DISCOVER-AQ OUTLOOK -- September 12, 2013

Some scattered cirrus were present in the morning, but otherwise this was perhaps the most cloud-free day we have had so far. Ozone built up in the afternoon on the west and southwest side of Houston, with a maximum of about 80 ppbv at the surface observed at Sugarland. However, the most seen from the P-3B was ~70 ppbv.

Friday is expected to be similar to today with only a small amount of cirrus. High clouds from the tropical system to our south should still remain well south of our region on Friday. However, Saturday, Sunday, and Monday show a much better chance of having upper level outflow cirrus from the tropical system.

Air quality is expected to reach Code Orange (unhealthy for sensitive groups) for ozone on Friday, especially on the SW and W side of Houston. Ozone should drop back to Code Yellow (moderate) on Saturday and Sunday.

9/12/2013 Weather Briefing

Clare Flynn
Ken Pickering

Conroe:

THIS AFTERNOON	TONIGHT	FRIDAY	FRIDAY NIGHT	SATURDAY	SATURDAY NIGHT	SUNDAY	SUNDAY NIGHT	MONDAY
Mostly Sunny High: 96 °F	Partly Cloudy Low: 71 °F	Mostly Sunny High: 96 °F	Mostly Cloudy Low: 71 °F	20% Slight Chc Thunderstorms High: 94 °F	Mostly Cloudy Low: 72 °F	20% Slight Chc Thunderstorms High: 93 °F	Mostly Cloudy Low: 73 °F	30% Chance Thunderstorms High: 92 °F

Houston Hobby:

THIS AFTERNOON	TONIGHT	FRIDAY	FRIDAY NIGHT	SATURDAY	SATURDAY NIGHT	SUNDAY	SUNDAY NIGHT	MONDAY
Mostly Sunny High: 94 °F	Partly Cloudy Low: 75 °F	Mostly Sunny High: 94 °F	Partly Cloudy Low: 75 °F	20% Slight Chc Thunderstorms High: 94 °F	Mostly Cloudy Low: 76 °F	30% Chance Thunderstorms High: 90 °F	20% Slight Chc Thunderstorms Low: 76 °F	30% Chance Thunderstorms High: 90 °F

Galveston:

THIS AFTERNOON	TONIGHT	FRIDAY	FRIDAY NIGHT	SATURDAY	SATURDAY NIGHT	SUNDAY	SUNDAY NIGHT	MONDAY
20% Slight Chc Thunderstorms High: 89 °F	Partly Cloudy Low: 81 °F	Mostly Sunny High: 89 °F	Partly Cloudy Low: 80 °F	20% Slight Chc Thunderstorms High: 89 °F	20% Slight Chc Thunderstorms Low: 80 °F	30% Chance Thunderstorms High: 86 °F	20% Slight Chc Thunderstorms Low: 80 °F	30% Chance Thunderstorms High: 87 °F

Current Conditions

Conroe:

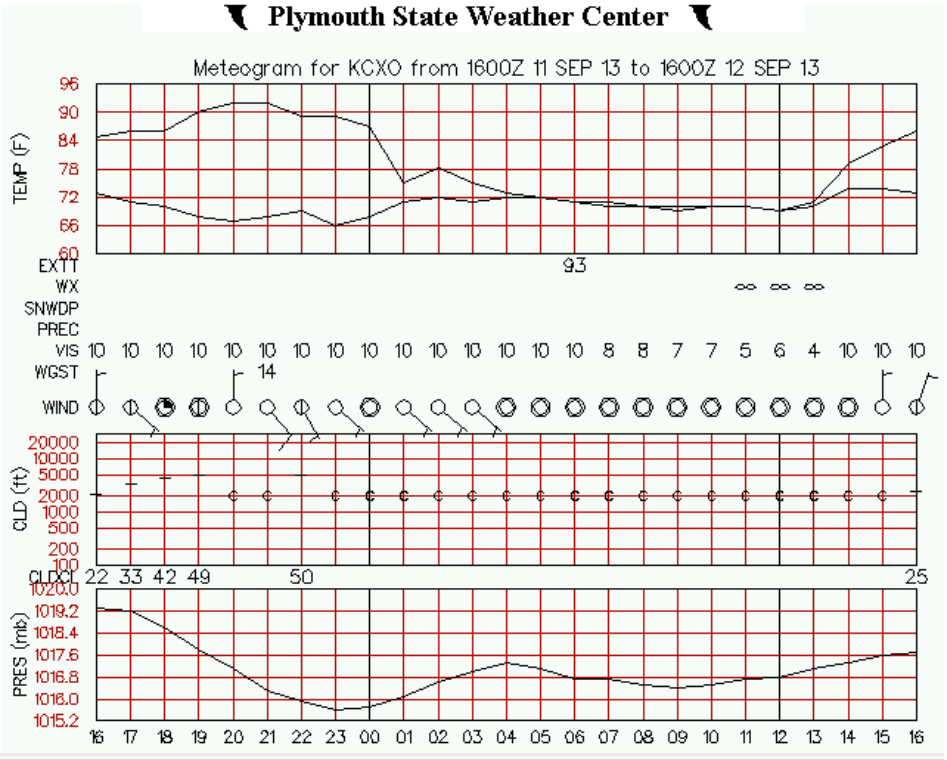
Mostly Cloudy

87°F

31°C

Humidity	55%
Wind Speed	NE 3 mph
Barometer	30.06 in (1017.4 m
Dewpoint	69°F (21°C)
Visibility	10.00 mi
Heat Index	91°F (33°C)

Last Update on 12 Sep 11:53 am CDT



Houston Hobby:

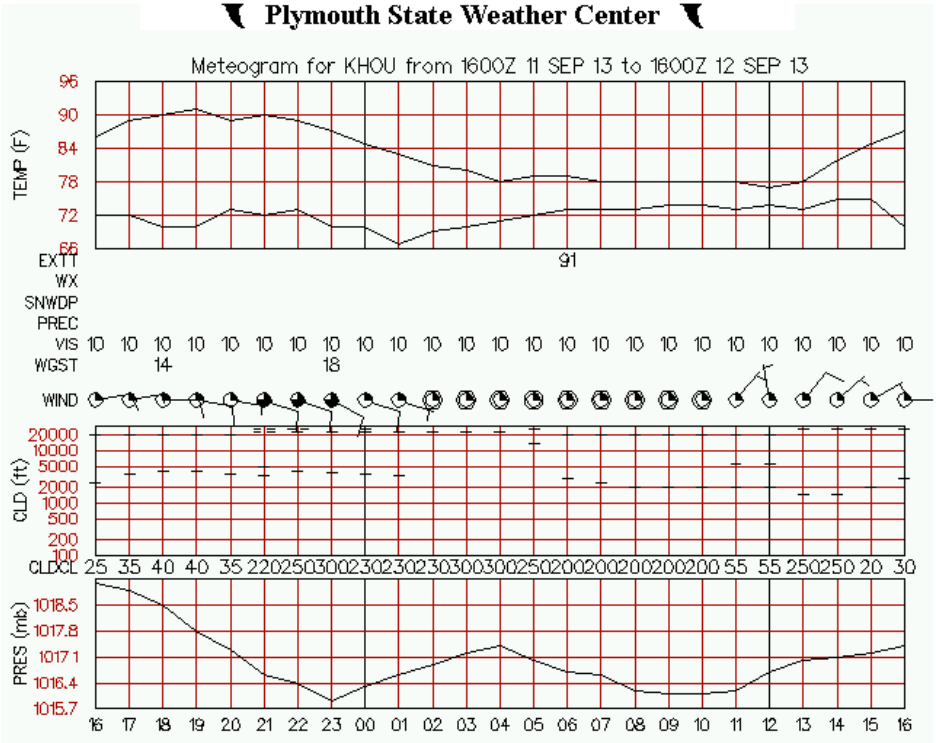
Partly Cloudy

90°F

32°C

Humidity	52%
Wind Speed	NE 10 mph
Barometer	30.02 in (1017.1 mb)
Dewpoint	70°F (21°C)
Visibility	10.00 mi
Heat Index	96°F (36°C)

Last Update on 12 Sep 11:53 am CDT



Current Conditions

Galveston:

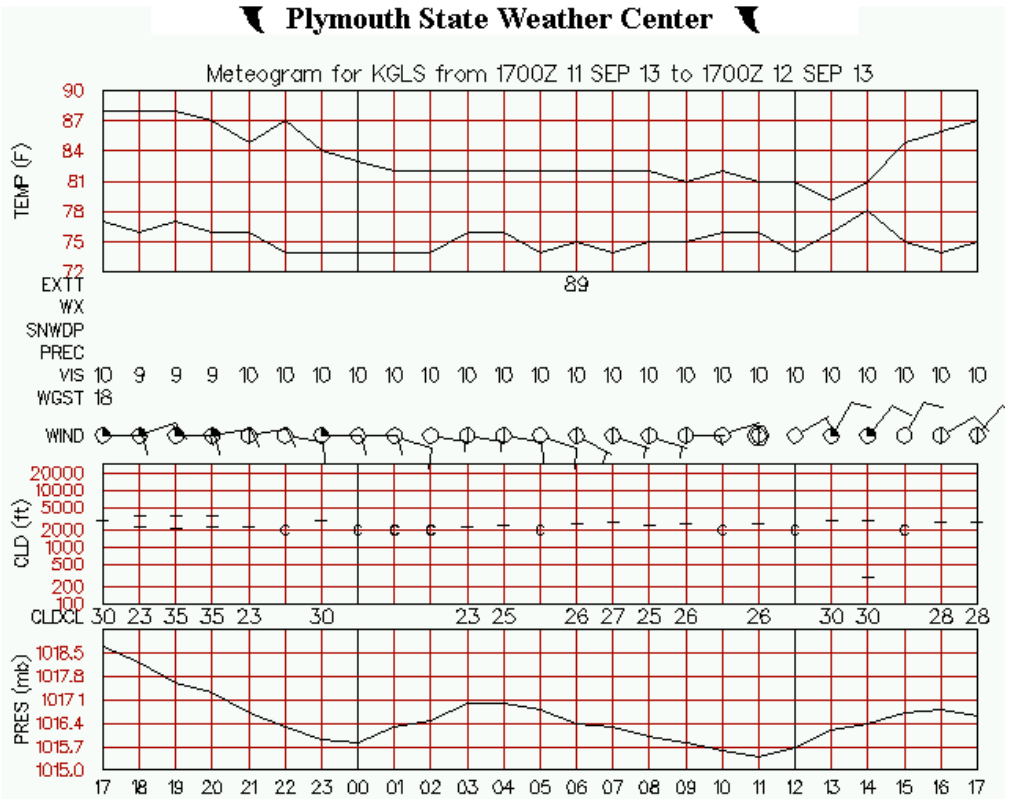
A Few Clouds

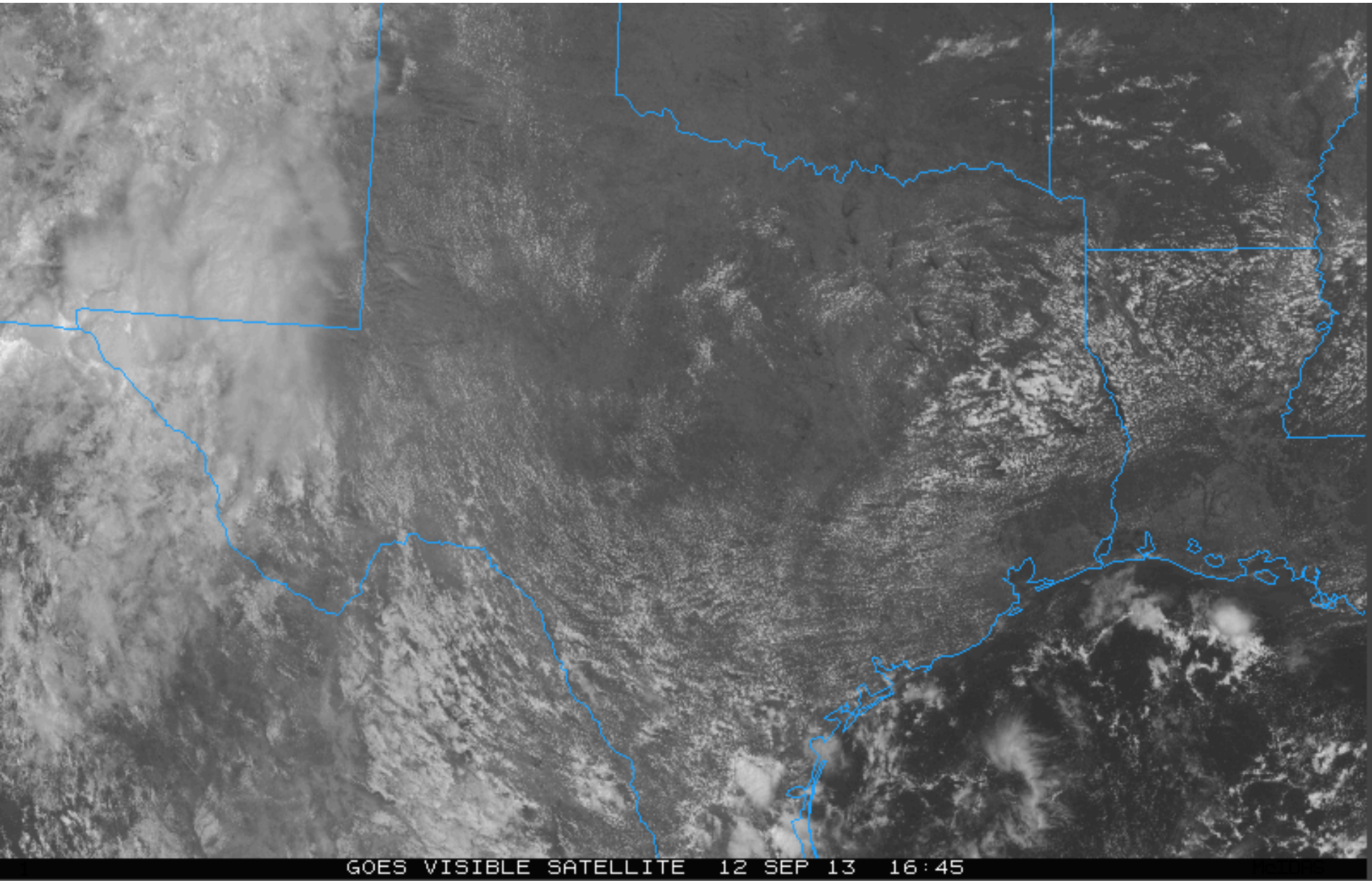
87°F

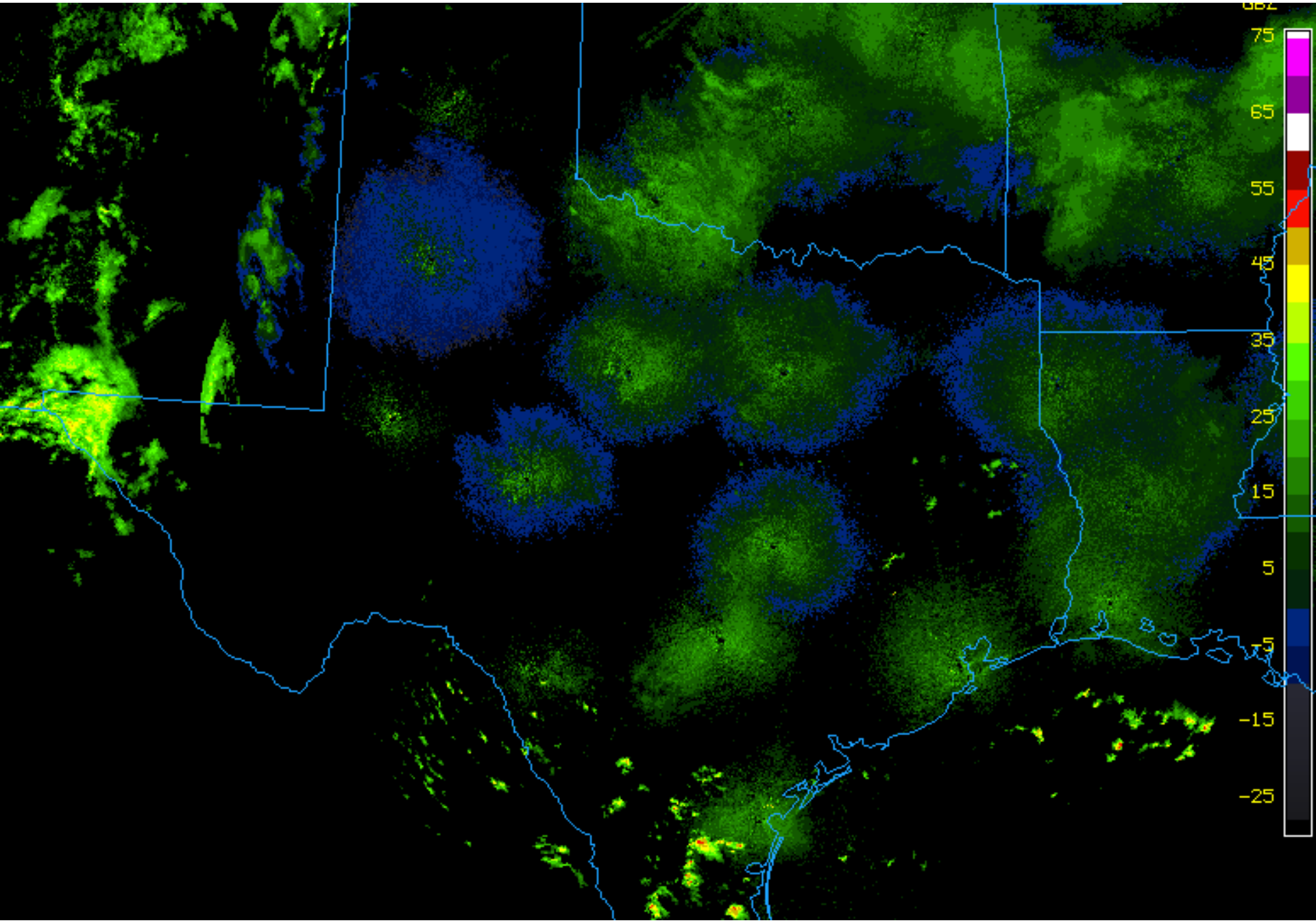
31°C

Humidity	67%
Wind Speed	NE 13 mph
Barometer	30.02 in (1016.6 mb)
Dewpoint	75°F (24°C)
Visibility	10.00 mi
Heat Index	96°F (36°C)

Last Update on 12 Sep 11:52 am CDT




GOES VISIBLE SATELLITE 12 SEP 13 16:45


75
65
55
45
35
25
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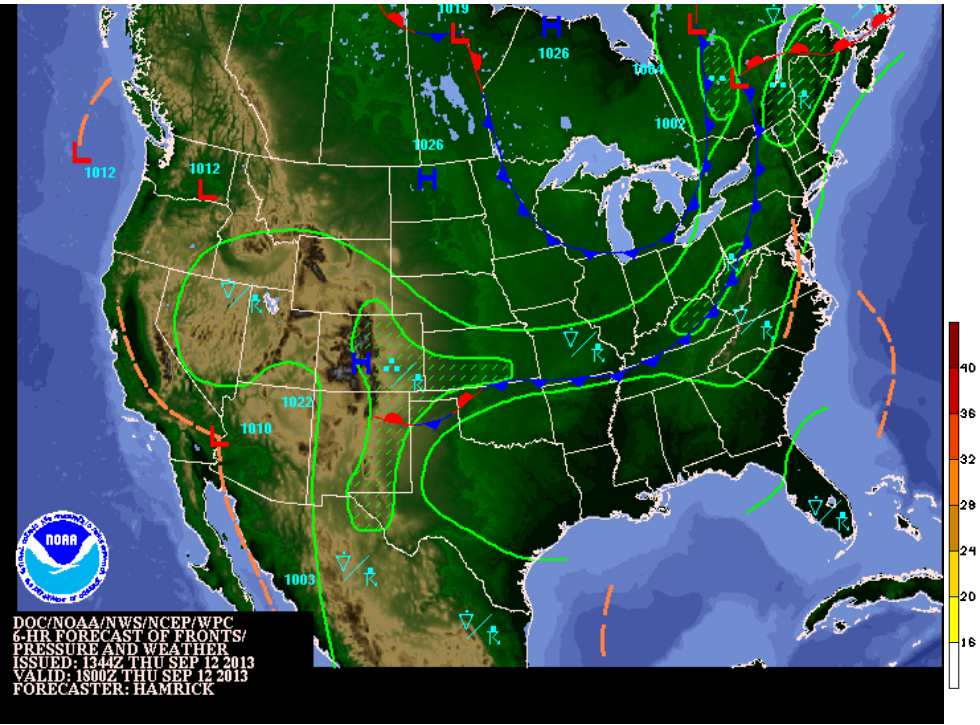
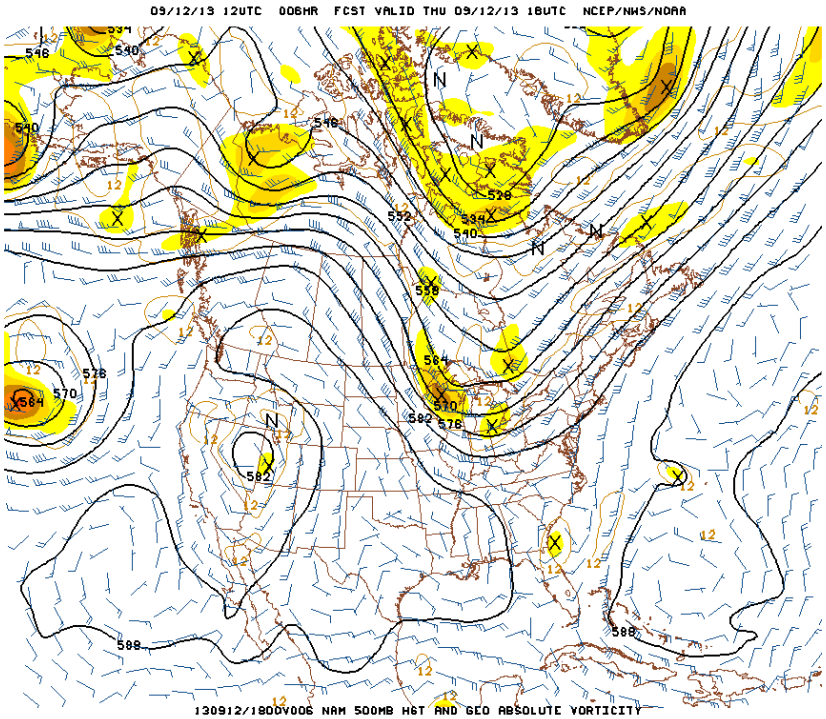
-25

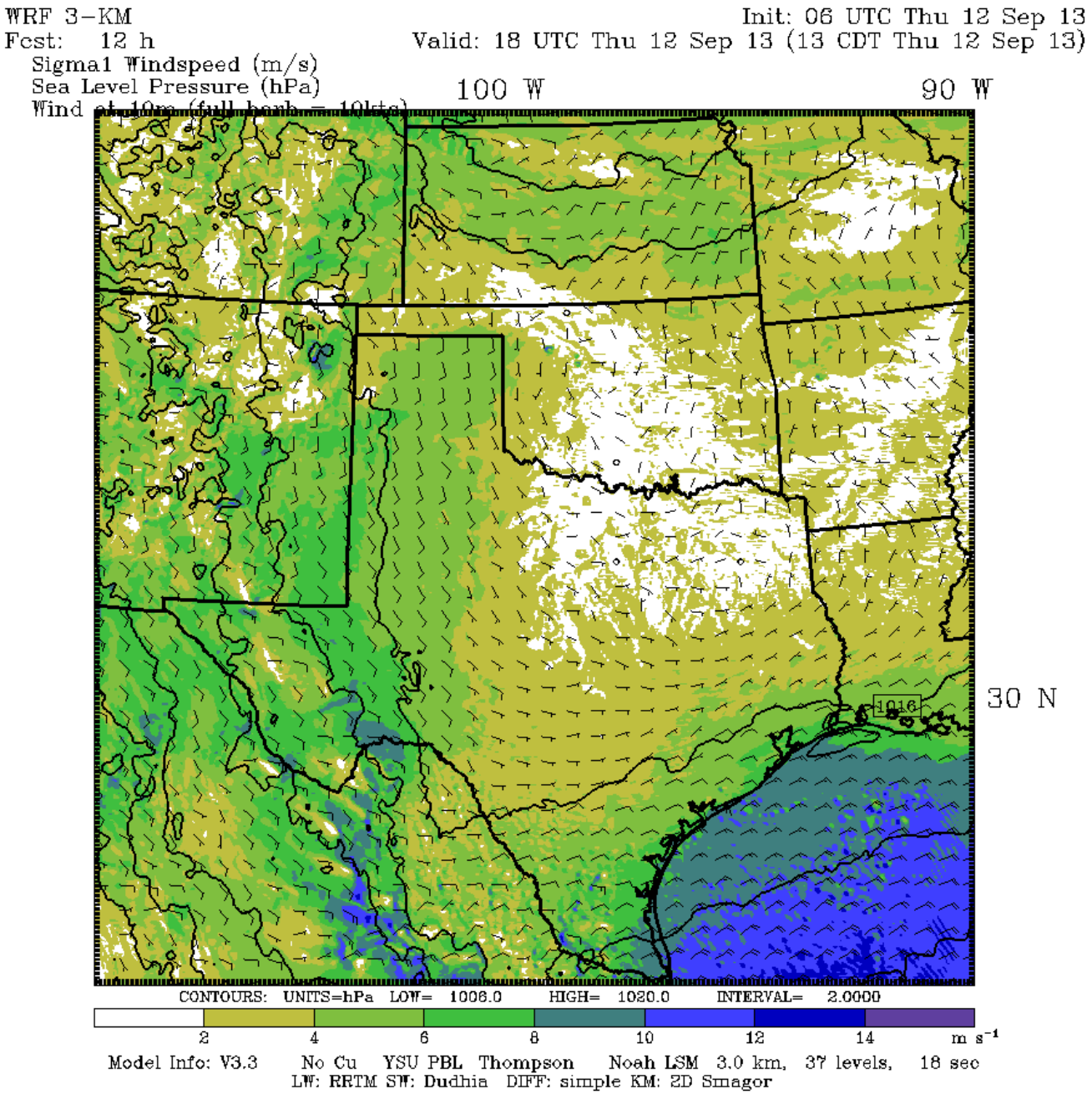
Today: Region under the influence of upper level ridge. Mainly sunny. E/NE flow.

