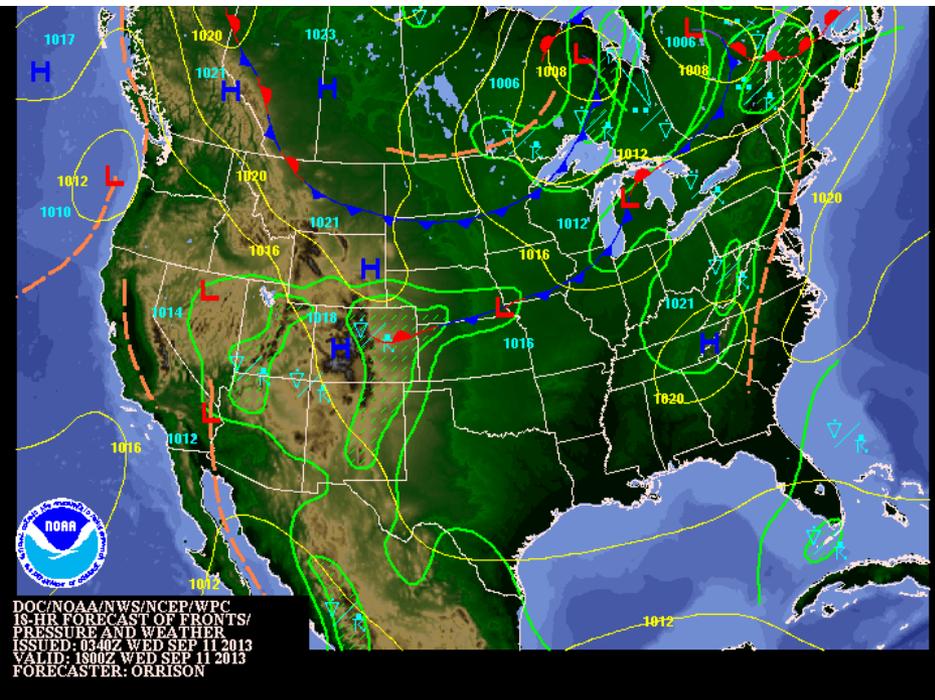


GOES VISIBLE SATELLITE 10 SEP 13 16:45



Today: Region under the influence of upper level ridge.  
Mainly sunny. Some cirrus blowing off from convection  
over southern Texas. East-northeasterly flow at sfc.

1 PM CDT  
500 mb vorticity



# 10 m winds at 1 PM today

WRF 3-KM  
Fest: 12 h

Init: 06 UTC Wed 11 Sep 13  
Valid: 18 UTC Wed 11 Sep 13 (13 CDT Wed 11 Sep 13)

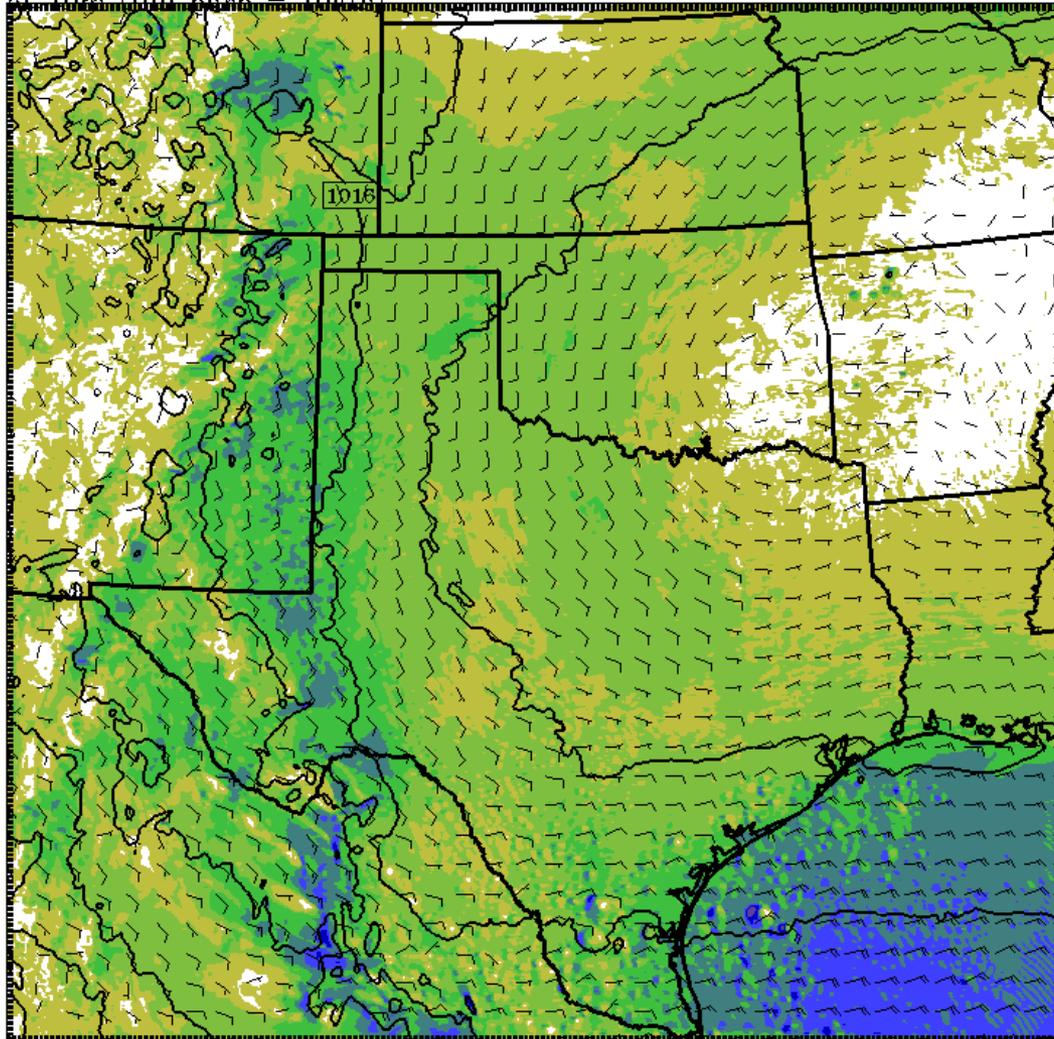
Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

Wind at 10m (full barb, 10kts)

100 W

90 W



30 N

CONTOURS: UNITS=hPa LOW= 1008.0 HIGH= 1020.0 INTERVAL= 2.0000

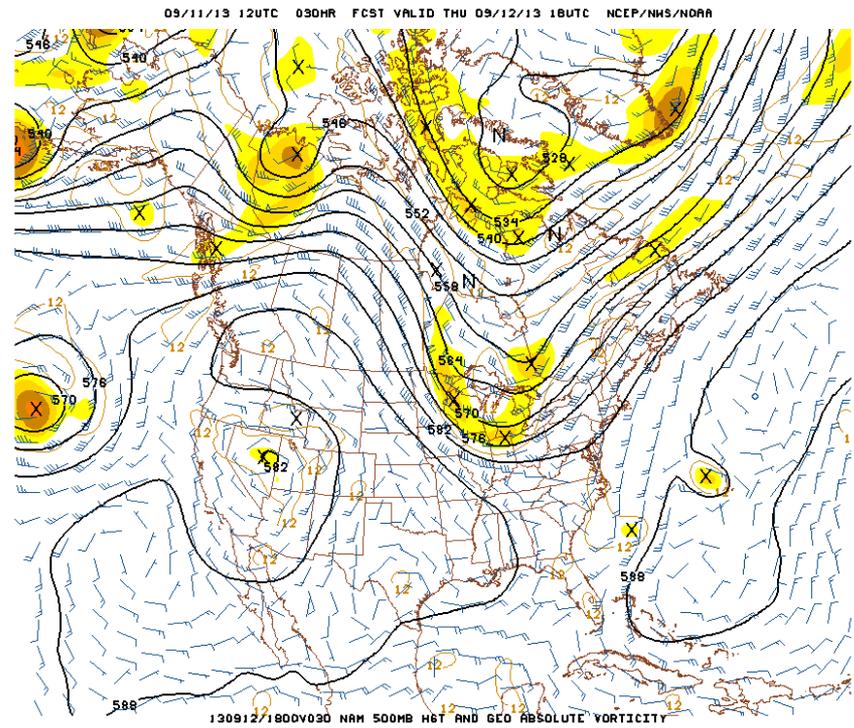
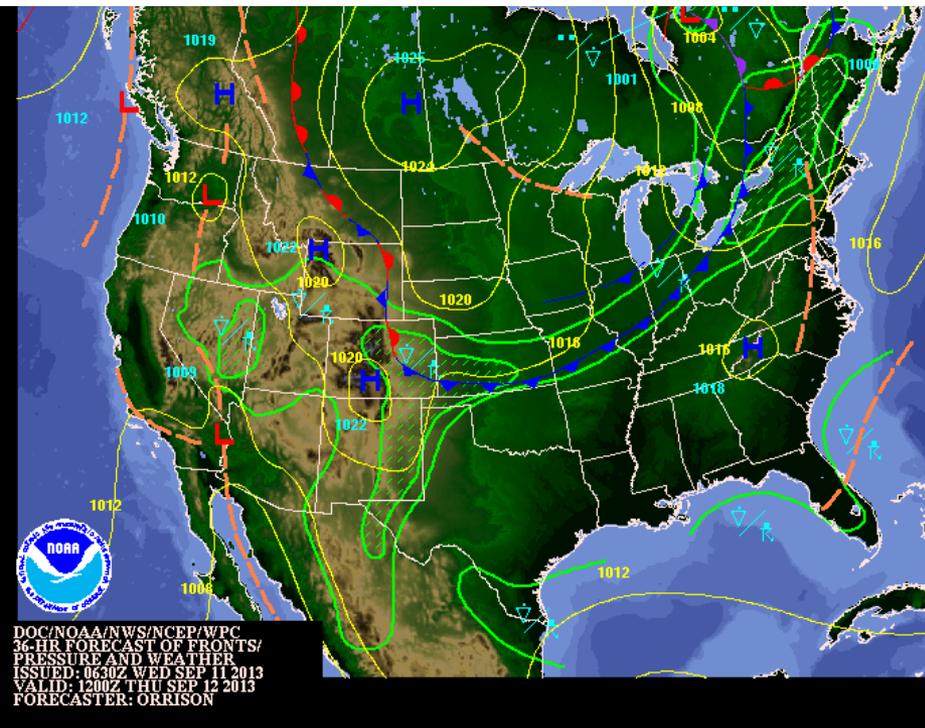


Model Info: V3.3

No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec  
LW: RRTM SW: Dudhia DIFF: simple KM: 2D Smagor

Tomorrow: Northeasterly flow at sfc. Drier, sunny conditions persist under the influence of the upper high.

1 PM CDT  
500 mb vorticity



# 10 m winds at 1 PM tomorrow

WRF 3-KM

Fcst: 42 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

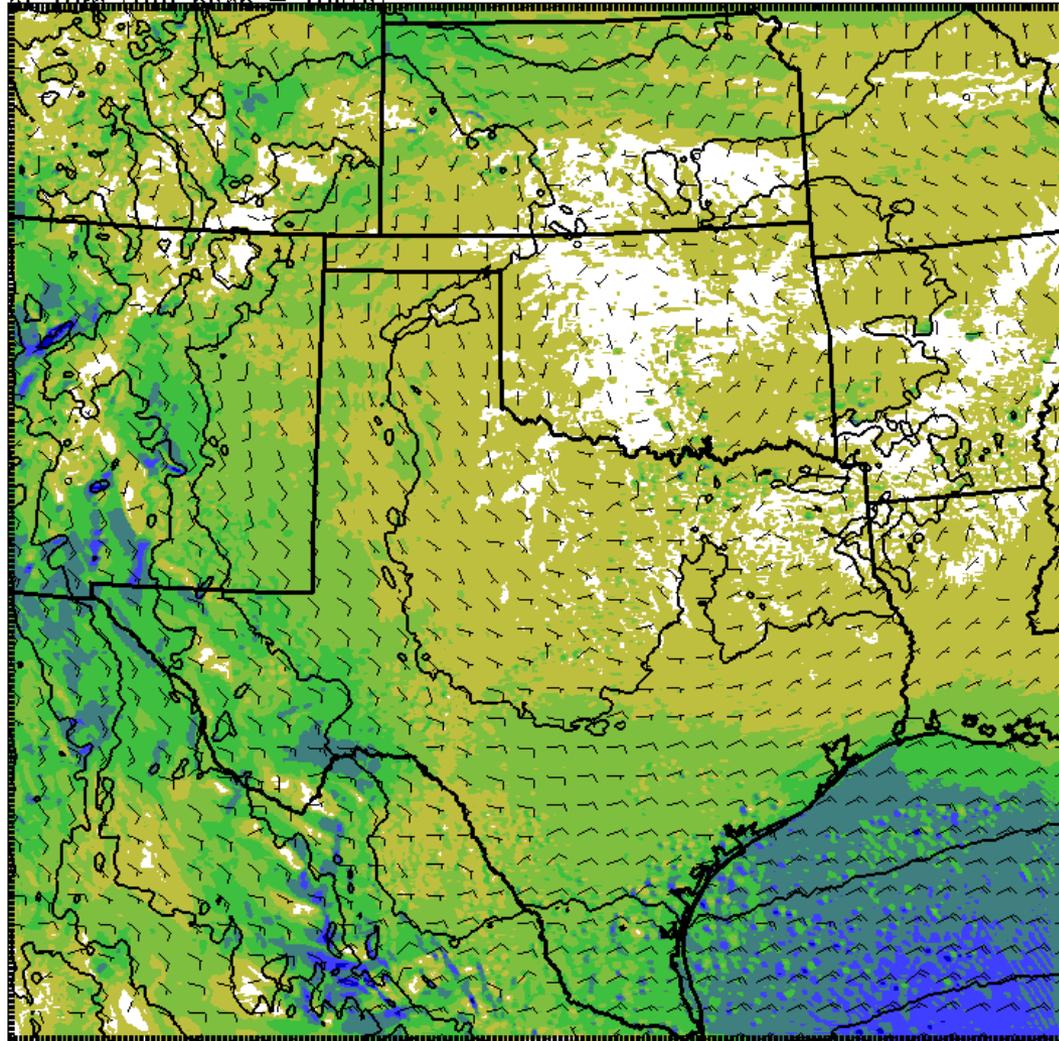
Wind at 10m (full barb, 10kts)

Init: 00 UTC Wed 11 Sep 13

Valid: 18 UTC Thu 12 Sep 13 (13 CDT Thu 12 Sep 13)

100 W

90 W



30 N

CONTOURS: UNITS=hPa LOW= 1008.0 HIGH= 1018.0 INTERVAL= 2.0000



Model Info: V3.3

No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec  
LW: RRTM SW: Dudhia DIFF: simple KM: 2D Smagor

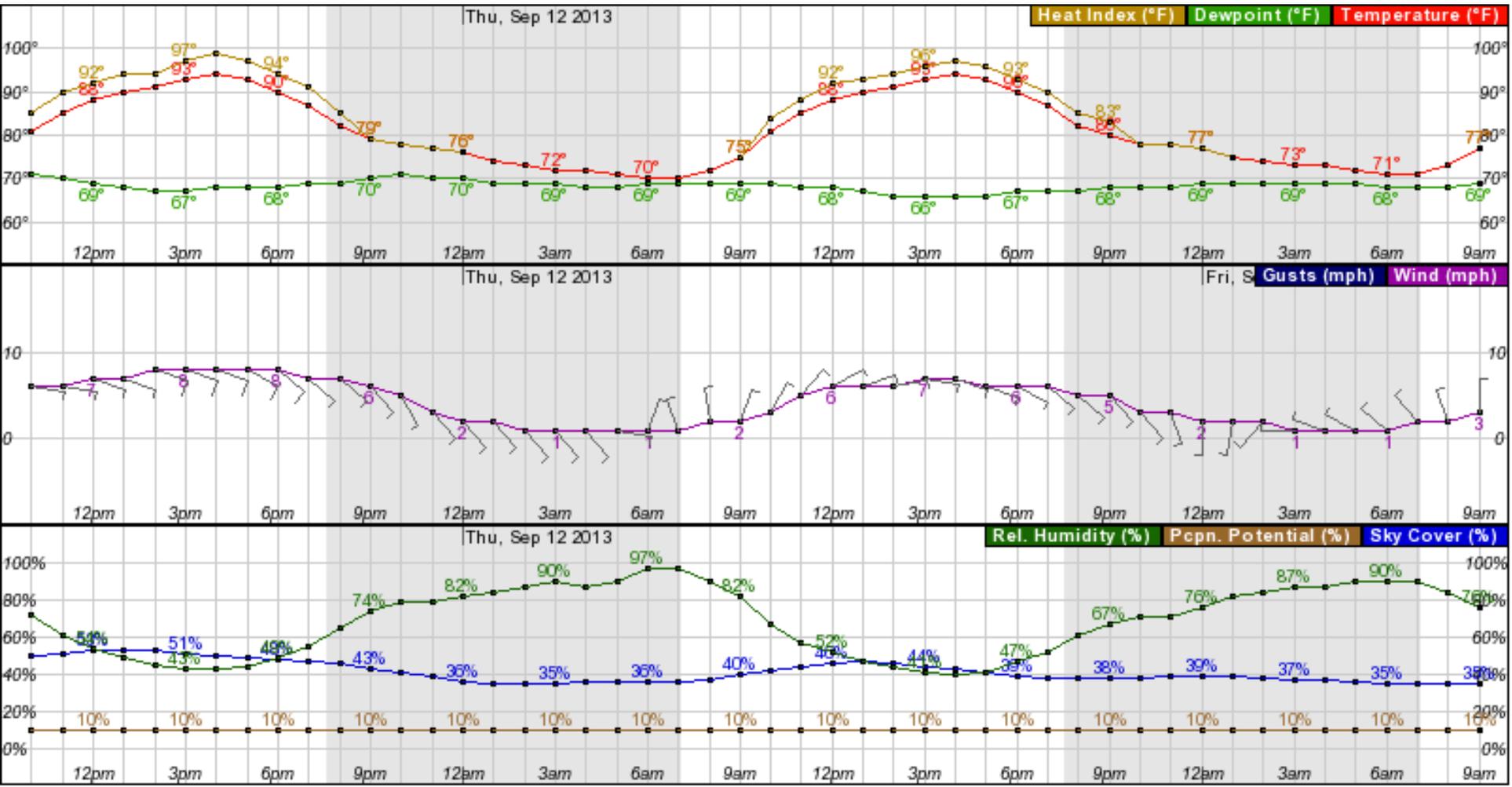
# Conroe

Today: Partly cloudy

Tomorrow: Partly cloudy

Today →

Tomorrow →



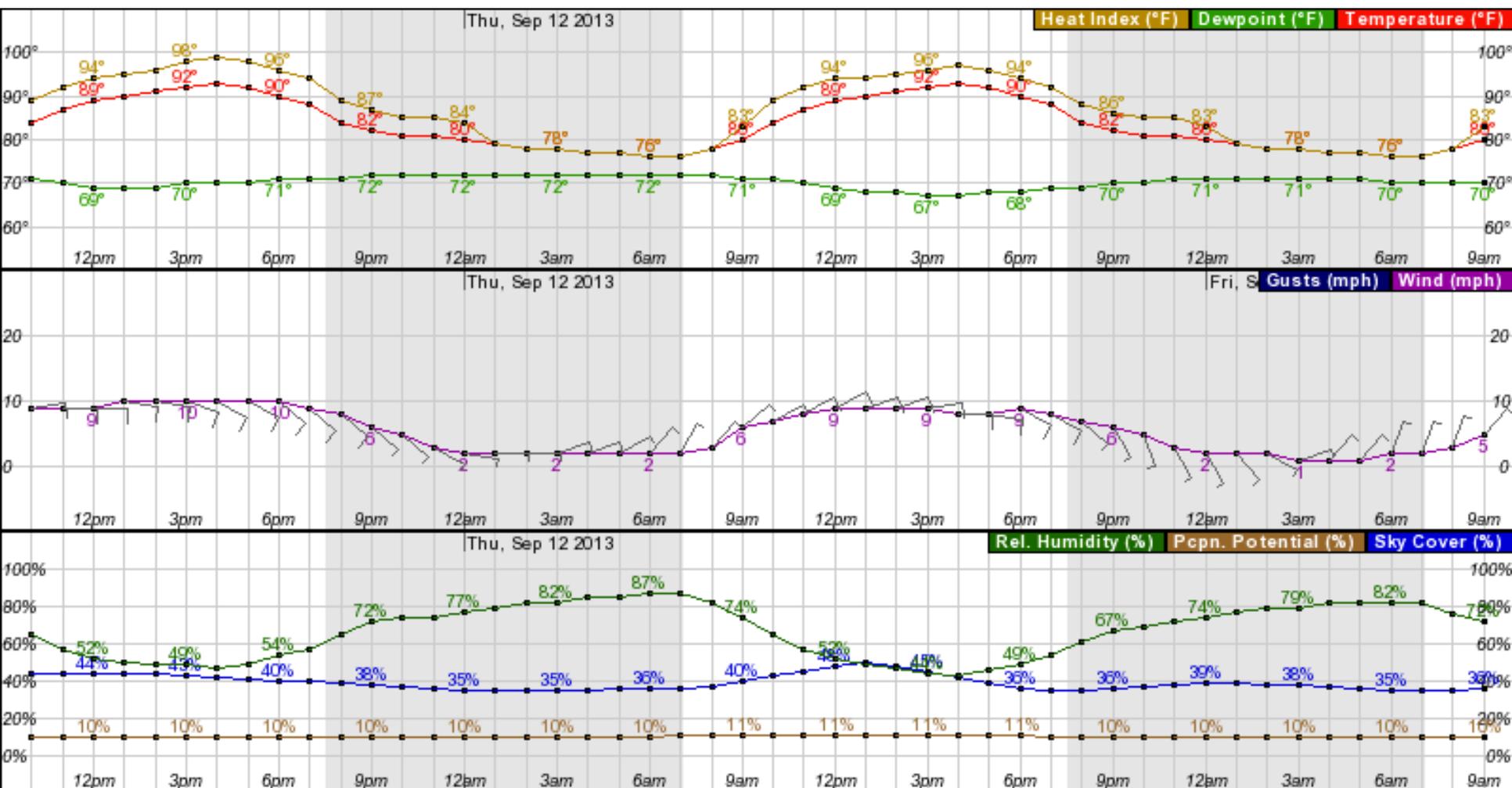
# Houston Hobby

Today: Partly cloudy

Tomorrow: Partly cloudy

Today →

Tomorrow →



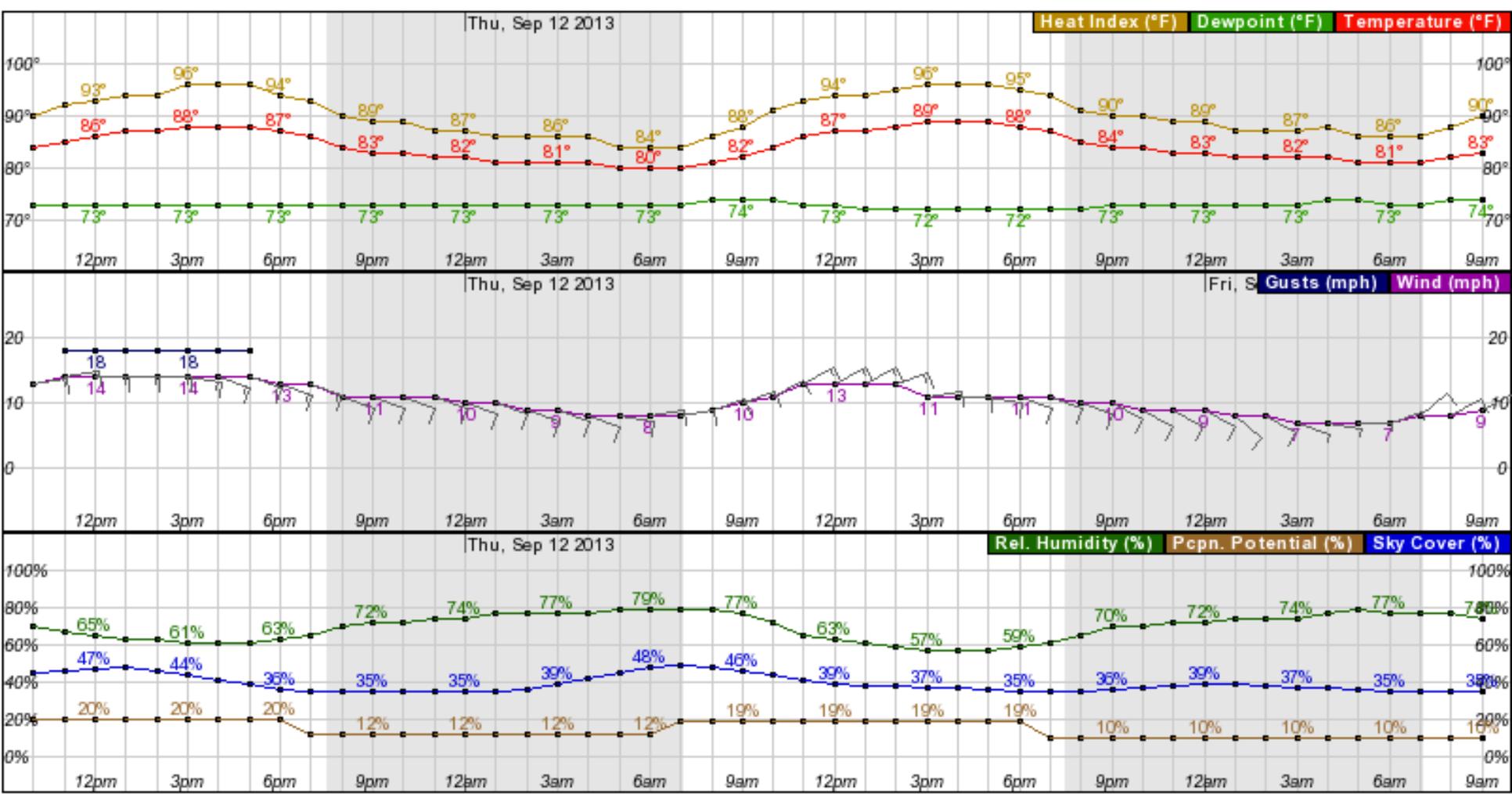
# Galveston

Today: Partly cloudy

Tomorrow: Partly cloudy

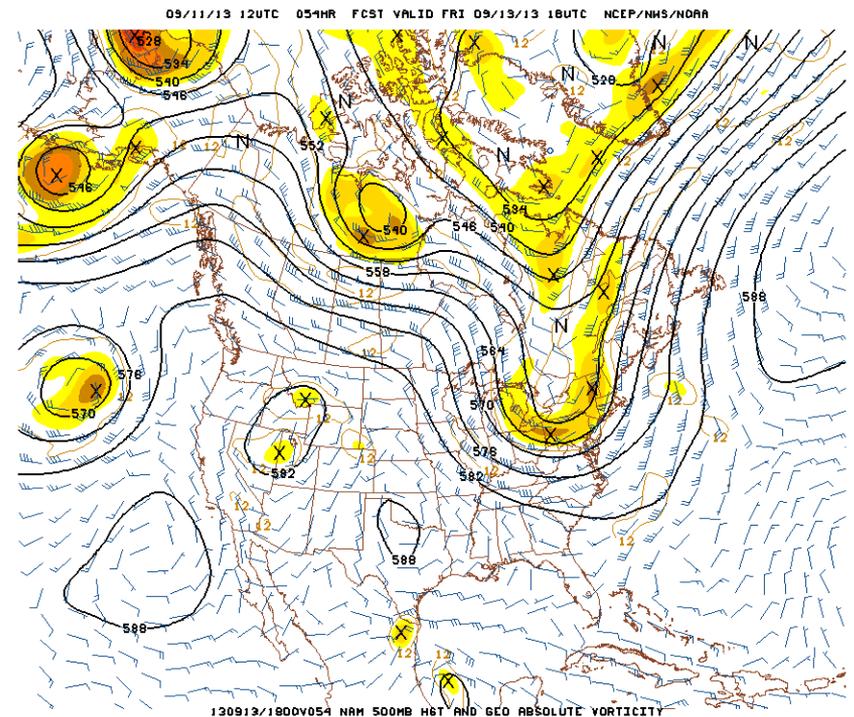
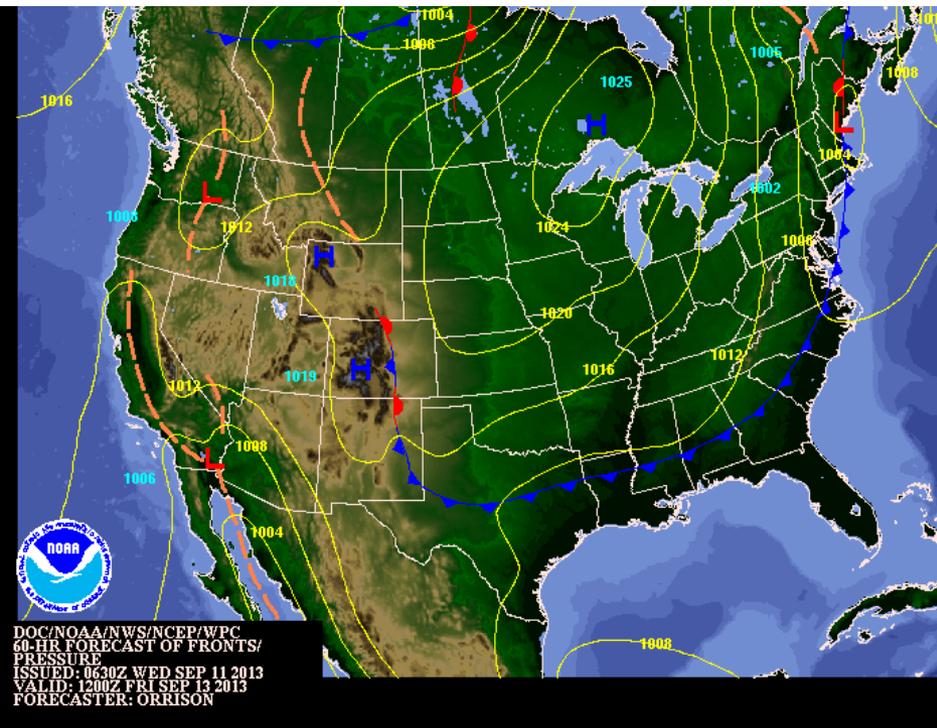
Today →

Tomorrow →



Friday: Continuation of the drying trend under the influence of the upper high. Northeasterly flow. However, watching tropics!

1 PM CDT  
500 mb vorticity



# 10 m winds at 1 PM Friday

WRF 3-KM

Fest: 60 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

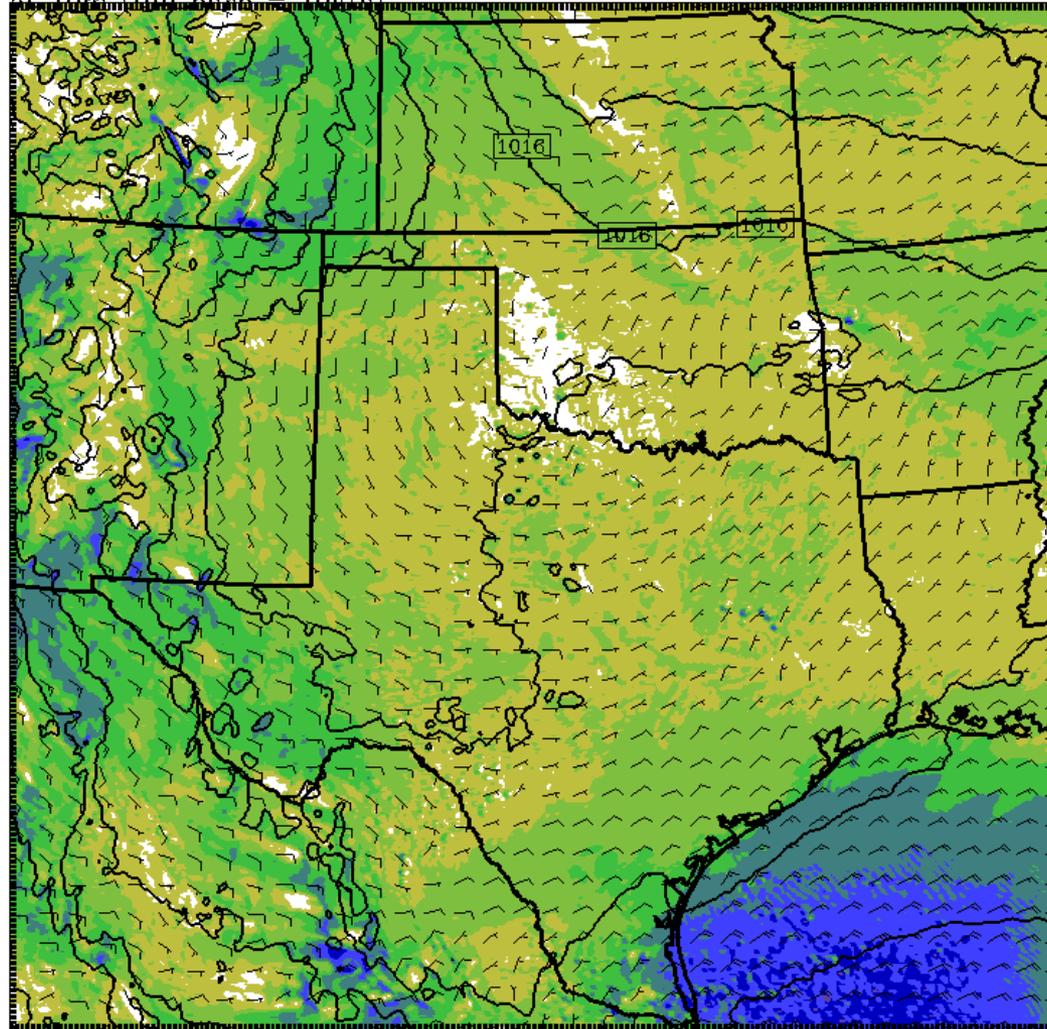
Wind at 10m (full barb = 10kts)

Init: 06 UTC Wed 11 Sep 13

Valid: 18 UTC Fri 13 Sep 13 (13 CDT Fri 13 Sep 13)

100 W

90 W



30 N

CONTOURS: UNITS=hPa LOW= 1004.0 HIGH= 1020.0 INTERVAL= 2.0000

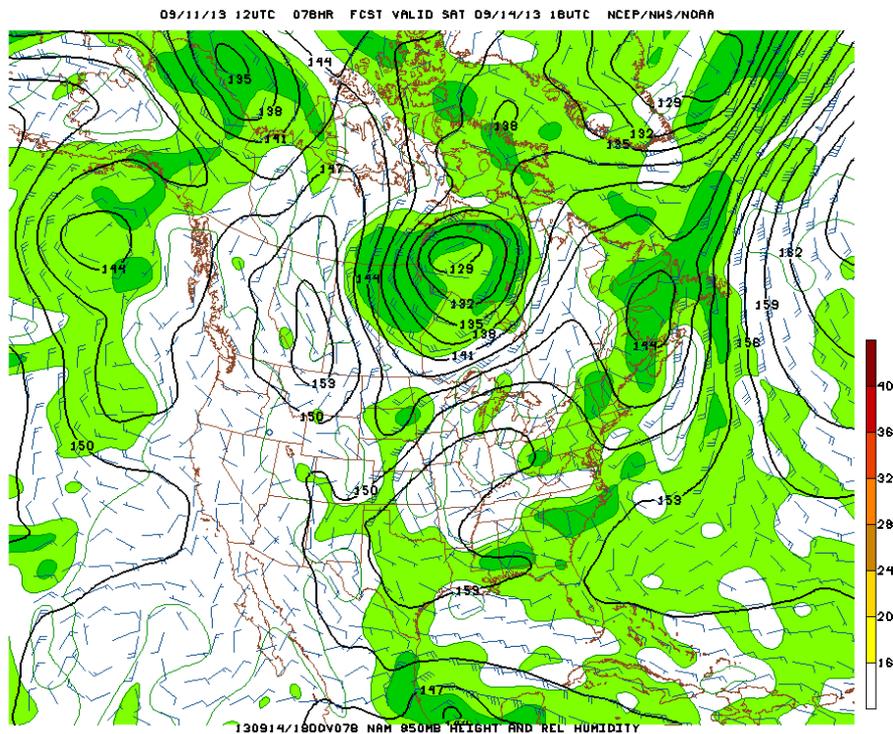


Model Info: V3.3

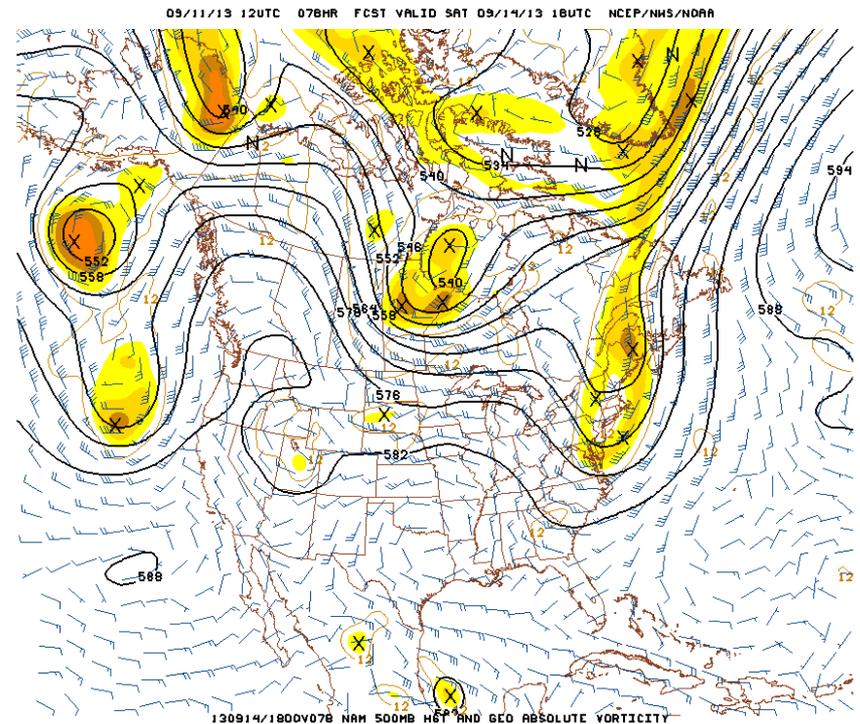
No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec  
LW: RRTM SW: Dudhia DIFF: simple KM: 2D Smagor

Saturday: Upper ridge moves eastward and upper trough begins to build into region. More moisture also intrudes into study region. Possibility that a backdoor cold front over southern Plains may work southward into Texas. Outflow from tropical system a possible issue.

1 PM CDT  
850 mb RH



500 mb vorticity



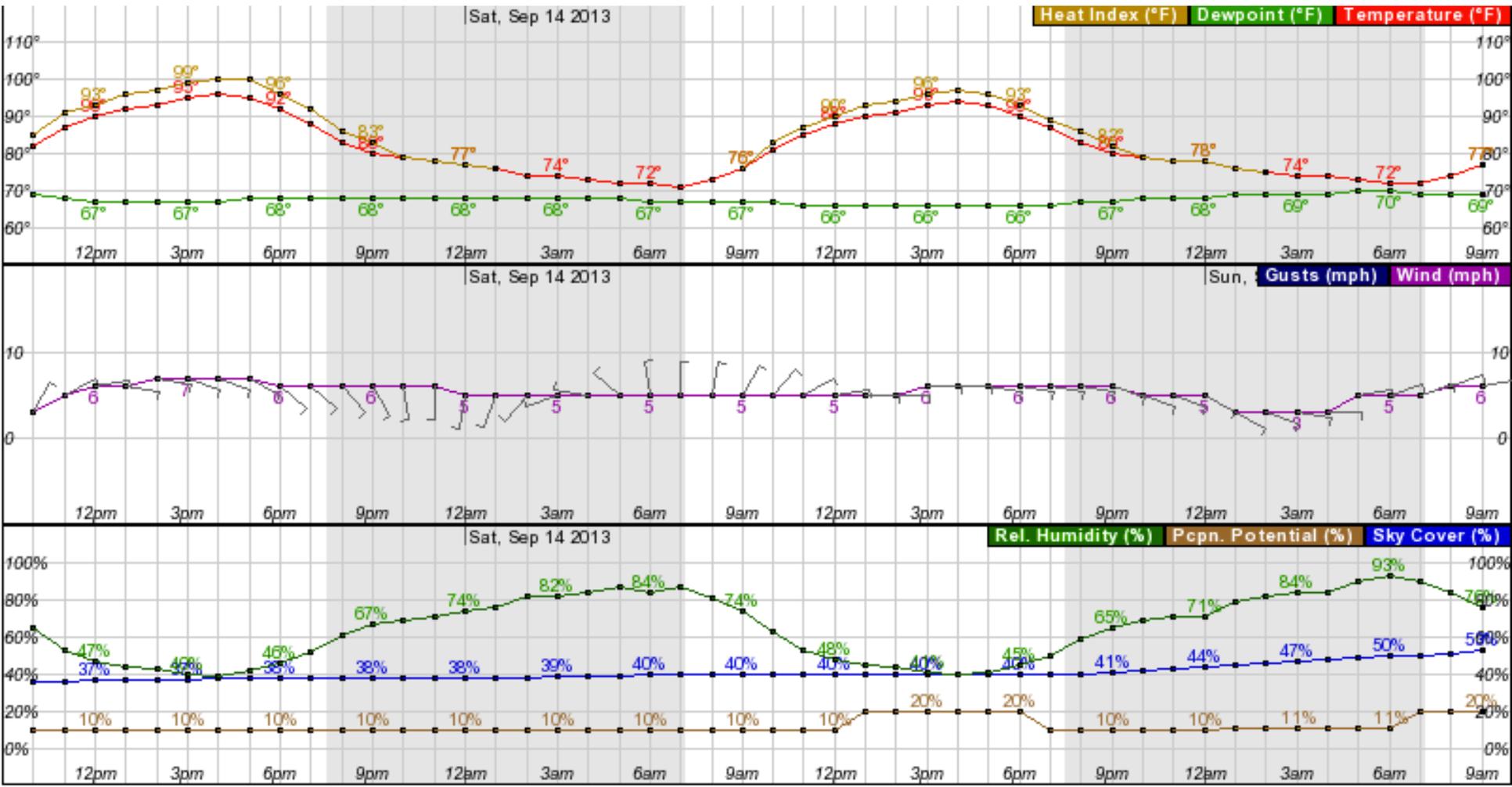
# Conroe

Friday: Partly cloudy

Saturday: Partly cloudy

Friday →

Saturday →



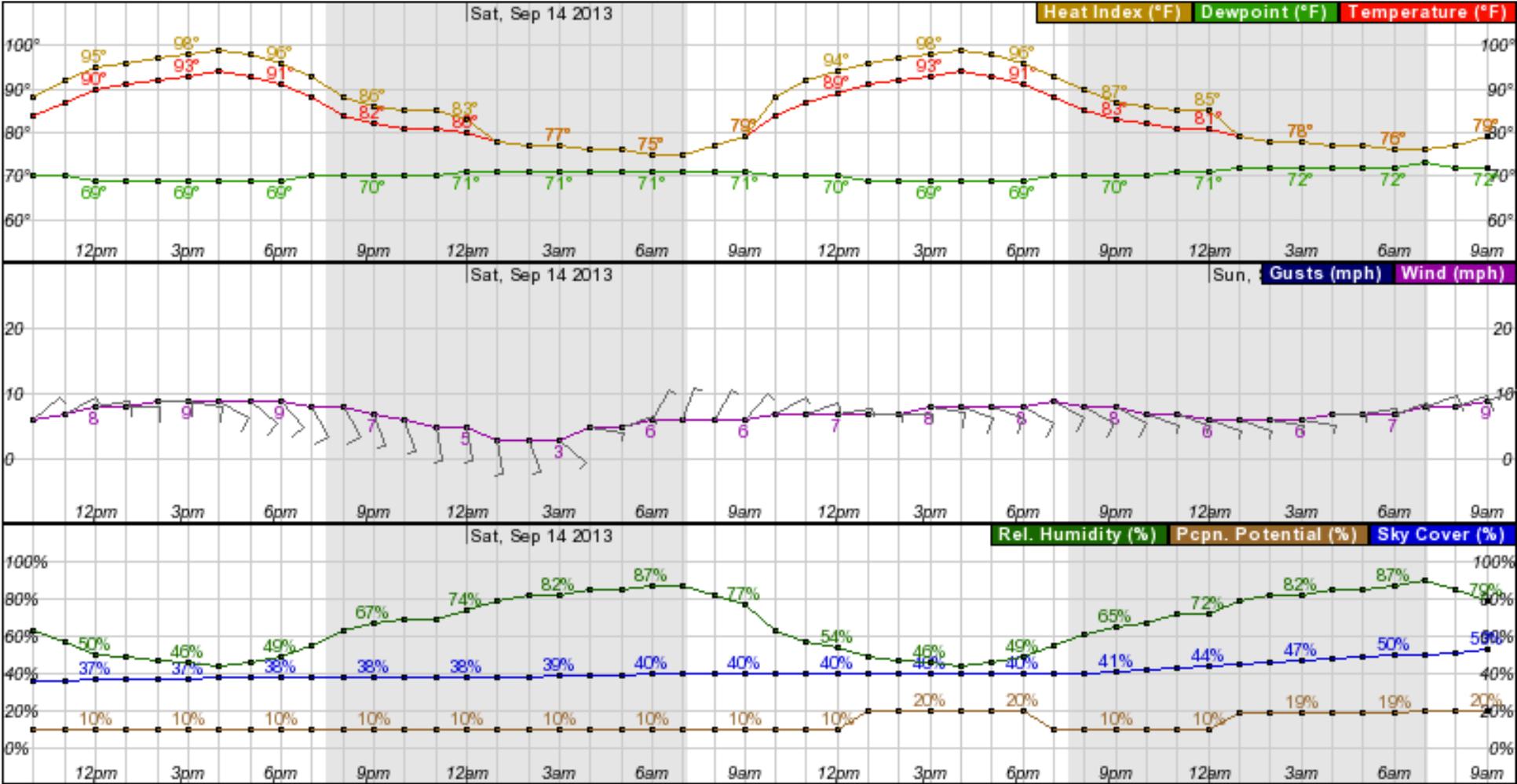
# Houston Hobby

Friday: Partly cloudy

Saturday: Partly cloudy

Thursday →

Friday →



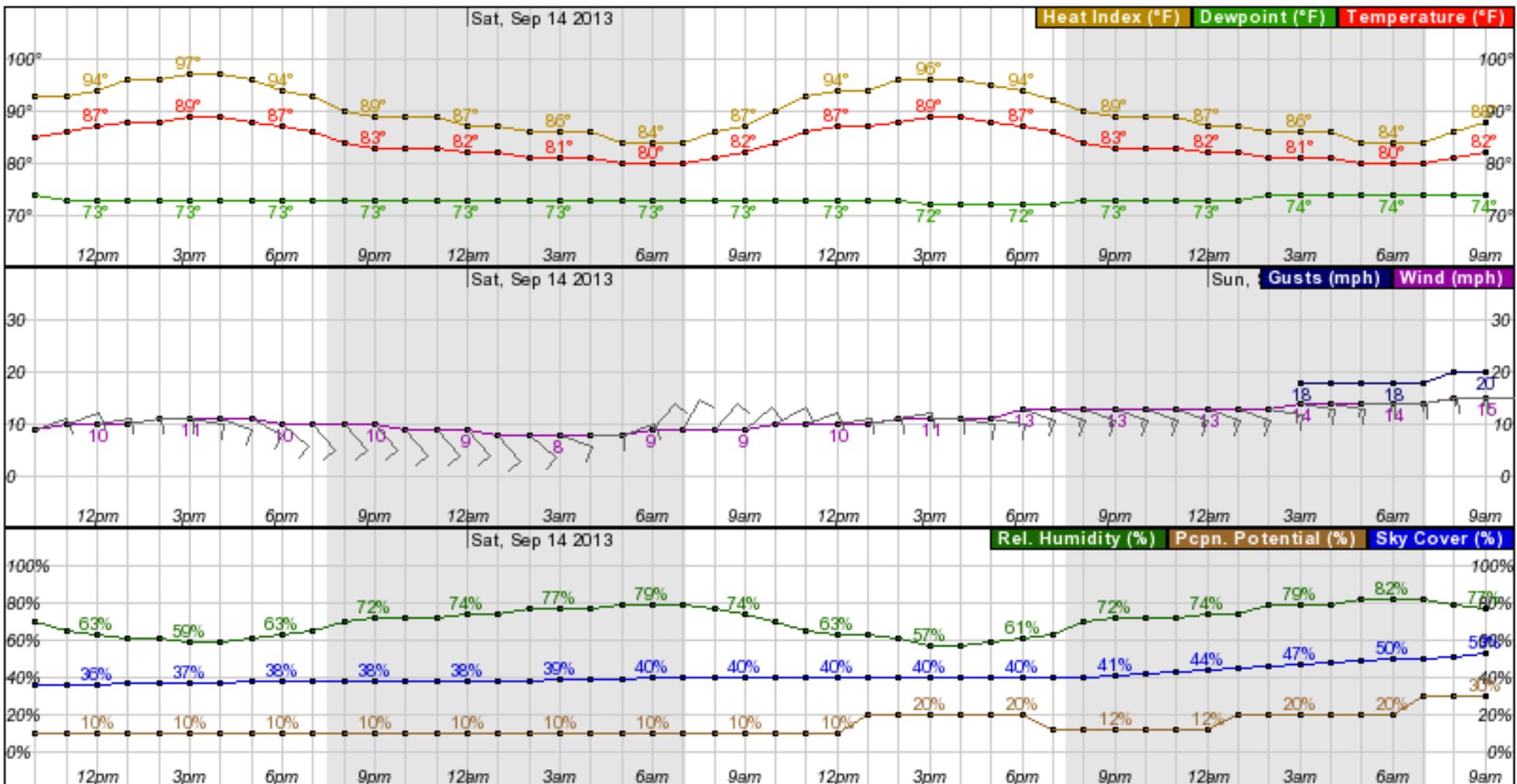
# Galveston

Friday: Partly cloudy

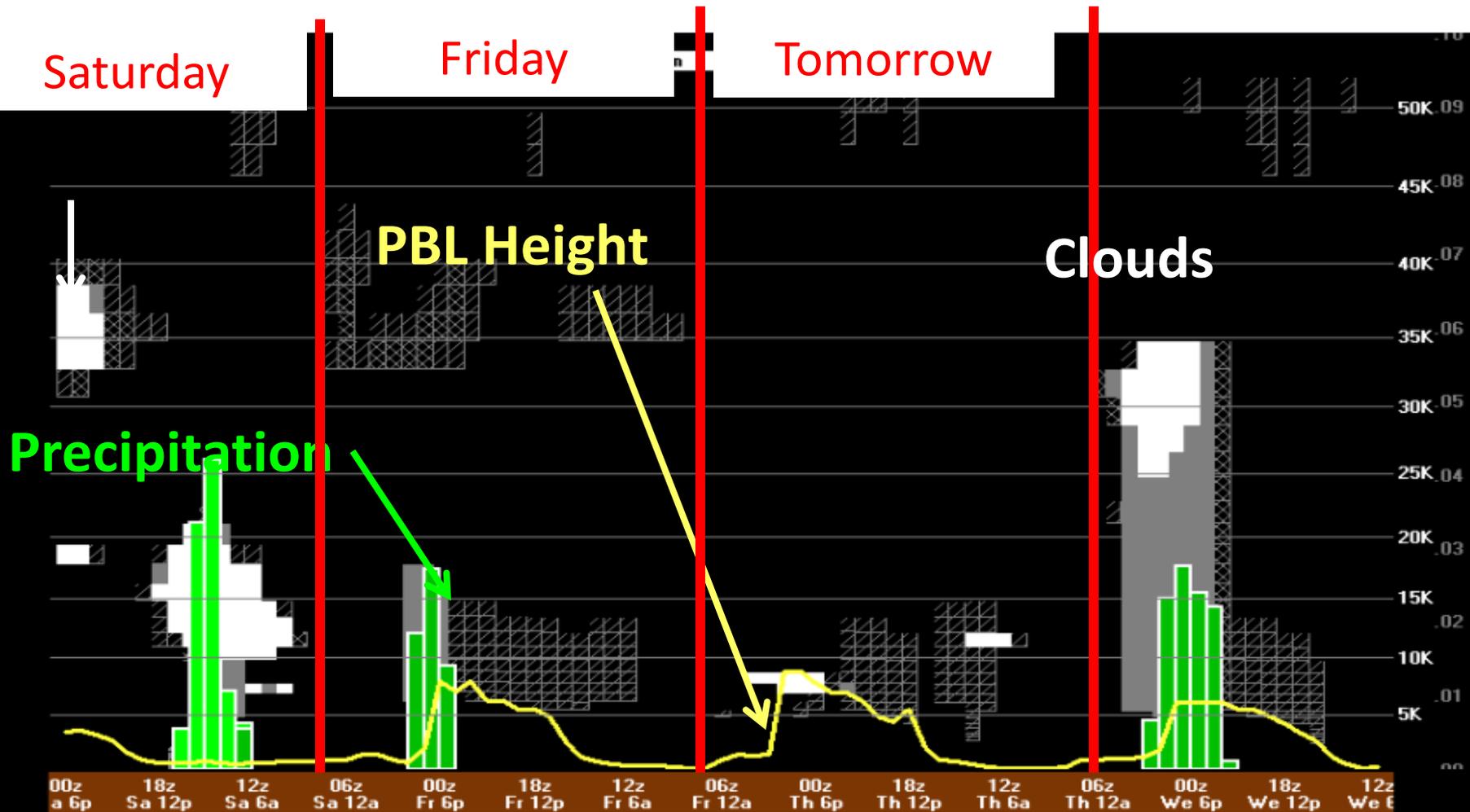
Saturday: Partly cloudy

Friday →

Saturday →

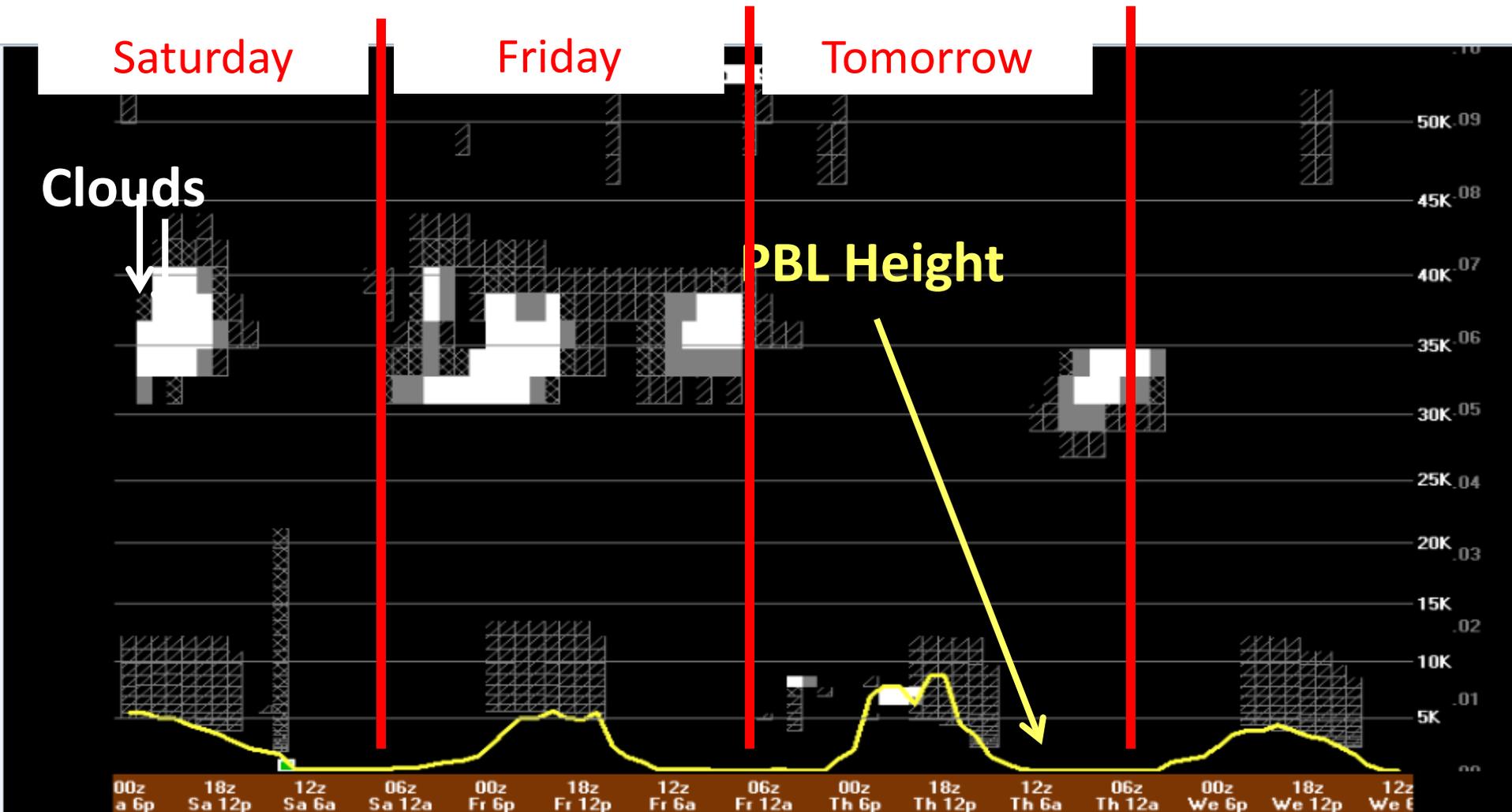


# Conroe; BUFKIT – NAM (12 UTC 10 September)



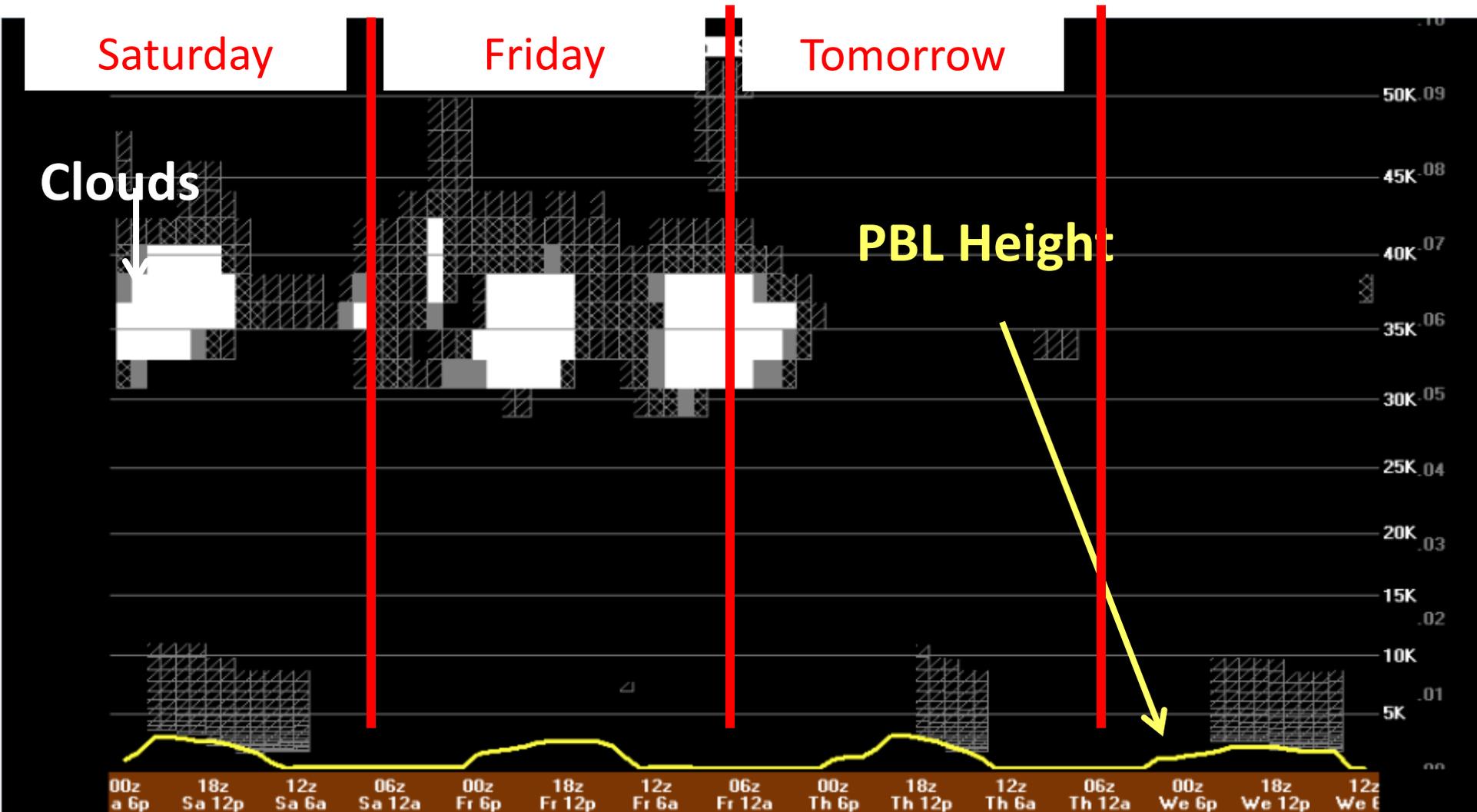
- Tomorrow: Scattered Cu during day, becoming partly cloudy during evening.
- Friday: Scattered Cu during day, becoming partly cloudy during evening.
- Saturday: Mostly cloudy.