1 PM CDT
500 mb vorticity



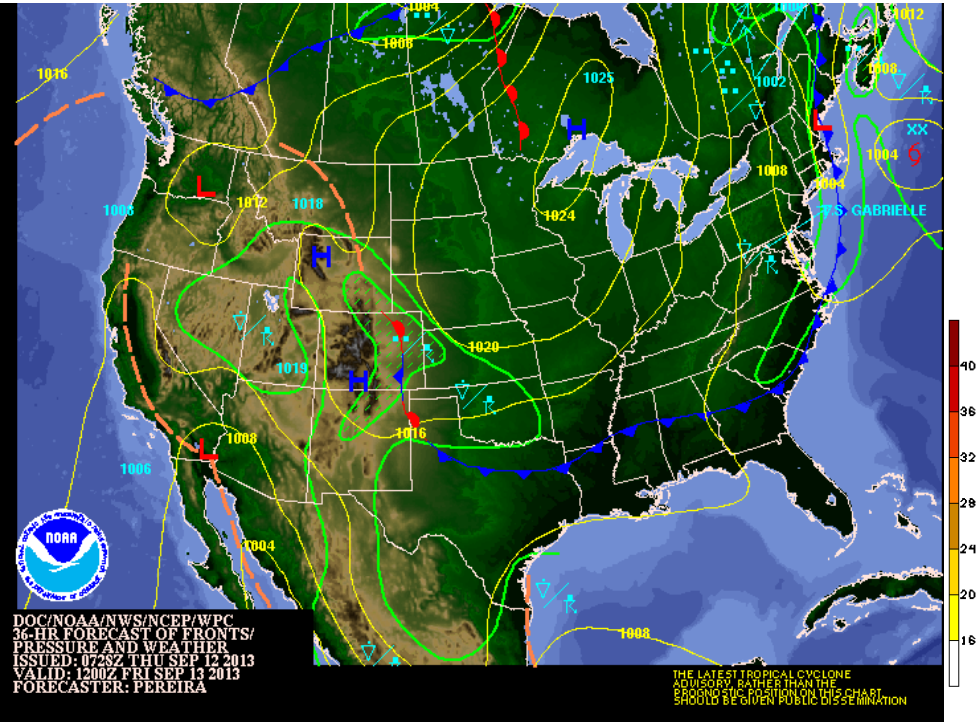


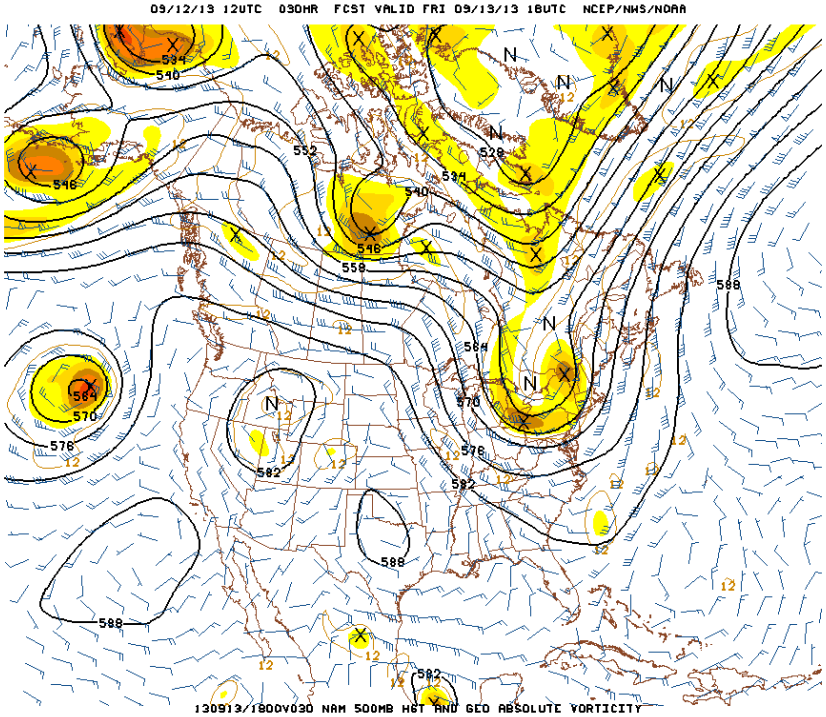
10 m winds at 1 PM today



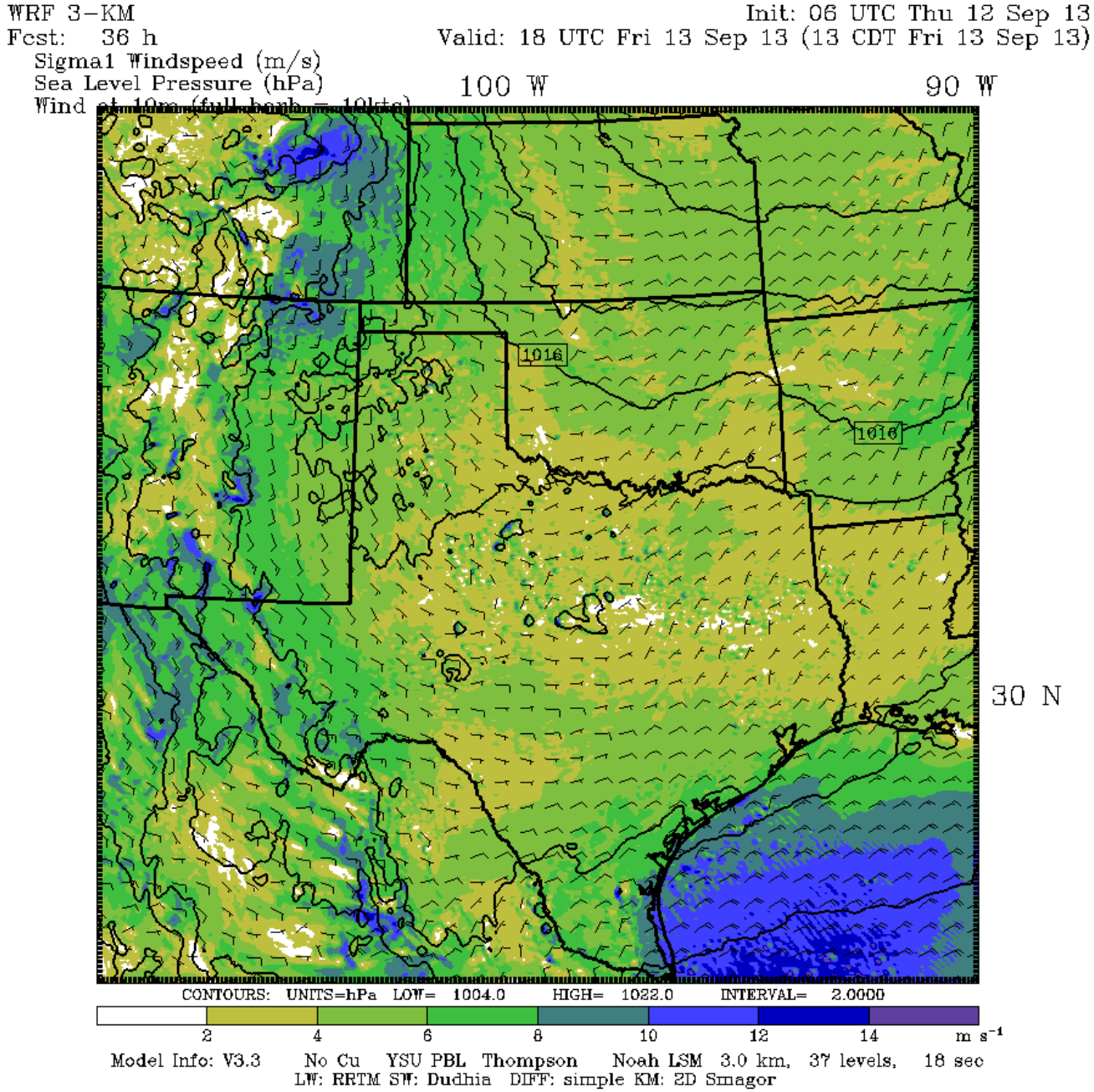
Tomorrow: Northeasterly flow. Cold front begins to push into Texas, but ridge should keep sunny skies and dry conditions through most of day; northern study region may be affected by showers late in the flight.