# Houston Hobby; BUFKIT – NAM (12 UTC 10 September)



- Tomorrow: Scattered Cu during day.
- Friday: Scattered Cu during day and high cloud throughout the day.
- Saturday: Scattered Cu during day, with more high cloud pushing in during evening.

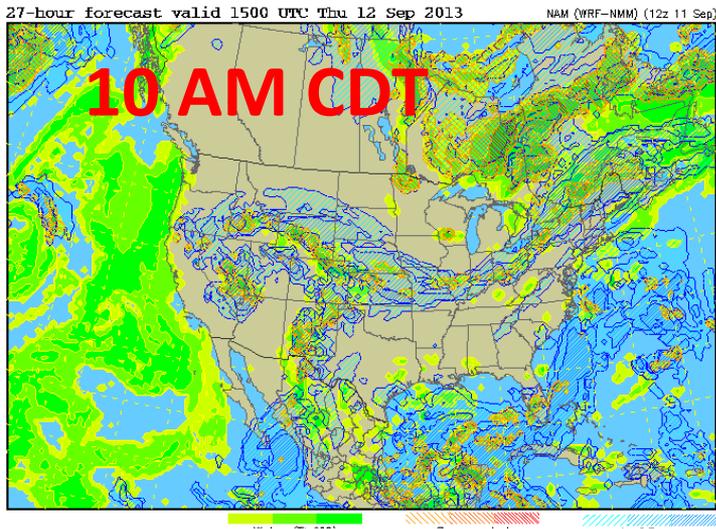
# Galveston; BUFKIT – NAM (12 UTC 10 September)



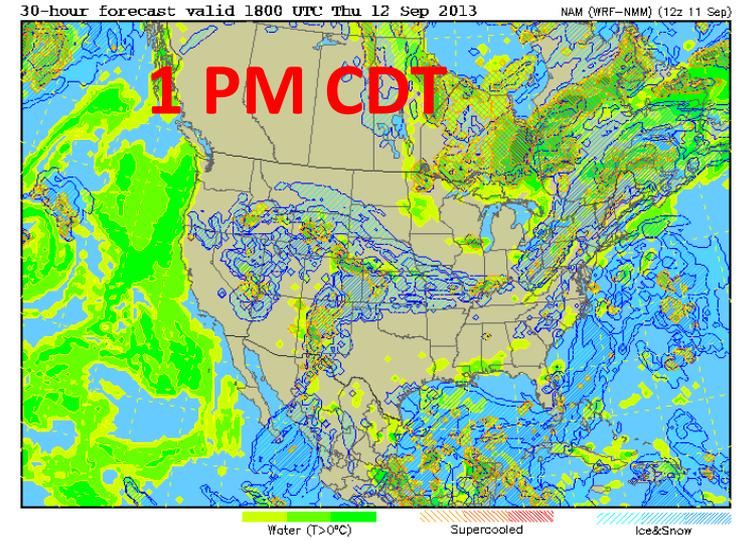
- Tomorrow: Scattered Cu during morning/early afternoon.
- Friday: High cloud throughout the day.
- Saturday: Scattered Cu and high cloud during the day.

# Tomorrow: NAM – High and low level clouds throughout the day

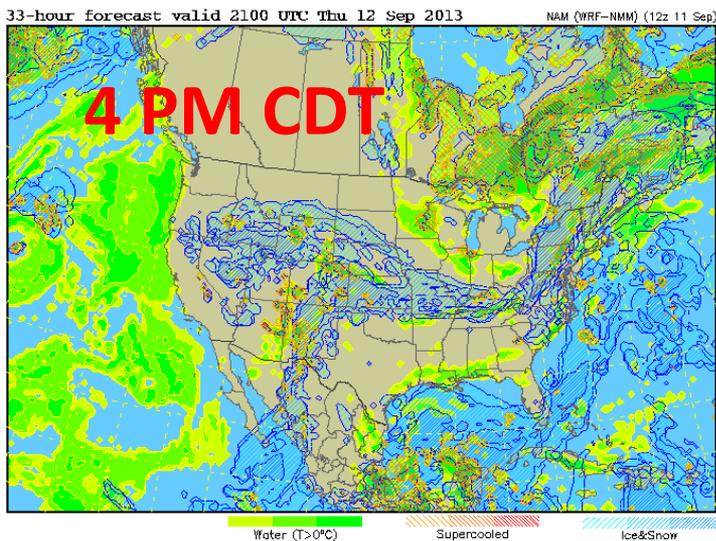
Integrated liquid and frozen hydrometeors (all levels)



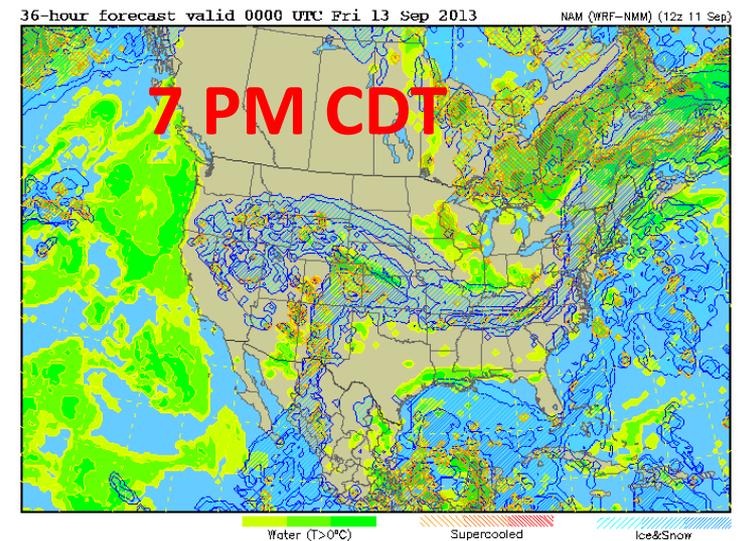
Integrated liquid and frozen hydrometeors (all levels)



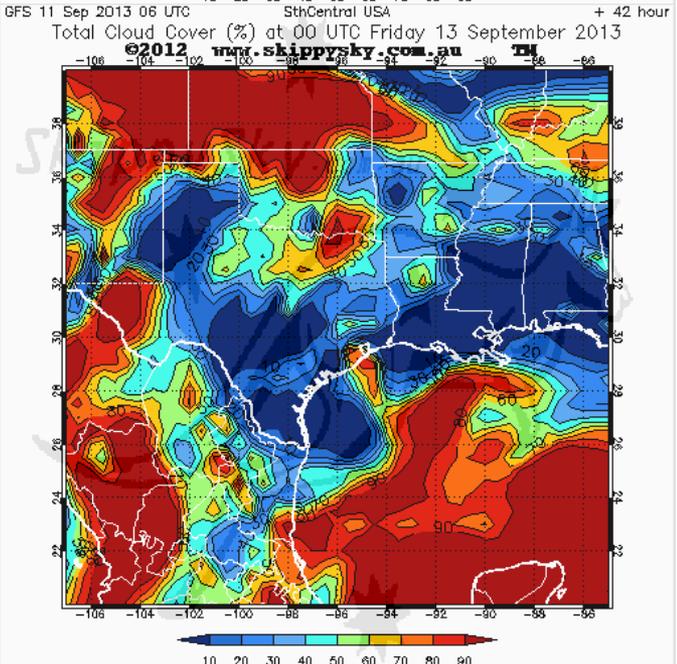
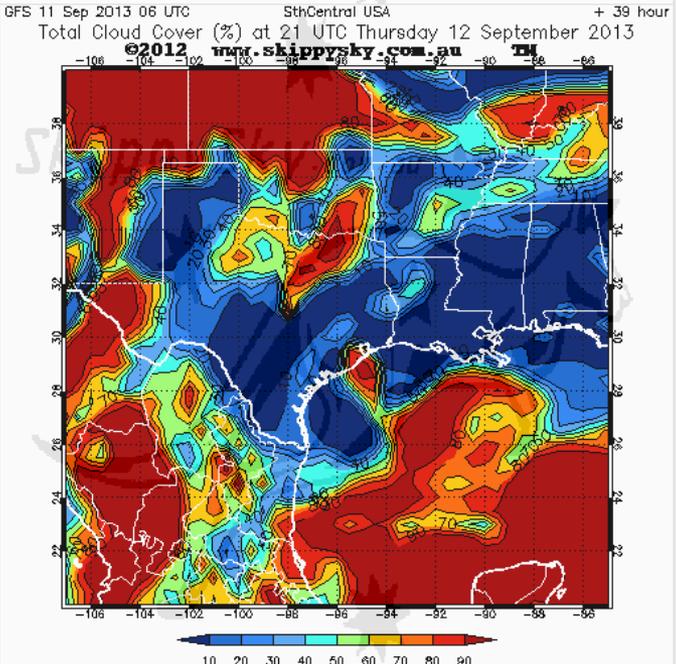
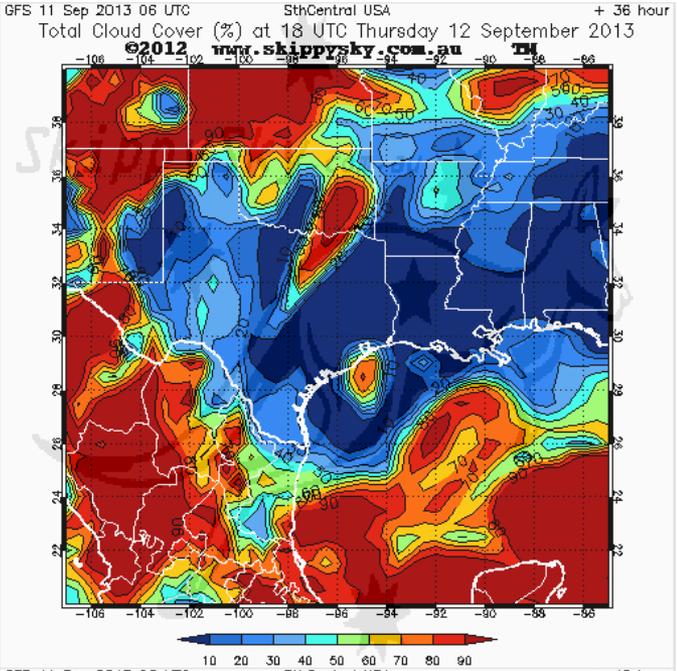
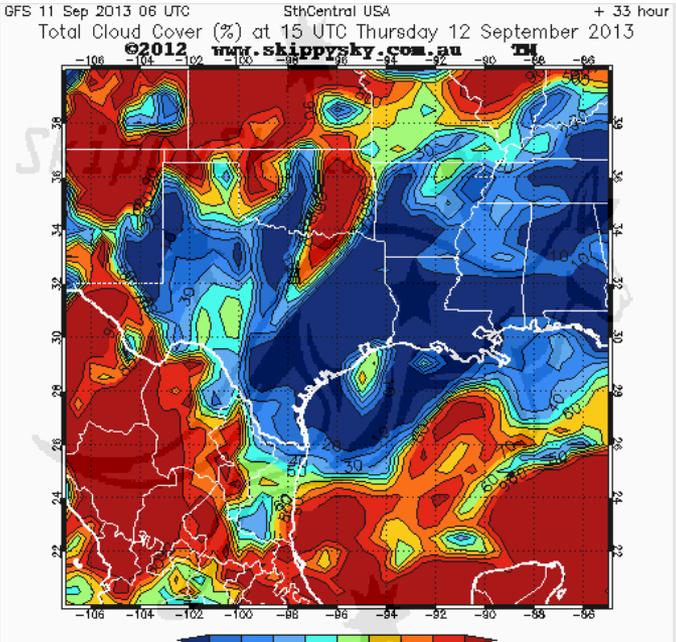
Integrated liquid and frozen hydrometeors (all levels)



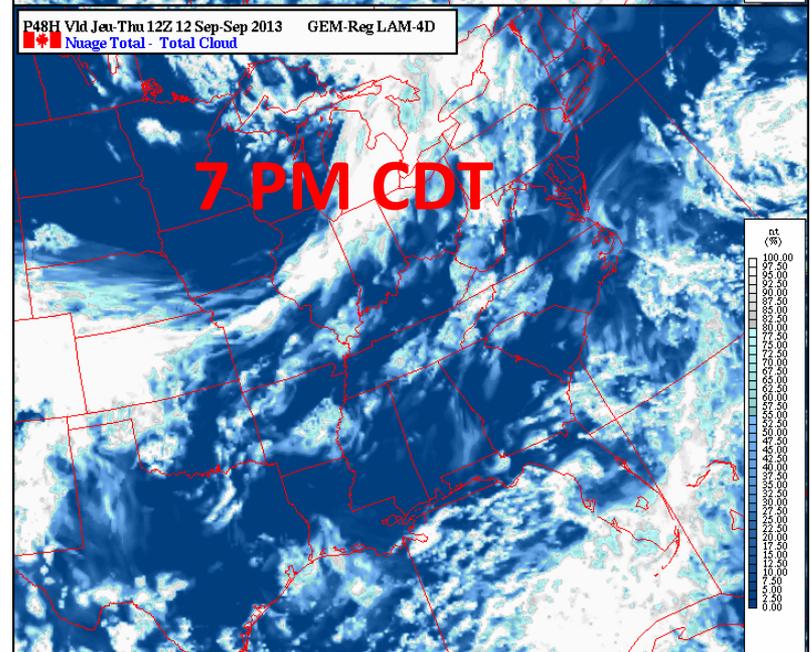
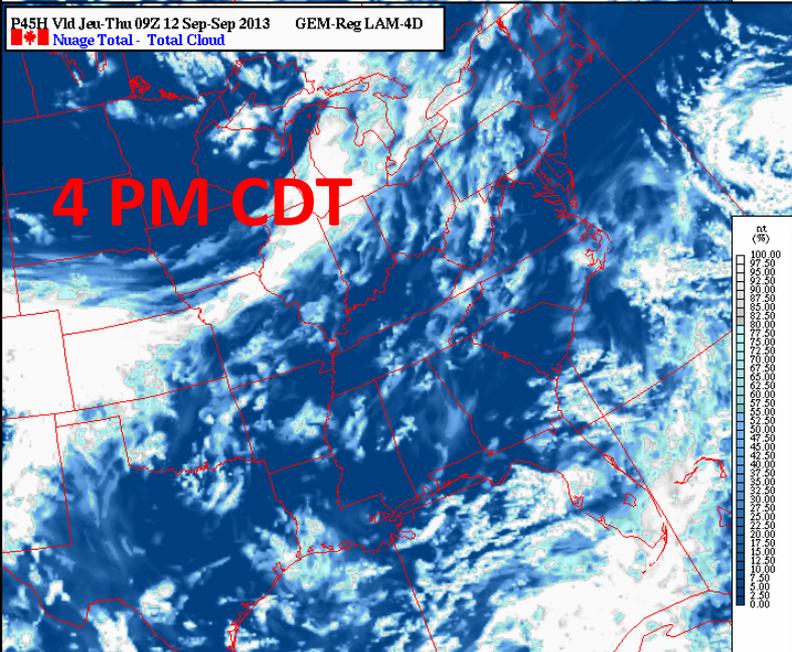
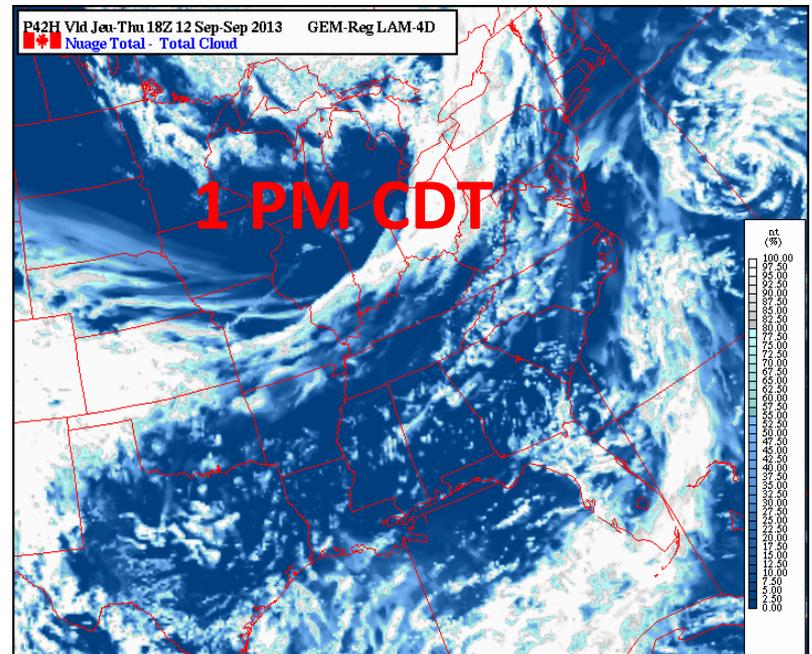
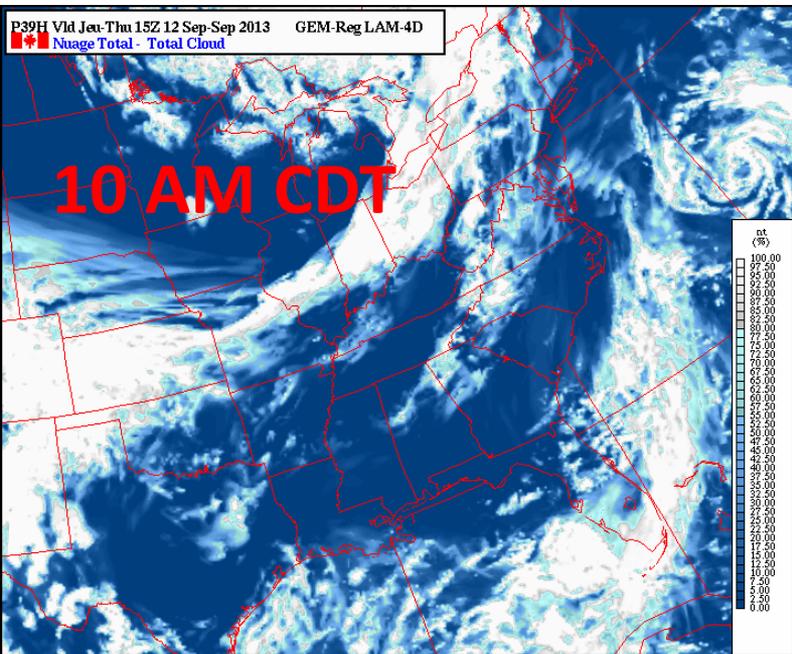
Integrated liquid and frozen hydrometeors (all levels)



# Tomorrow: GFS – Some clouds intrude into the study region



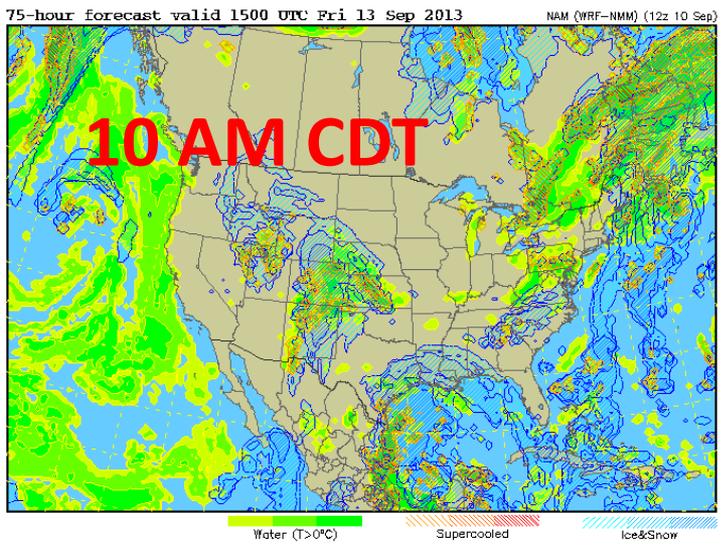
# Tomorrow: Canadian - scattered clouds



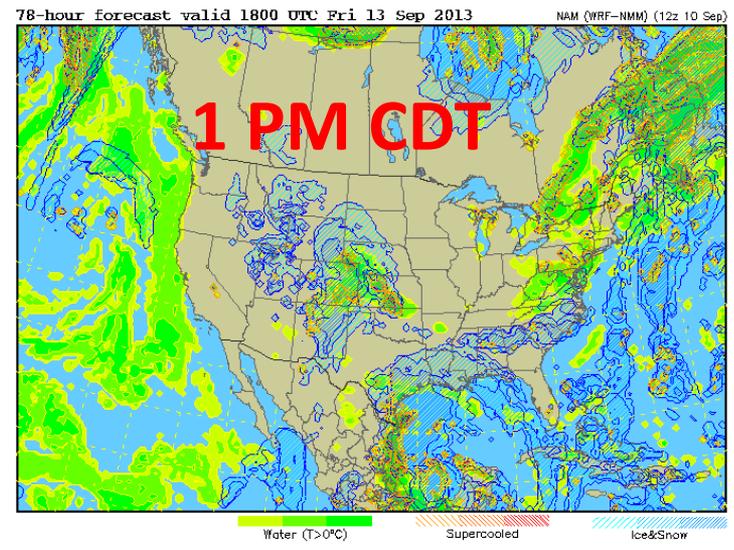


# Friday: NAM – high level clouds; low level clouds in morning

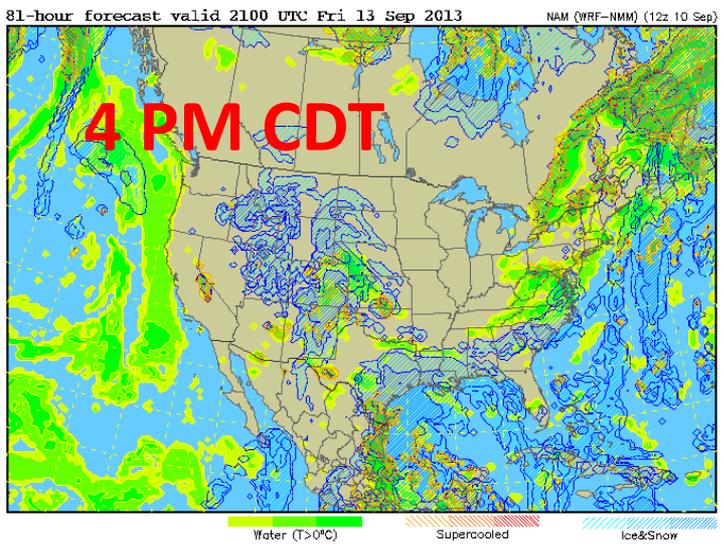
Integrated liquid and frozen hydrometeors (all levels)



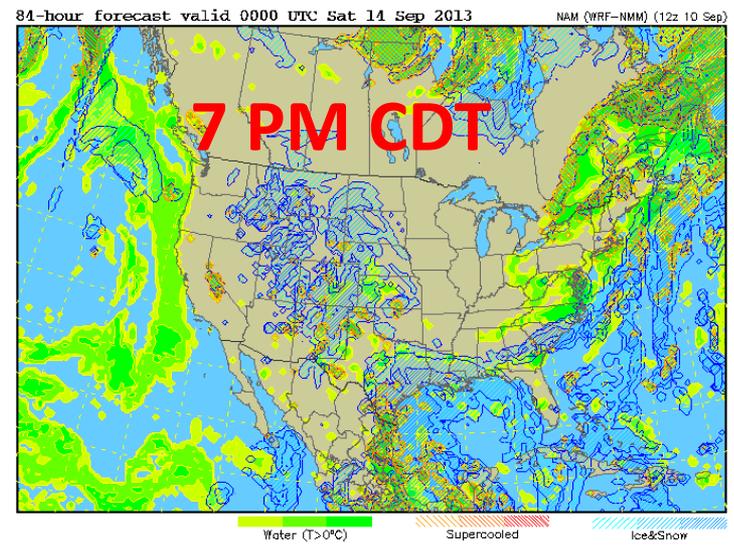
Integrated liquid and frozen hydrometeors (all levels)



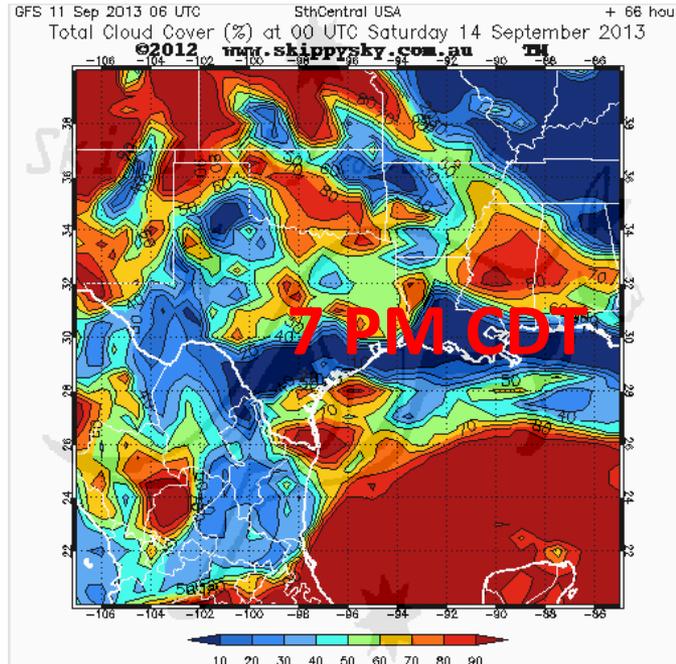
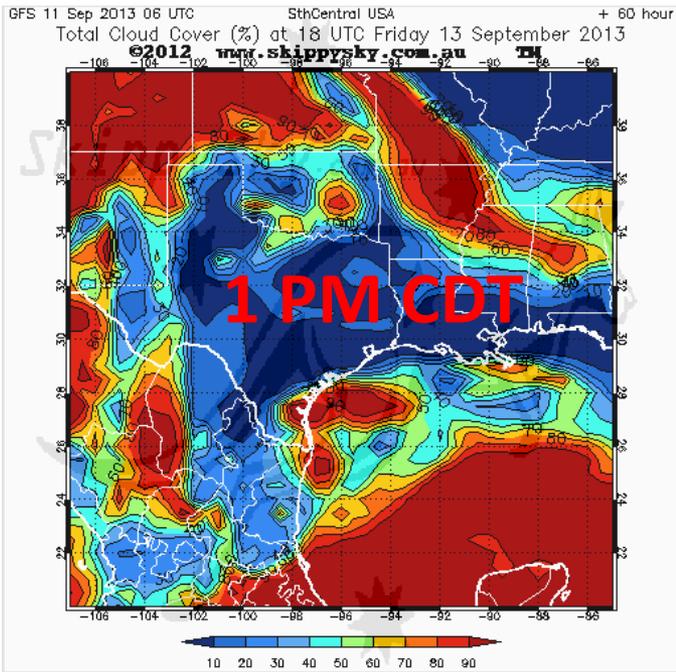
Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)



**Friday: GFS – Some clouds to the north of the study area through afternoon, becoming increasingly cloudier throughout the day**