1 PM CDT
500 mb vorticity





10 m winds at 1 PM tomorrow

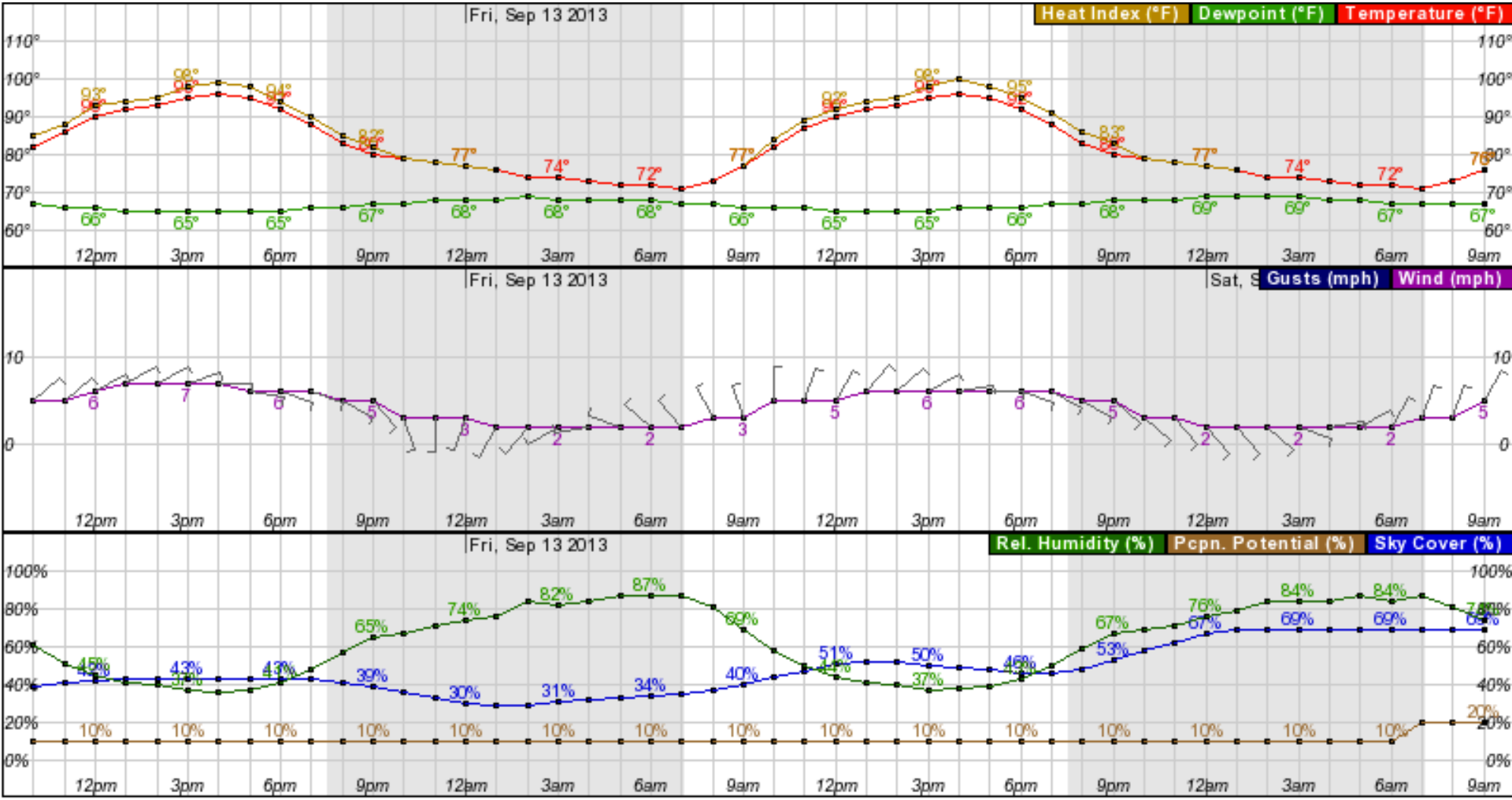


Conroe

Today: Partly cloudy

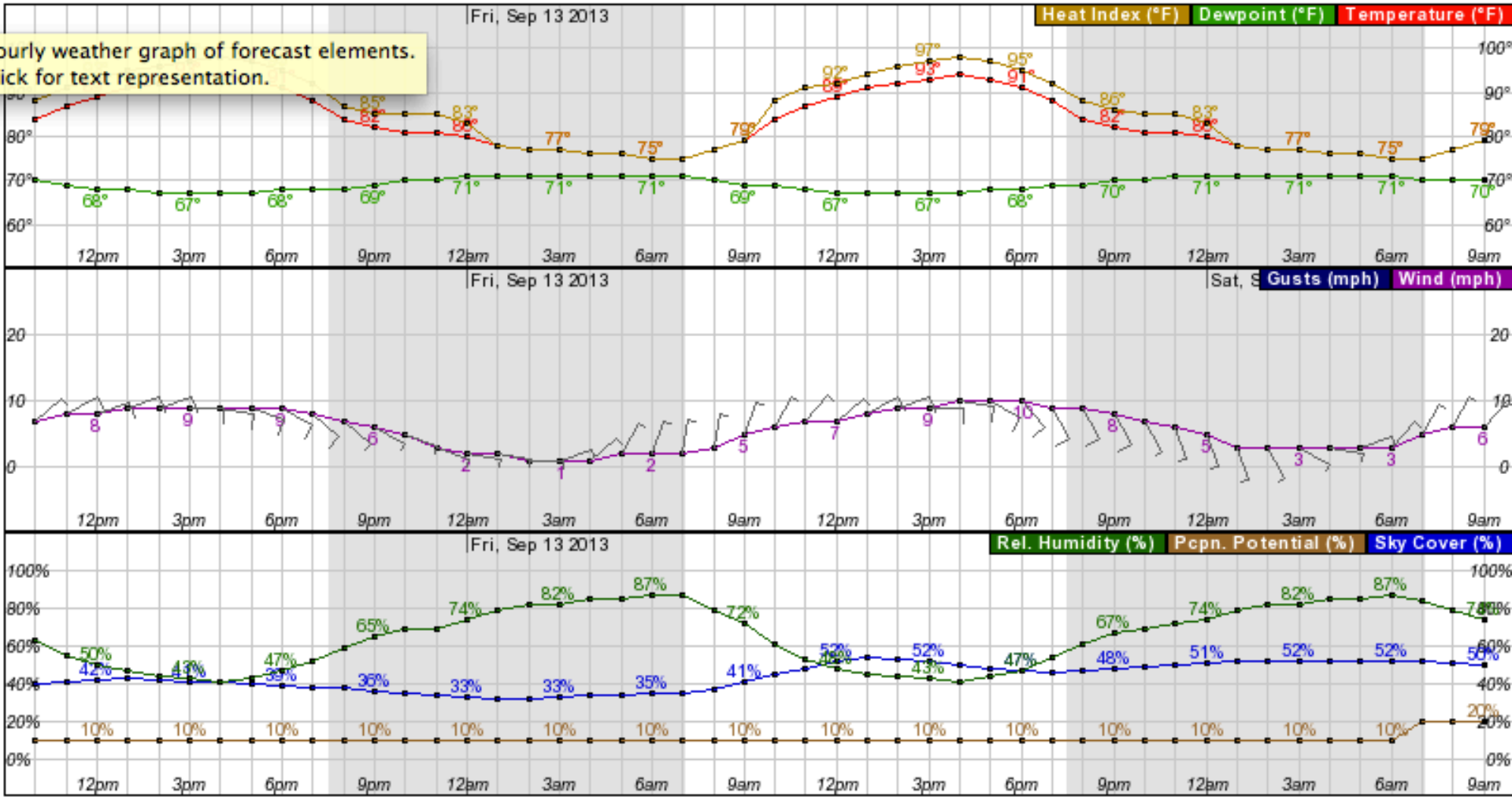
Tomorrow: Partly cloudy

Today → **Tomorrow →**



Houston Hobby
Today: Partly cloudy
Tomorrow: Partly cloudy

Today → **Tomorrow →**

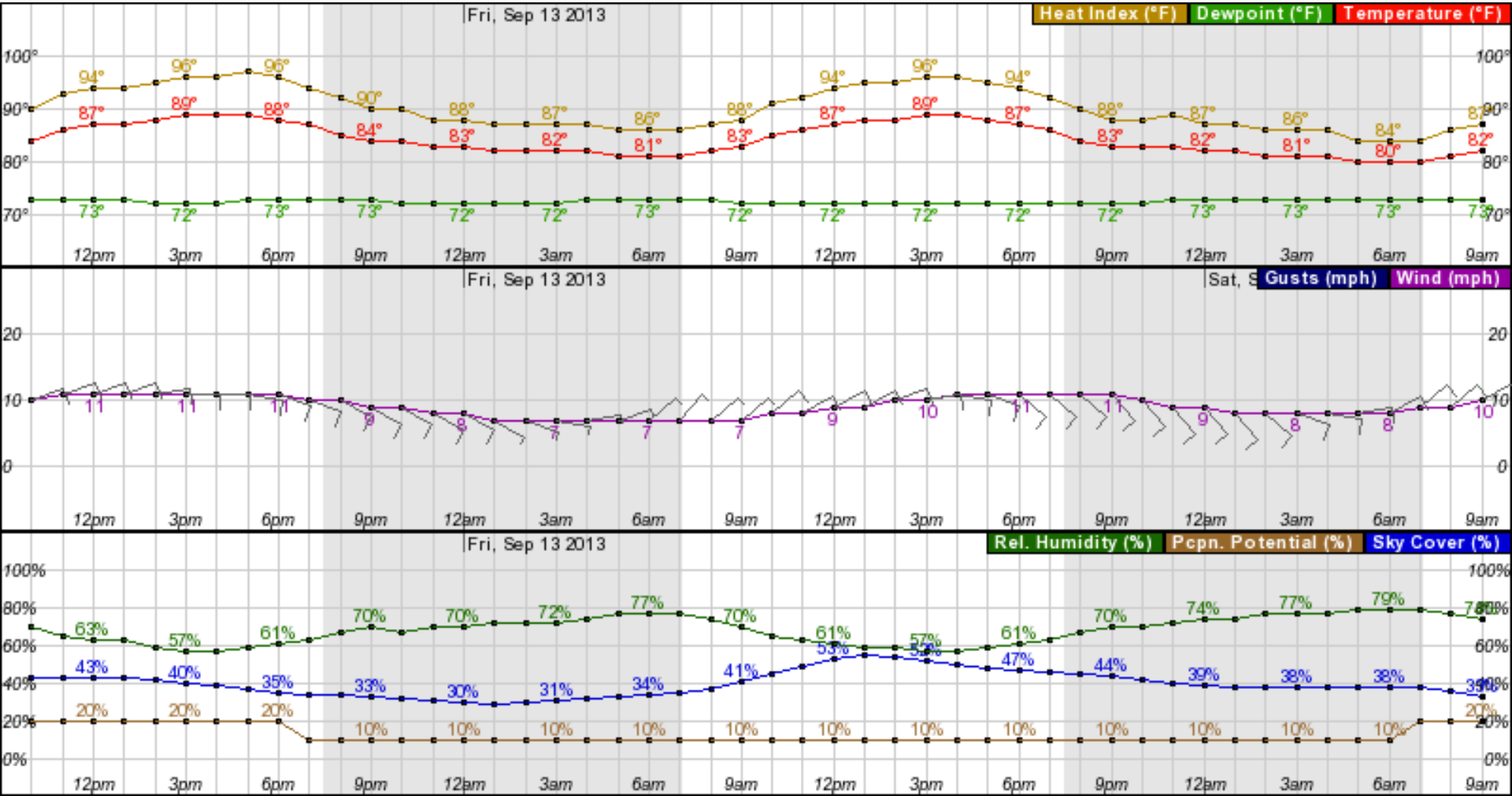


Galveston

Today: Partly cloudy

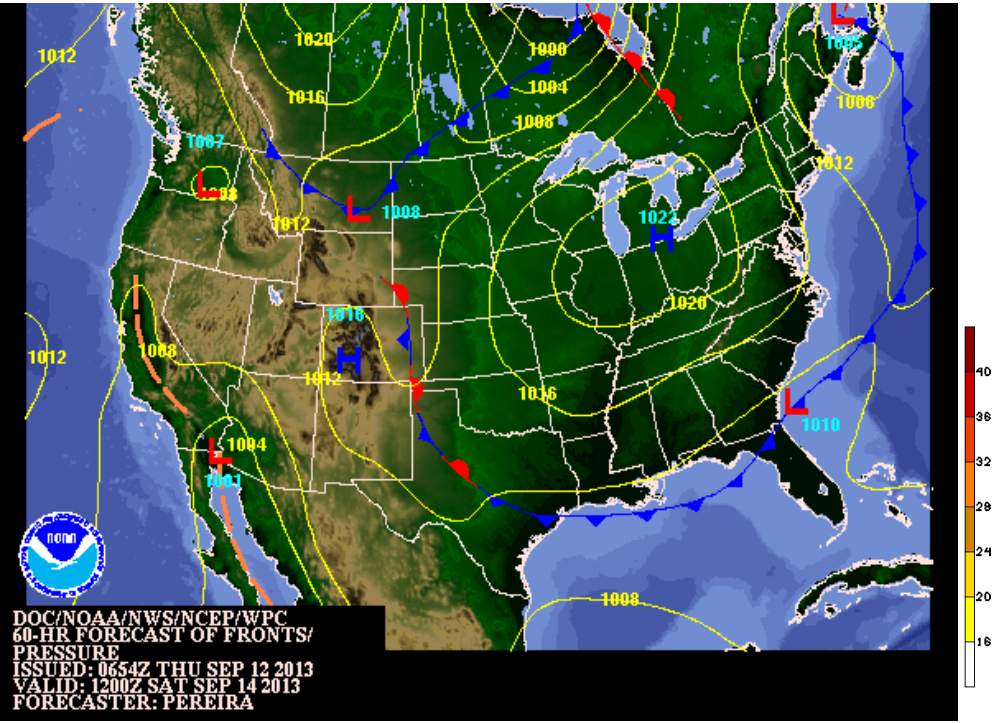
Tomorrow: Partly cloudy

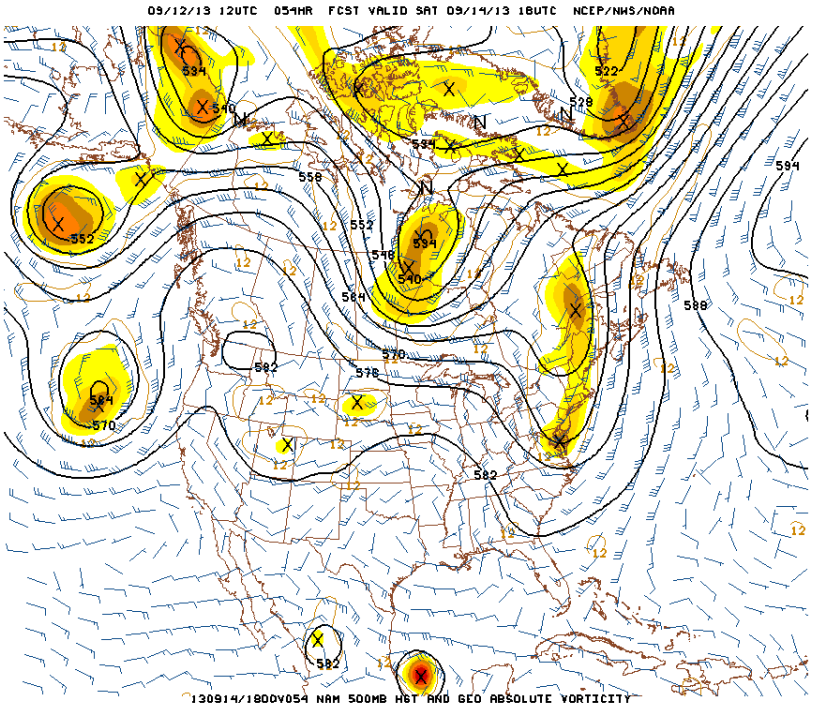
Today → **Tomorrow →**



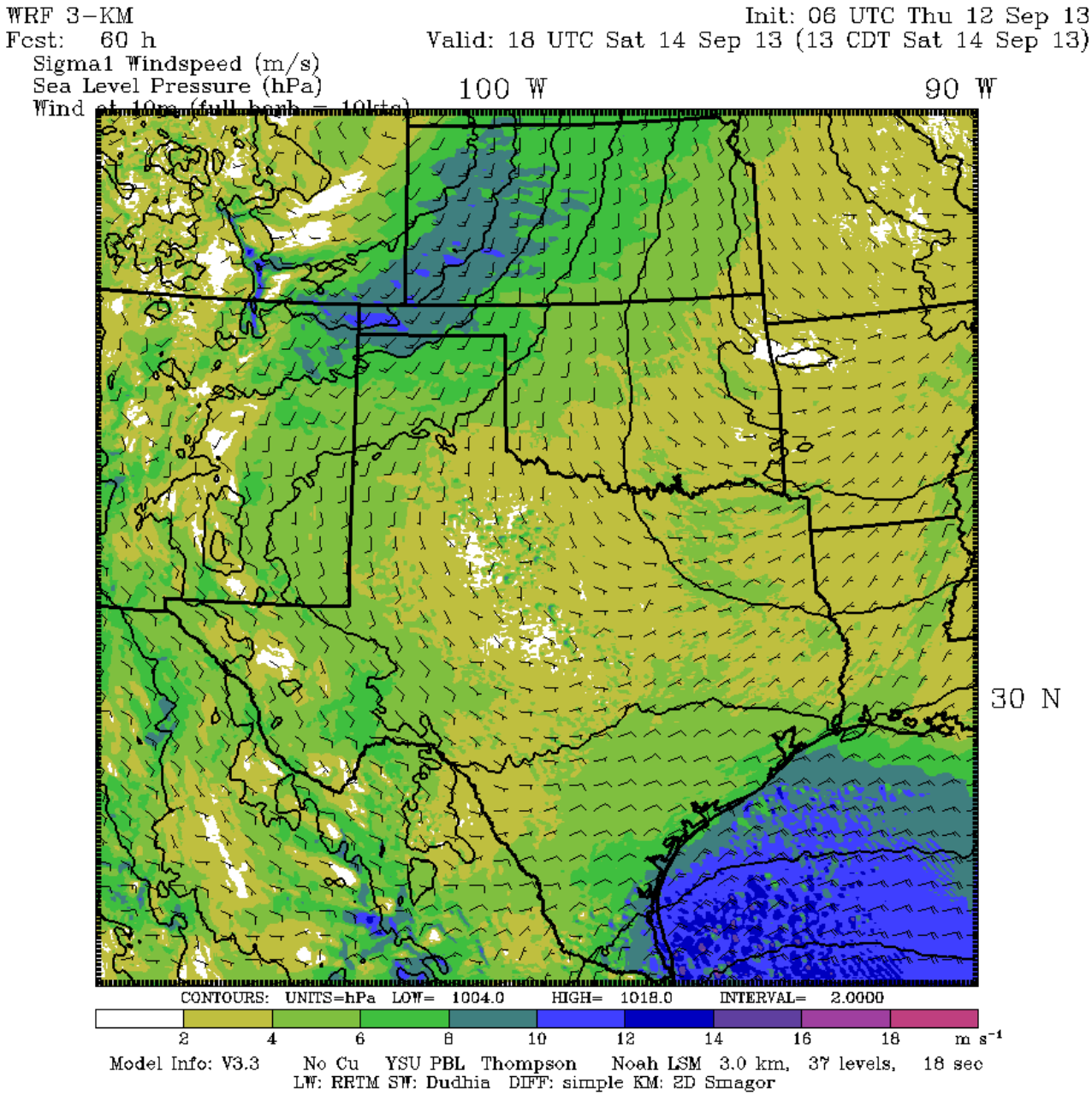
Saturday: Upper trough develops as ridge moves E. Cold front over region, bringing clouds and chance of precipitation. Northeasterly flow.

1 PM CDT
500 mb vorticity





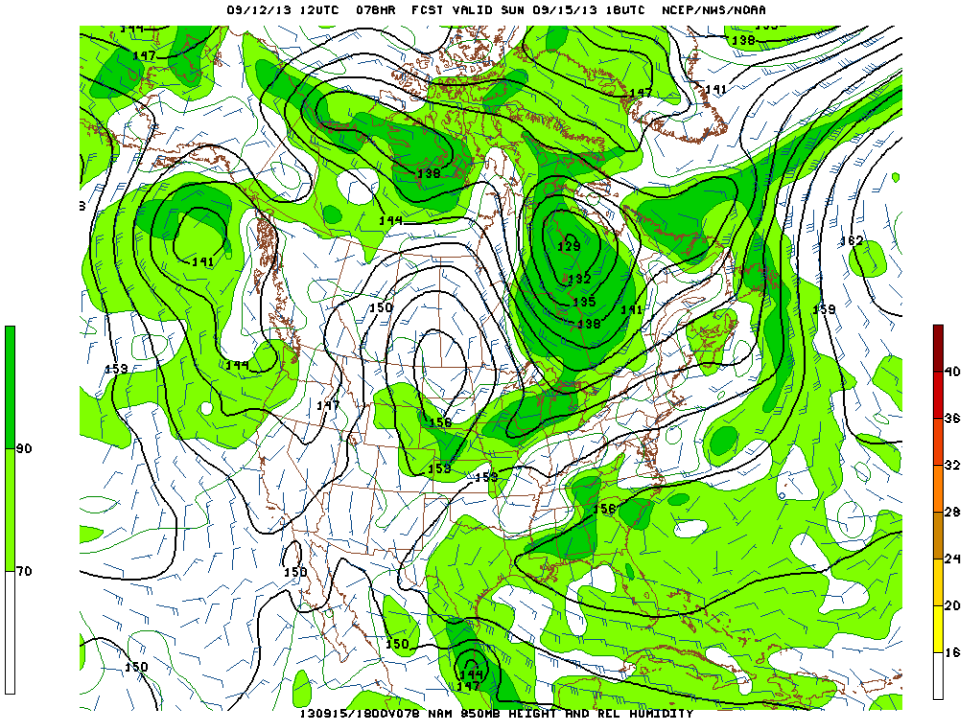
10 m winds at 1 PM Saturday



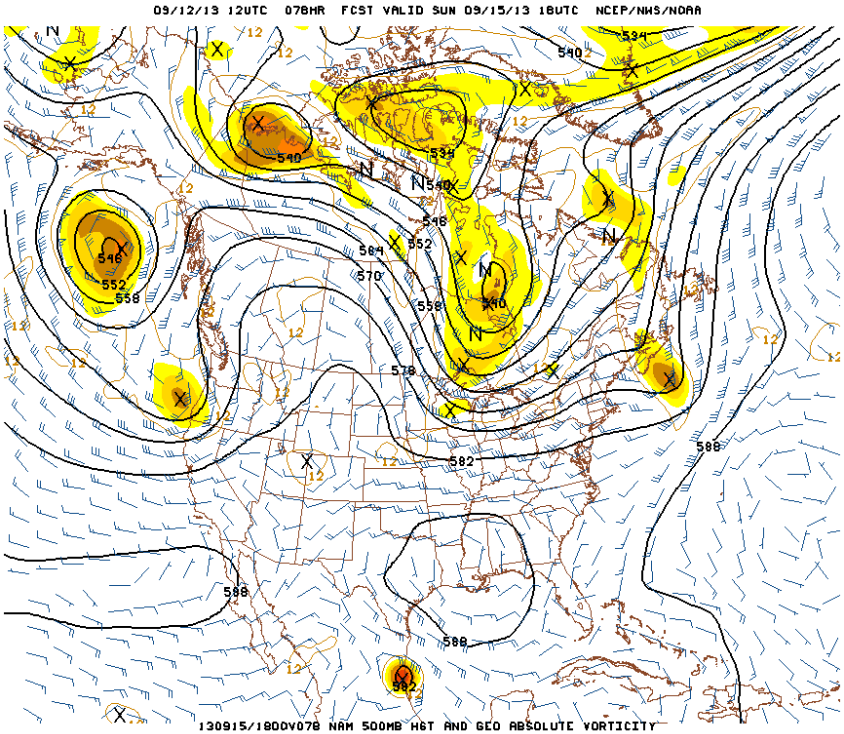
Sunday: Upper ridge begins to build back into the region. However, some moisture may remain in area after passage of cold front, and moisture should stream into area from the storm in the Bay of Campeche, likely bringing clouds.

1 PM CDT

850 mb RH



500 mb vorticity

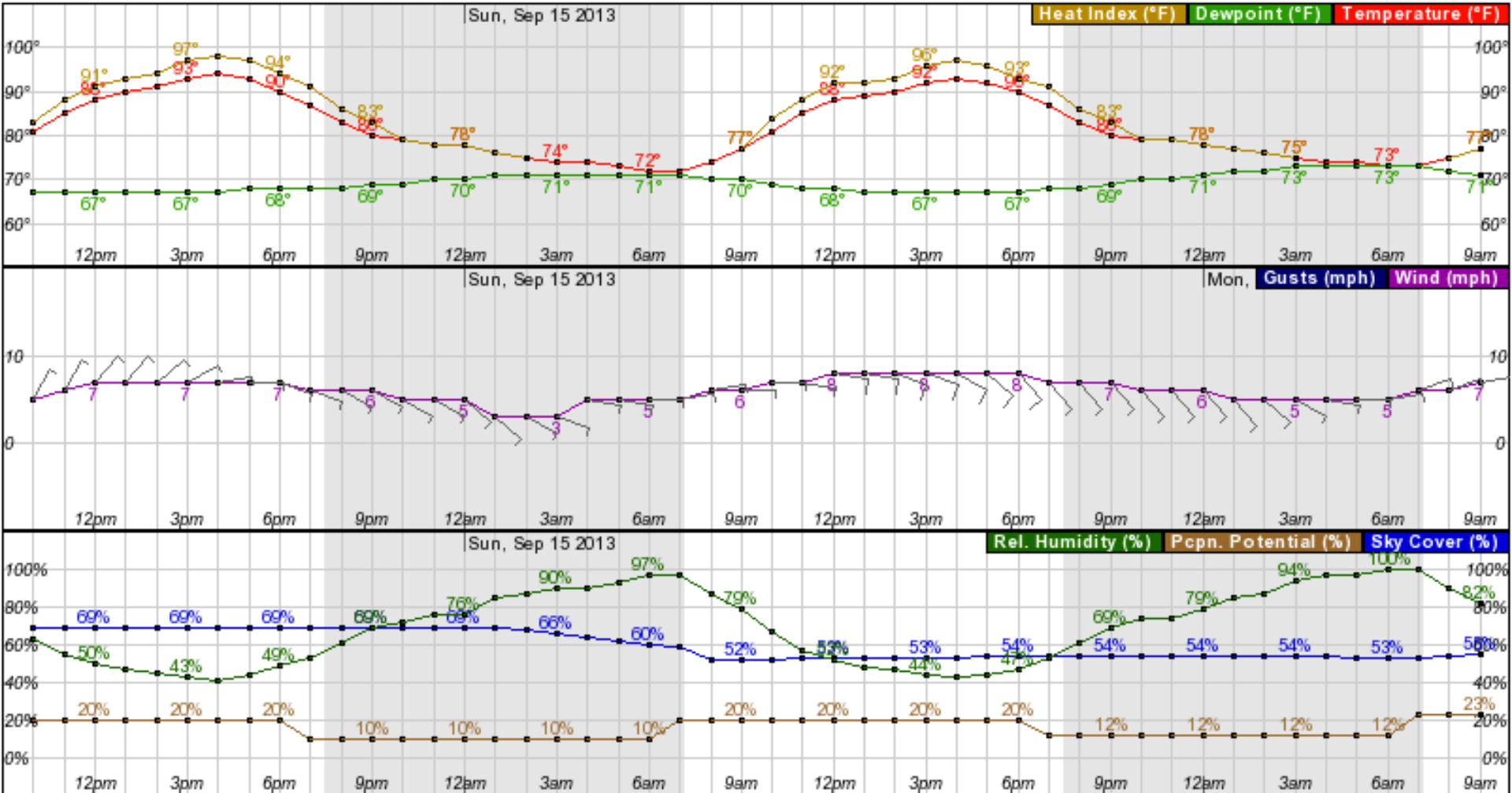


Conroe

Saturday: Mostly cloudy

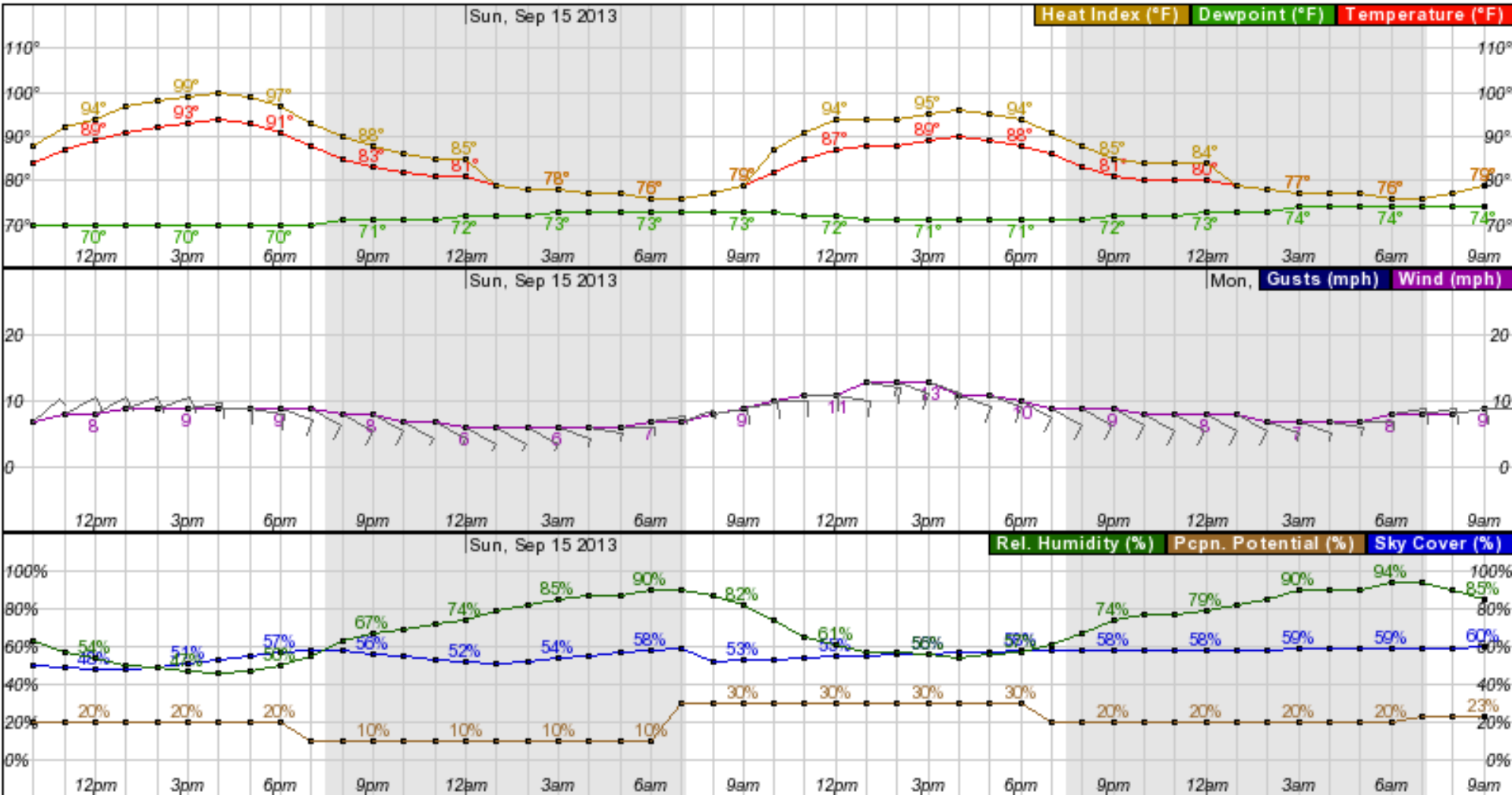
Sunday: Partly cloudy

Saturday→ **Sunday→**



Houston Hobby
Saturday: Partly cloudy
Sunday: Partly cloudy

Saturday→ **Sunday→**

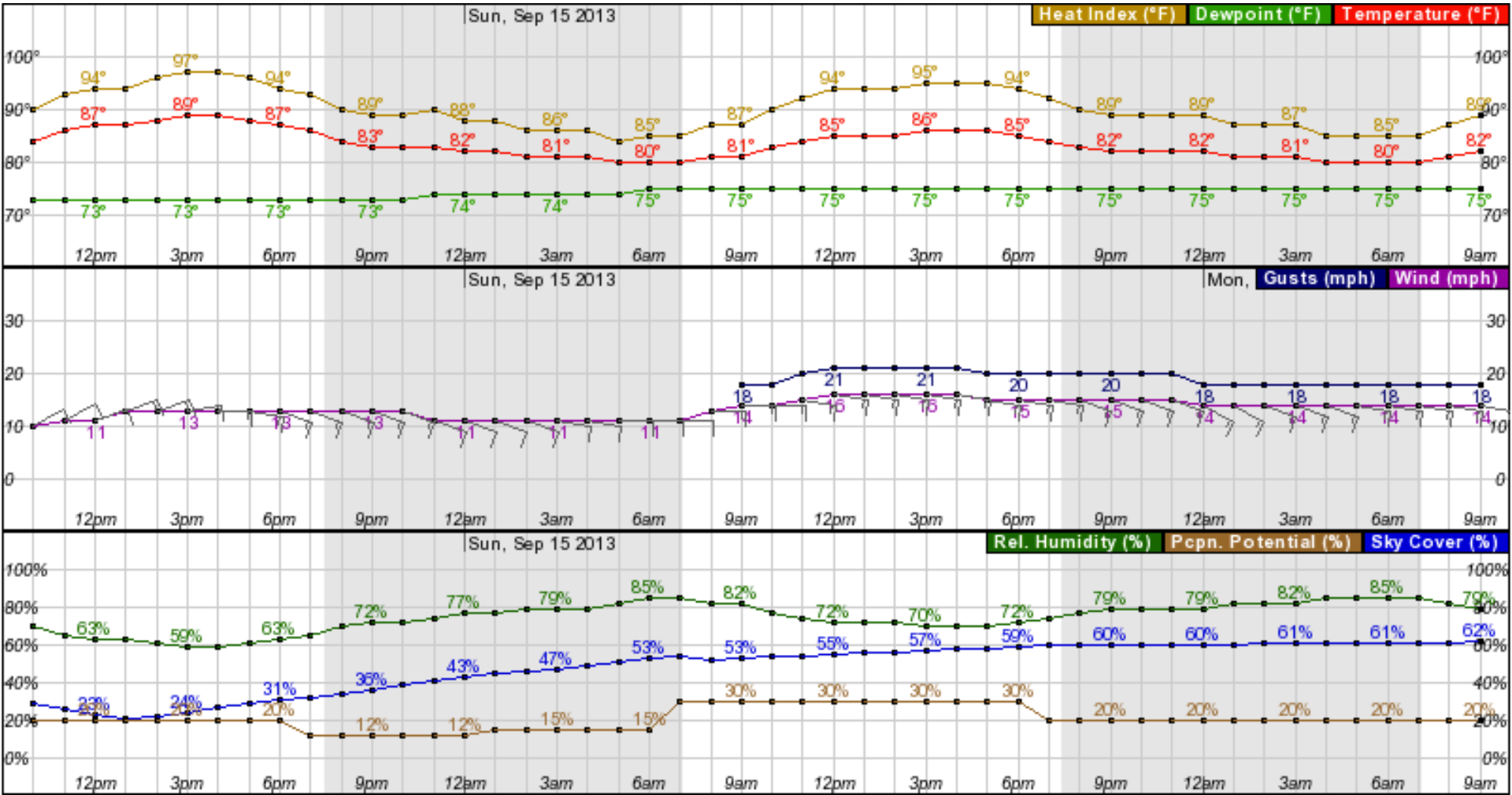


Galveston

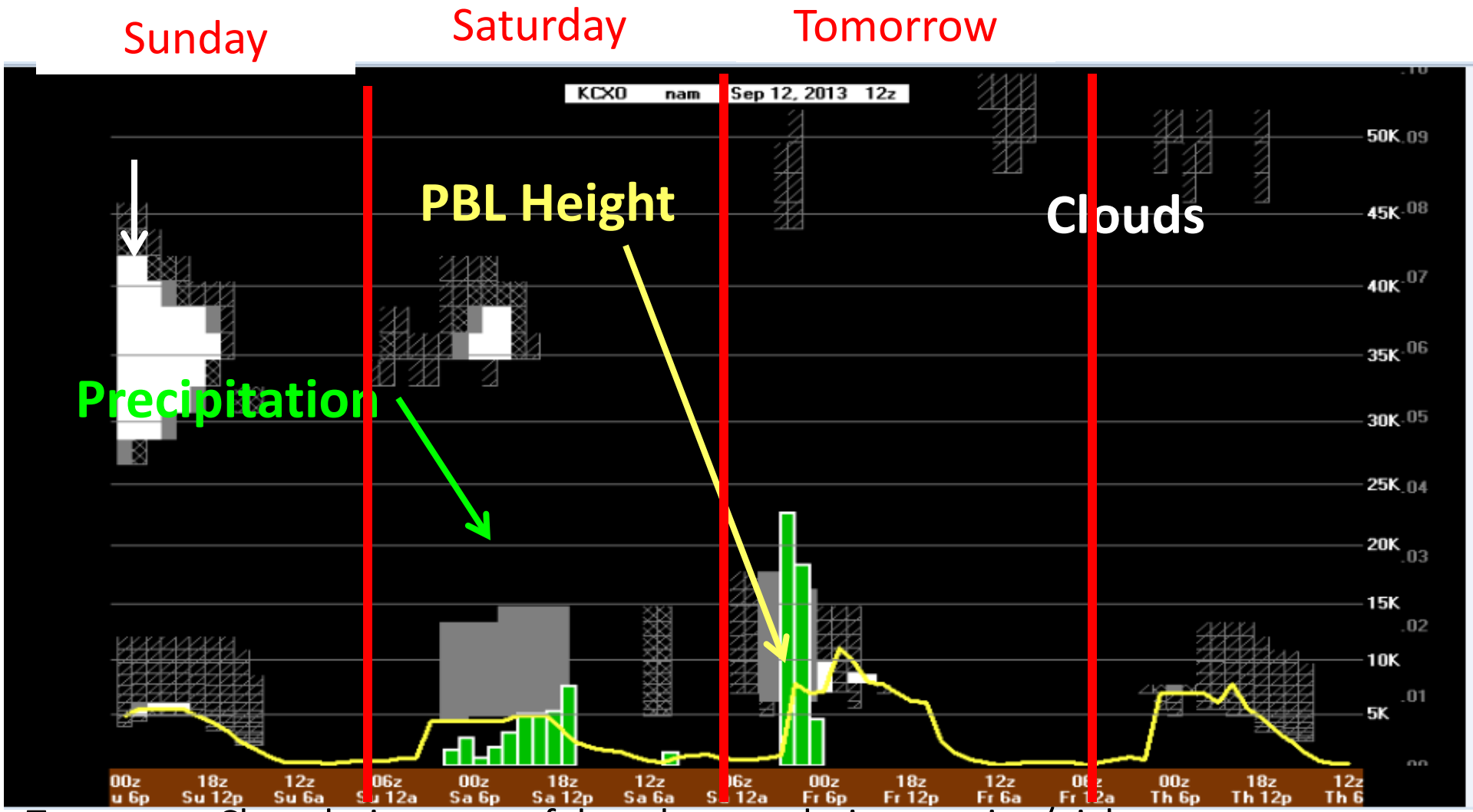
Saturday: Partly cloudy

Sunday: Mostly cloudy

Saturday→ **Sunday→**



Conroe; BUFKIT – NAM (12 UTC 10 September)

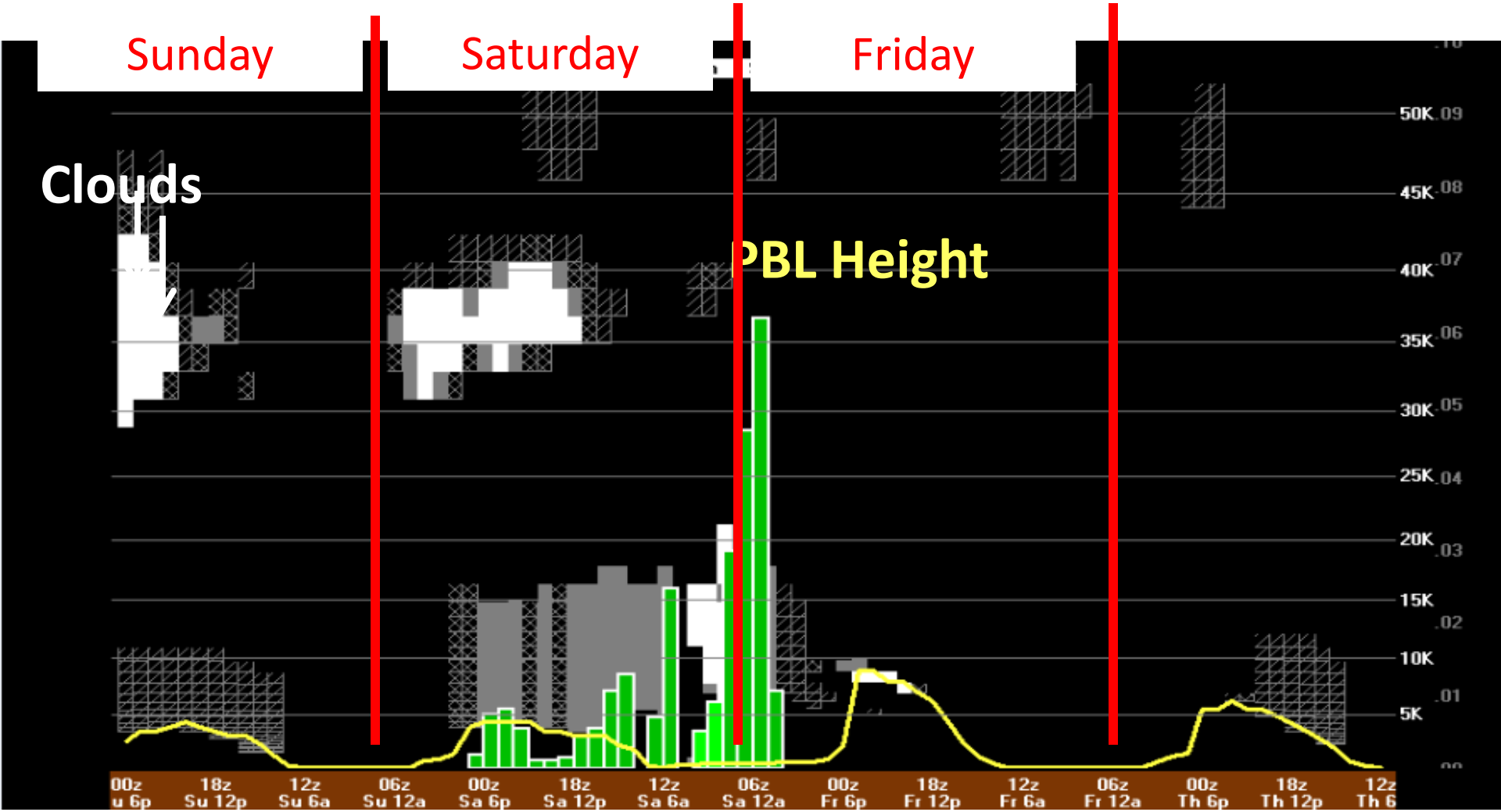


-Tomorrow: Clear during most of day; showers during evening/night.

-Saturday: Clouds and showers throughout most of the day.

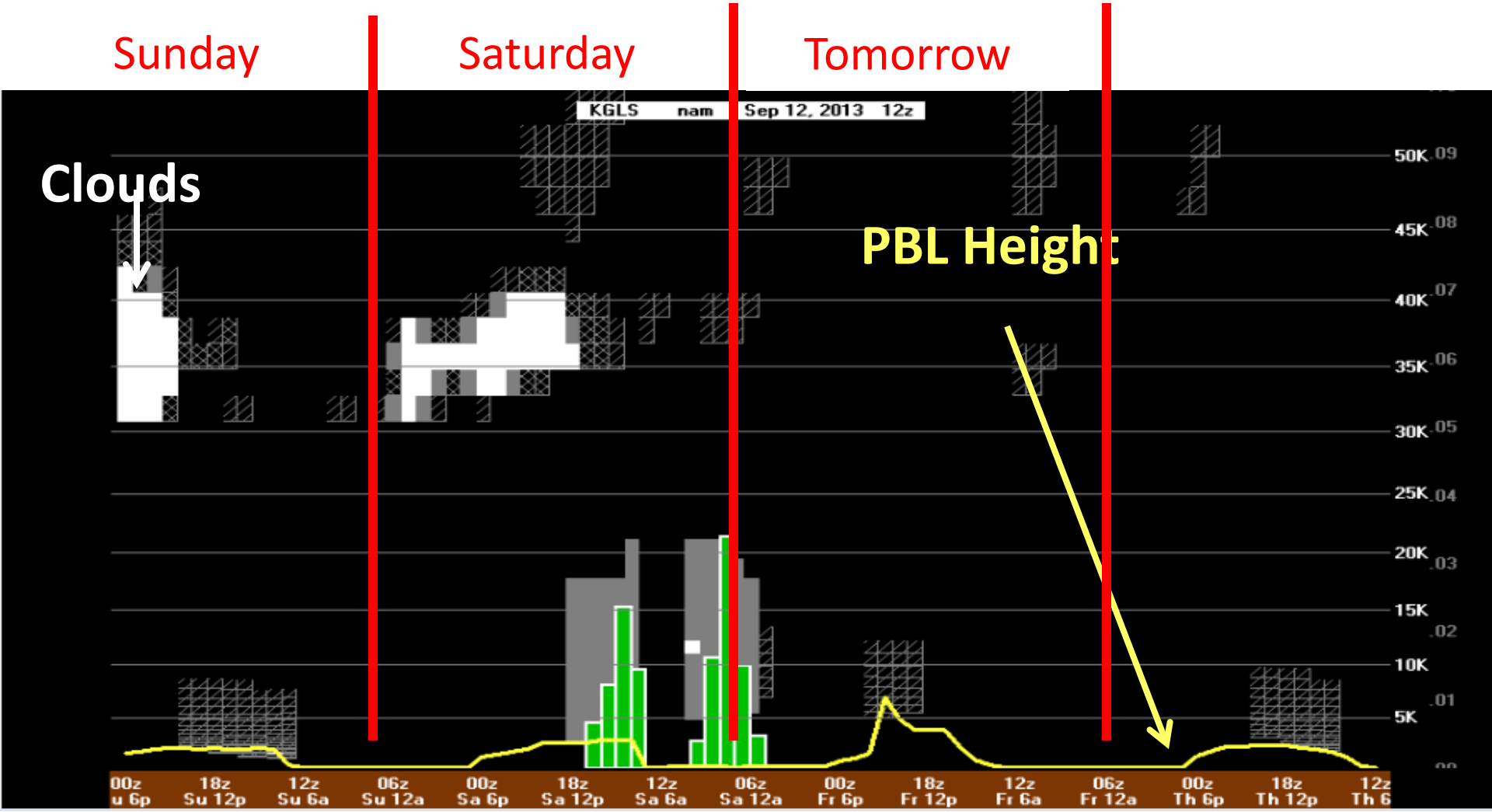
-Sunday: Scattered Cu and high cloud afternoon.

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



-Tomorrow: Clear through most of day.
-Saturday: Clouds and showers through most of day.
-Sunday: Scattered Cu and high clouds through most of day.

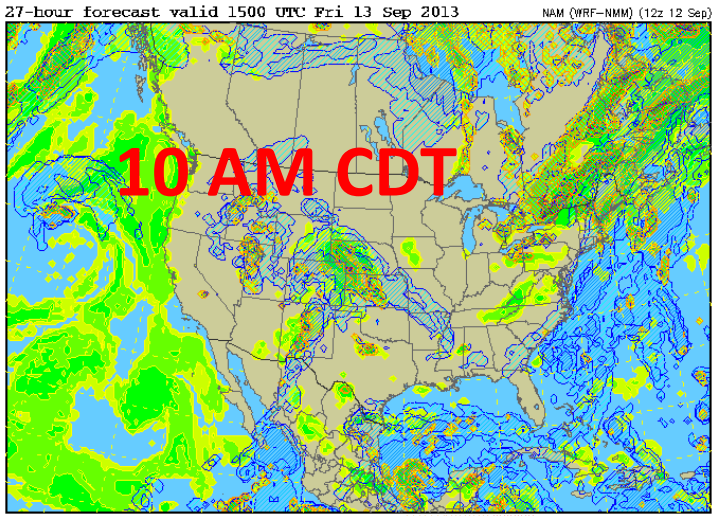
Galveston; BUFKIT – NAM (12 UTC 10 September)



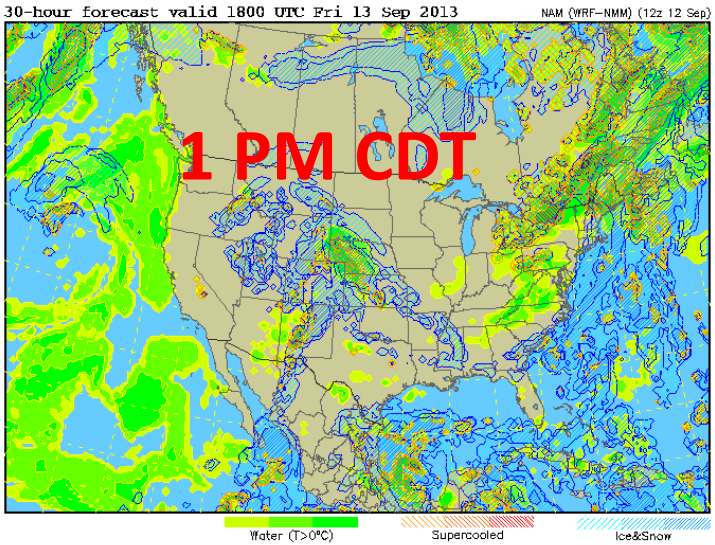
-Tomorrow: Some scattered Cu during afternoon.
-Saturday: Showers early, then high cloud during afternoon/evening.
-Sunday: Scattered Cu during afternoon, and high cloud during evening.

Tomorrow: NAM – Mostly clear until late afternooon/evening.

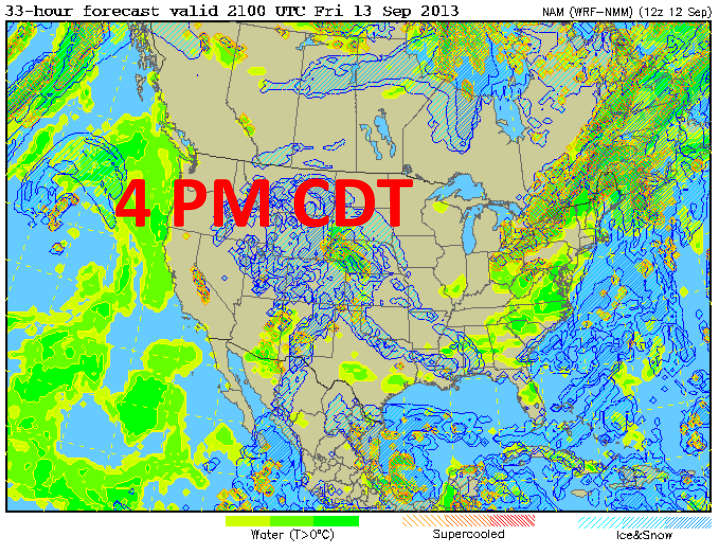
Integrated liquid and frozen hydrometeors (all levels)



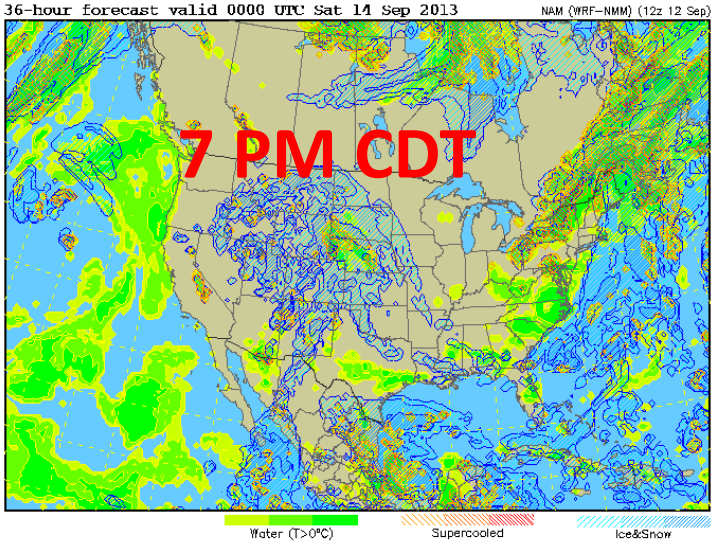
Integrated liquid and frozen hydrometeors (all levels)



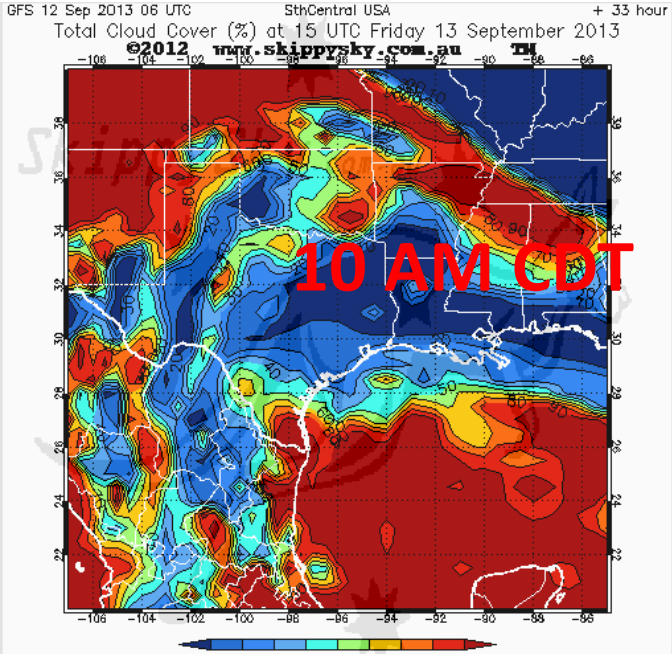
Integrated liquid and frozen hydrometeors (all levels)

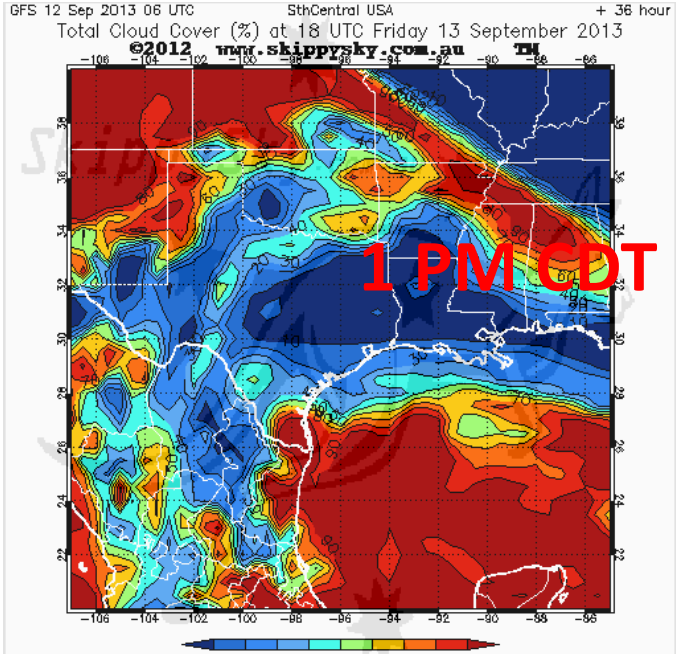


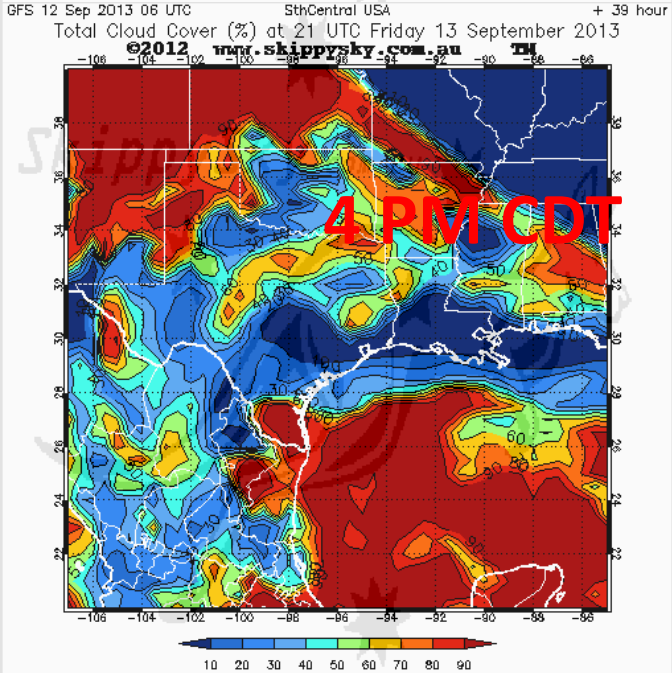
Integrated liquid and frozen hydrometeors (all levels)

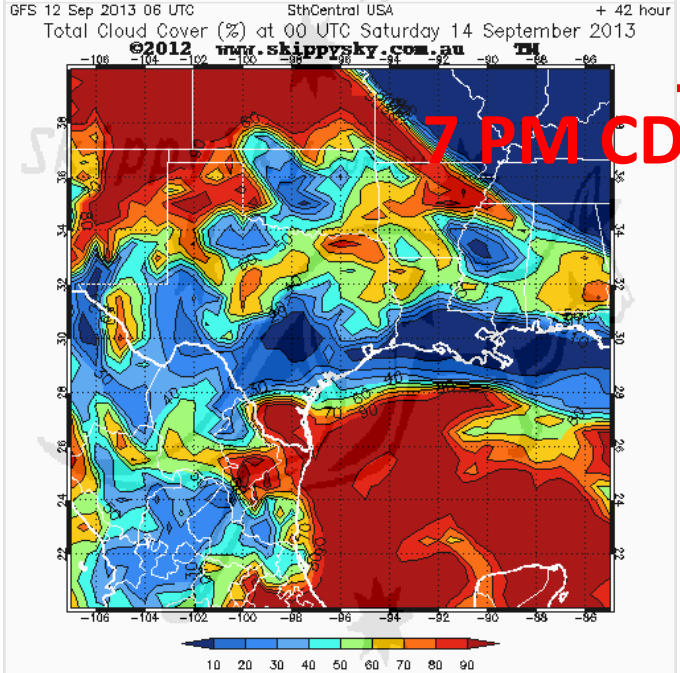


Tomorrow: GFS – Clouds hang off the study region through most of day.