# Friday: GEOS-5 –high clouds; low level clouds push into region during day.

10 am

1 pm

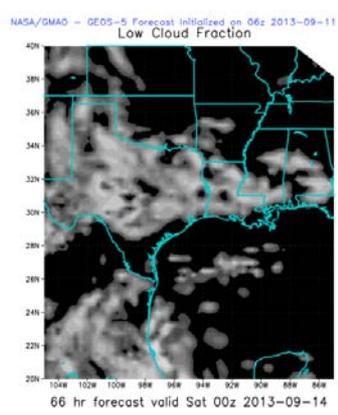
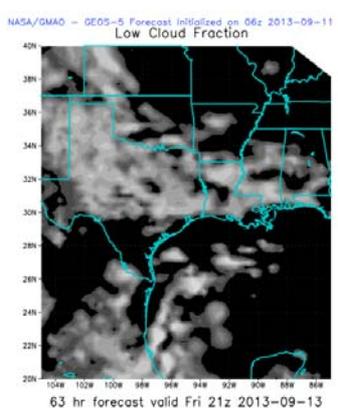
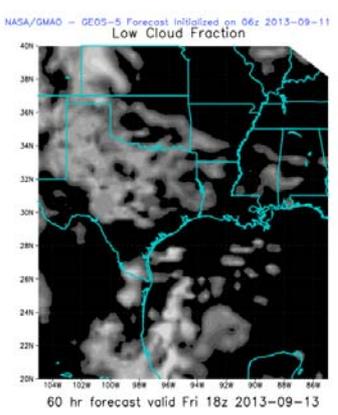
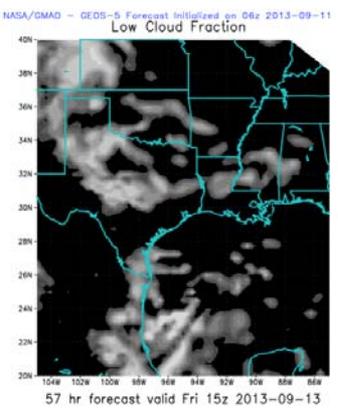
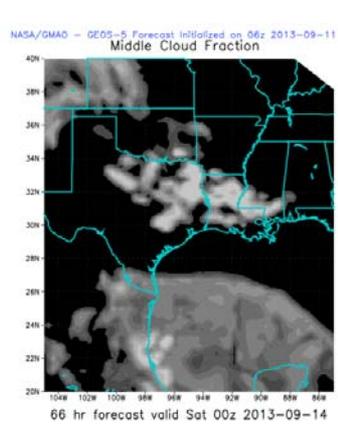
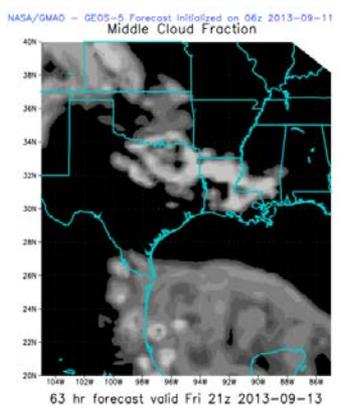
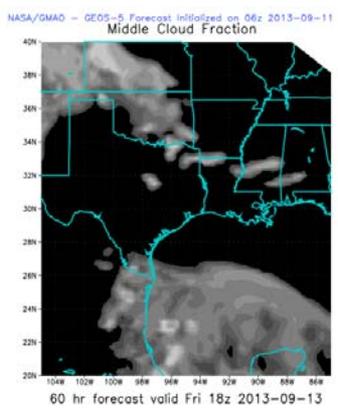
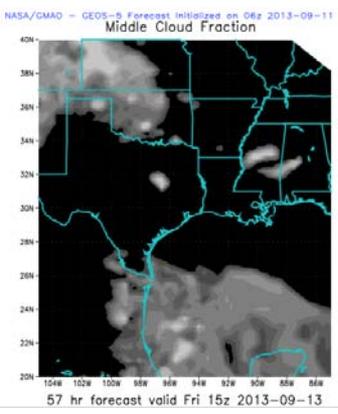
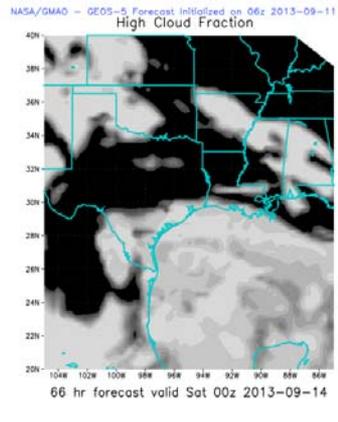
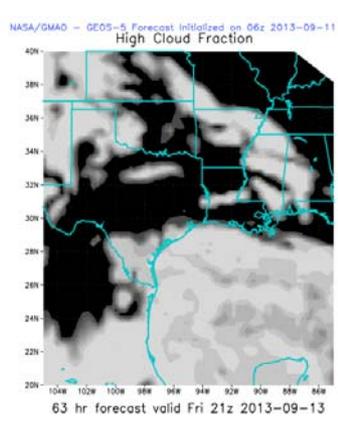
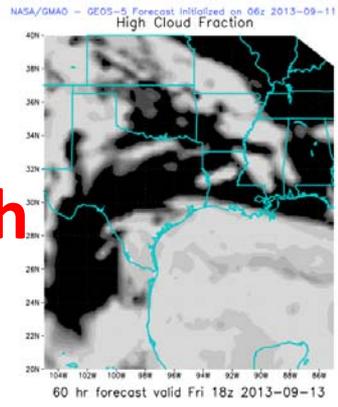
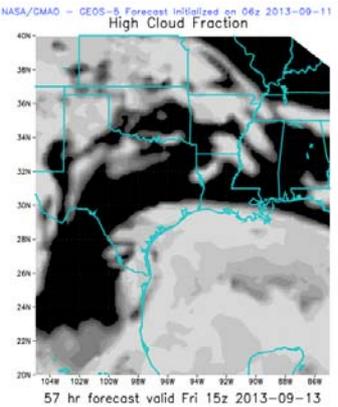
4 pm

7 pm

High

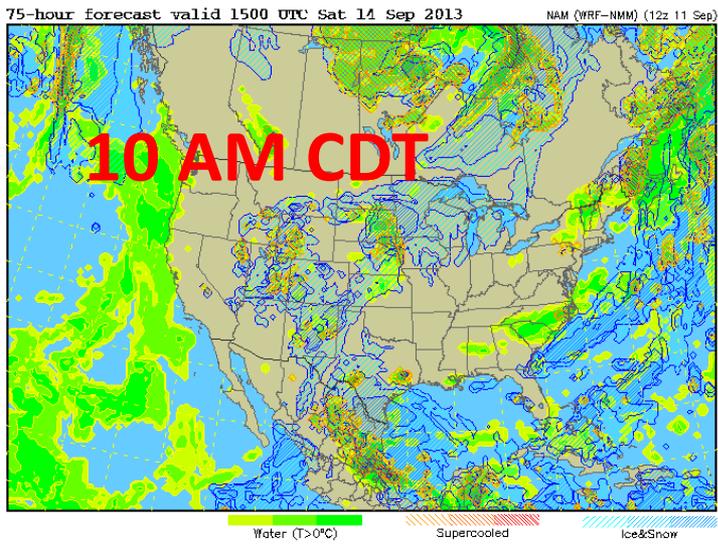
Mid

Low

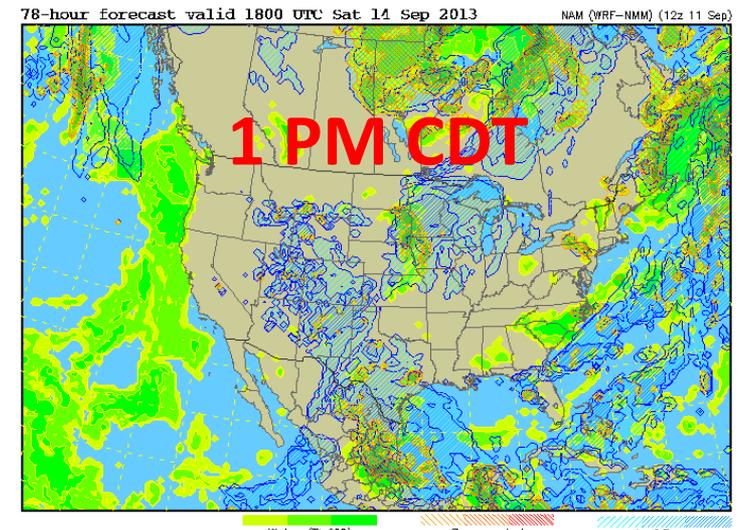


# Saturday: NAM – high level and low level clouds

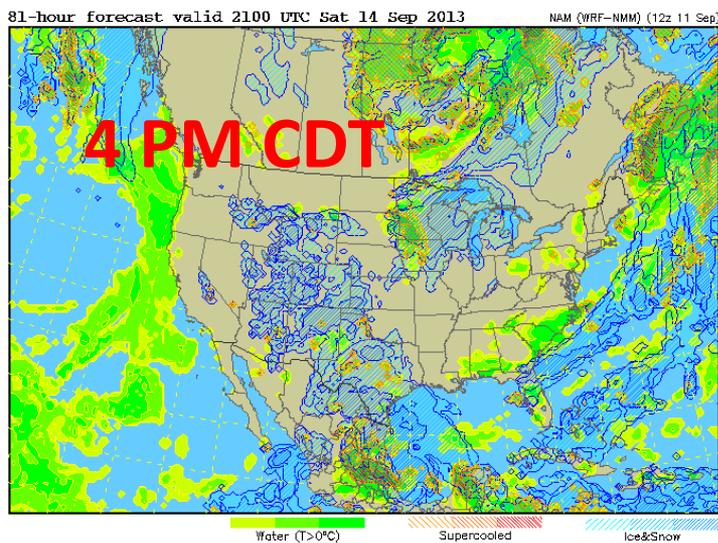
Integrated liquid and frozen hydrometeors (all levels)



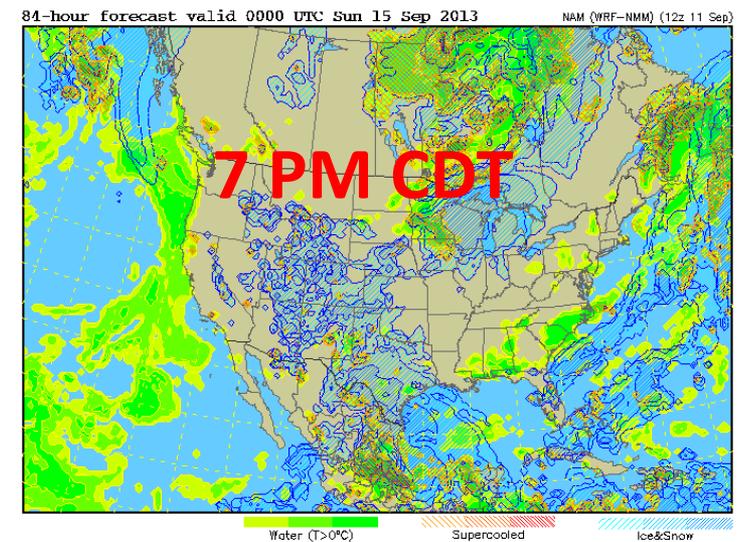
Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)



# Saturday: GEOS-5 – clouds at all levels push into region during day

10 am

1 pm

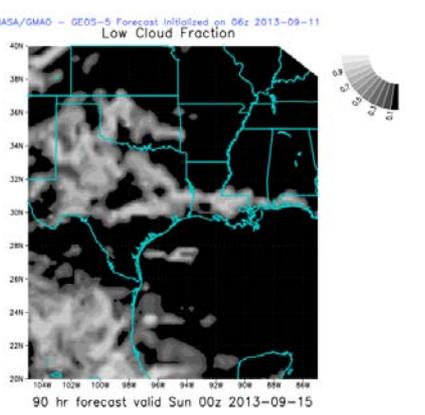
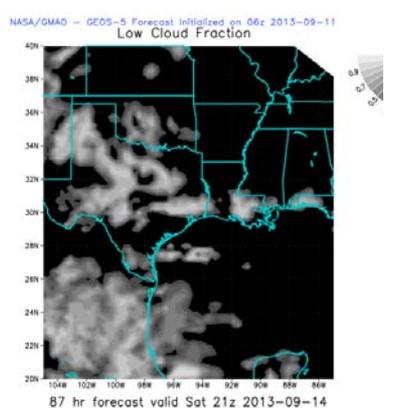
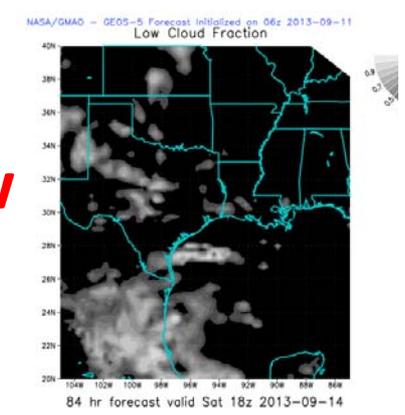
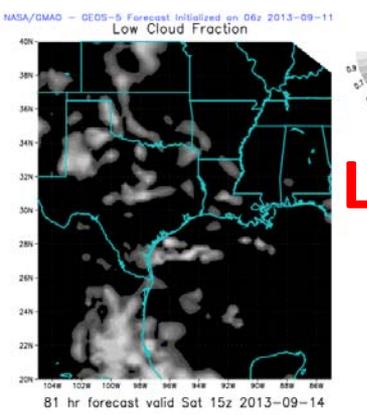
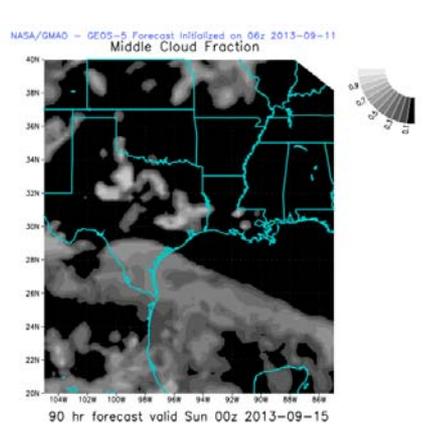
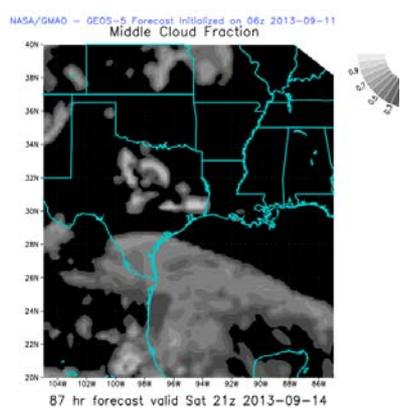
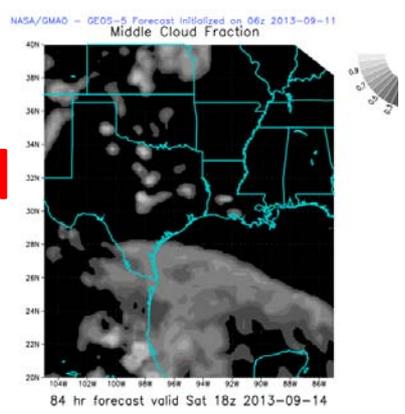
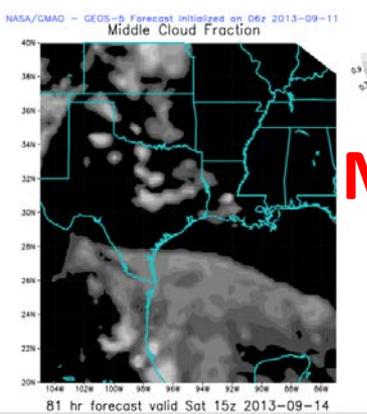
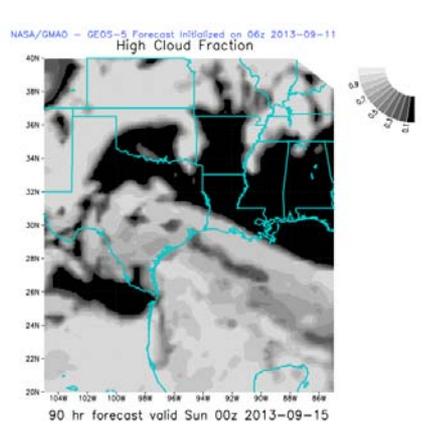
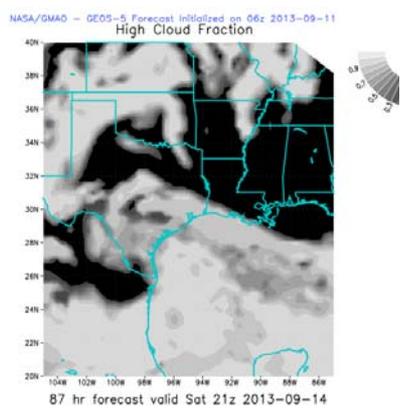
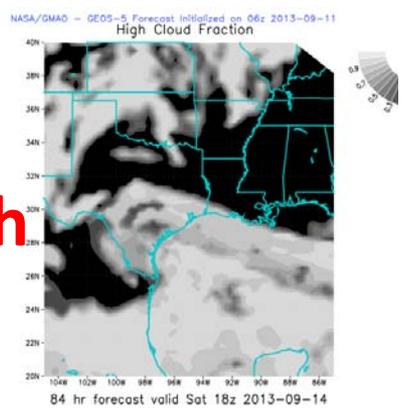
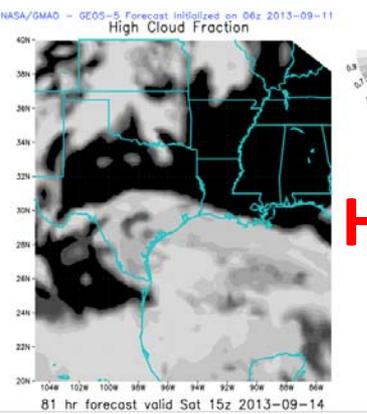
4 pm

7 pm

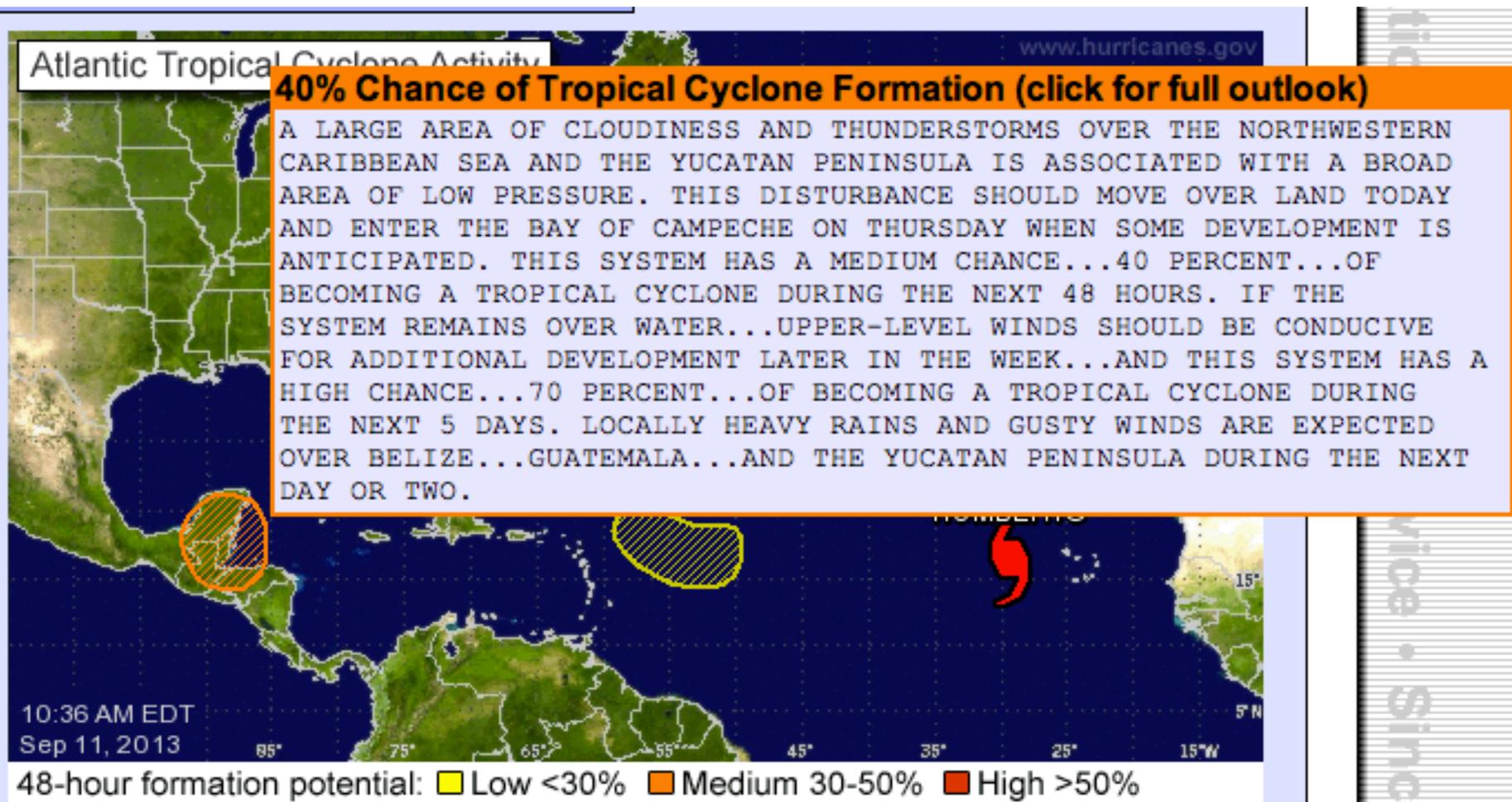
High

Mid

Low



Disturbed weather in NW Caribbean/Yucatan Peninsula...Should move into Bay of Campeche by Thursday...Has a 70% chance of becoming a tropical cyclone over the next 5 days once there. GFS model develops circulation by Friday afternoon in Bay of Campeche.



# Recommendations

- Tomorrow: P3B and King Air flight day. NWS forecaster thinks it likely that today's conditions persist into tomorrow. But perhaps less cirrus than today.
- Friday: Possible flight day. However, some cirrus may come up from the south. Frontal system not likely to impact region until weekend.
- Saturday: Possible flight day, but will have to watch the forecast for more clouds from both cold front and tropical system

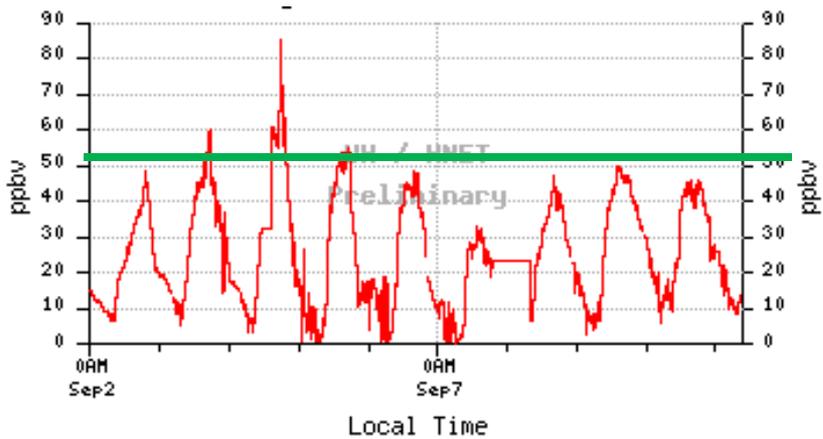
# **DISCOVER-AQ Air Quality Outlook**

## **September 11, 2013**

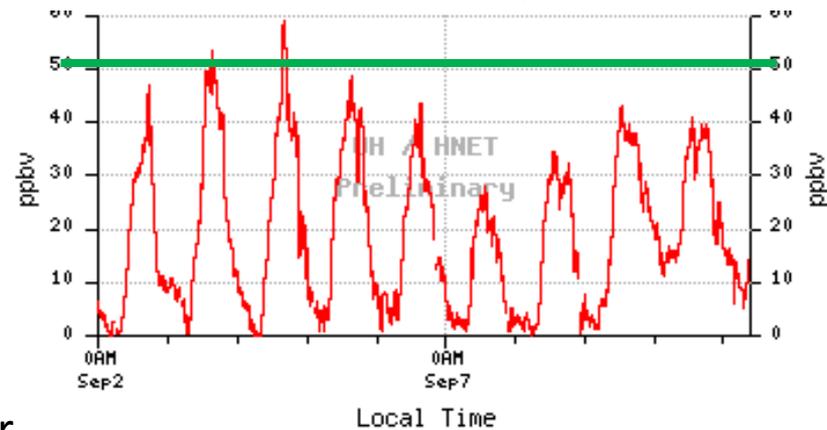
**Ken Pickering**

**Mariel Friberg**

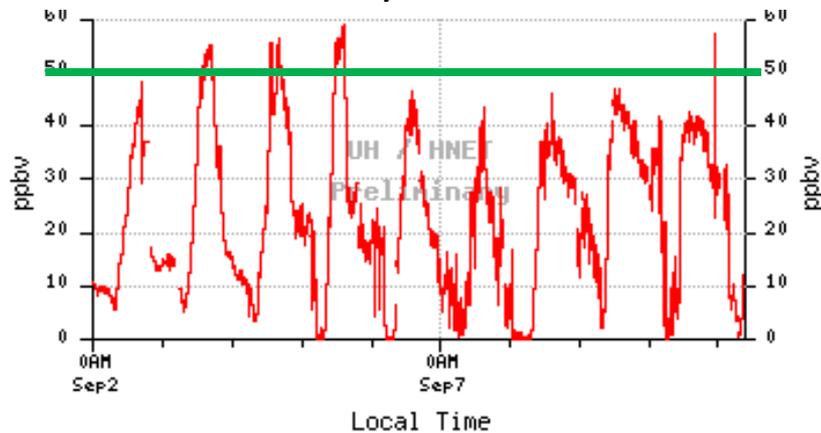
### Jones Forest



### West Liberty



### Moody Tower

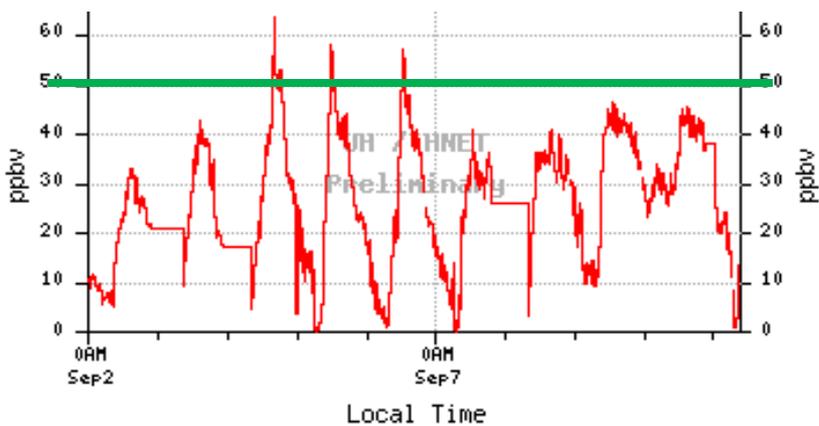


**O<sub>3</sub> (ppbv) – 15 min avg**  
**September 2nd – 10th**

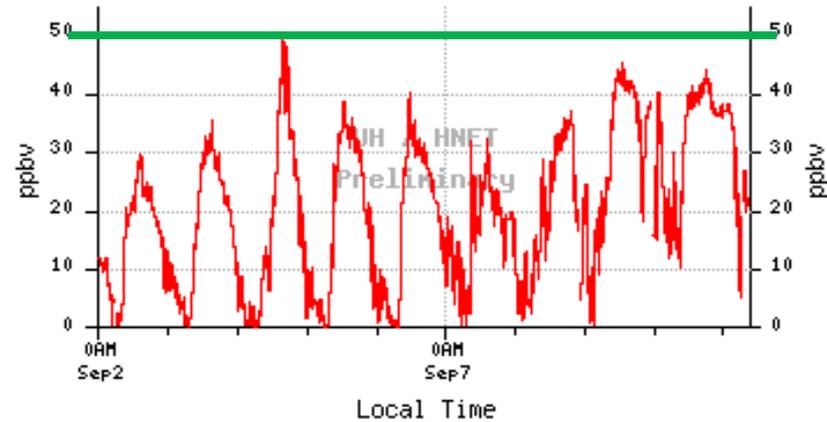
**———— = 50 ppbv**

**Houston – Network of  
Environmental Towers  
(H-NET)**

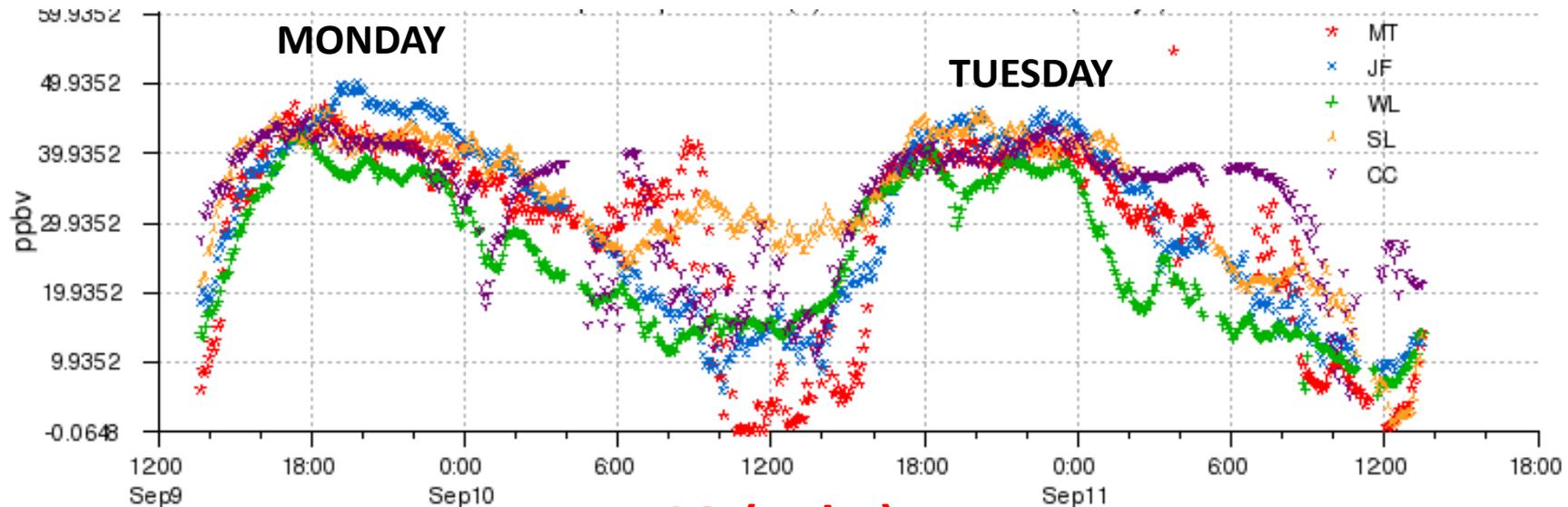
### Sugar Land



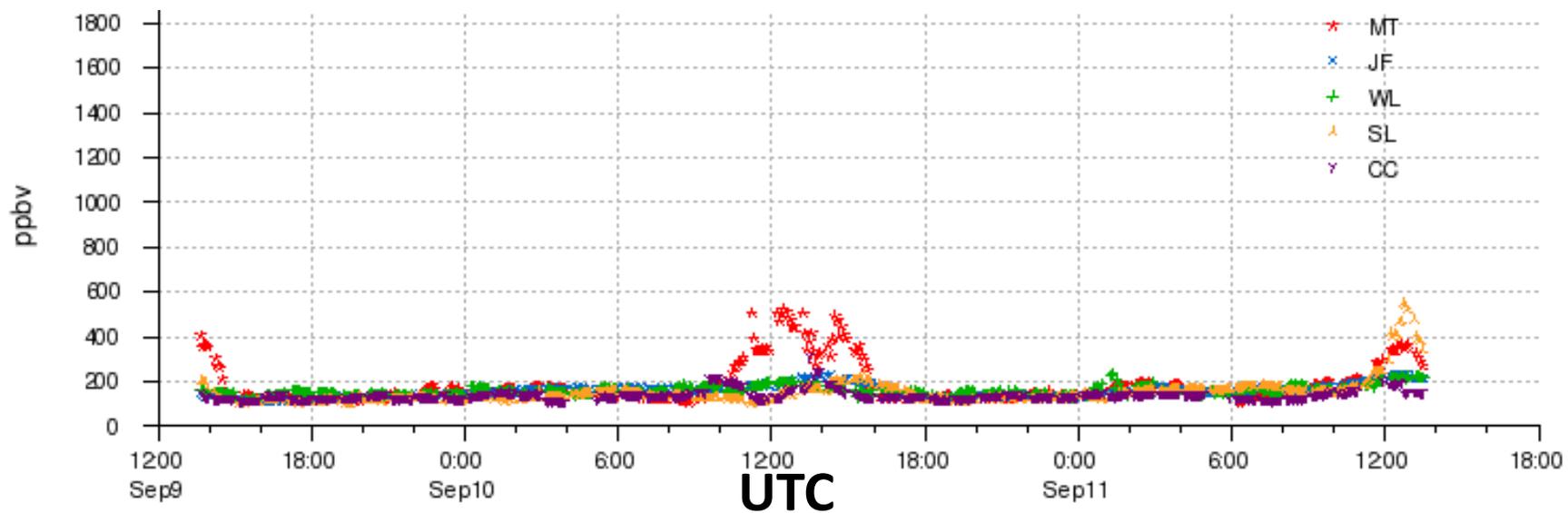
### Coastal Center



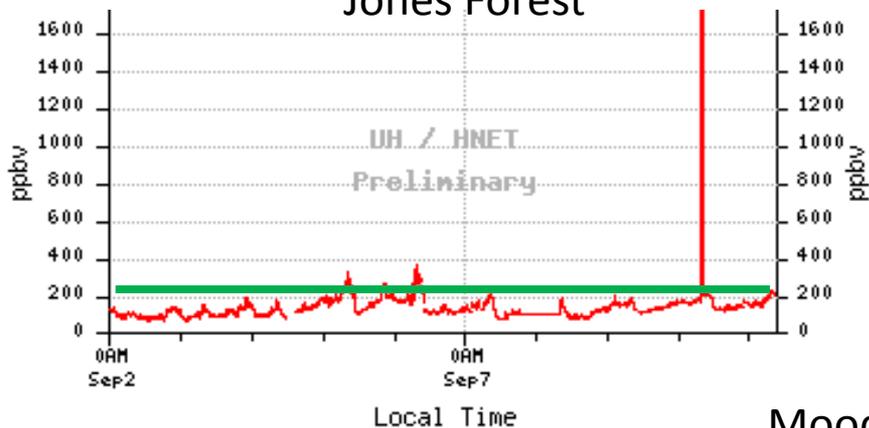
## Ozone (ppbv)