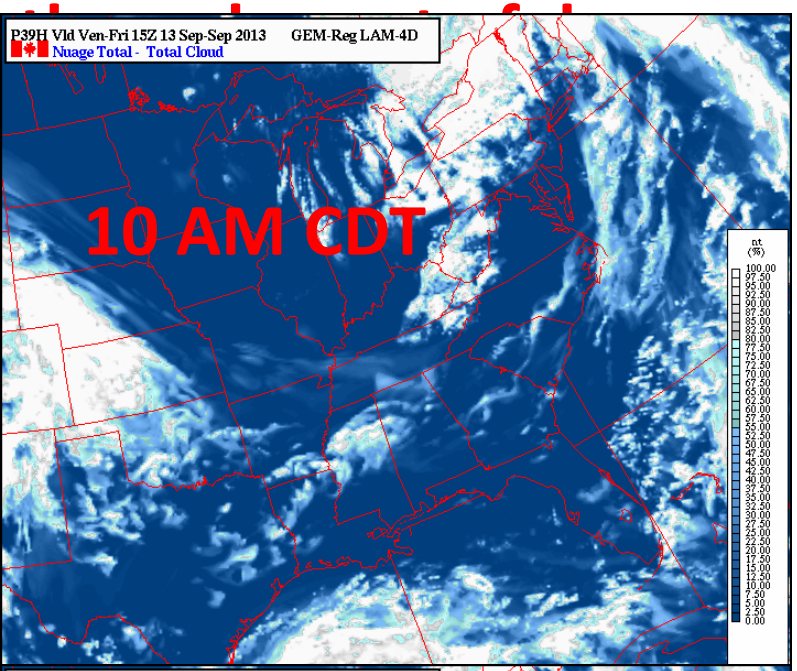


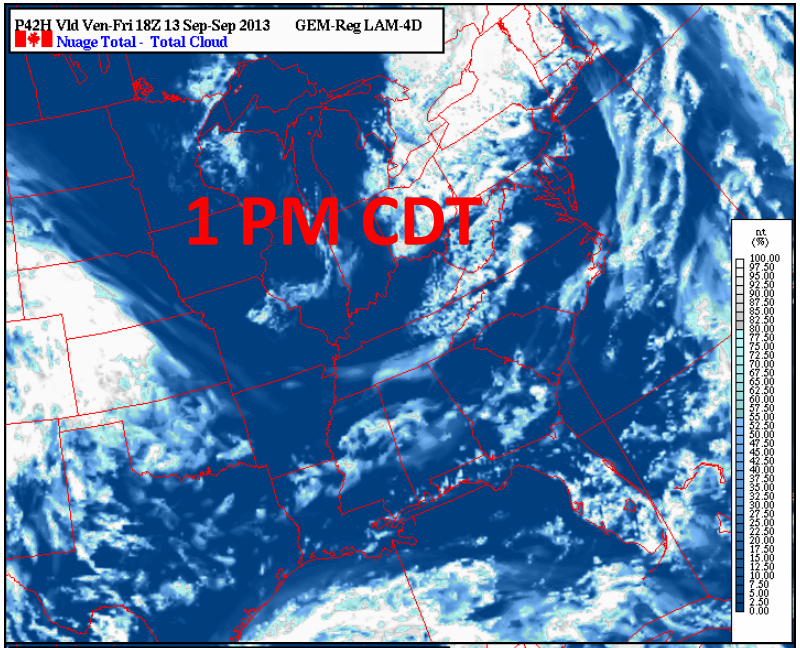


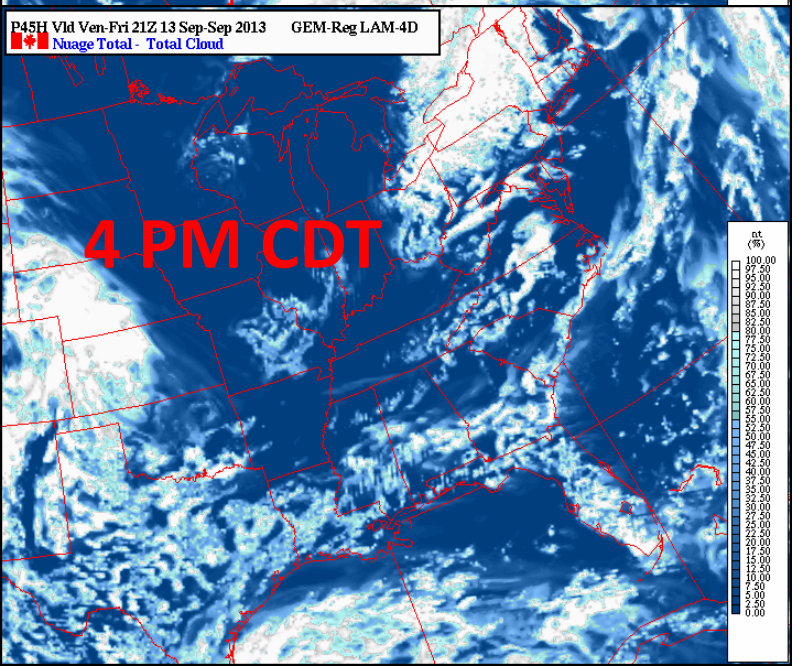


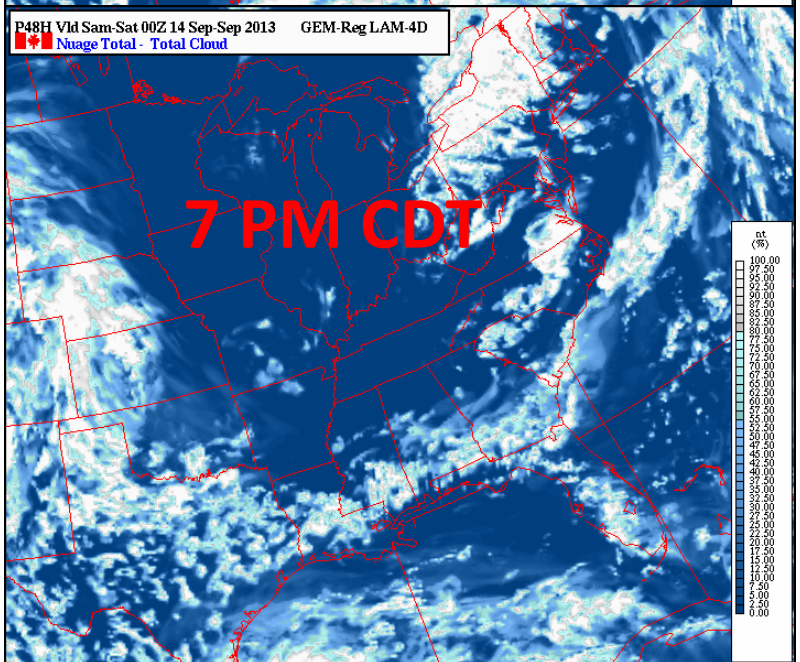


Tomorrow: Canadian - Clouds hang off the study region



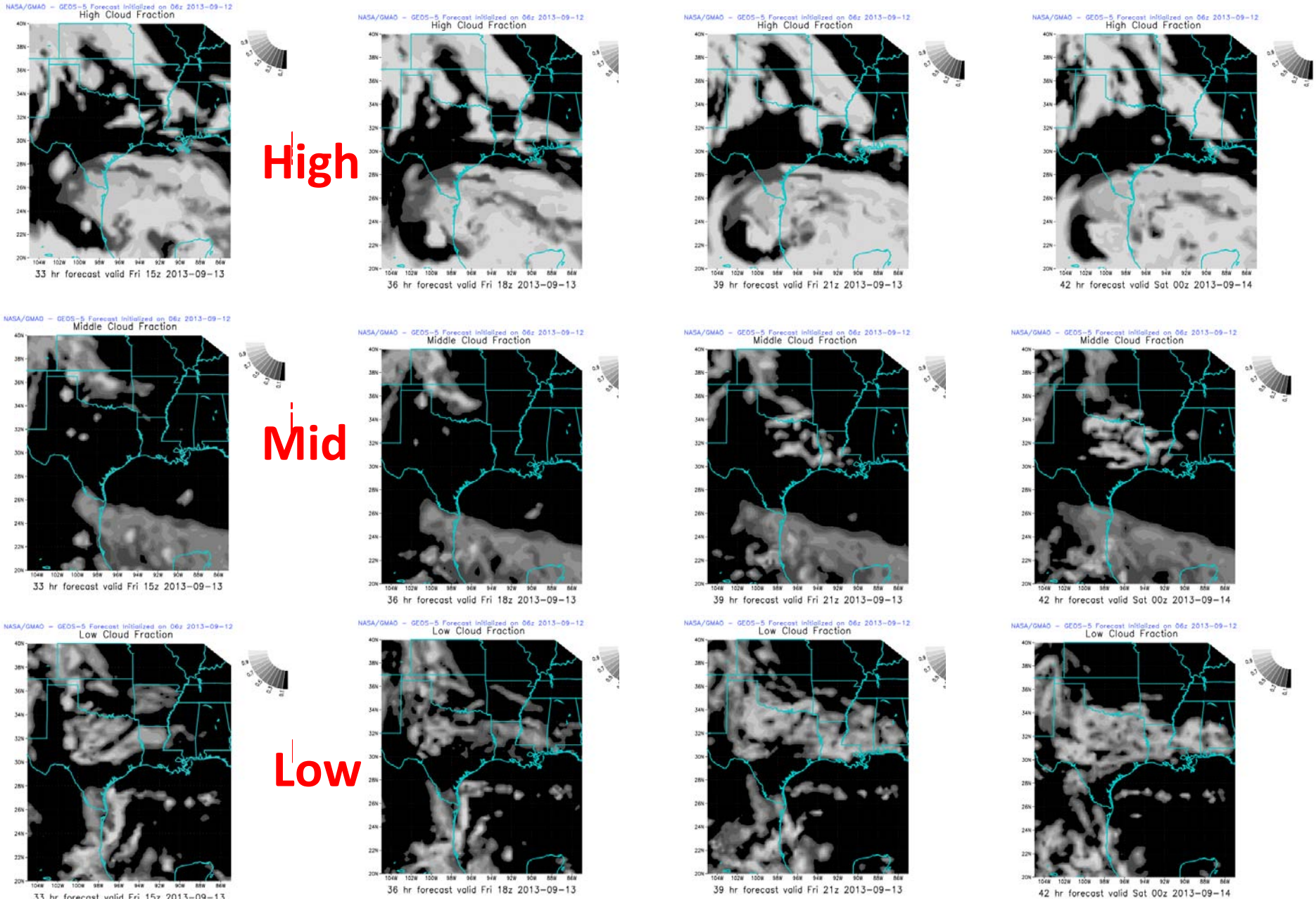






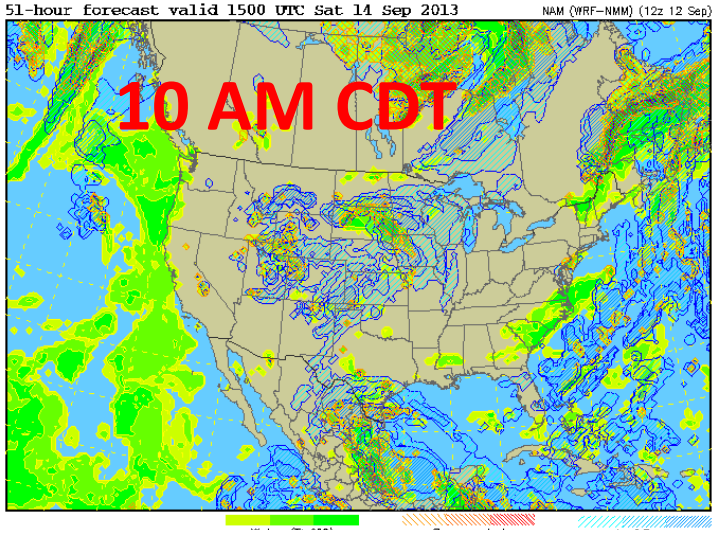
Tomorrow: GEOS-5 –Clouds hang off the study region through most of day.

10 am **1 pm** **4 pm** **7 pm**

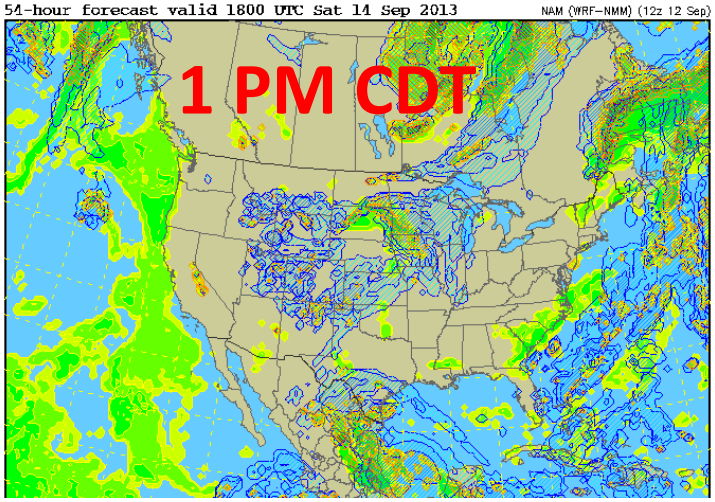


Saturday: NAM – high level clouds through most of day

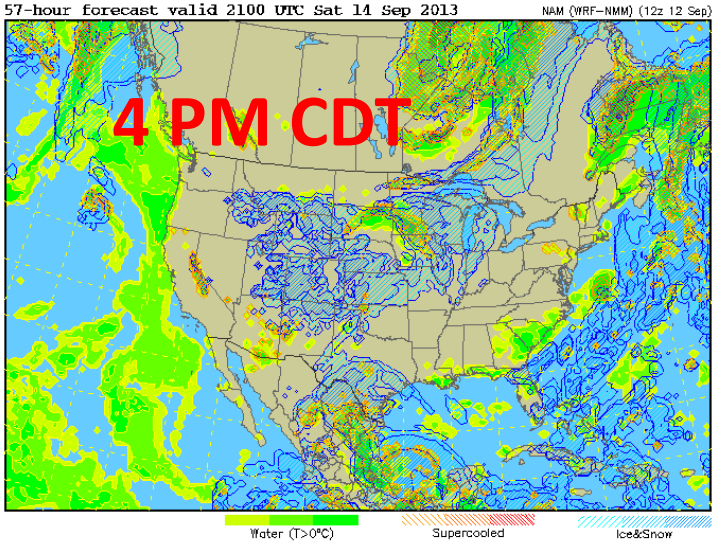
Integrated liquid and frozen hydrometeors (all levels)



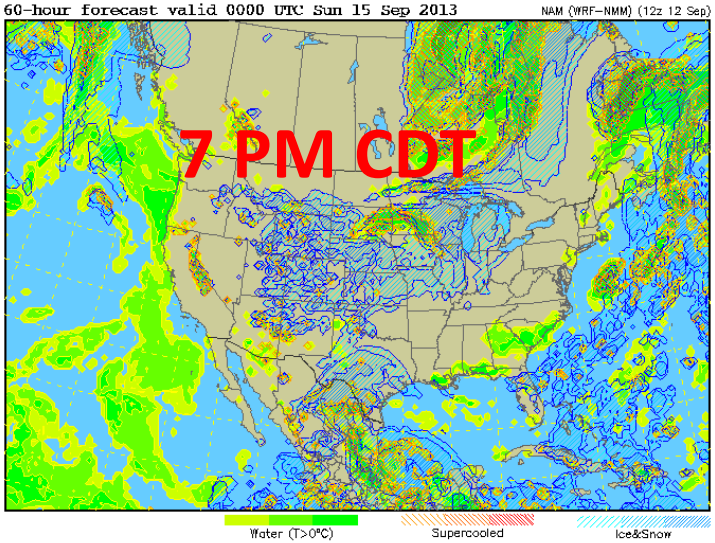
Integrated liquid and frozen hydrometeors (all levels)



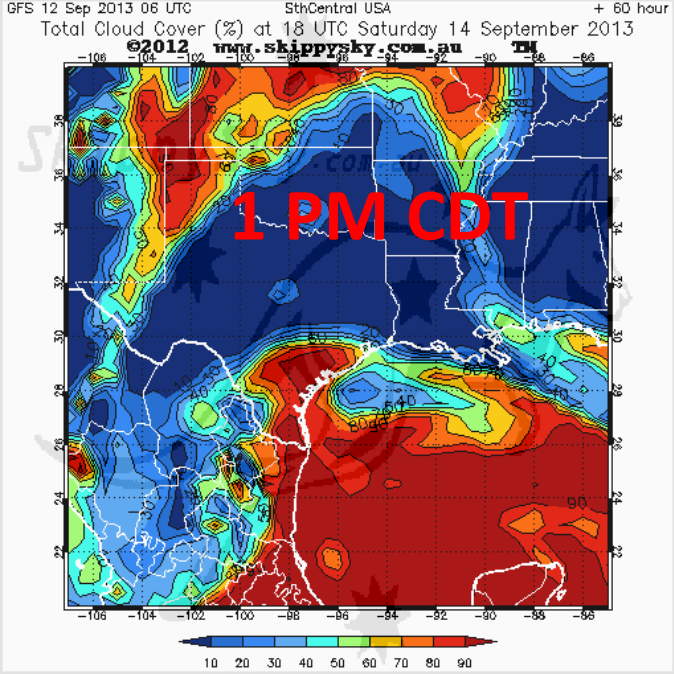
Integrated liquid and frozen hydrometeors (all levels)

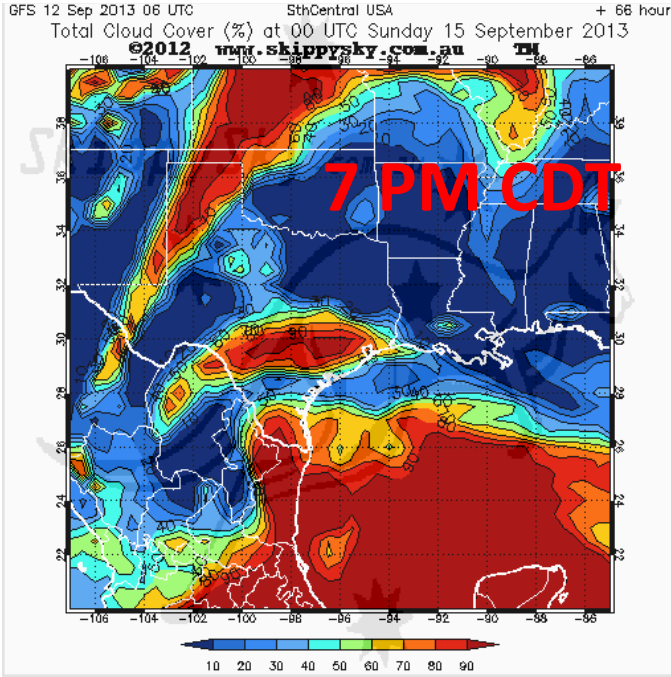


Integrated liquid and frozen hydrometeors (all levels)



Saturday: GFS – Clouds throughout the day

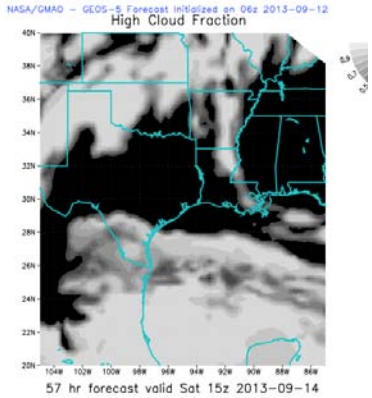


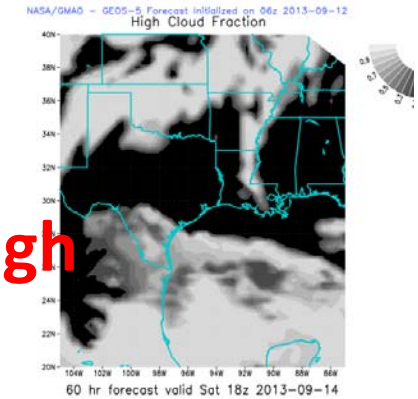


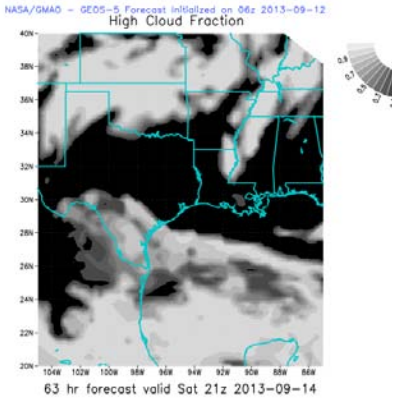
Saturday: GEOS-5 –Mid and low level clouds push into region during afternoon

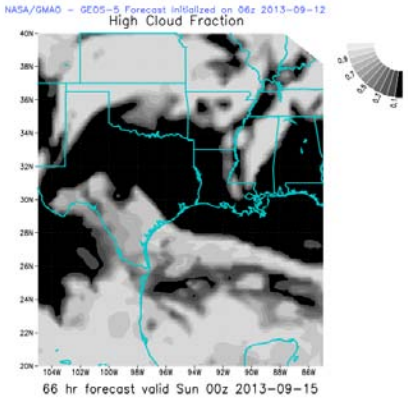
10 am **1 pm** **4 pm** **7 pm**

High

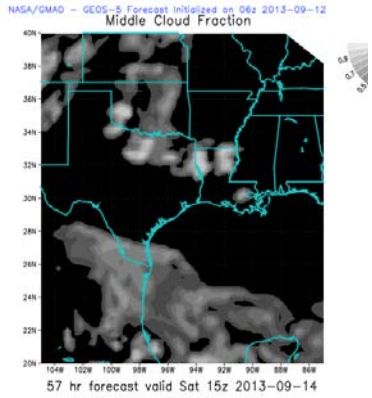


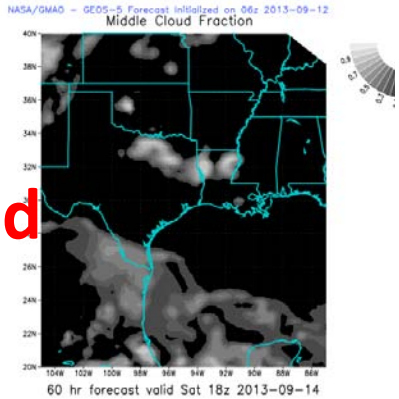


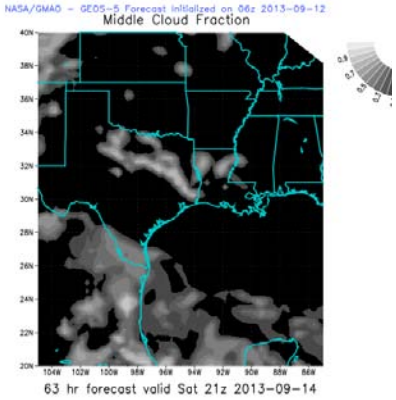


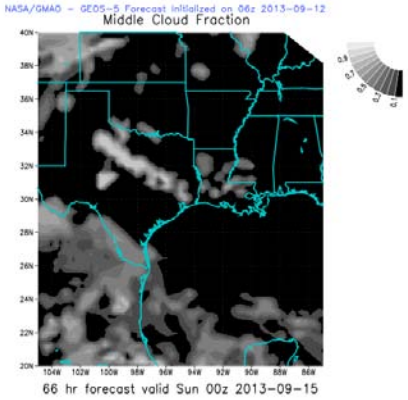


Mid

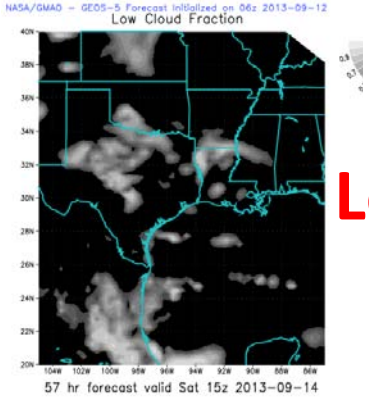


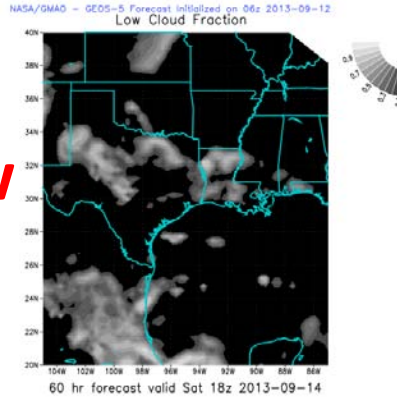


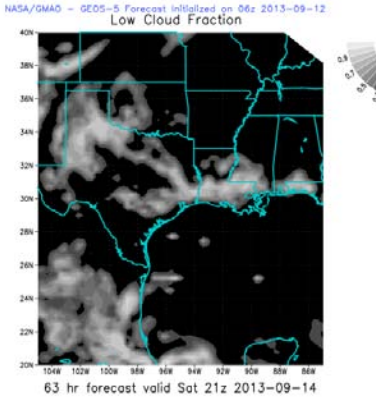


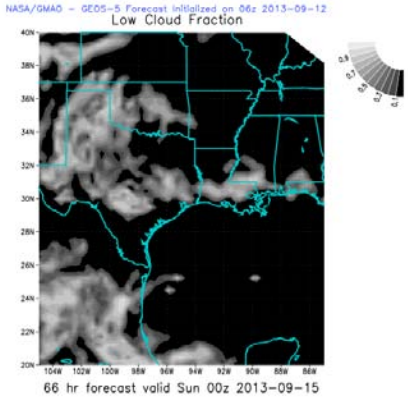


Low



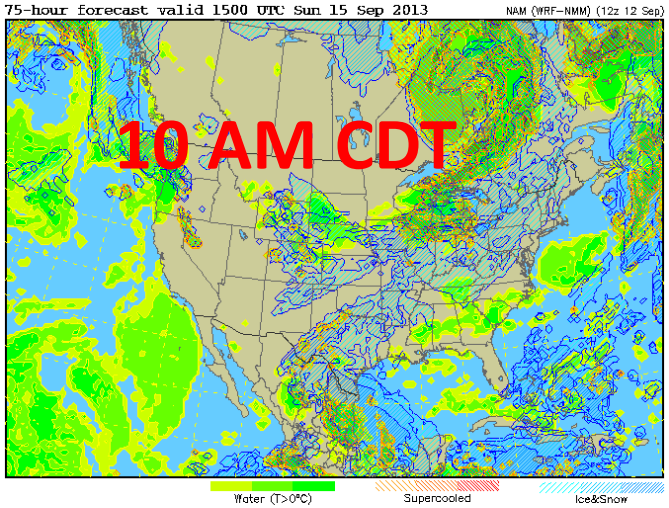




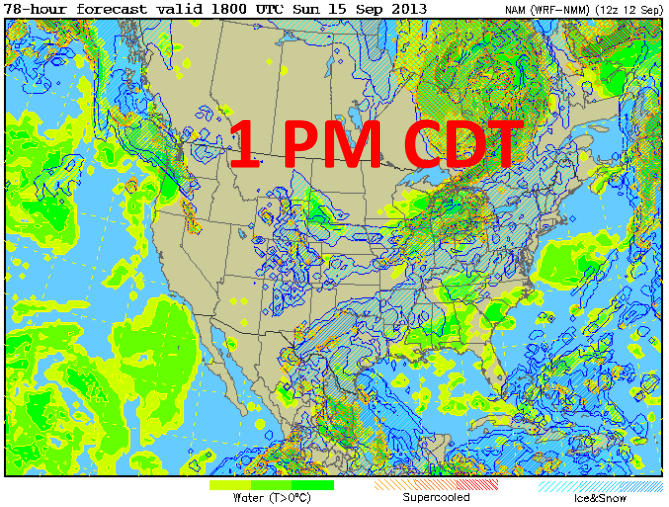


Sunday: NAM – high level and low level clouds

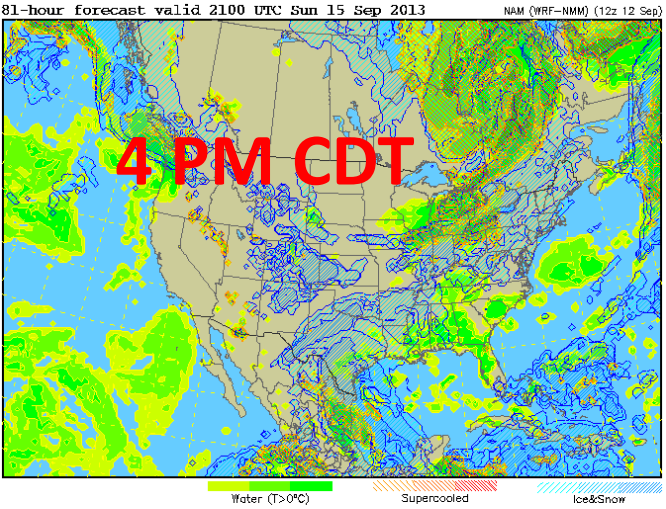
Integrated liquid and frozen hydrometeors (all levels)



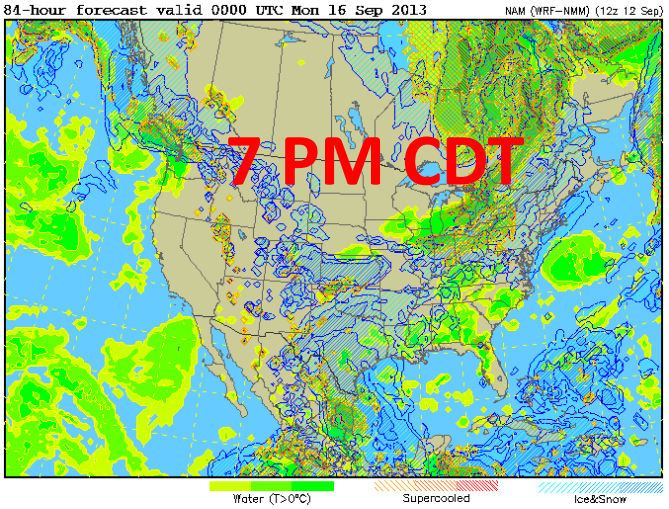
Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)

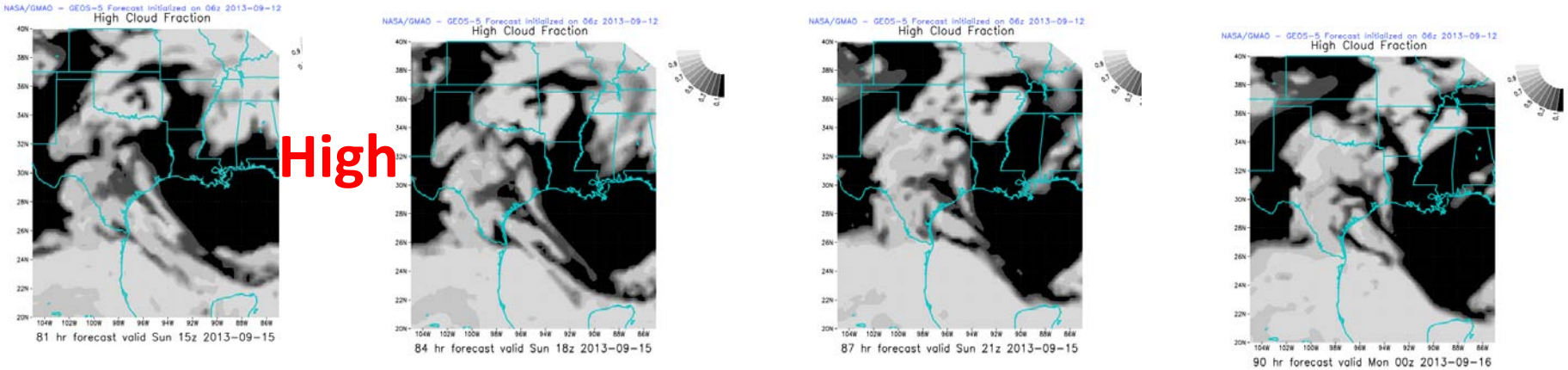


Integrated liquid and frozen hydrometeors (all levels)

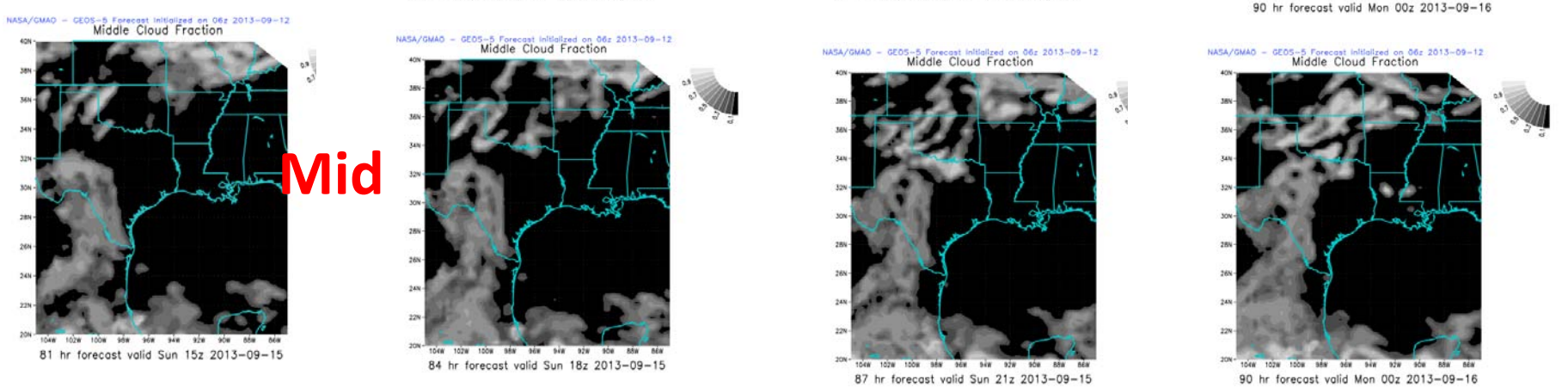


Sunday: GEOS-5 – high clouds; low level clods build into region during afternoon

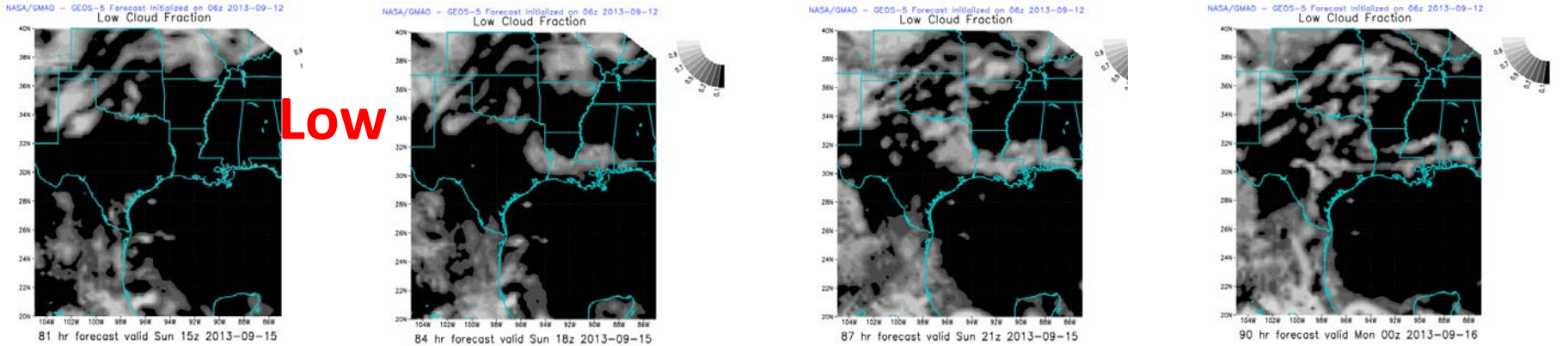
10 am **1 pm** **4 pm** **7 pm**



High

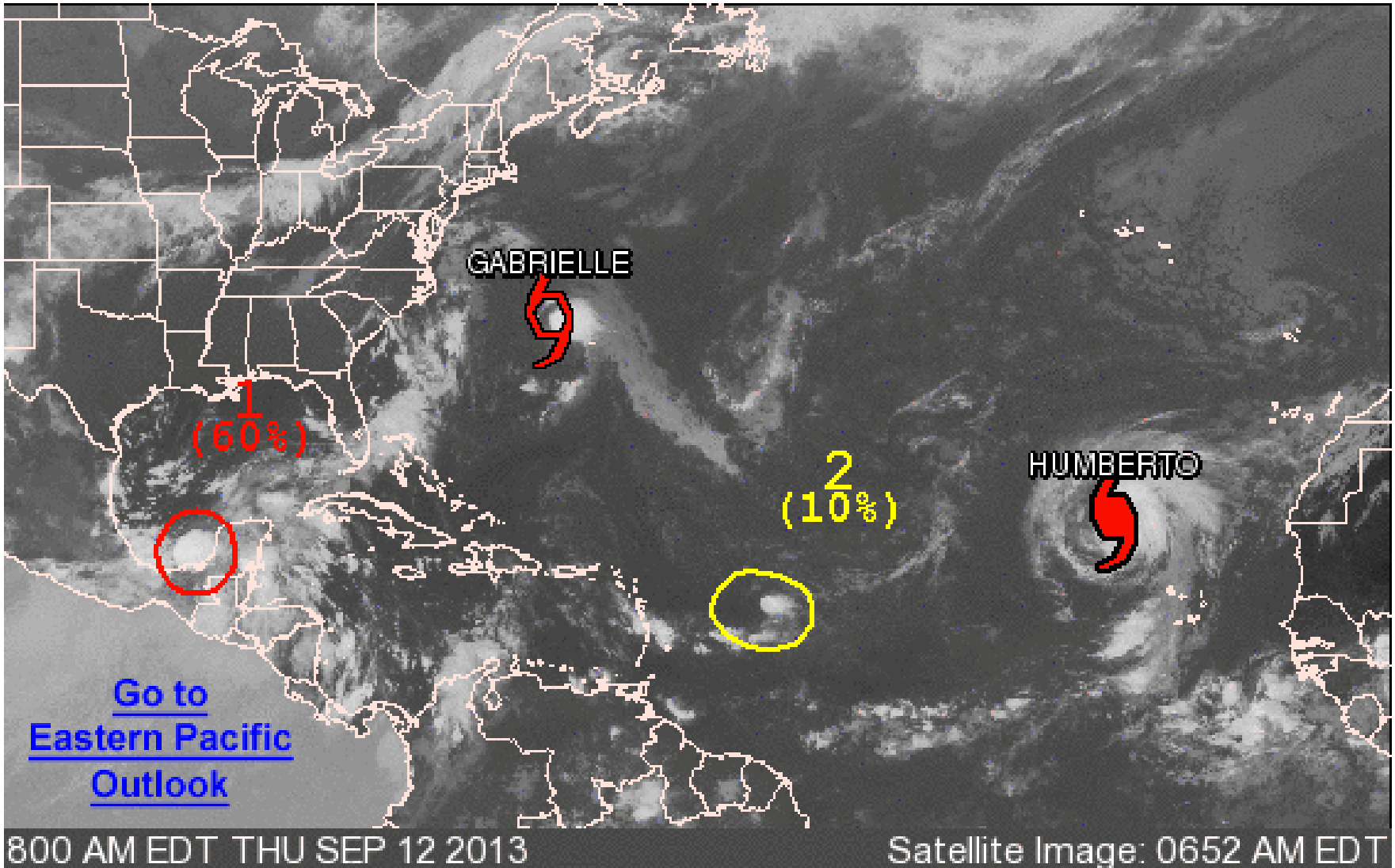


Mid



Low

Disturbed weather now located in southern Bay of Campeche….Convective activity has increased…60% of becoming a TC within next 48 hours…should move NW slowly



Recommendations

- Tomorrow: P3B and King Air flight day. NWS forecaster thinks tomorrow should be even better than today.
- Saturday and Sunday: Look like no fly days. Cold front pushes into region Friday night/Saturday, while outflow from Campeche begins to impact region. This outflow should continue to impact region through Monday.

DISCOVER-AQ Air Quality Outlook
September 12, 2013

Bryan Duncan

Mariel Friberg

Ken Pickering

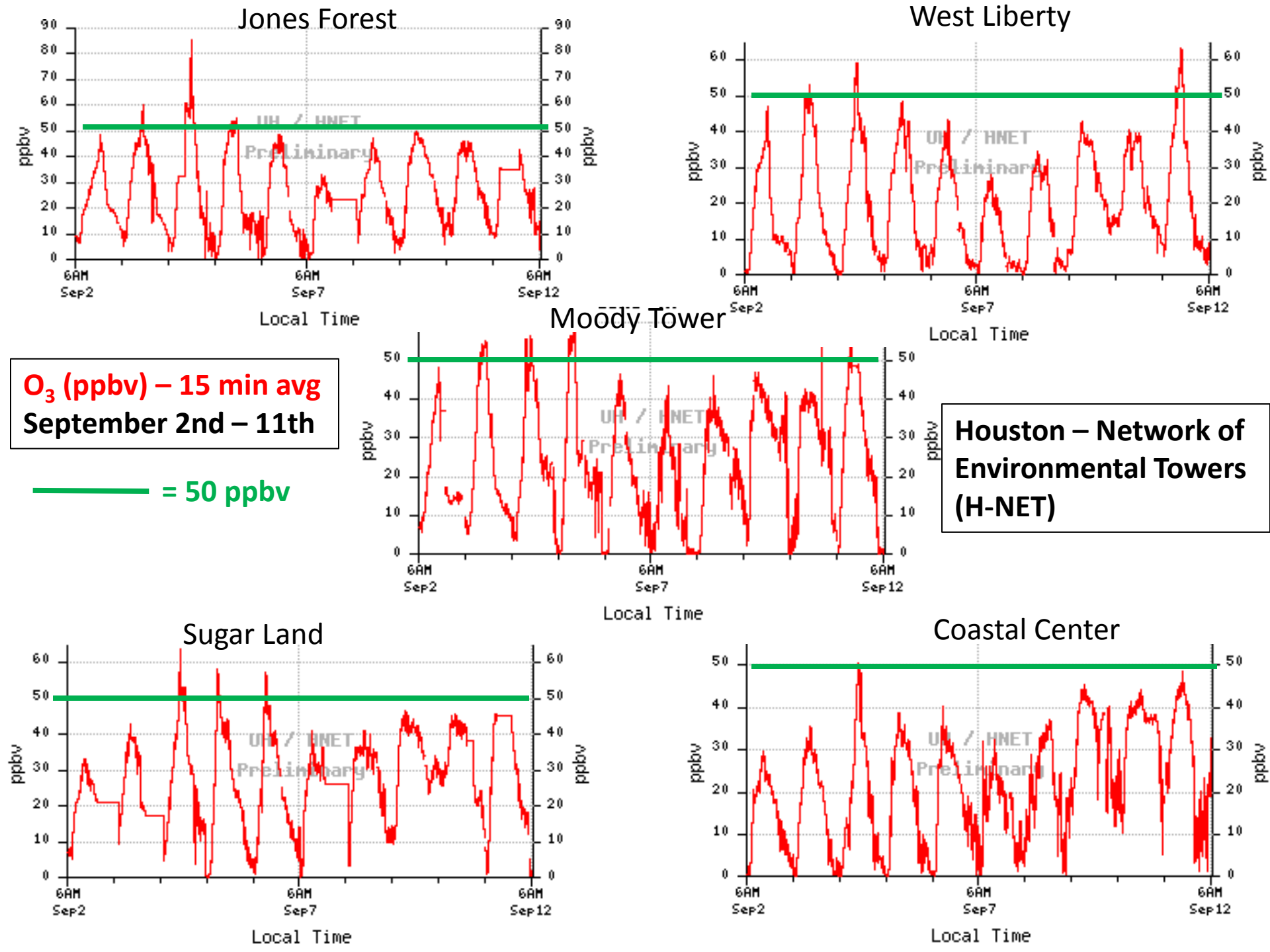
Houston - Network of Environmental Towers (H-NET)

Houston Network of Environmental Towers (H-NET) collect chemistry and meteorological measurements for air quality model applications in Houston Galveston Area. This web site provides real-time update of collected data, as well as historical data.

Currently, five sites have been set up in

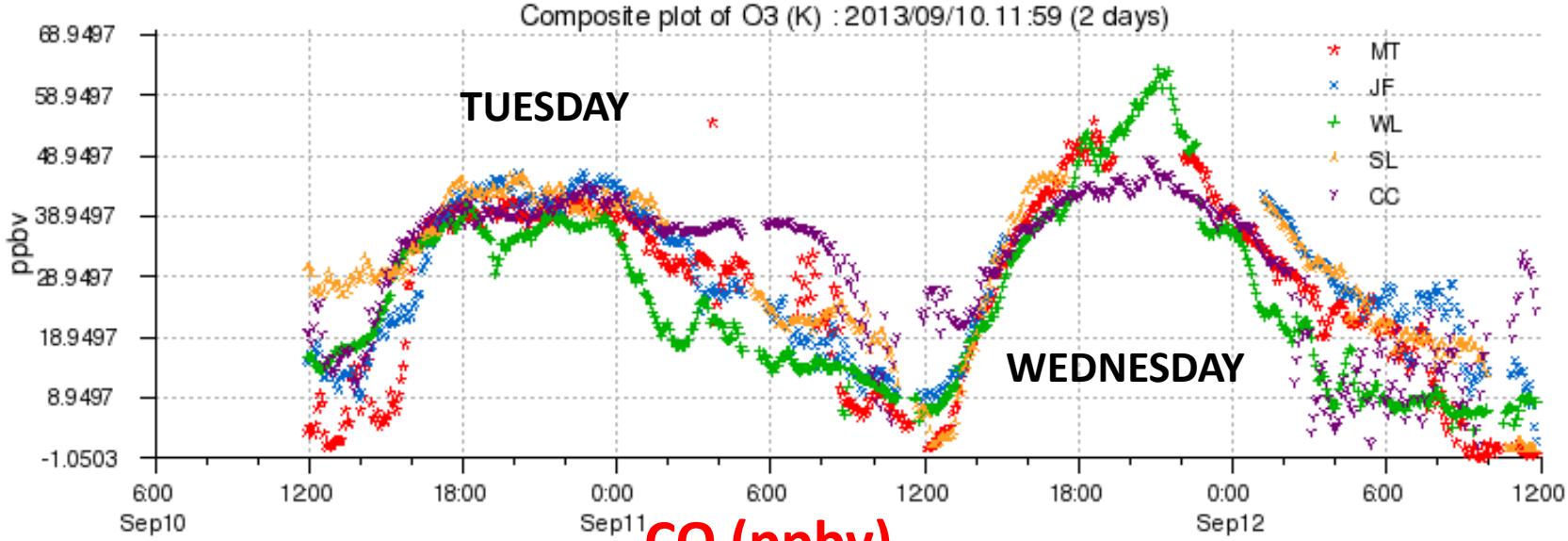
- UH - Main Campus (695)
- Jones State Forest (698)
- West Liberty Airport (699)
- UH - Sugar Land (696)
- UH - Coastal Center (697)

More about this project.

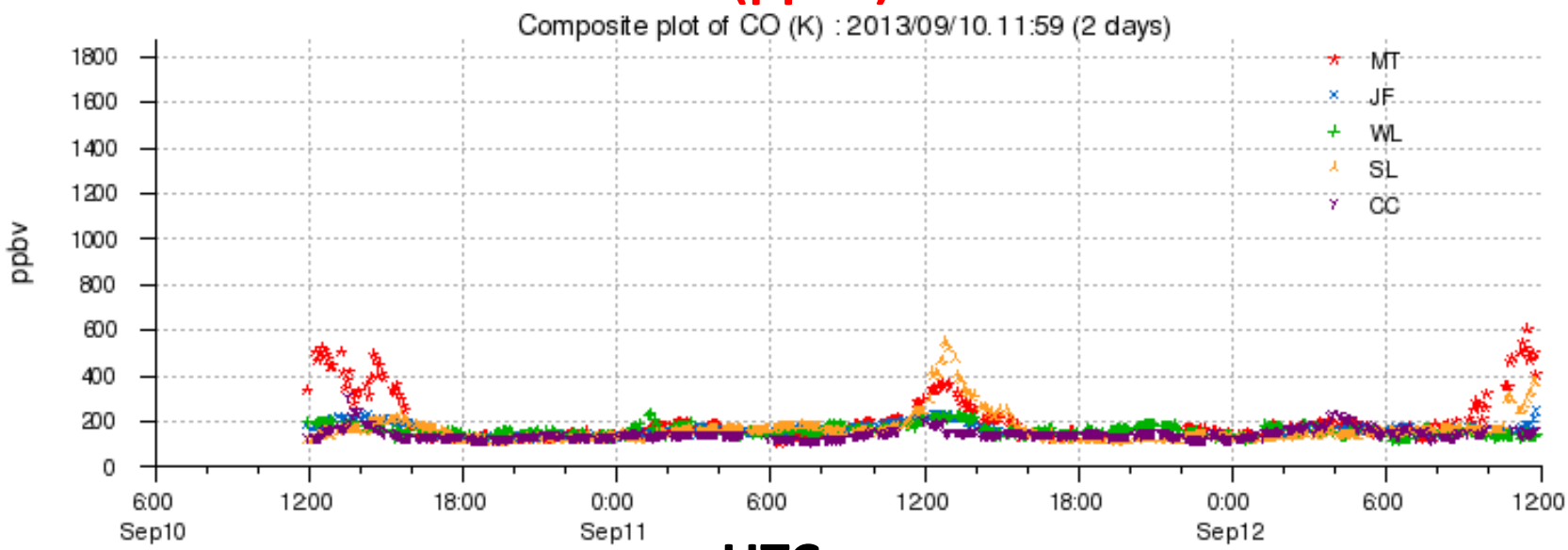

Jones Forest
West Liberty
Moody Tower
Sugar Land
Coastal Center
UH / HNET
Preliminary
ppbv
6AM Sep2
6AM Sep7
6AM Sep12
Local Time
O3 (ppbv) – 15 min avg
September 2nd – 11th
= 50 ppbv
Houston – Network of Environmental Towers (H-NET)

HNET

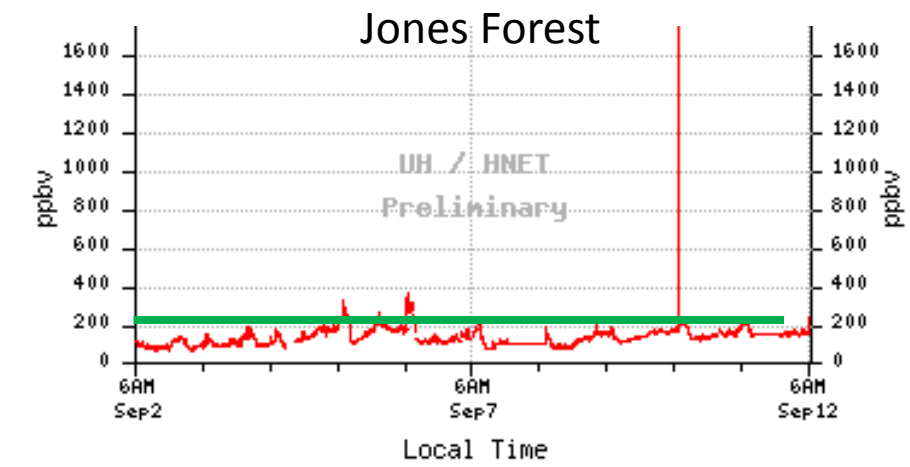
Ozone (ppbv)