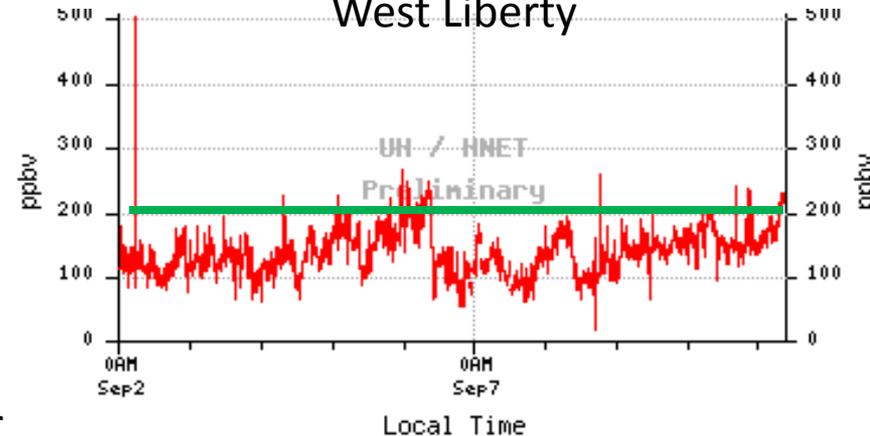
## CO (ppbv)



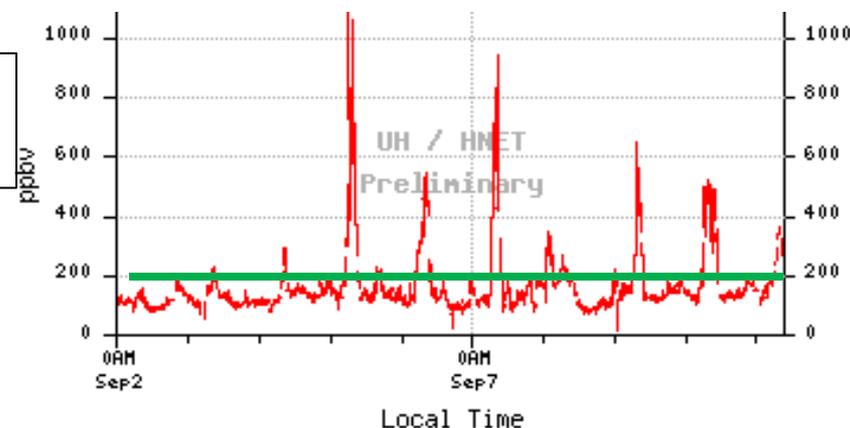
### Jones Forest



### West Liberty



### Moody Tower

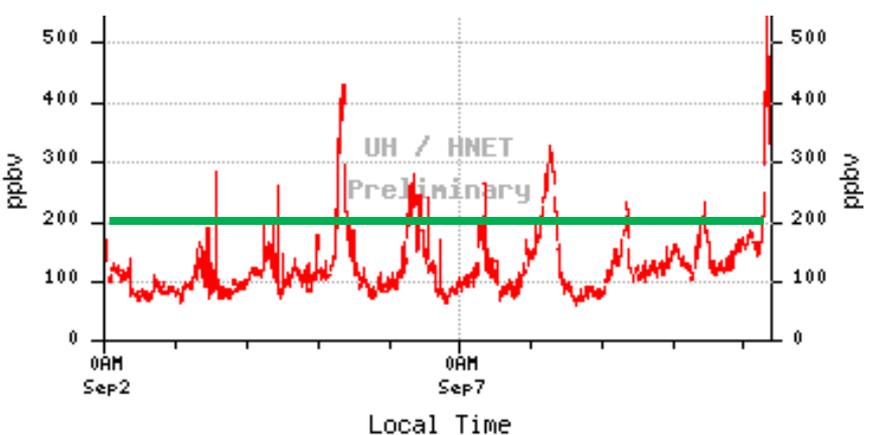


**CO (ppbv) – 15 min avg**  
**Sep. 2nd – 10th**

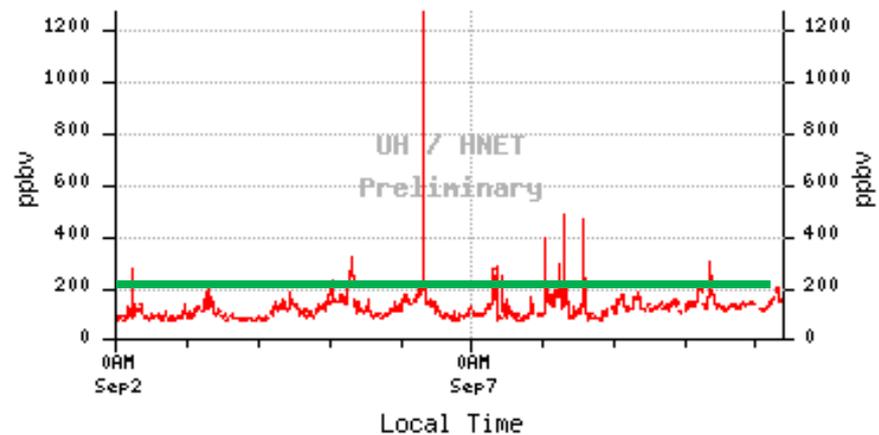
**———— = 200 ppbv**

**Houston – Network of**  
**Environmental Towers**  
**(H-NET)**

### Sugar Land



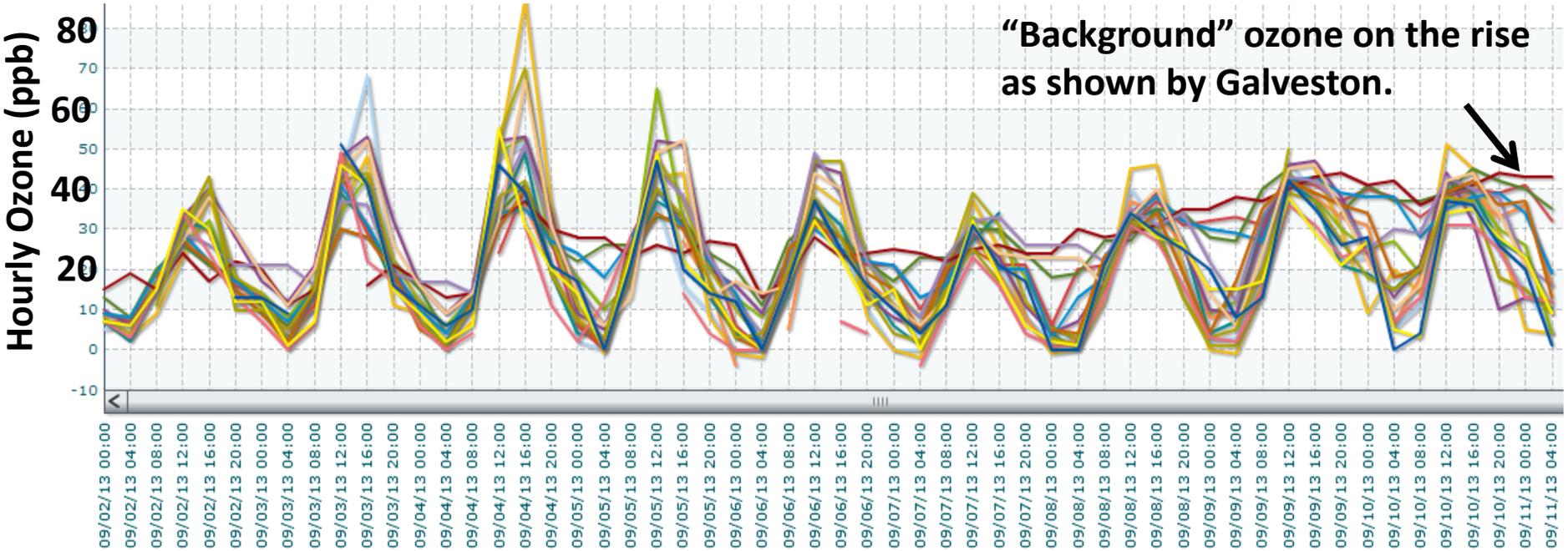
### Coastal Center



# Hourly Ozone (airnowtech.org)\*\*

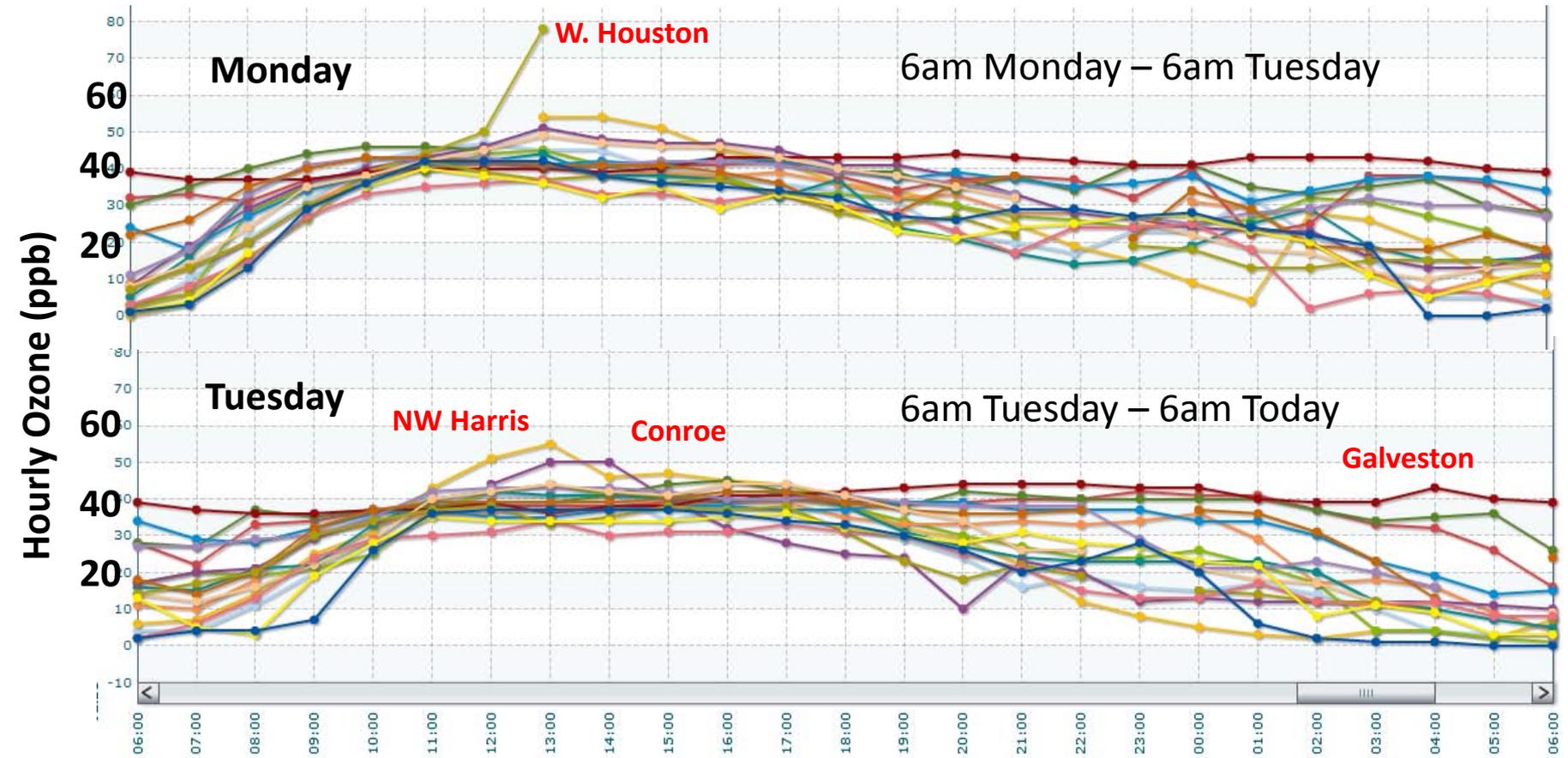
September 2<sup>nd</sup> – 10<sup>th</sup>

\*\* EVERY 4<sup>th</sup> HOUR PLOTTED!!!!



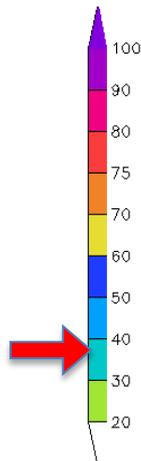
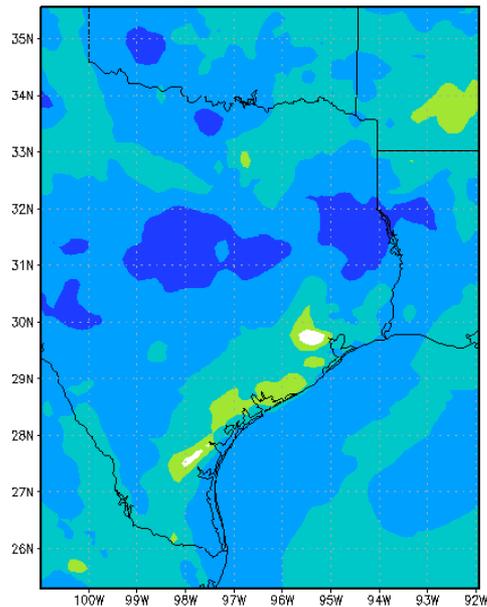
- Houston Aldine C8/O3 - 44201/1 Hr/2
- Houston Westhollow C410/O3 - 44201/1 Hr/1
- Manvel Croix Park C84/O3 - 44201/1 Hr/1
- Conroe Relocated C78/O3 - 44201/1 Hr/1
- West Houston C554/O3 - 44201/1 Hr/1
- Galveston Airport C1034/O3 - 44201/1 Hr/1
- Coastal Center C697/O3 - 44201/1 Hr/1
- West Liberty C699/O3 - 44201/1 Hr/1
- Clinton C403/O3 - 44201/1 Hr/3
- Northwest Harris Co. C26/C110/C154/O3 - 44201/1 Hr/2
- Houston Deer Park C35/O3 - 44201/1 Hr/1
- Seabrook Friendship Park C45/O3 - 44201/1 Hr/1
- Texas City C620/O3 - 44201/1 Hr/1
- La Porte Sylvan Beach C556/O3 - 44201/1 Hr/1
- Sugarland C696/O3 - 44201/1 Hr/1
- Jones Forest C698/O3 - 44201/1 Hr/1
- Channelview C15/O3 - 44201/1 Hr/3
- Houston Texas Avenue C411/O3 - 44201/1 Hr/1 (Method: 047)

# Hourly Ozone (airnowtech.org)



- |   |   |
|---|---|
| Houston Aldine C8/O3 - 44201/1 Hr/2       | Northwest Harris Co. C26/C110/C154/O3 - 44201/1 Hr/2      |
| Houston Westhollow C410/O3 - 44201/1 Hr/1 | Houston Deer Park C35/O3 - 44201/1 Hr/1                   |
| Manvel Croix Park C84/O3 - 44201/1 Hr/1   | Seabrook Friendship Park C45/O3 - 44201/1 Hr/1            |
| Conroe Relocated C78/O3 - 44201/1 Hr/1    | Texas City C620/O3 - 44201/1 Hr/1                         |
| West Houston C554/O3 - 44201/1 Hr/1       | La Porte Sylvan Beach C556/O3 - 44201/1 Hr/1              |
| Galveston Airport C1034/O3 - 44201/1 Hr/1 | Sugarland C696/O3 - 44201/1 Hr/1                          |
| Coastal Center C697/O3 - 44201/1 Hr/1     | Jones Forest C698/O3 - 44201/1 Hr/1                       |
| West Liberty C699/O3 - 44201/1 Hr/1       | Channelview C15/O3 - 44201/1 Hr/3                         |
| Clinton C403/O3 - 44201/1 Hr/3            | Houston Texas Avenue C411/O3 - 44201/1 Hr/1 (Method: 047) |

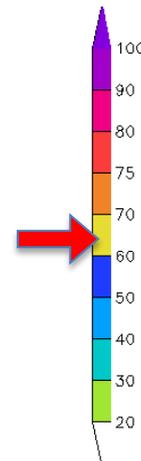
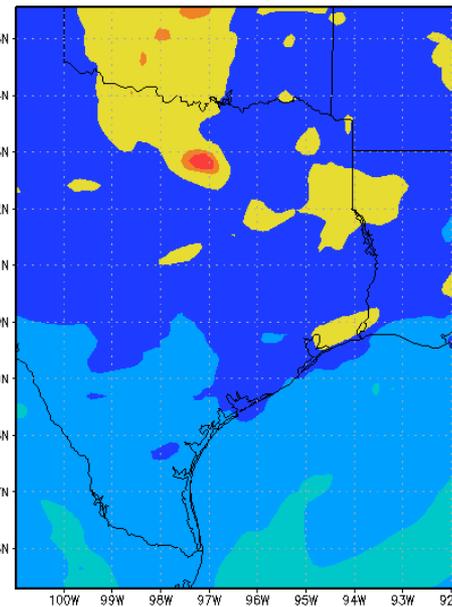
O3 [ppb] at 1013 [hPa] Valid 14Z SEP 12 2013



**NOAA  
Experim.  
CMAQ**

**Surface  
Ozone**

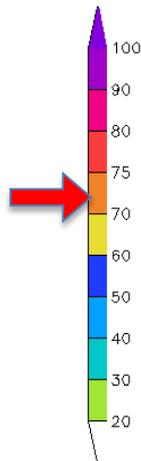
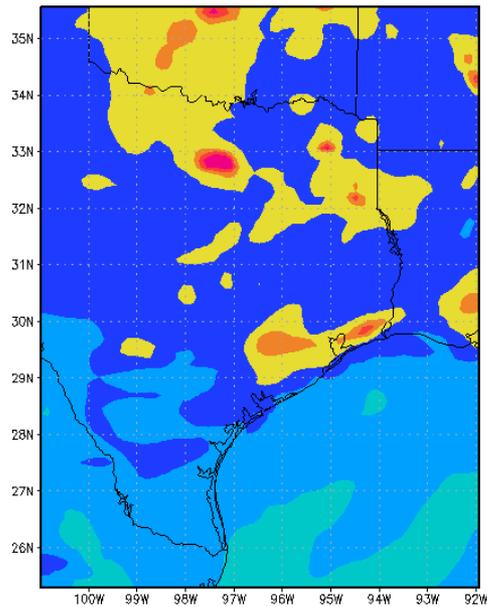
O3 [ppb] at 1013 [hPa] Valid 17Z SEP 12 2013



GRADS: COLA/IGES

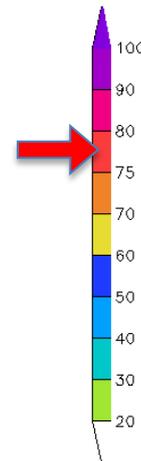
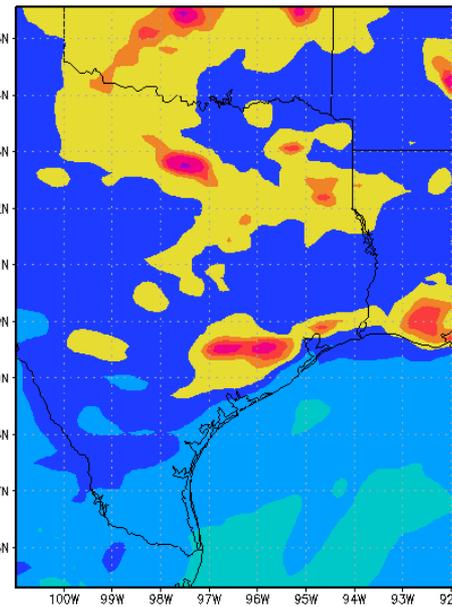
GRADS: COLA/IGES

O3 [ppb] at 1013 [hPa] Valid 19Z SEP 12 2013



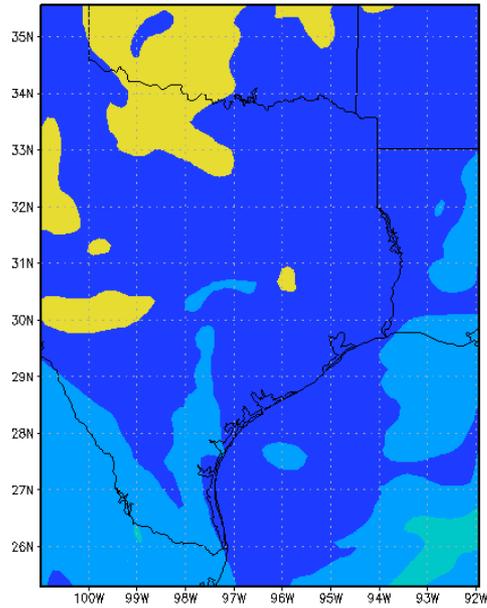
GRADS: COLA/IGES

O3 [ppb] at 1013 [hPa] Valid 22Z SEP 12 2013



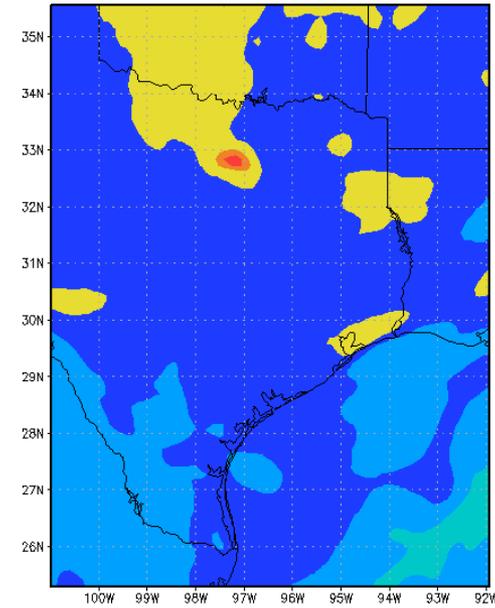
GRADS: COLA/IGES

O3 [ppb] at 850 [hPa] Valid 14Z SEP 12 2013



GRADS: COLA/IGES

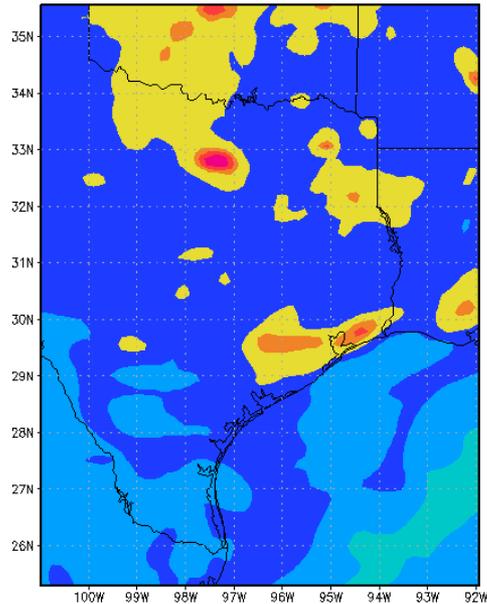
O3 [ppb] at 850 [hPa] Valid 17Z SEP 12 2013



GRADS: COLA/IGES

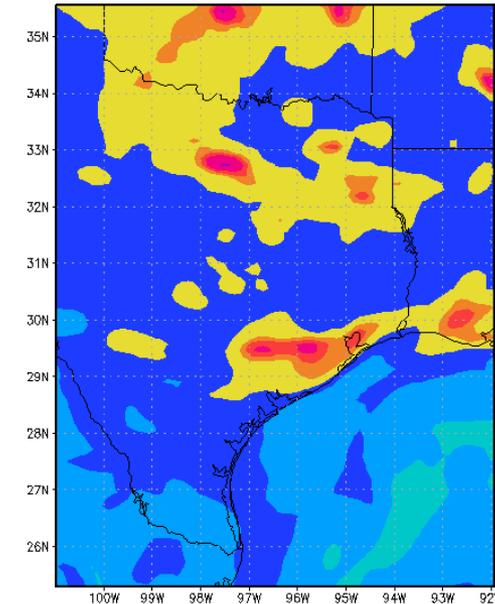
**NOAA  
Experim.  
CMAQ  
  
1.5 Km  
Ozone**

O3 [ppb] at 850 [hPa] Valid 19Z SEP 12 2013



GRADS: COLA/IGES

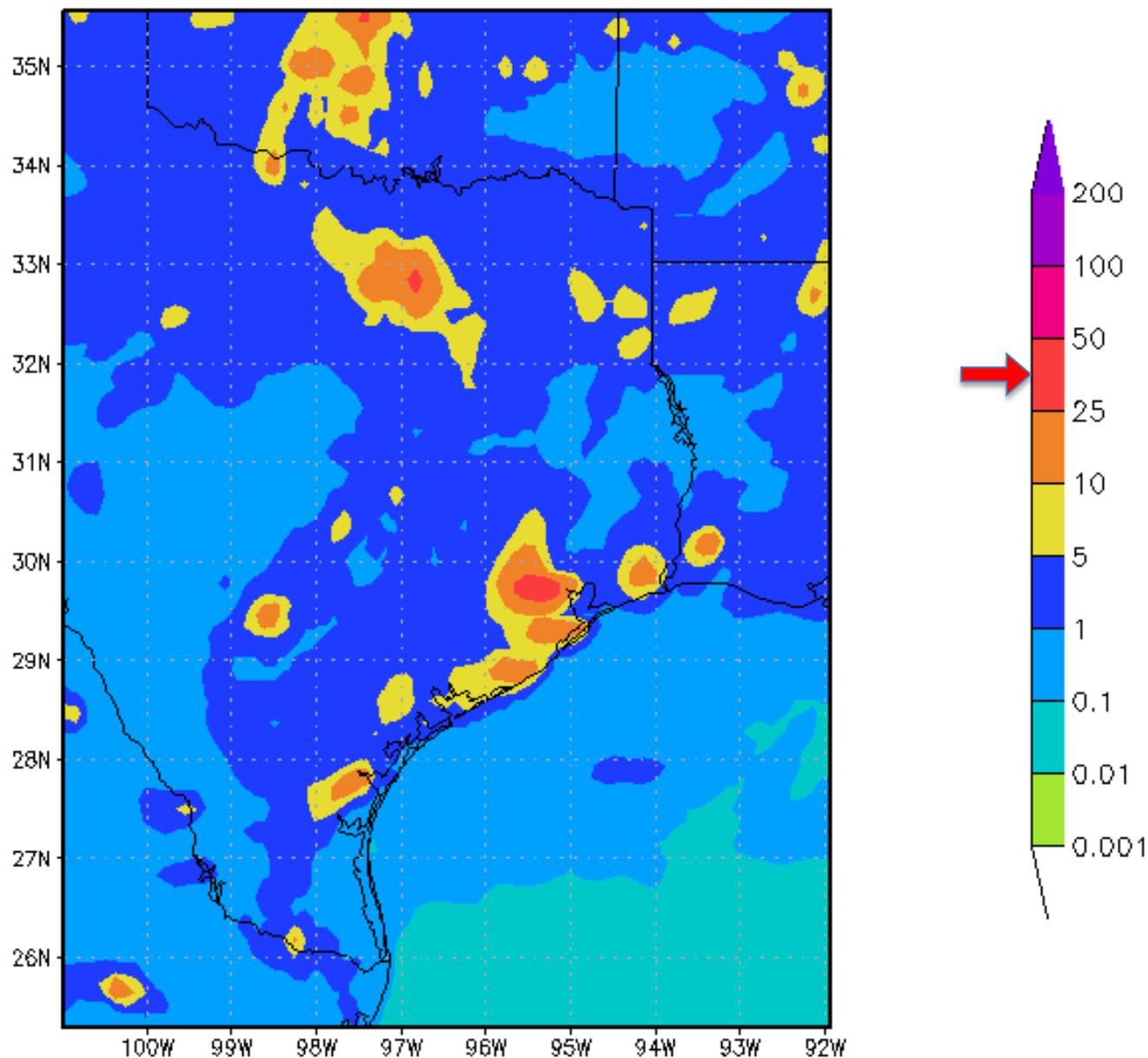
O3 [ppb] at 850 [hPa] Valid 22Z SEP 12 2013