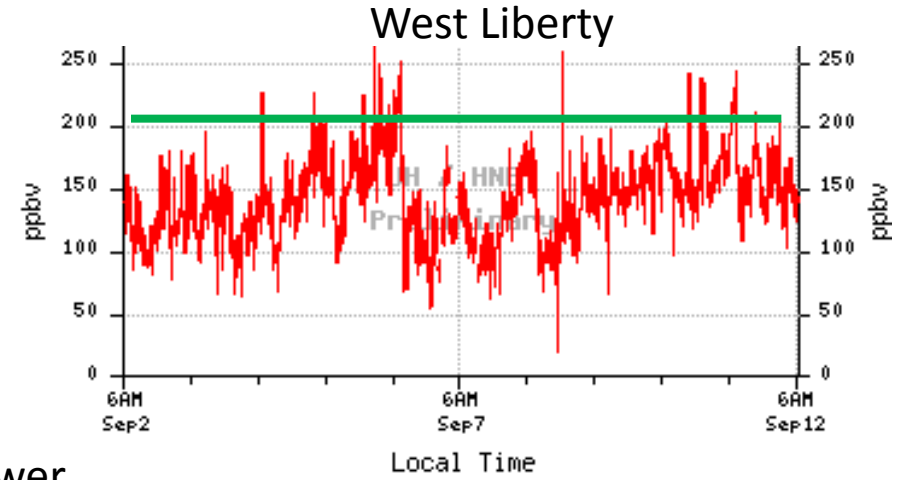


CO (ppbv)



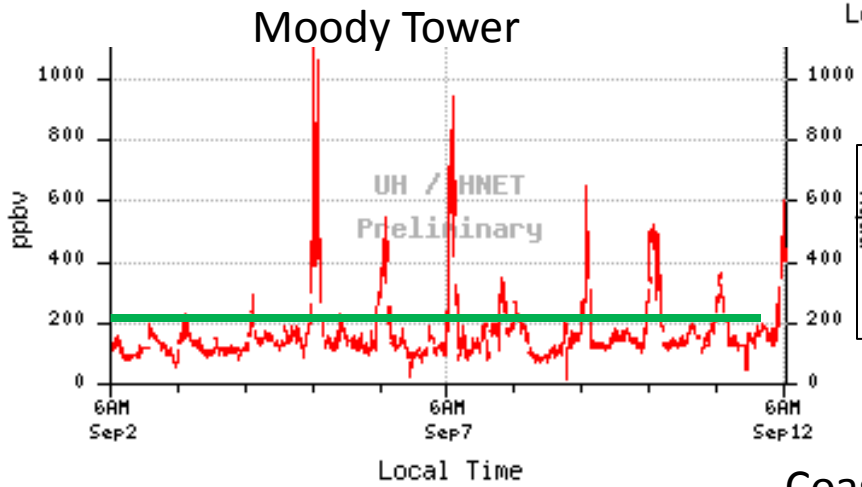
UTC



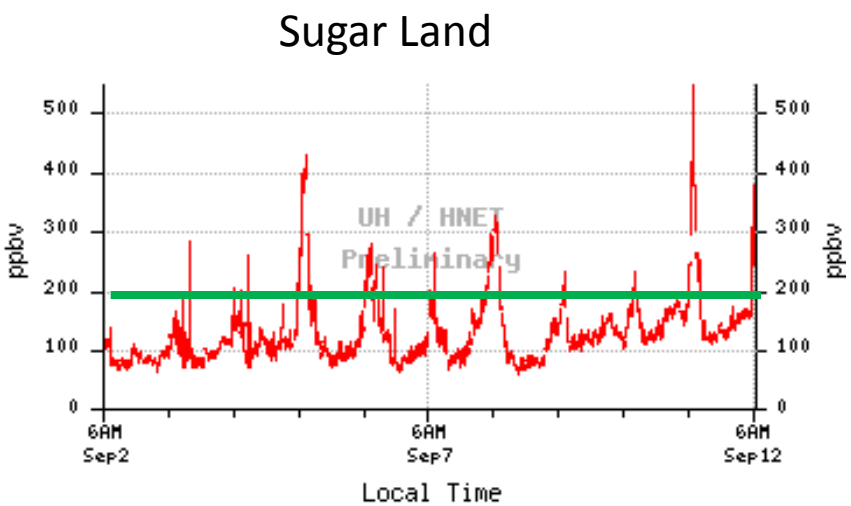


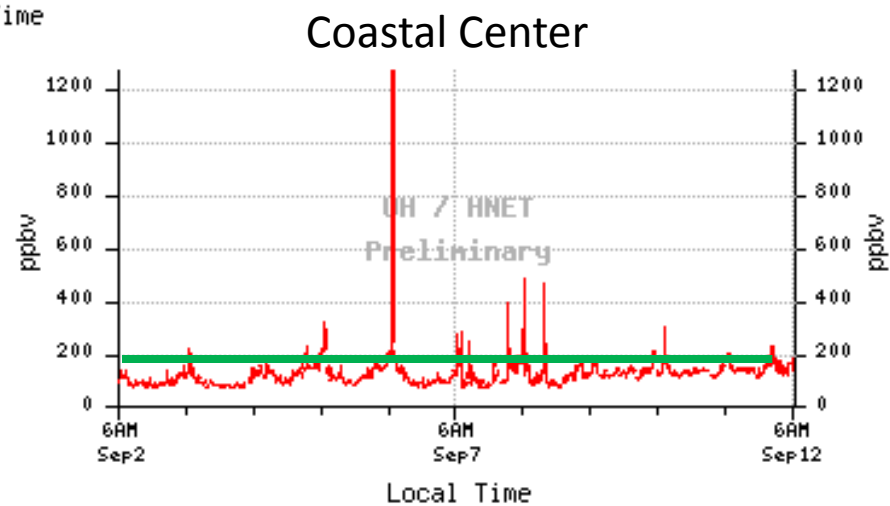
CO (ppbv) – 15 min avg
Sep. 2nd – 11th

= 200 ppbv



Houston – Network of Environmental Towers (H-NET)

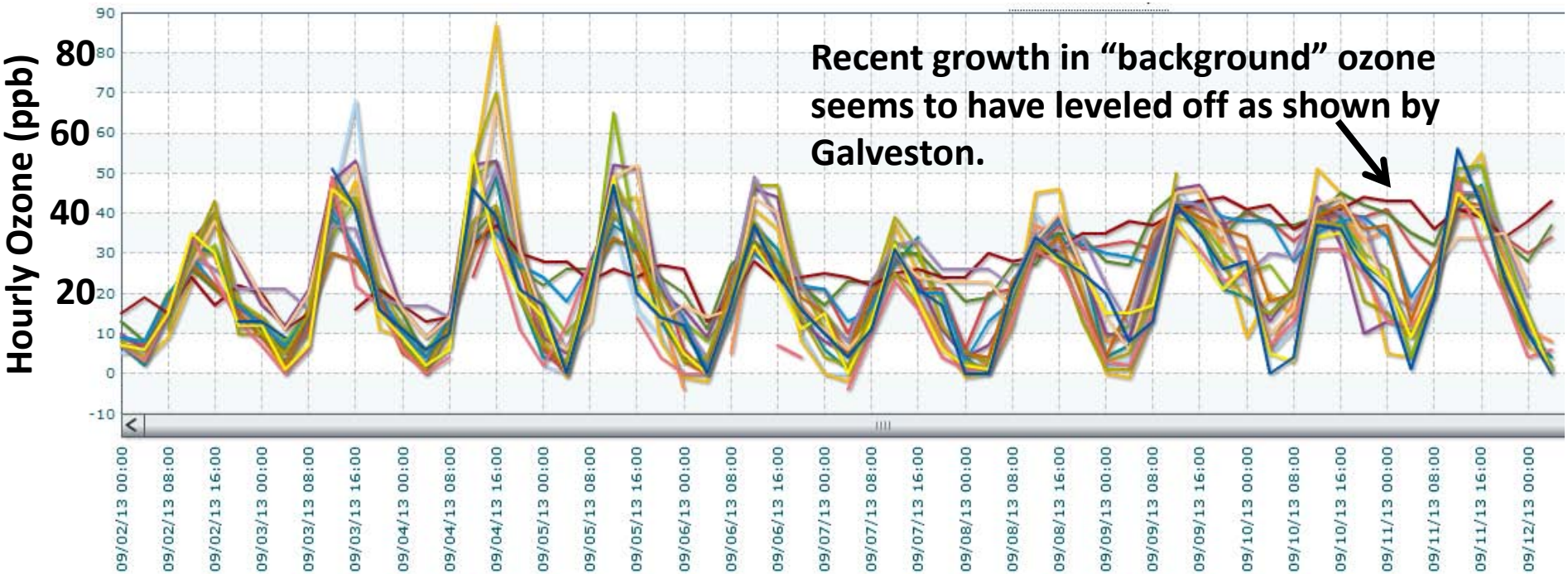




Hourly Ozone (airnowtech.org)**

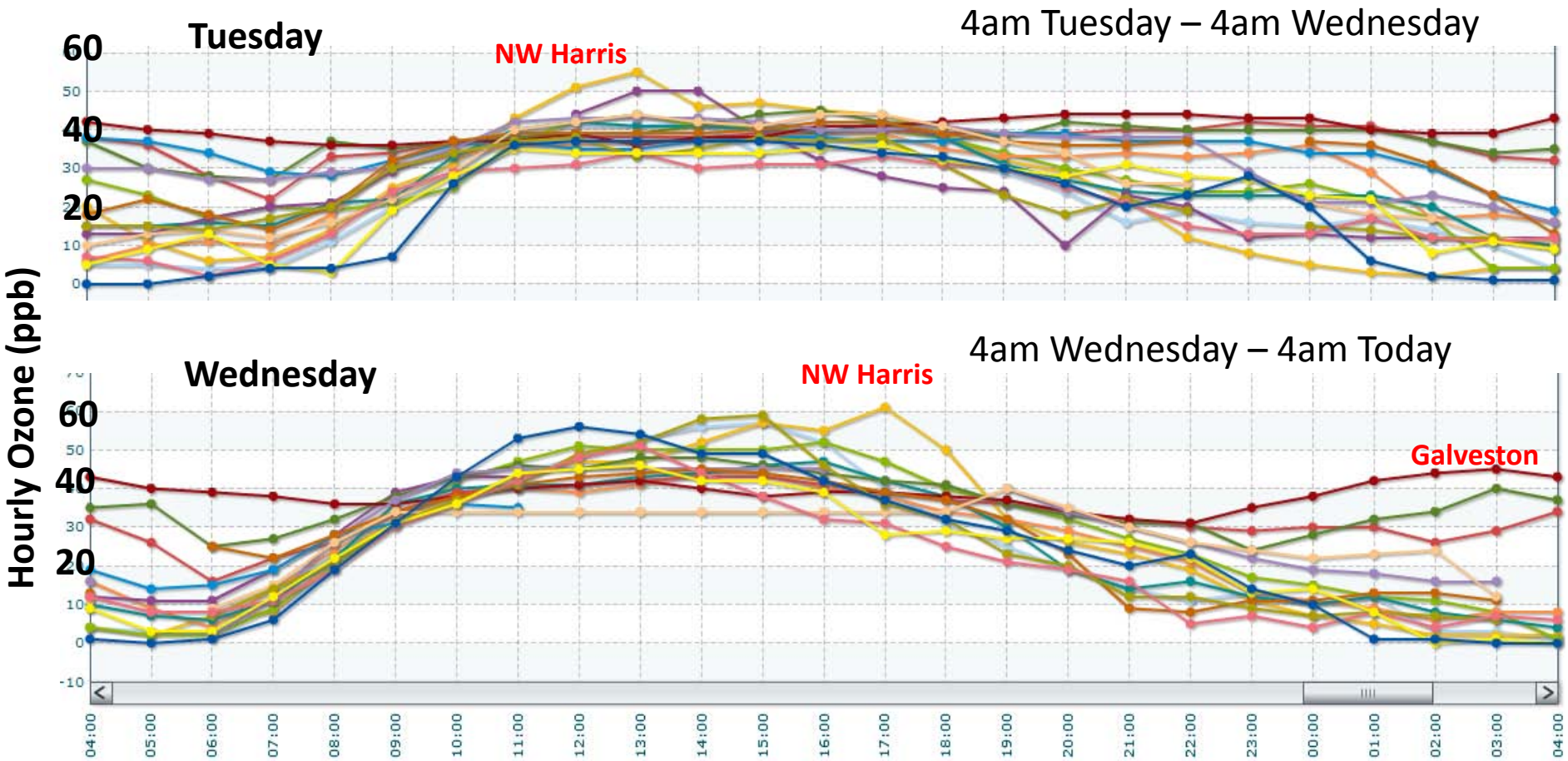
September 2nd – 11th

** EVERY 4th 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)

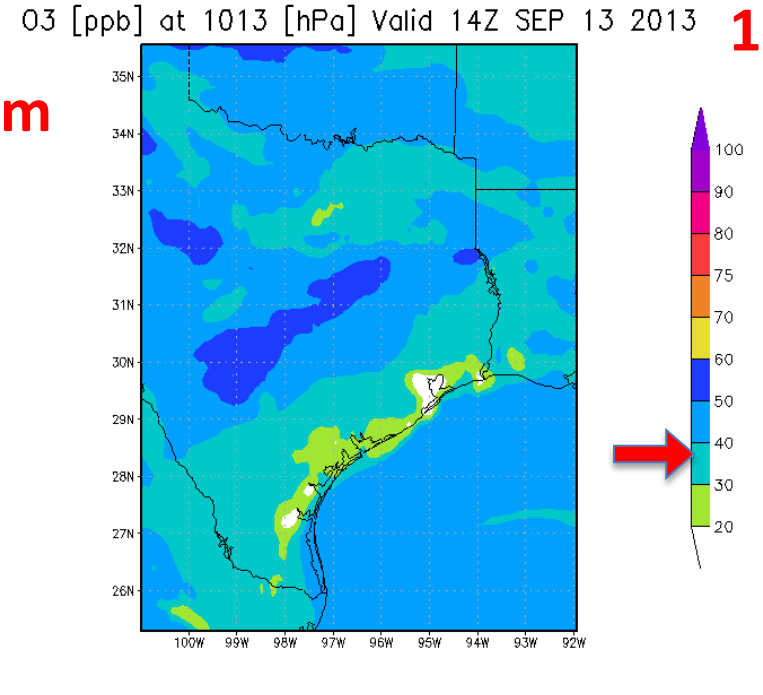
Hourly Ozone (airnowtech.org)



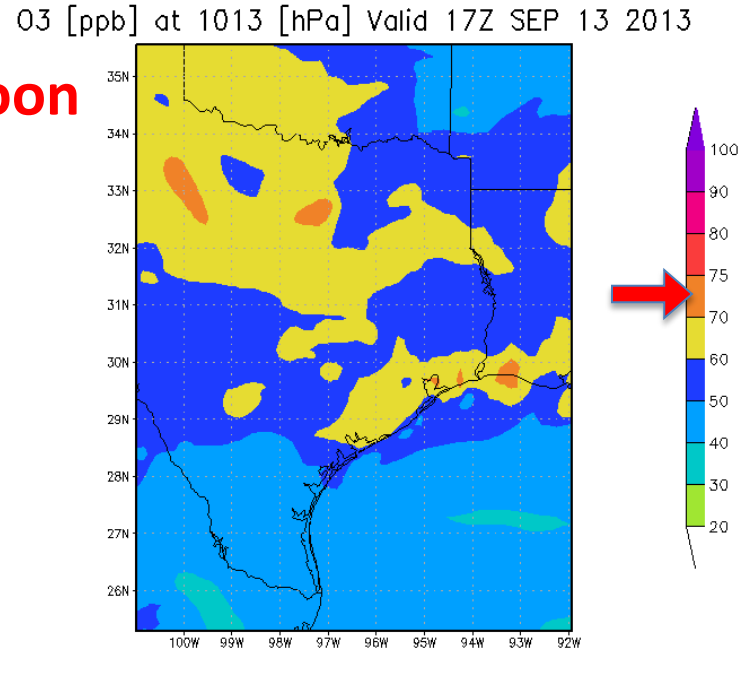
- Houston Aldine C8/O3 - 44201/1 Hr/2
- Houston Westhollow C410/O3 - 44201/1 Hr/1
- Manvel Croix Park C84/O3 - 44201/1 Hr/1
- Conroe Relocated C78/O3 - 44201/1 Hr/1
- West Houston C554/O3 - 44201/1 Hr/1
- Galveston Airport C1034/O3 - 44201/1 Hr/1
- Coastal Center C697/O3 - 44201/1 Hr/1
- West Liberty 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)