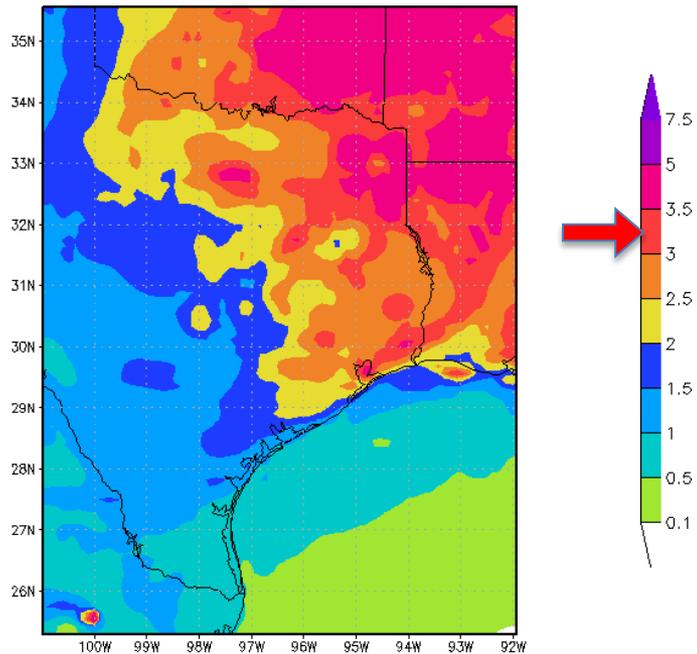
GRADS: COLA/IGES

# NO2 [ppb] at 1013 [hPa] Valid 14Z SEP 12 2013

NOAA Experm.  
CMAQ Model  
Surface NO2

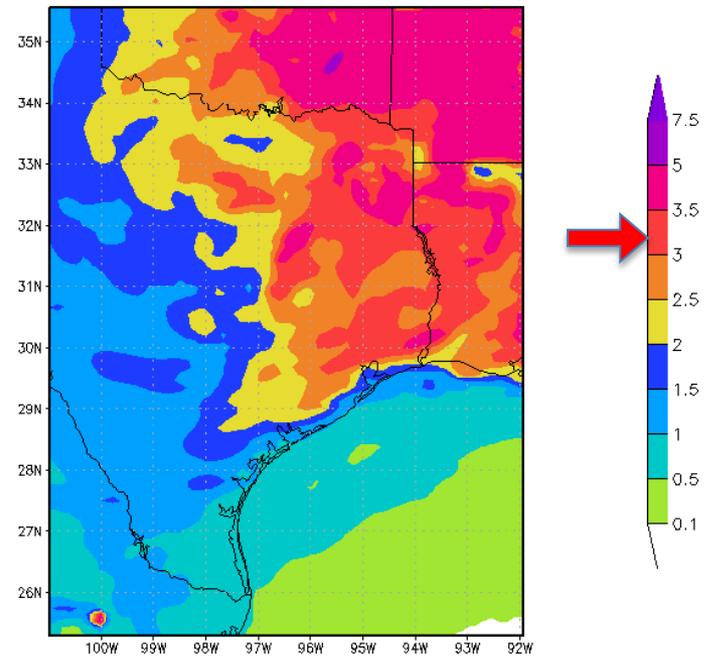


FORM [ppb] at 1013 [hPa] Valid 19Z SEP 12 2013



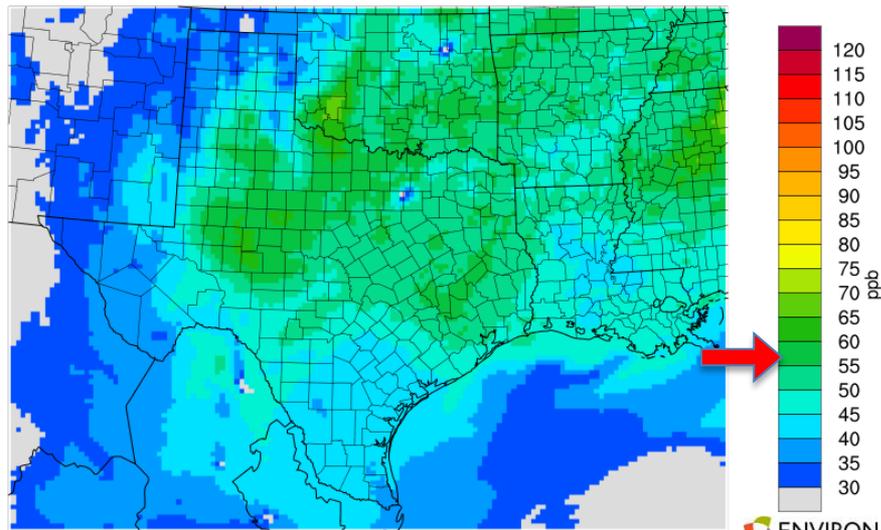
## NOAA Experm. CMAQ Model Surface Formaldehyde

FORM [ppb] at 1013 [hPa] Valid 22Z SEP 12 2013



### Ozone

Best Case

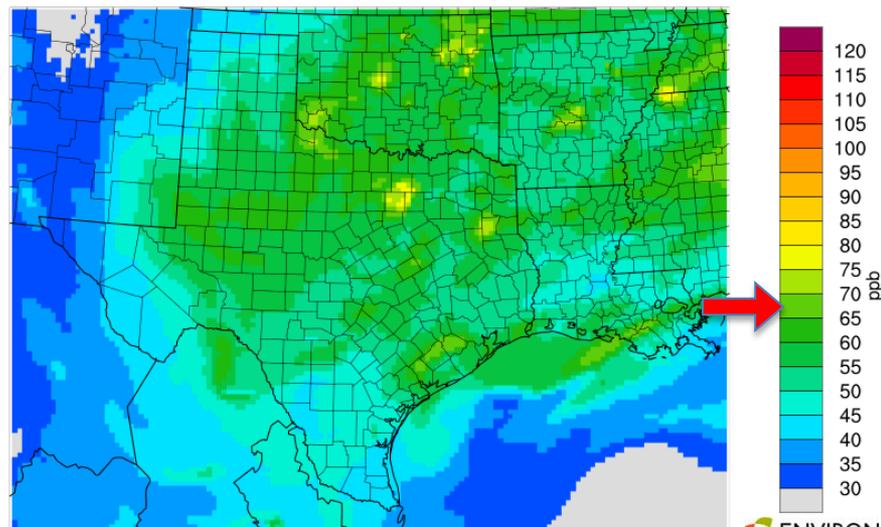


Min(18,103) = 16.8, Max(68,89) = 69.5

Thu September 12 09:00 CST

### Ozone

Best Case



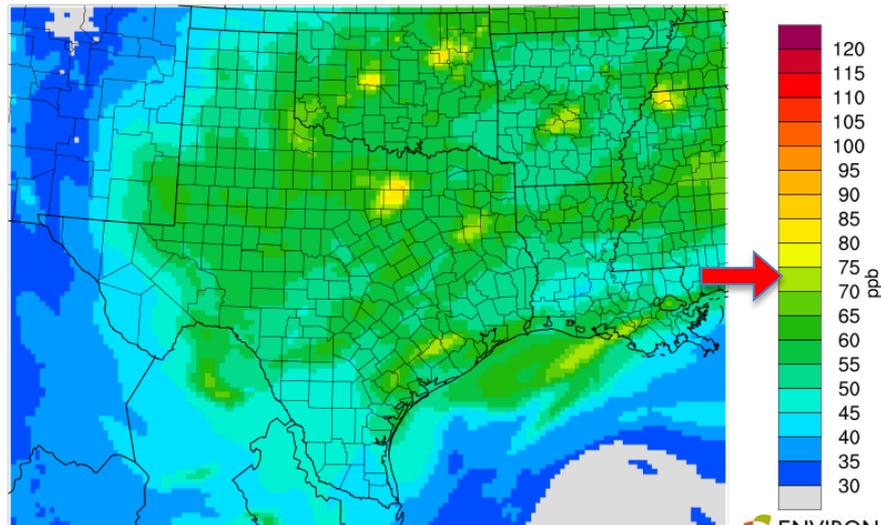
Min(127,2) = 23.8, Max(136,92) = 80.4

Thu September 12 12:00 CST

## CAMx Model Surface Ozone

### Ozone

Best Case

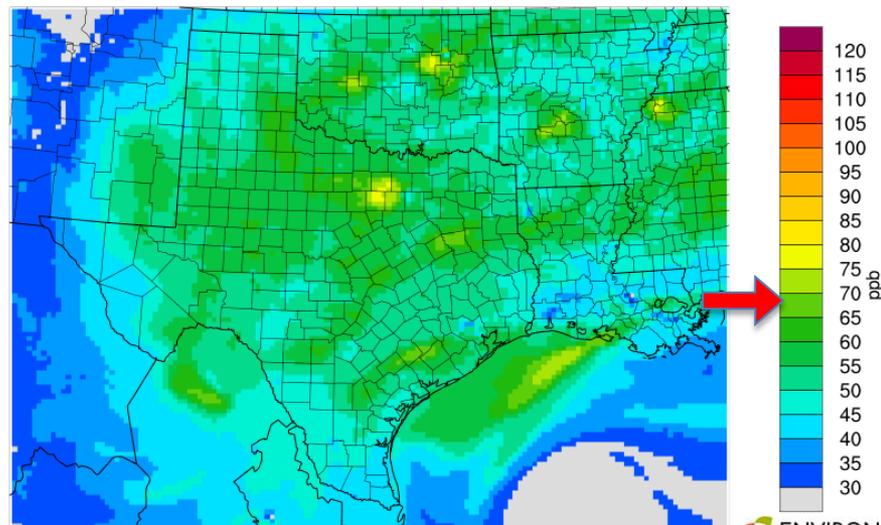


Min(121,2) = 23.2, Max(82,72) = 85.1

Thu September 12 14:00 CST

### Ozone

Best Case

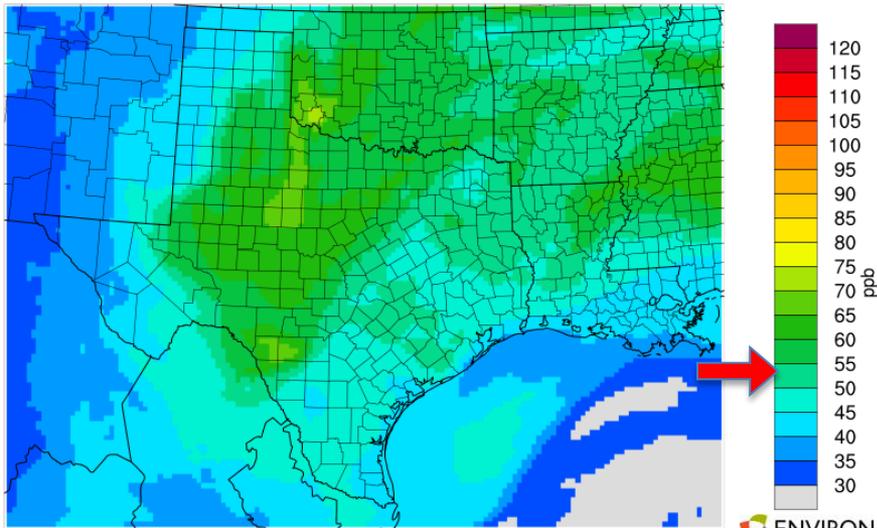


Min(116,8) = 23.0, Max(135,90) = 79.2

Thu September 12 17:00 CST

### Ozone

Best Case: CAMx Layer 14

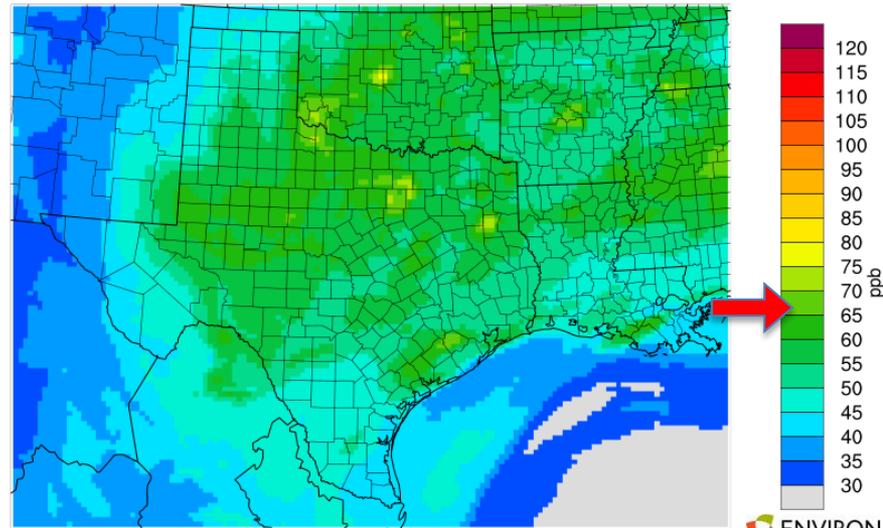


Min(136,14) = 26.1, Max(65,87) = 72.1

Thu September 12 09:00 CST

### Ozone

Best Case: CAMx Layer 14



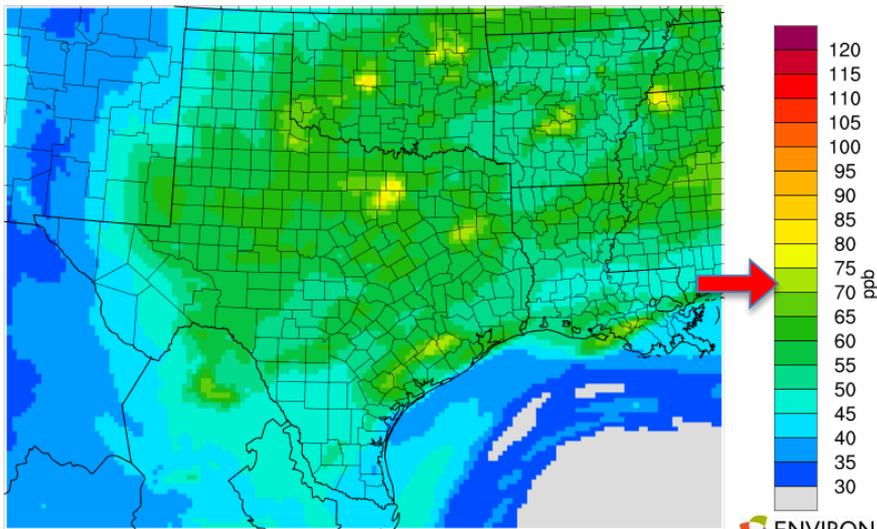
Min(129,8) = 25.9, Max(77,95) = 76.4

Thu September 12 12:00 CST

## CAMx Model 1.2 km Ozone

### Ozone

Best Case: CAMx Layer 14

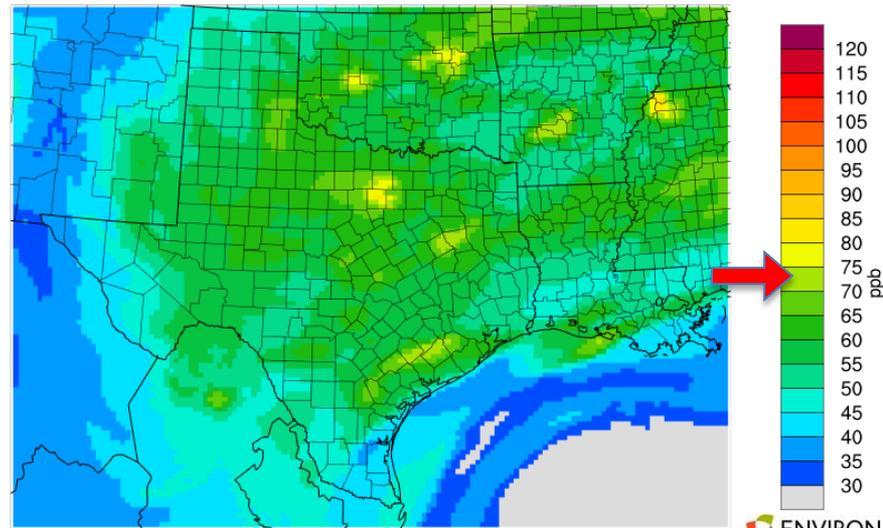


Min(126,13) = 25.4, Max(76,94) = 82.8

Thu September 12 14:00 CST

### Ozone

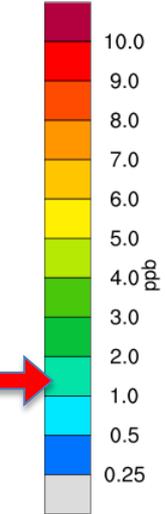
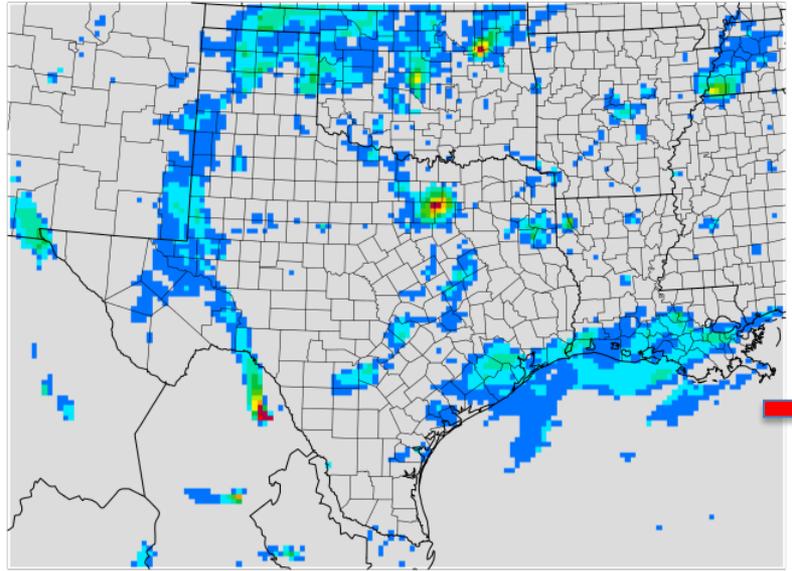
Best Case: CAMx Layer 14



Min(119,17) = 25.0, Max(135,90) = 85.0

Thu September 12 17:00 CST

**NO**  
Best Case



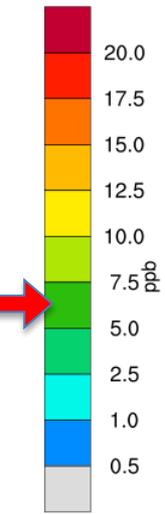
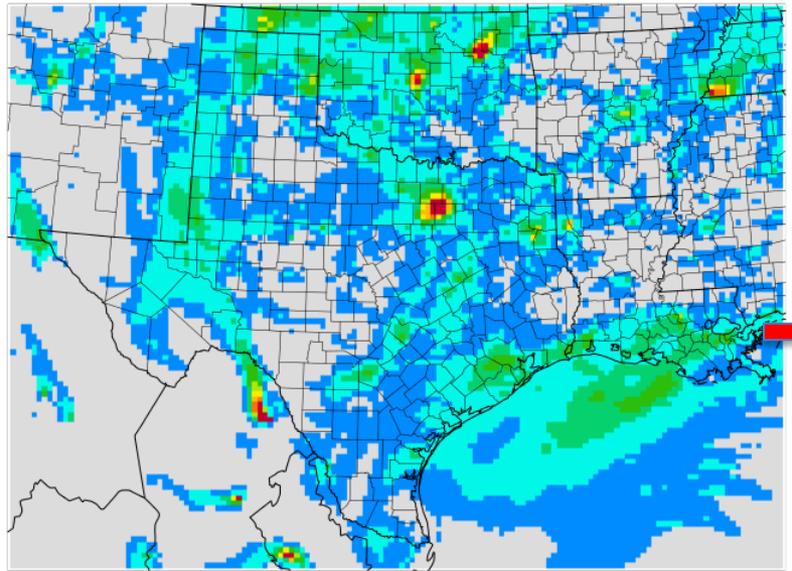
ENVIRON

Min(5,100) = 0.0, Max(50,30) = 25.9

Thu September 12 09:00 CST

**CAMx Surface NO and NOx**

**NOx**  
Best Case



ENVIRON

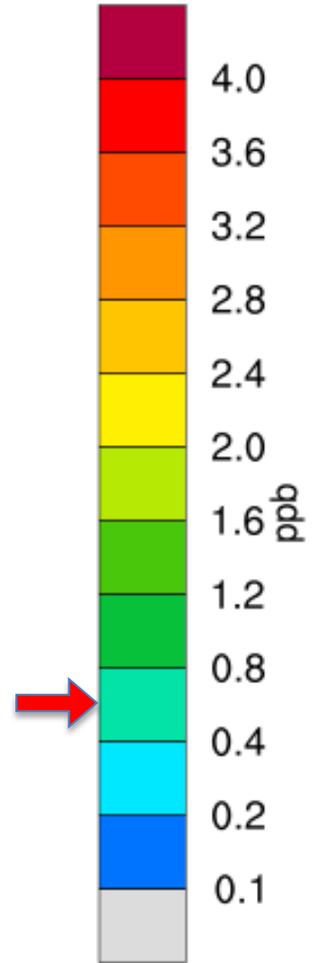
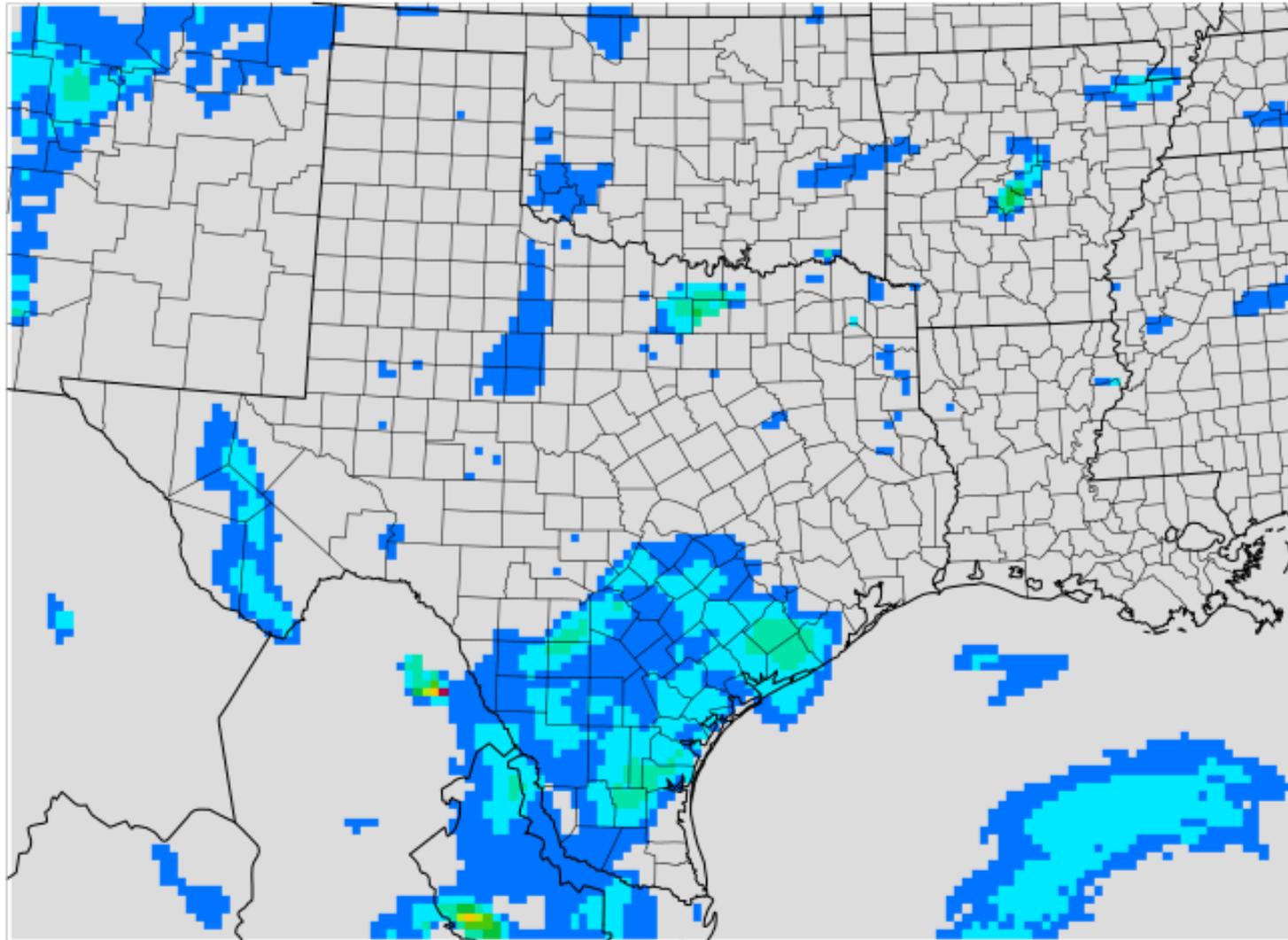
Min(7,15) = 0.1, Max(50,30) = 56.1

Thu September 12 09:00 CST

CAMx Model  
1.2 km NO2

# NO<sub>2</sub>

Best Case: CAMx Layer 14



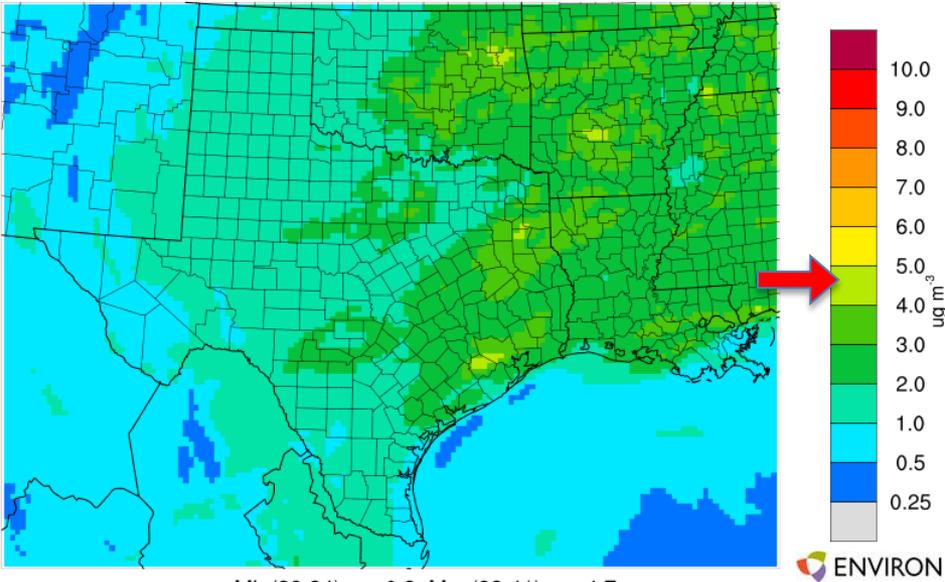
Min(100,30) = 0.0, Max(51,30) = 5.4

Thu September 12 09:00 CST



# Formaldehyde

Best Case: CAMx Layer 14



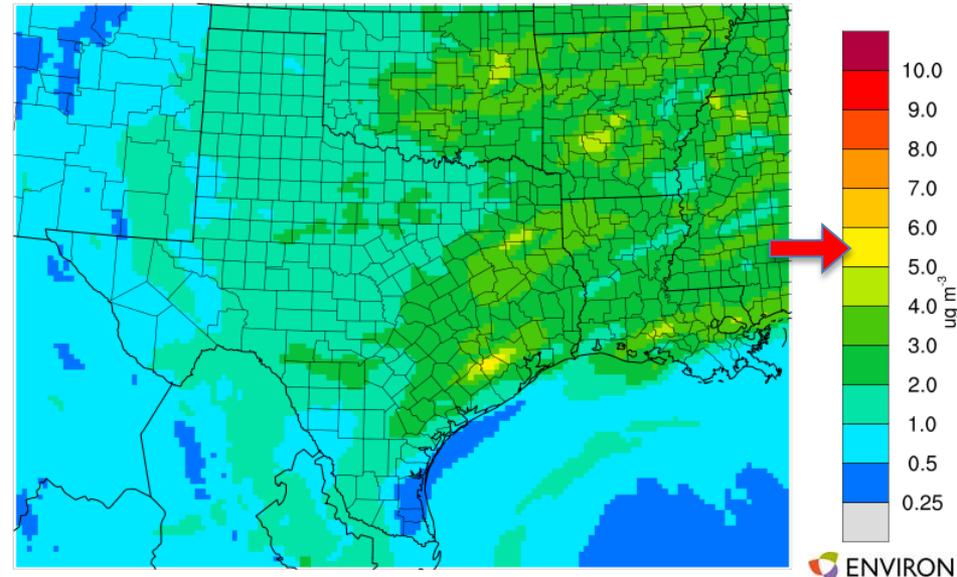
Min(39,24) = 0.3, Max(93,41) = 4.7

Thu September 12 14:00 CST

## CAMx Model Formaldehyde 1.2 km (Layer 14)

# Formaldehyde

Best Case: CAMx Layer 14

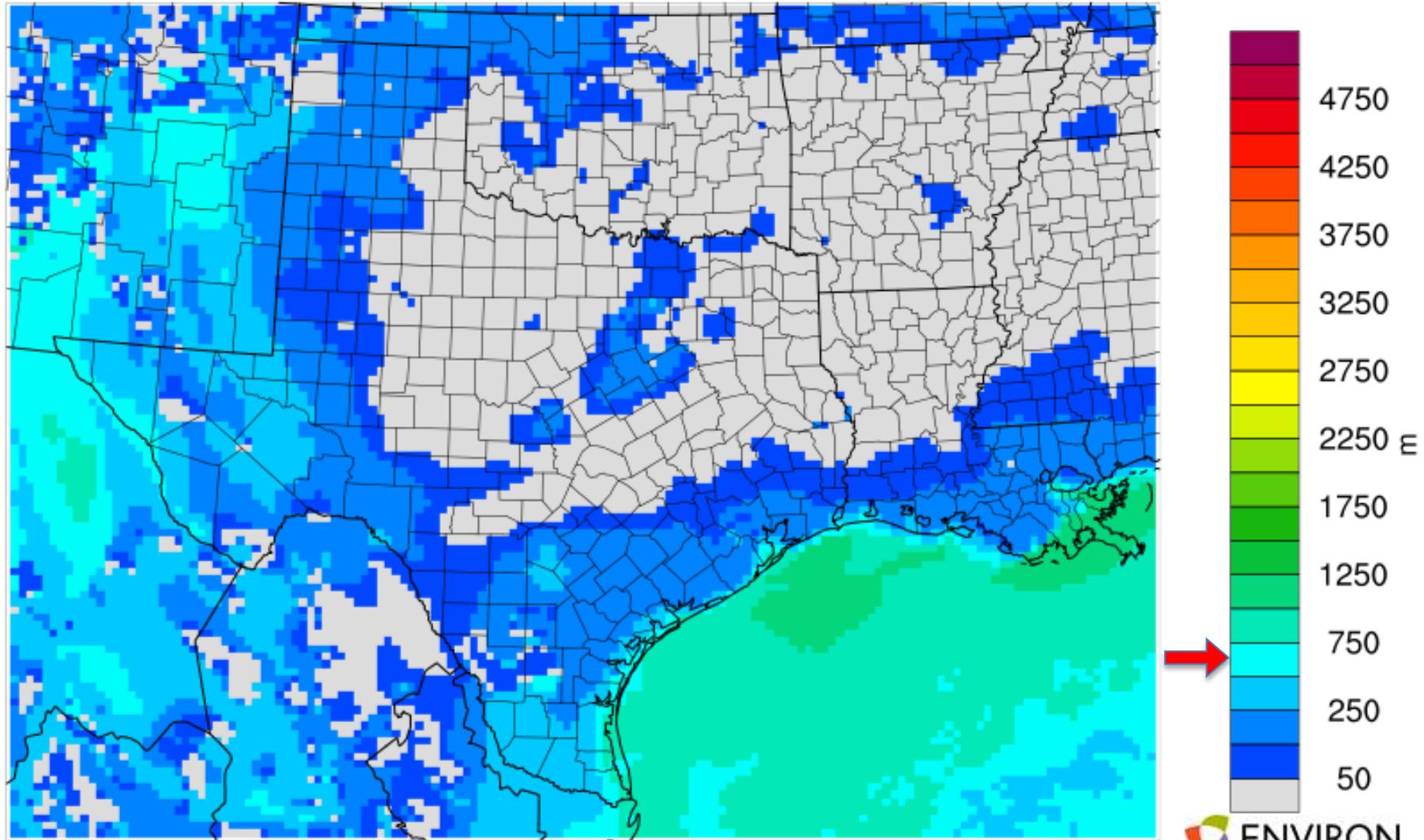


Min(35,21) = 0.3, Max(92,41) = 5.5

Thu September 12 17:00 CST

# PBL Height

Texas 12km



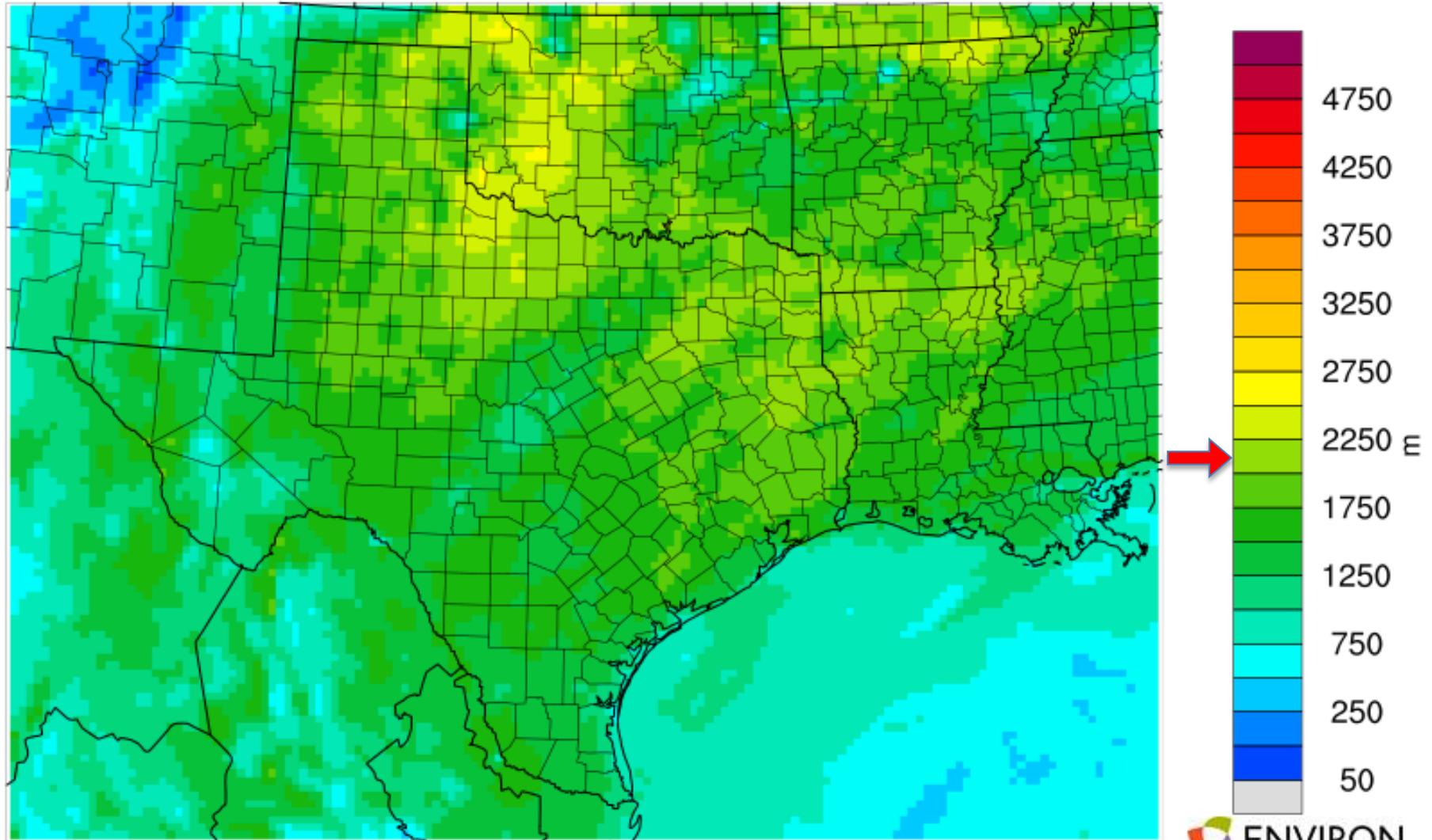
Min(2,99) = 16.0, Max(140,43) = 1176.3

Thu September 12 06:00 CST



# PBL Height

Texas 12km

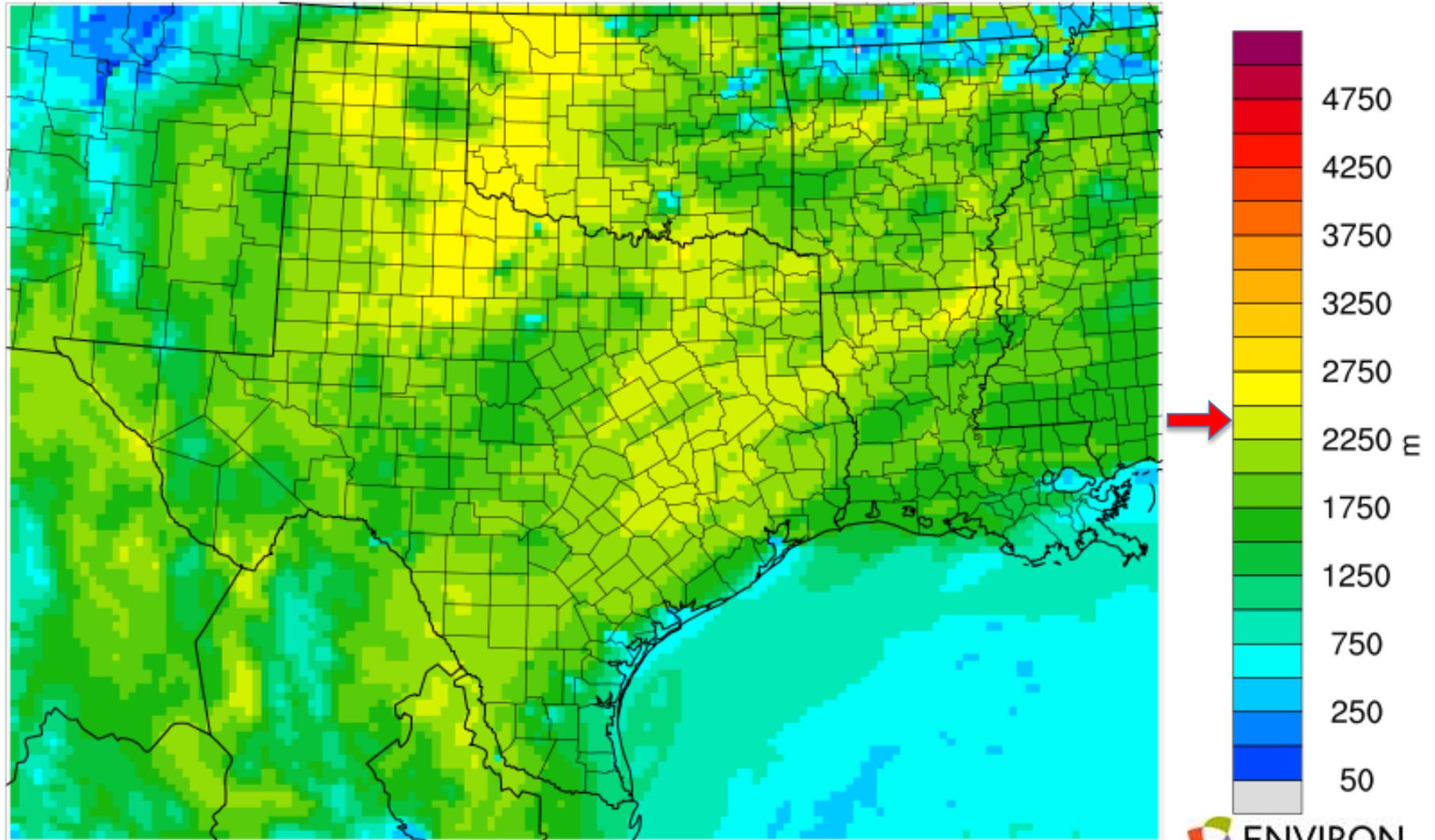


Min(23,109) = 62.6, Max(66,106) = 2547.6

Thu September 12 12:00 CST

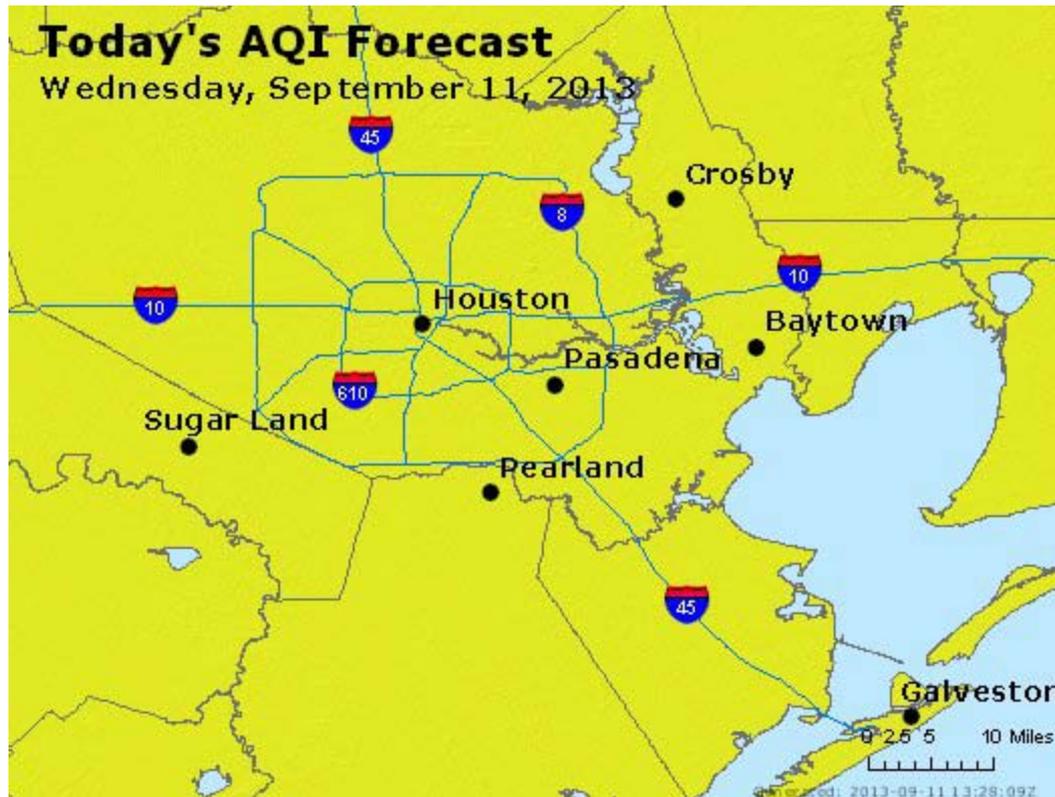
# PBL Height

Texas 12km



Min(110,104) = 47.0, Max(60,79) = 2794.0

Thu September 12 16:00 CST



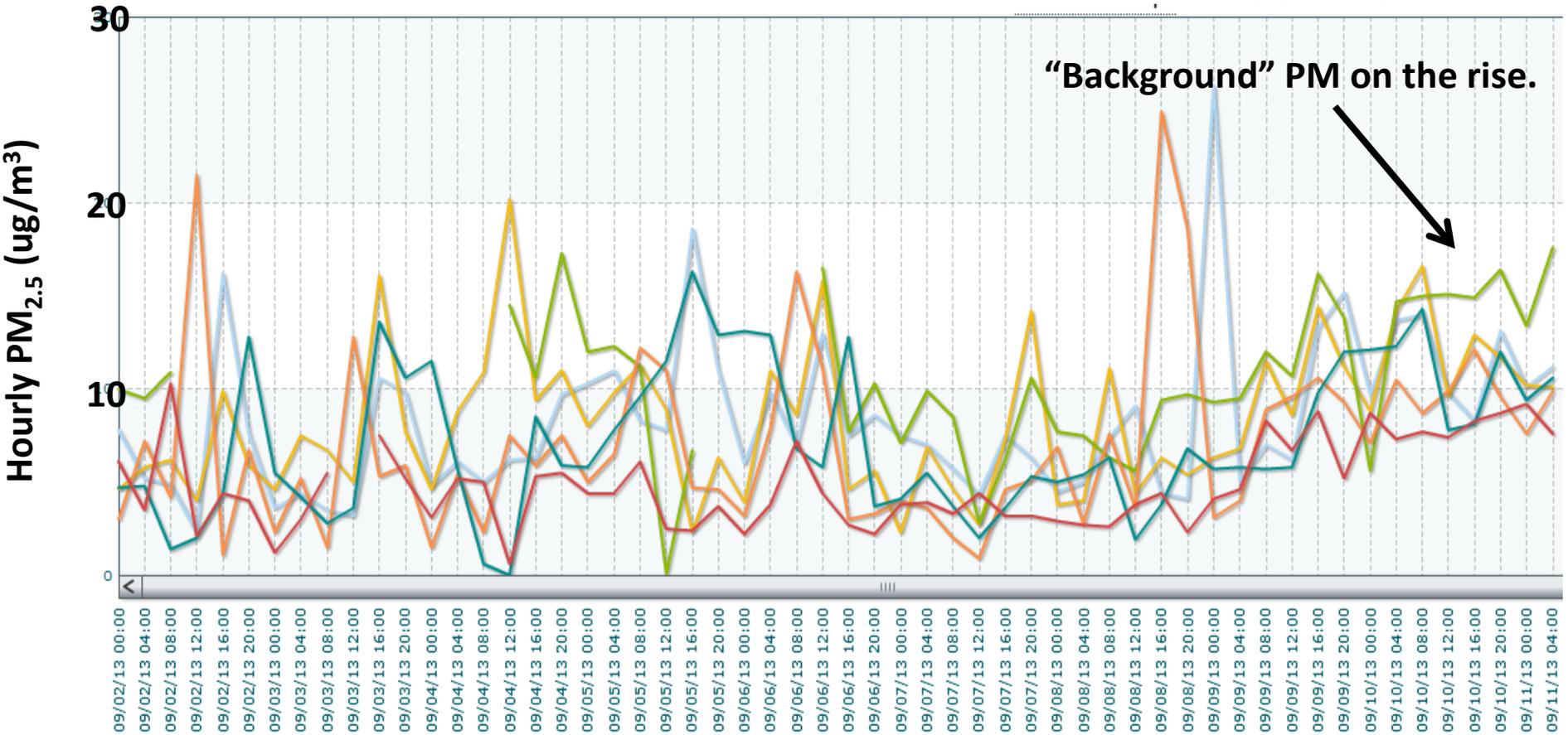
Moderate ozone (Code Yellow) expected today W and SW of Houston; Yellow but borderline Code Orange on Thurs. to the W and SW; Code Orange on Friday and Saturday, especially W and NW of Houston.

PM2.5 will be in the low moderate range Wed., Thurs., Fri., and Sat. with considerable continental background advected to the region.

# Hourly PM<sub>2.5</sub> (airnowtech.org)\*\*

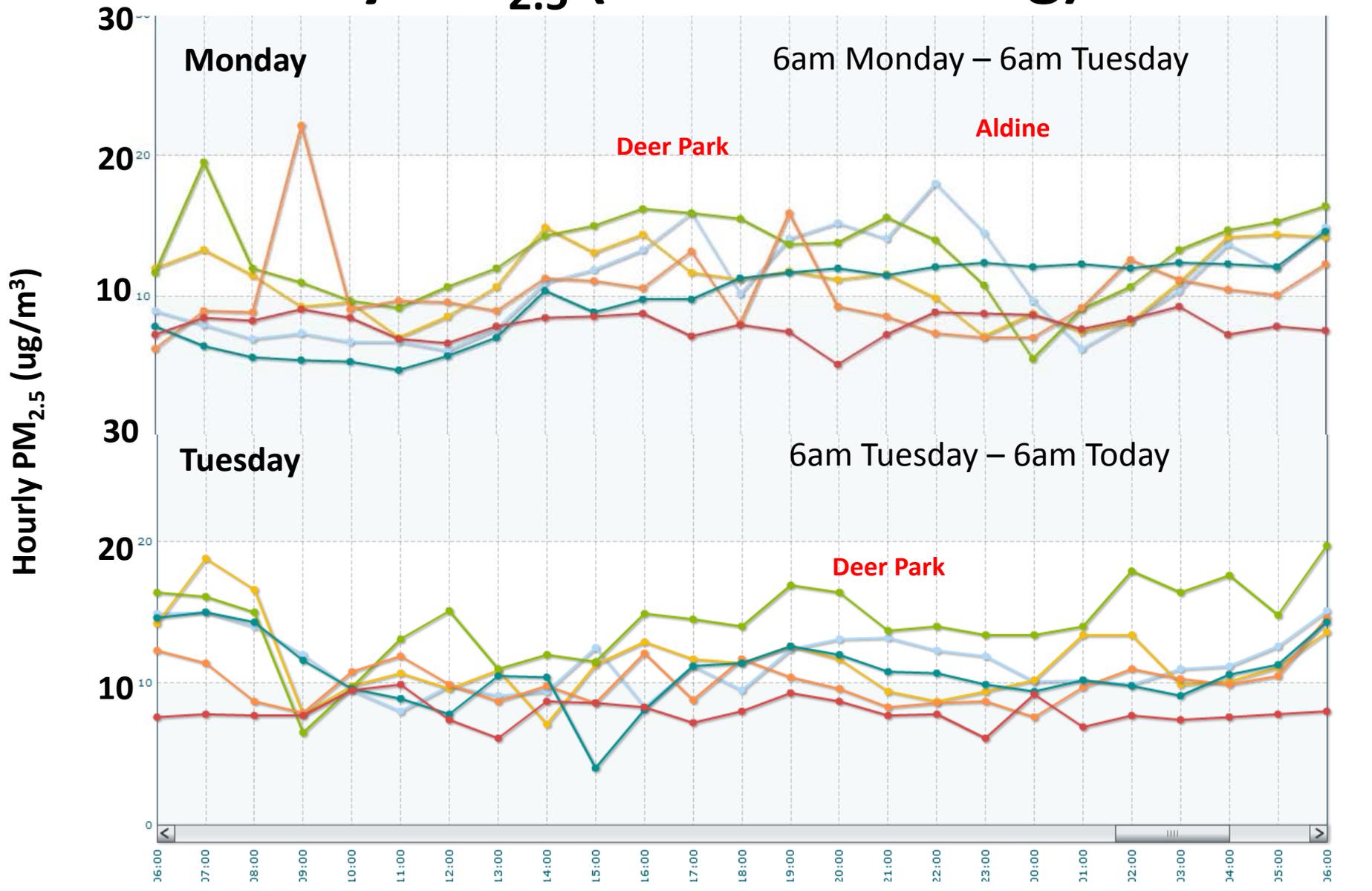
September 2<sup>nd</sup> – 10<sup>th</sup>

\*\* EVERY 4<sup>th</sup> HOUR PLOTTED!!!!



- |  |   |
|--|---|
| Houston Aldine C8/PM2.5-88502 - 88502/1 Hr/3     | Clinton C403/PM2.5-88502 - 88502/1 Hr/3                 |
| Houston Deer Park C35/PM2.5-88502 - 88502/1 Hr/3 | Seabrook Friendship Park C45/PM2.5-88502 - 88502/1 Hr/3 |
| Conroe Relocated C78/PM2.5-88502 - 88502/1 Hr/3  | Galveston Airport C1034/PM2.5-88502 - 88502/1 Hr/3      |

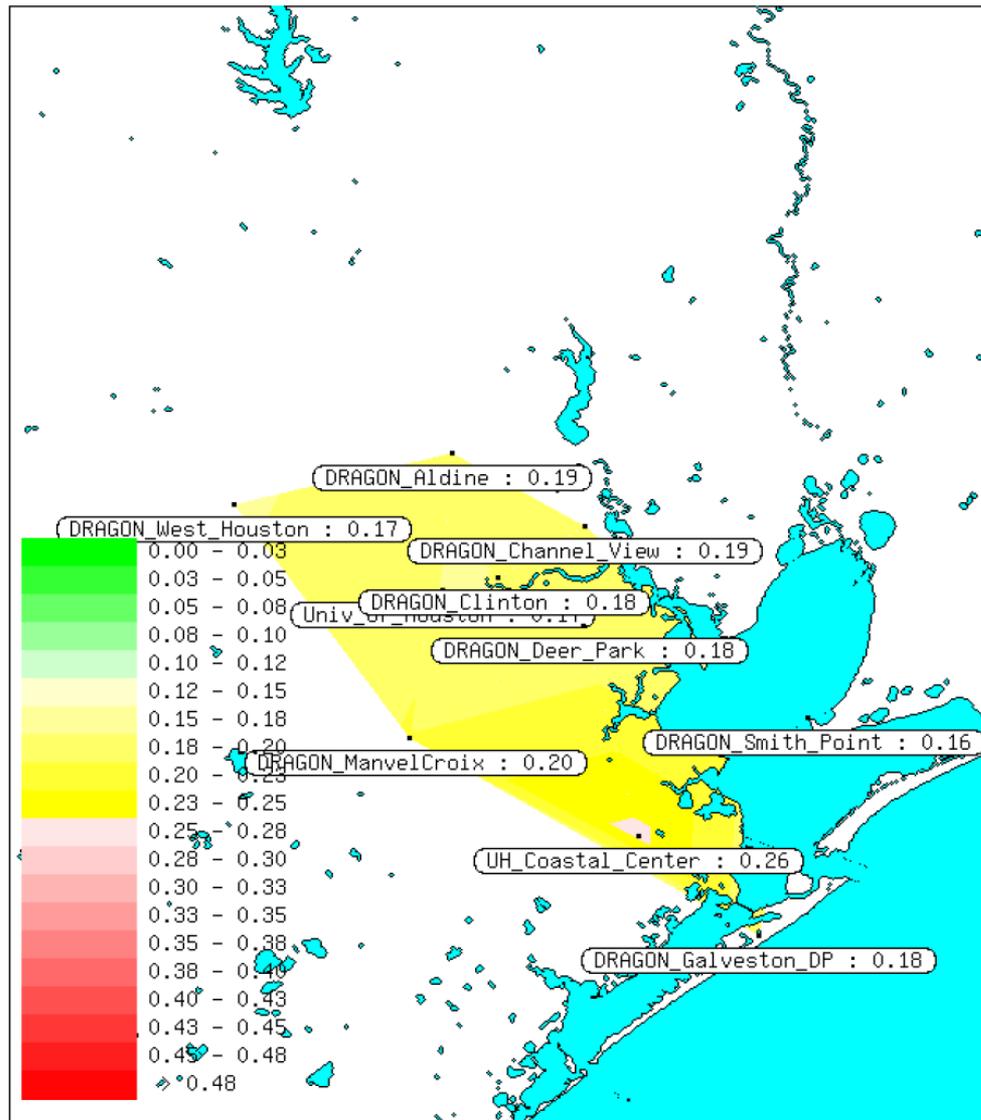
# Hourly PM<sub>2.5</sub> (airnowtech.org)



- Houston Aldine C8/PM2.5-88502 - 88502/1 Hr/3
- Houston Deer Park C35/PM2.5-88502 - 88502/1 Hr/3
- Houston Clinton C403/PM2.5-88502 - 88502/1 Hr/3
- Houston Seabrook Friendship Park C45/PM2.5-88502 - 88502/1 Hr/3
- Conroe Relocated C78/PM2.5-88502 - 88502/1 Hr/3
- Galveston Airport C1034/PM2.5-88502 - 88502/1 Hr/3

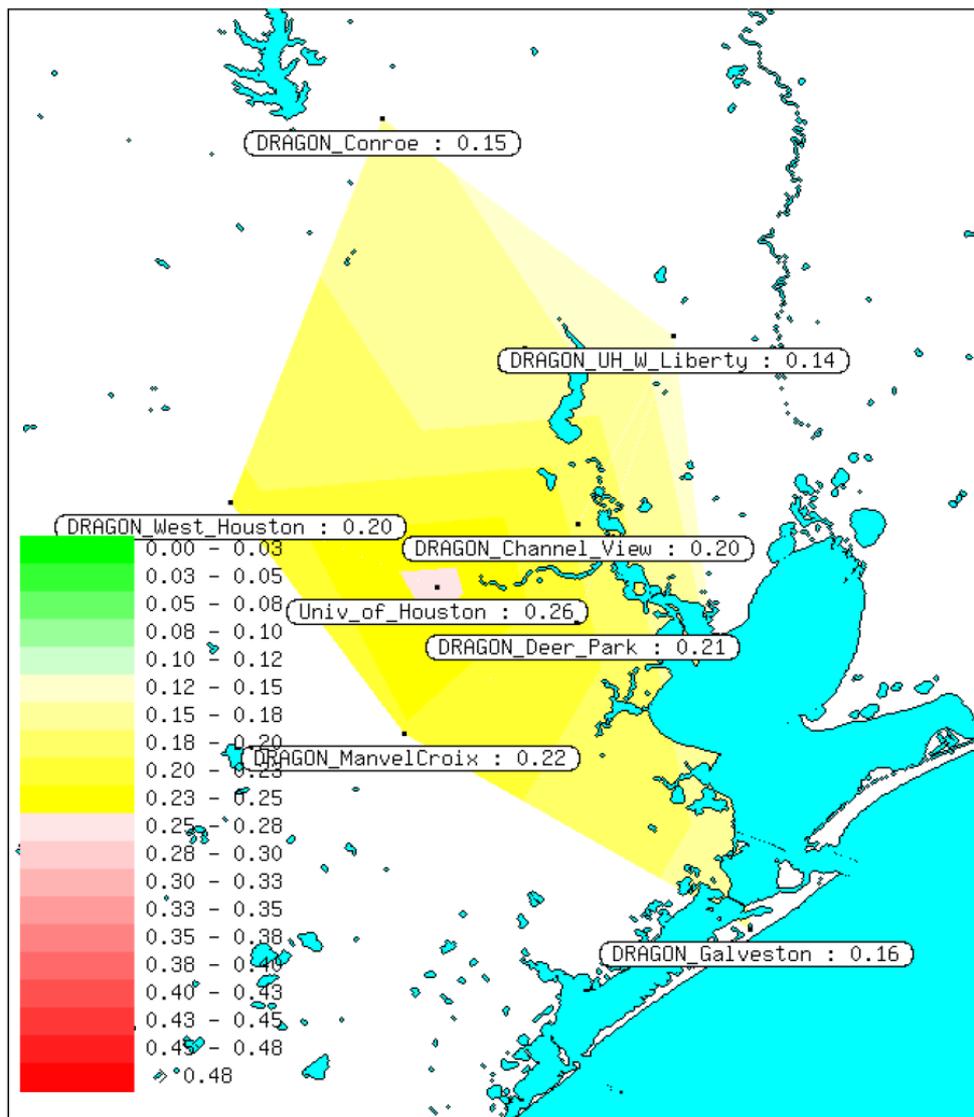
( N 30.5000, W 96.0000 )

( N 30.5000, W 94.5000 )

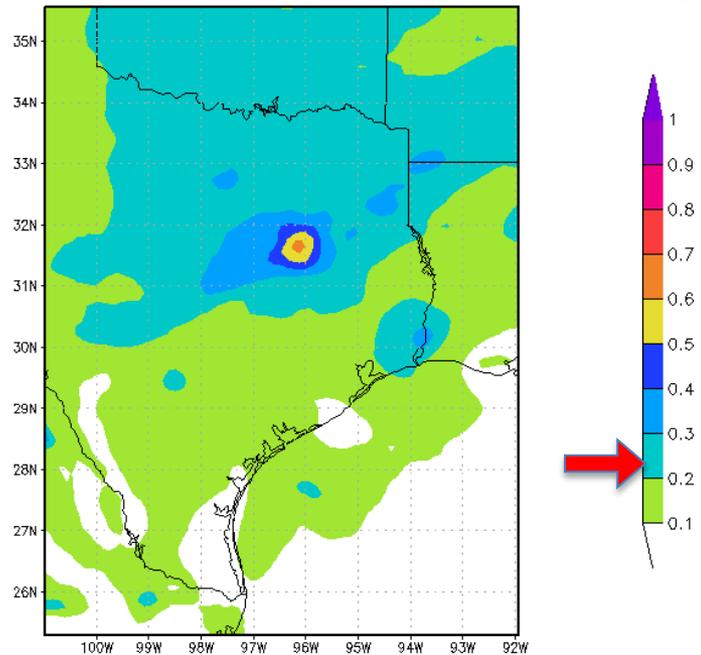


( N 30.5000, W 96.0000 )

( N 30.5000, W 94.5000 )

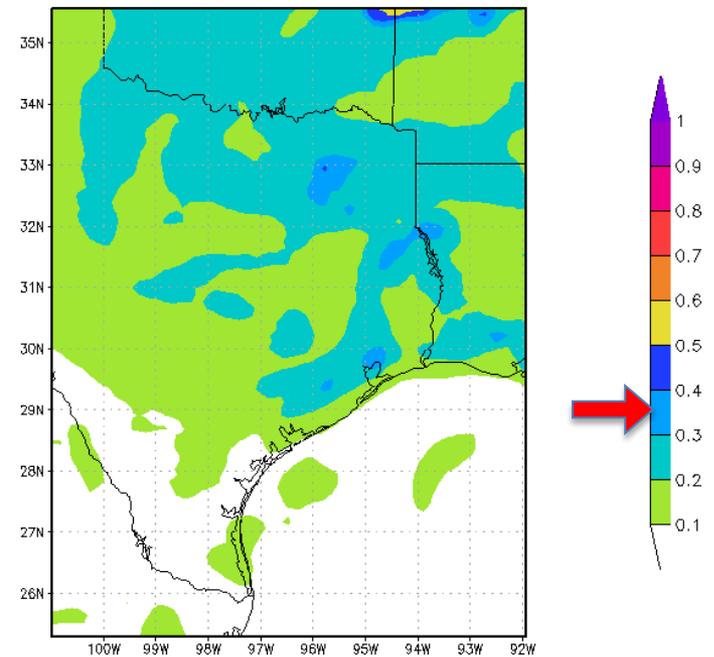


(dev) aot 32H VALID 14Z 12 SEP2013 [dimensionless]

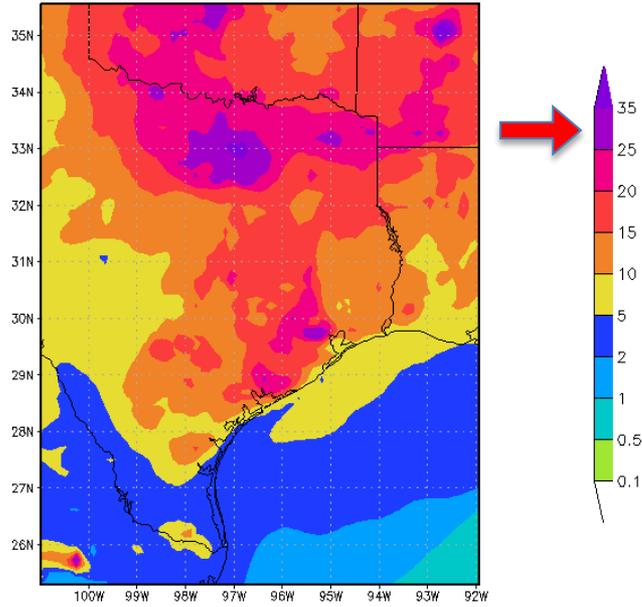


## NOAA Experimental CMAQ

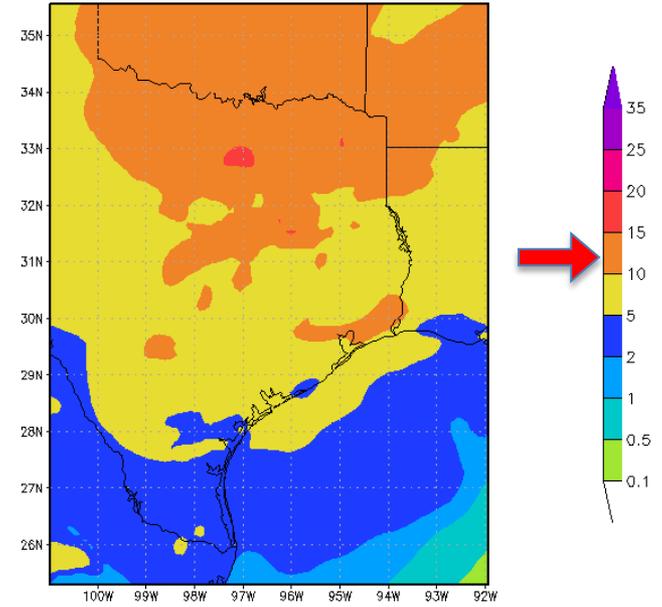
(dev) aot 40H VALID 22Z 12 SEP2013 [dimensionless]



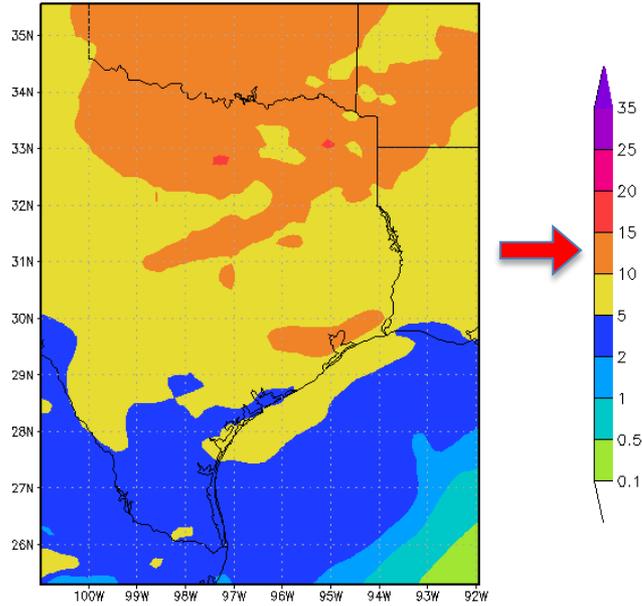
(dev) sfc pm25 32H VALID 14Z 12 SEP2013 [ $\mu\text{g}/\text{m}^3$ ]



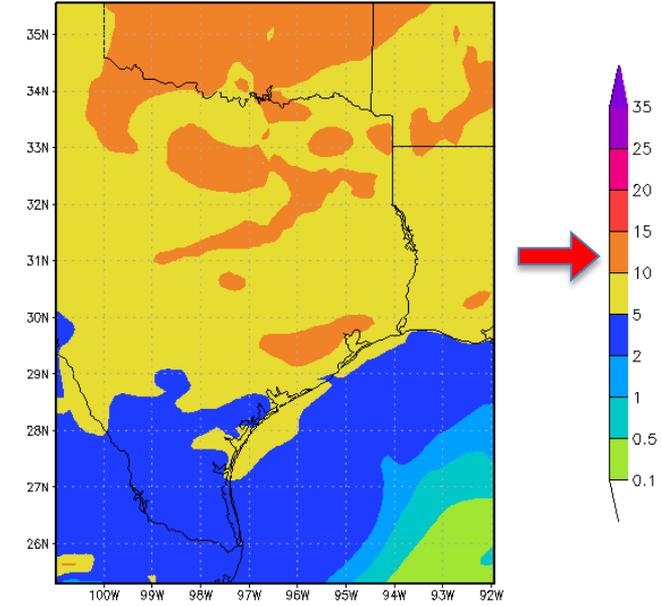
(dev) sfc pm25 35H VALID 17Z 12 SEP2013 [ $\mu\text{g}/\text{m}^3$ ]



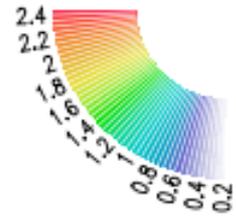
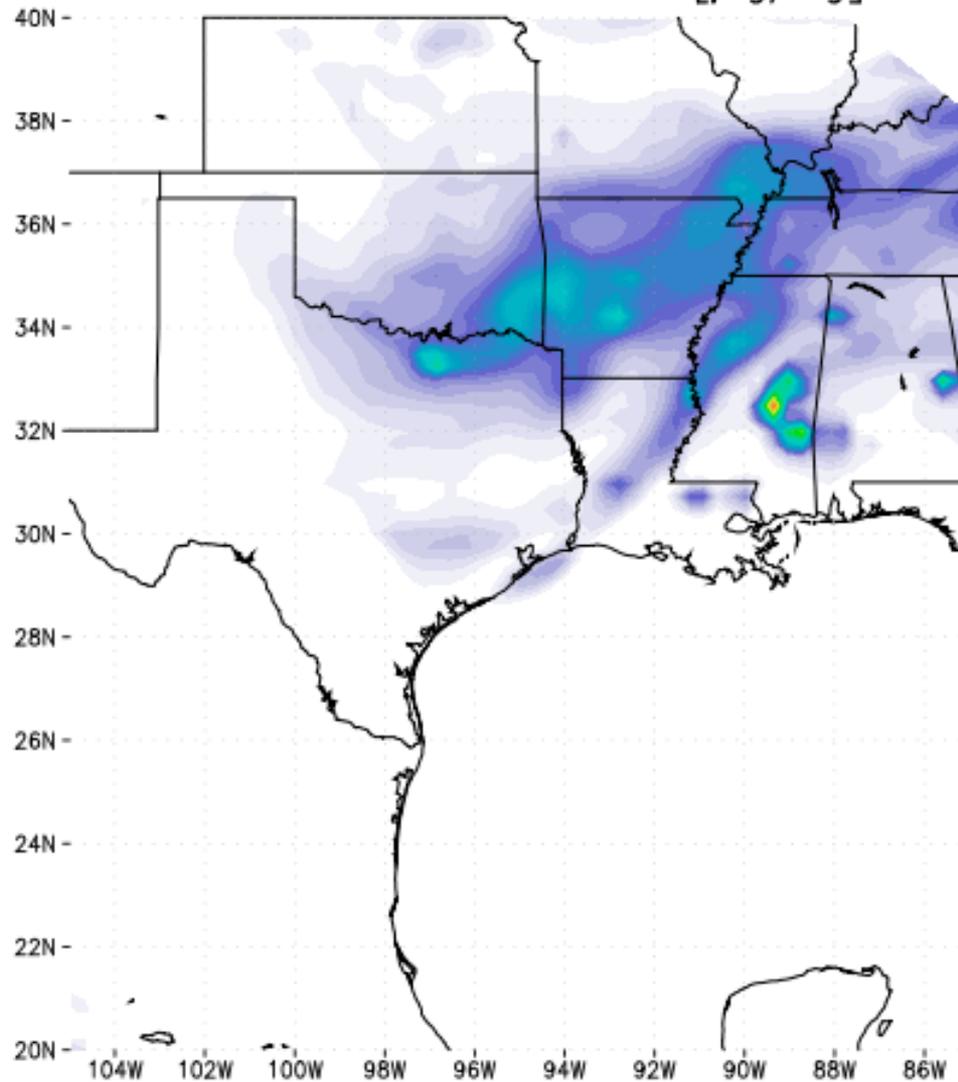
(dev) sfc pm25 37H VALID 19Z 12 SEP2013 [ $\mu\text{g}/\text{m}^3$ ]



(dev) sfc pm25 40H VALID 22Z 12 SEP2013 [ $\mu\text{g}/\text{m}^3$ ]

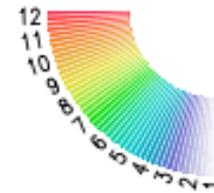
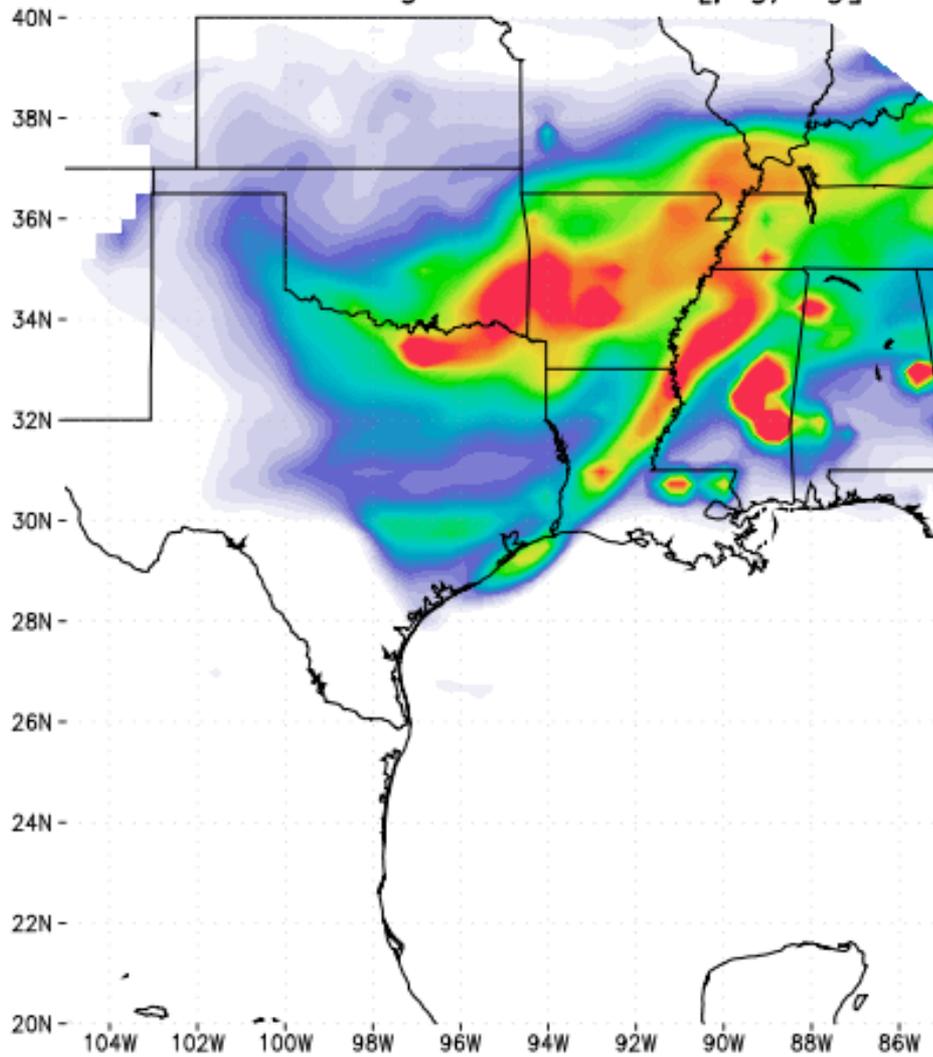


NASA/GMAO - GEOS-5 Forecast Initialized on 06z 2013-09-11  
850 hPa Black Carbon [ $\mu\text{g}/\text{kg}$ ]



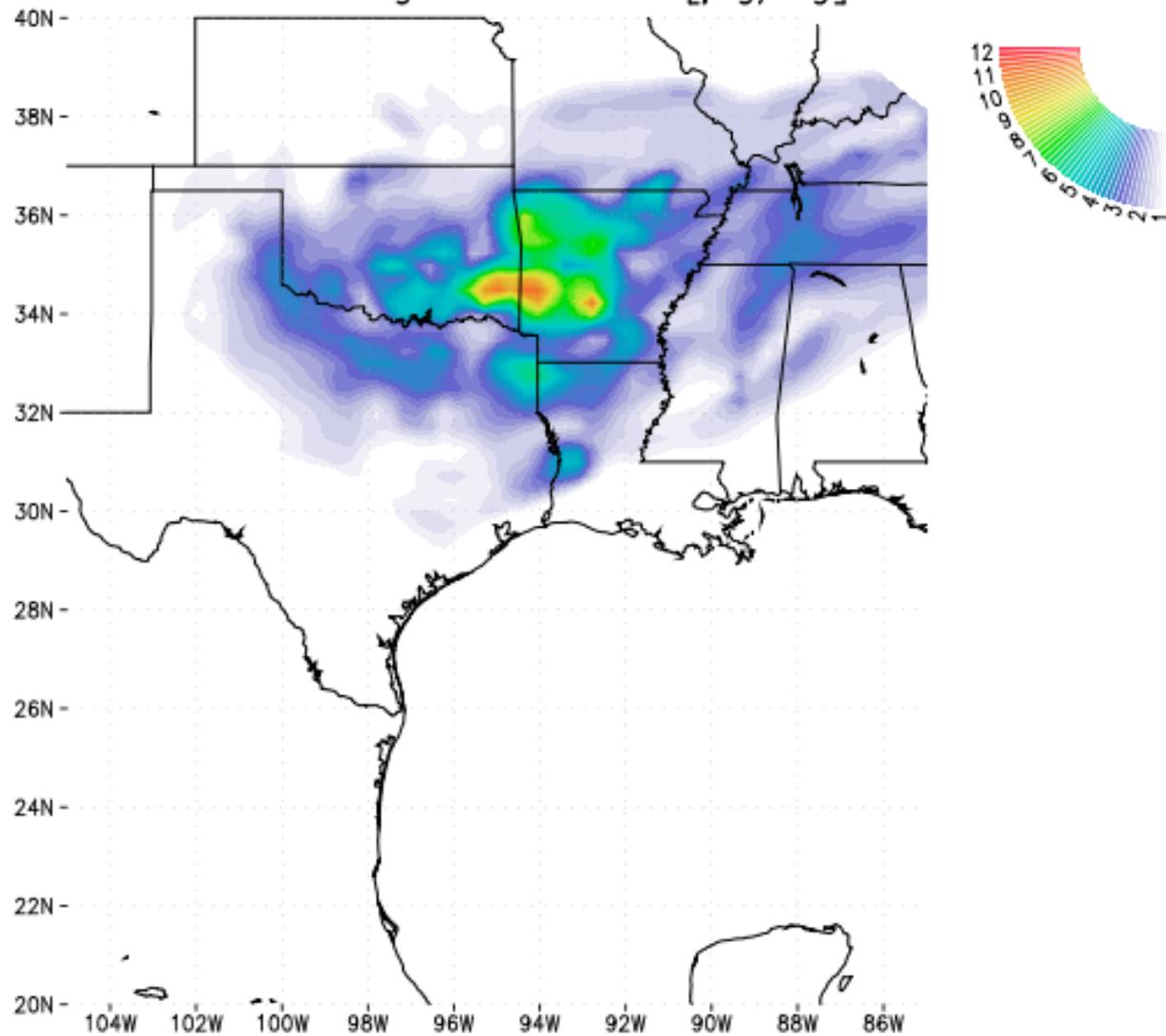
Valid: Thu 18z 2013-09-12 ( $\tau = 36$ )

NASA/GMAO – GEOS-5 Forecast Initialized on 06z 2013-09-11  
850 hPa Organic Carbon [ $\mu\text{g}/\text{kg}$ ]



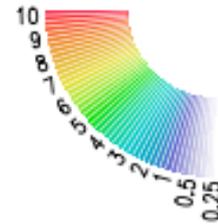
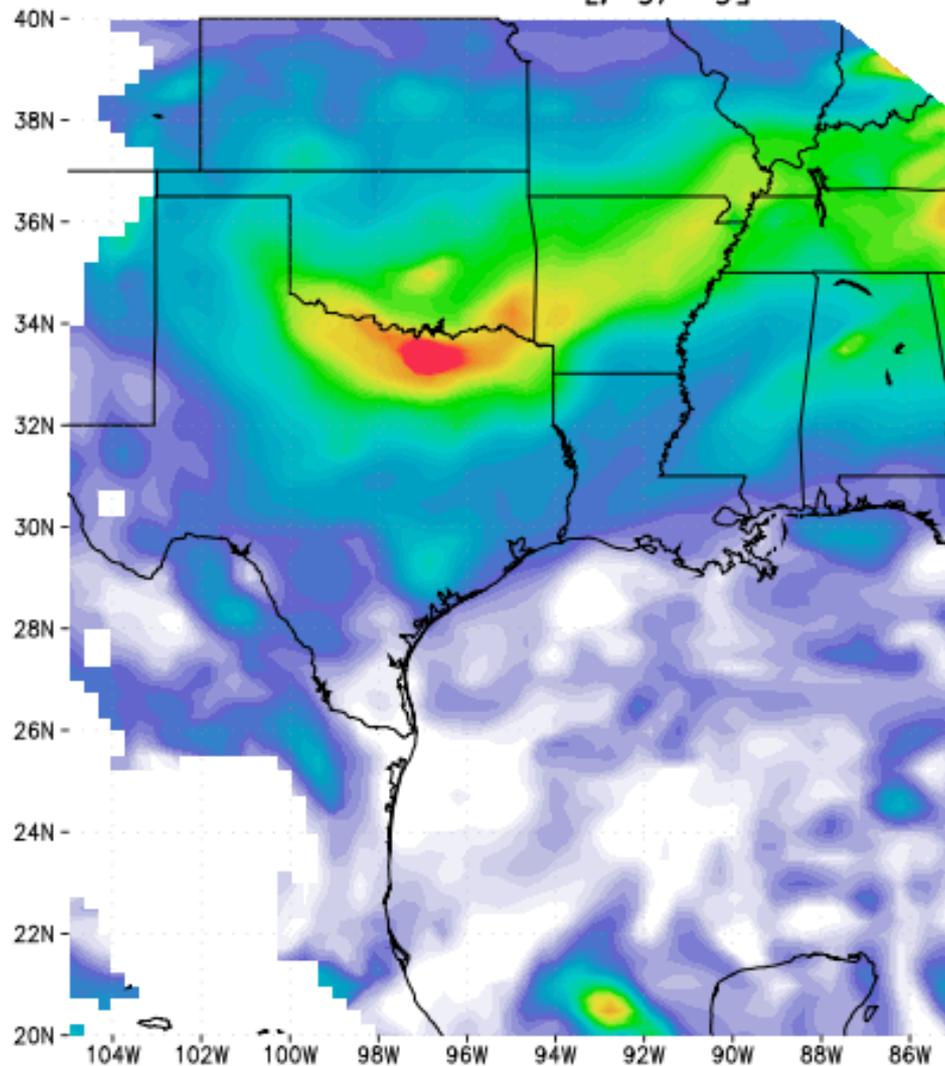
Valid: Thu 18z 2013-09-12 ( $\tau = 36$ )

NASA/GMAO – GEOS-5 Forecast Initialized on 06z 2013-09-11  
700 hPa Organic Carbon [ $\mu\text{g}/\text{kg}$ ]



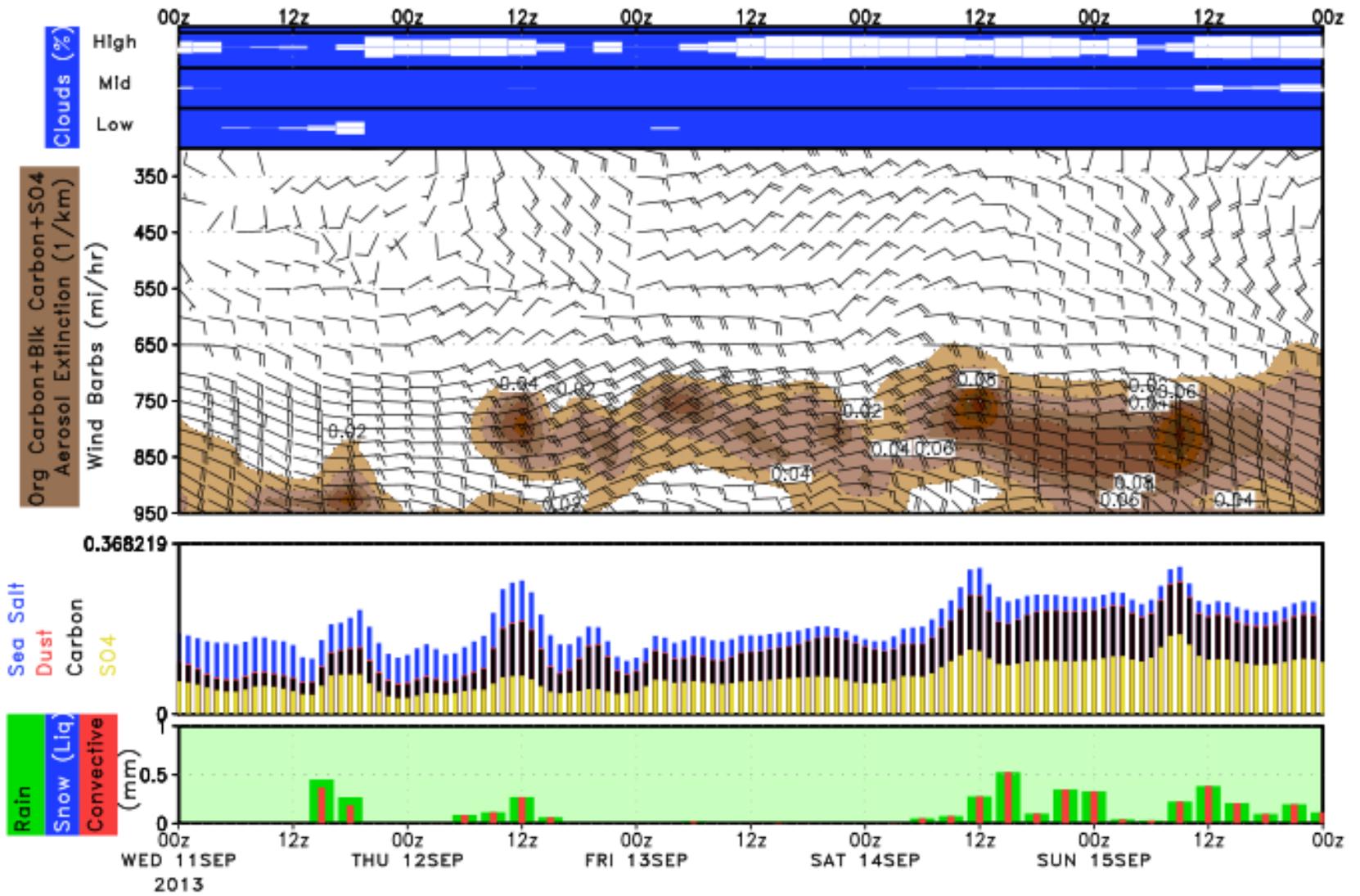
Valid: Thu 18z 2013-09-12 ( $\tau = 36$ )

NASA/GMAO - GEOS-5 Forecast Initialized on 06z 2013-09-11  
850 hPa S04 [ $\mu\text{g}/\text{kg}$ ]



Valid: Thu 18z 2013-09-12 ( $\tau = 36$ )





LAT = 29.2 , LON = -94.8, Location = Galveston, Fcst\_init = 20130911