1013 hPa

9 am



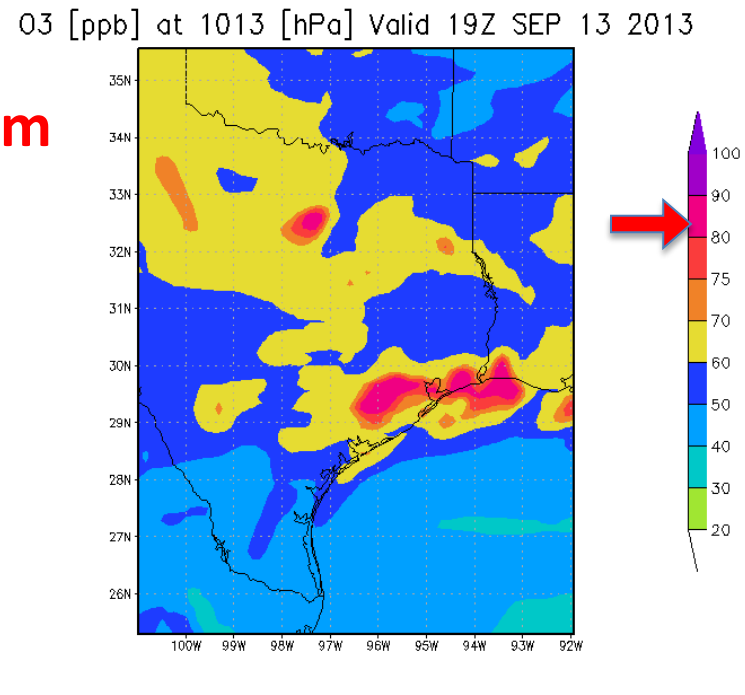
noon



NOAA Experim. CMAQ

Surface Ozone

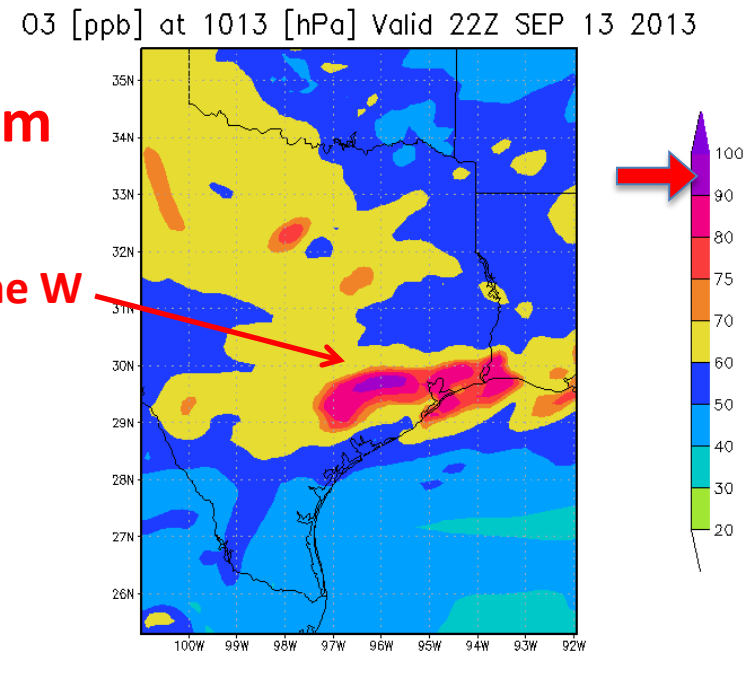
2 pm



5 pm

Plume W

FRIDAY

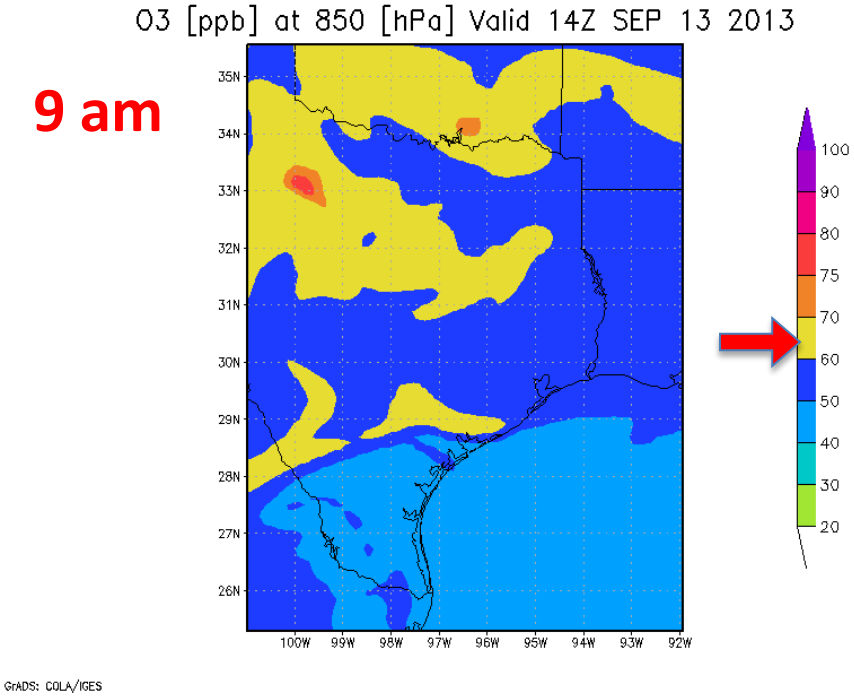


850 hPa

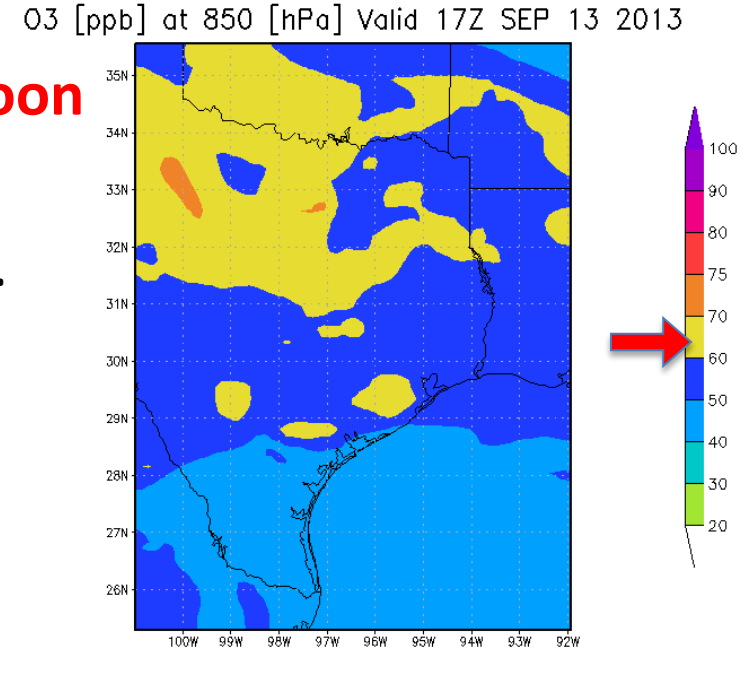
NOAA Experim. CMAQ

1.5 Km Ozone

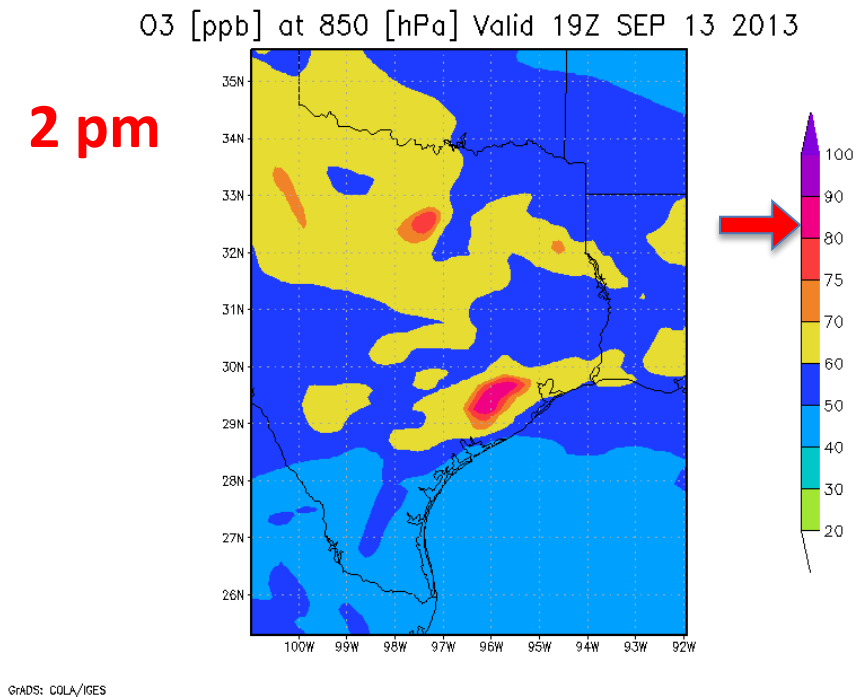
9 am



noon



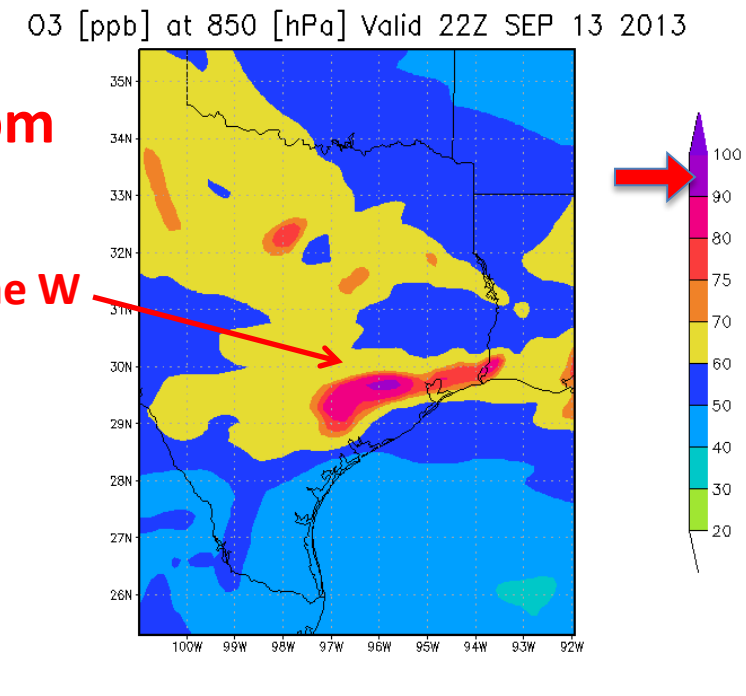
2 pm



5 pm

Plume W

FRIDAY

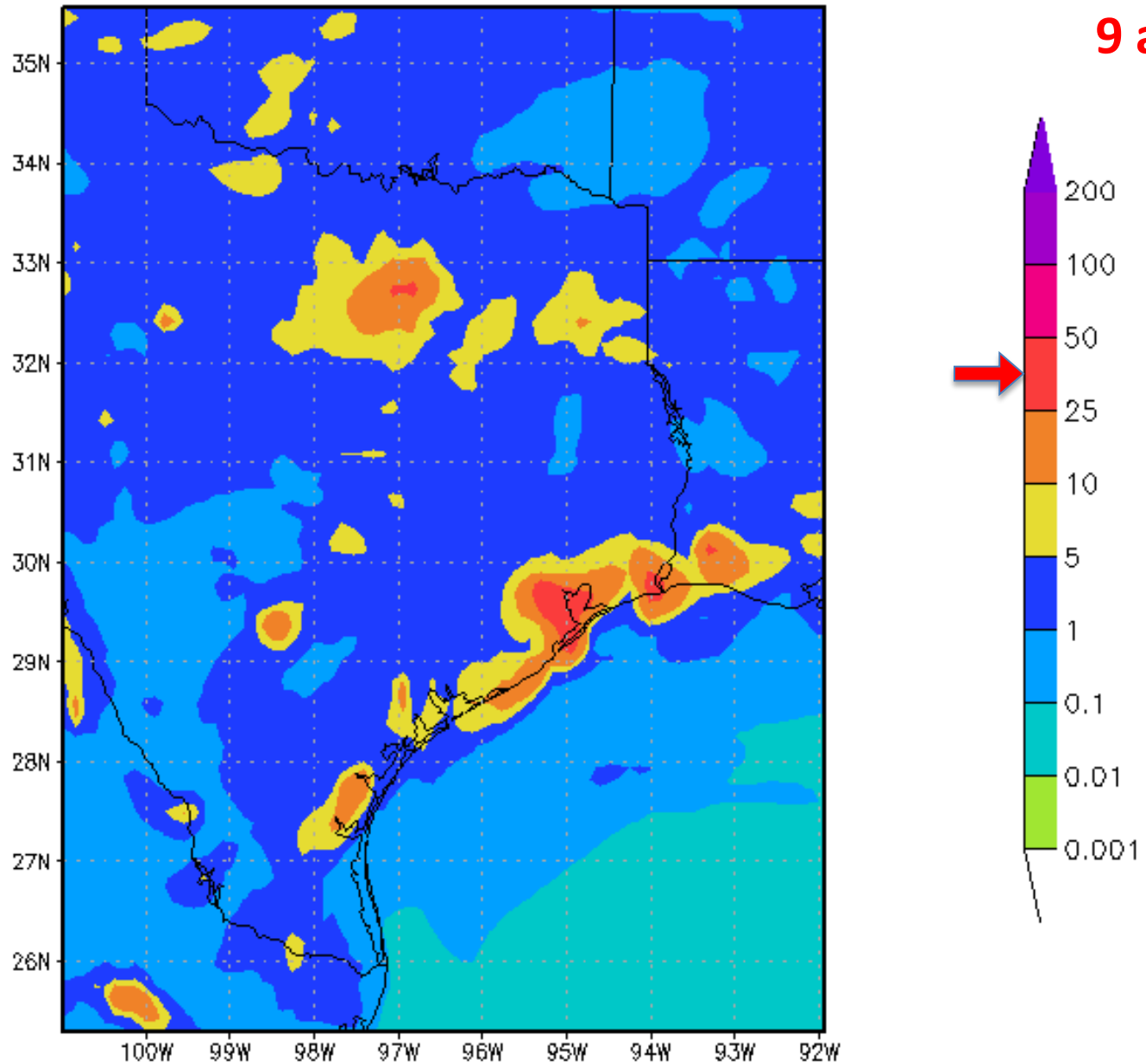


NO2 [ppb] at 1013 [hPa] Valid 14Z SEP 13 2013

9 am

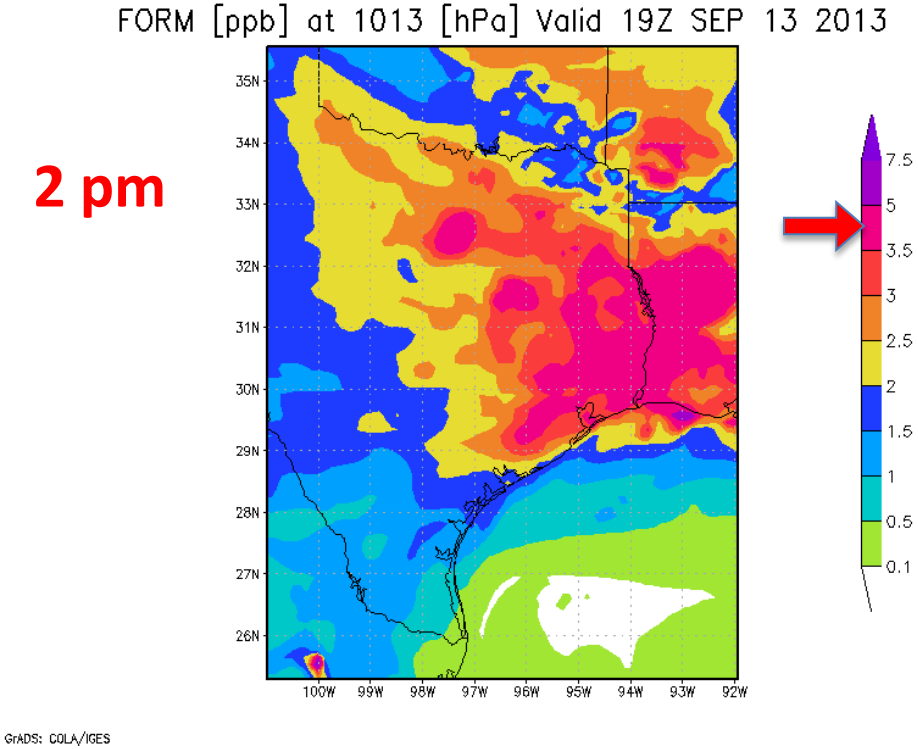
NOAA Experm.
CMAQ Model
Surface NO2

FRIDAY



GrADS: COLA/IGES

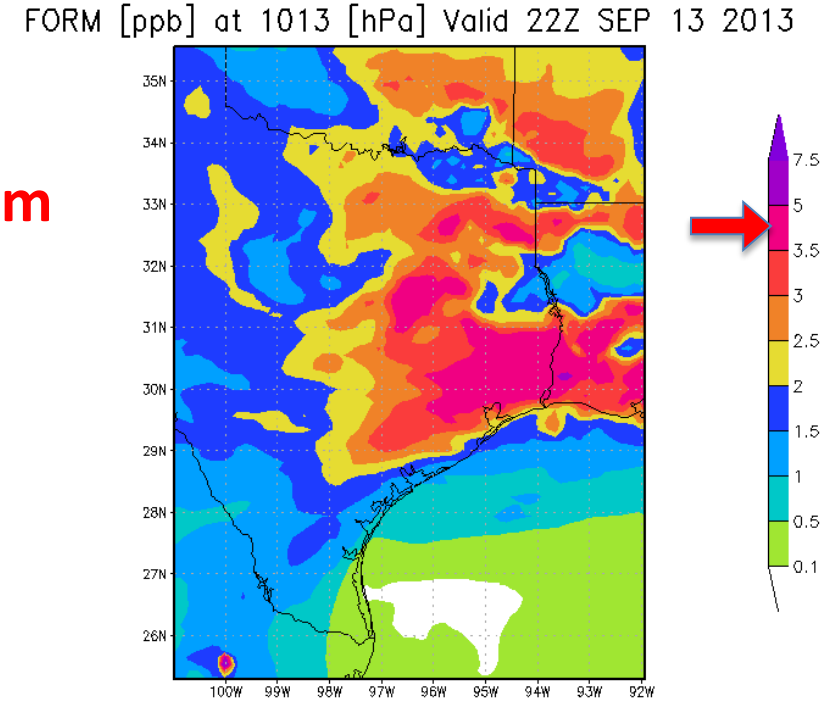
2 pm



FRIDAY

NOAA Experm. CMAQ Model Surface Formaldehyde

5 pm

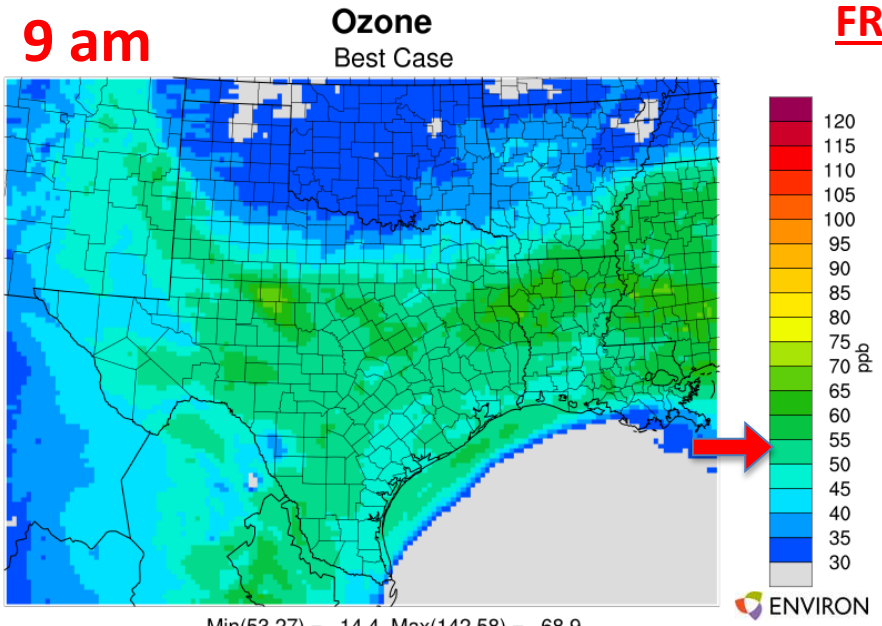


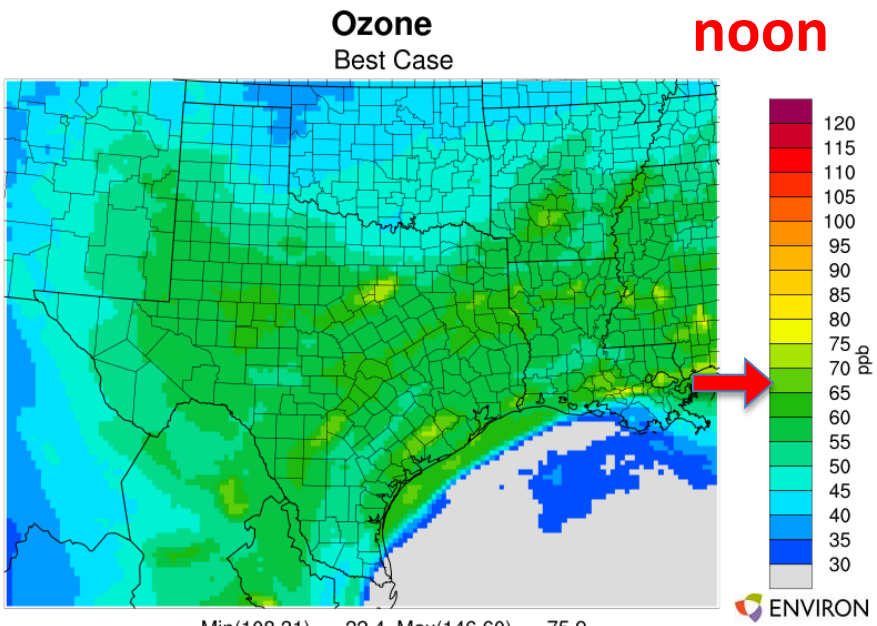
NE flow allowing plume over Houston – a new flow pattern since mission started.

Flow should last for a day or two more.

FRIDAY

CAMx Model
Surface Ozone


9 am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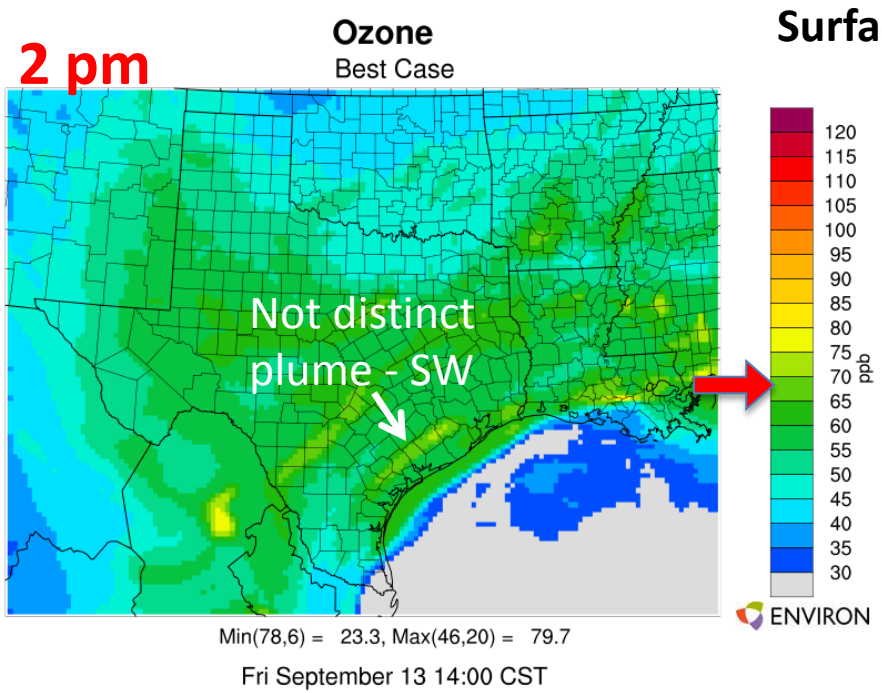
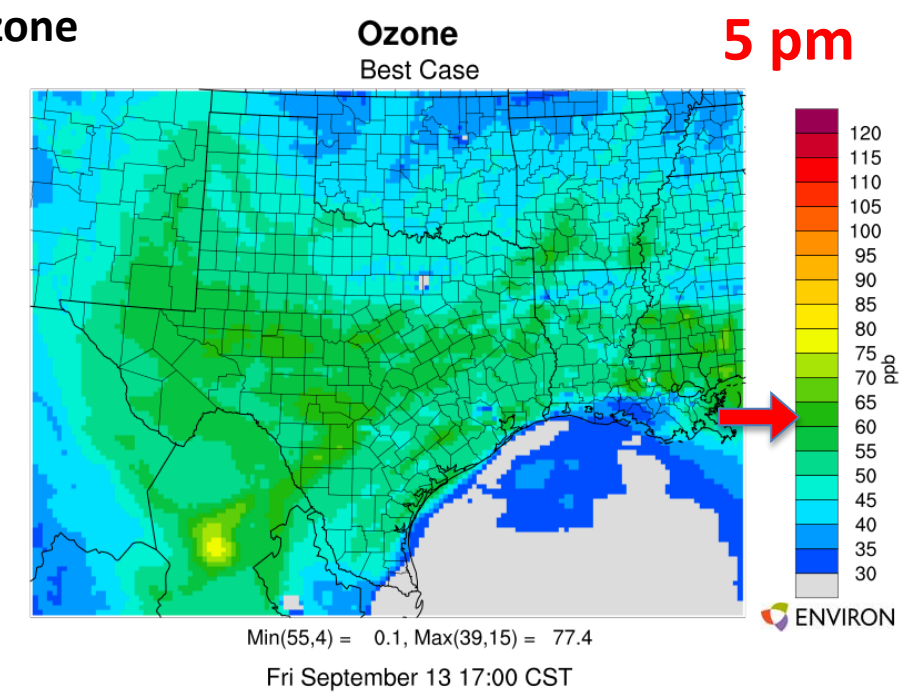
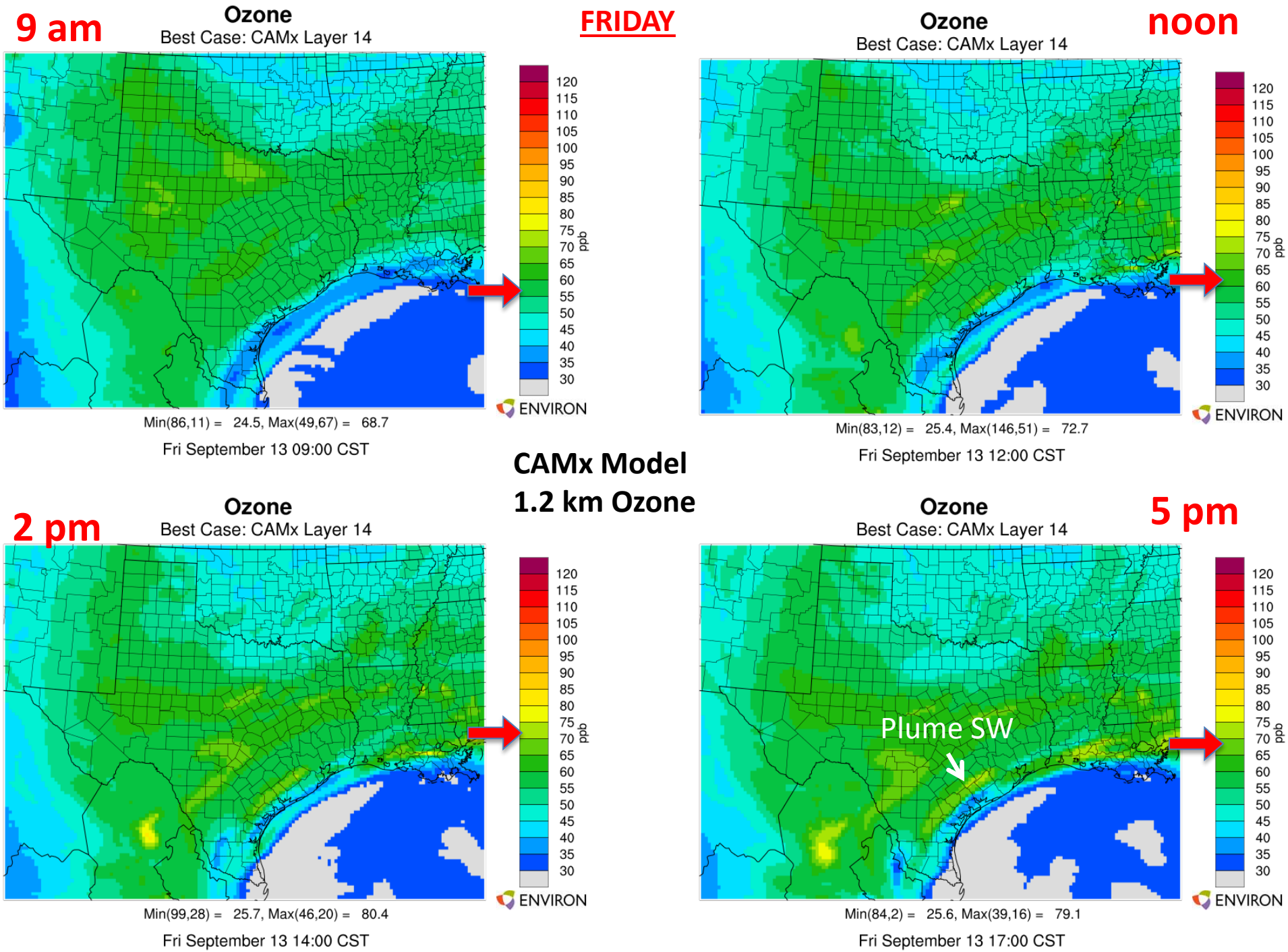

2 pm


5 pm

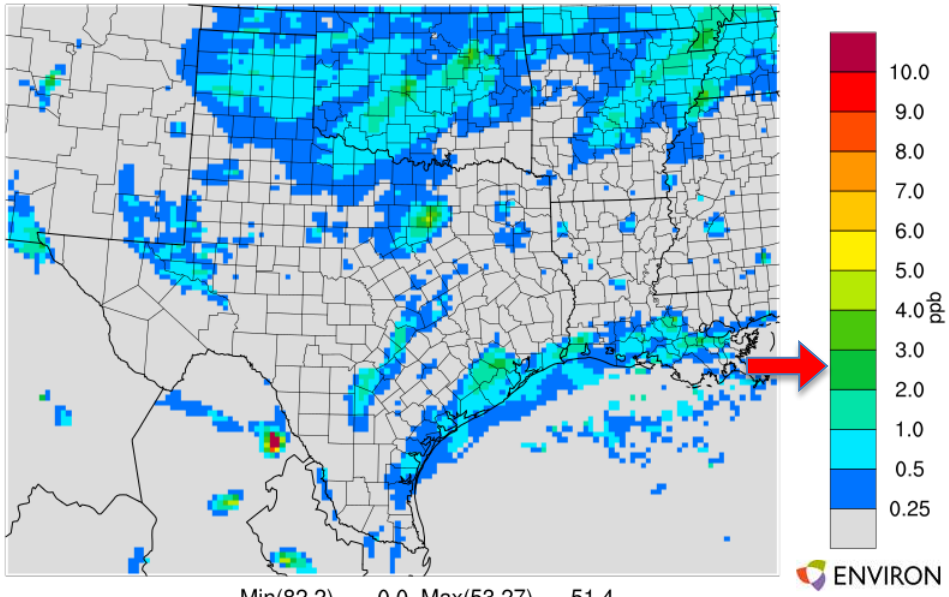

9 am
Ozone
Best Case: CAMx Layer 14
FRIDAY
120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30
ppb
ENVIRON
Min(86,11) = 24.5, Max(49,67) = 68.7
Fri September 13 09:00 CST
noon
Ozone
Best Case: CAMx Layer 14
Min(83,12) = 25.4, Max(146,51) = 72.7
Fri September 13 12:00 CST
CAMx Model
1.2 km Ozone
2 pm
Ozone
Best Case: CAMx Layer 14
Min(99,28) = 25.7, Max(46,20) = 80.4
Fri September 13 14:00 CST
5 pm
Ozone
Best Case: CAMx Layer 14
Plume SW
Min(84,2) = 25.6, Max(39,16) = 79.1
Fri September 13 17:00 CST

FRIDAY

CAMx Surface NO and NOx

NO 9 am

Best Case

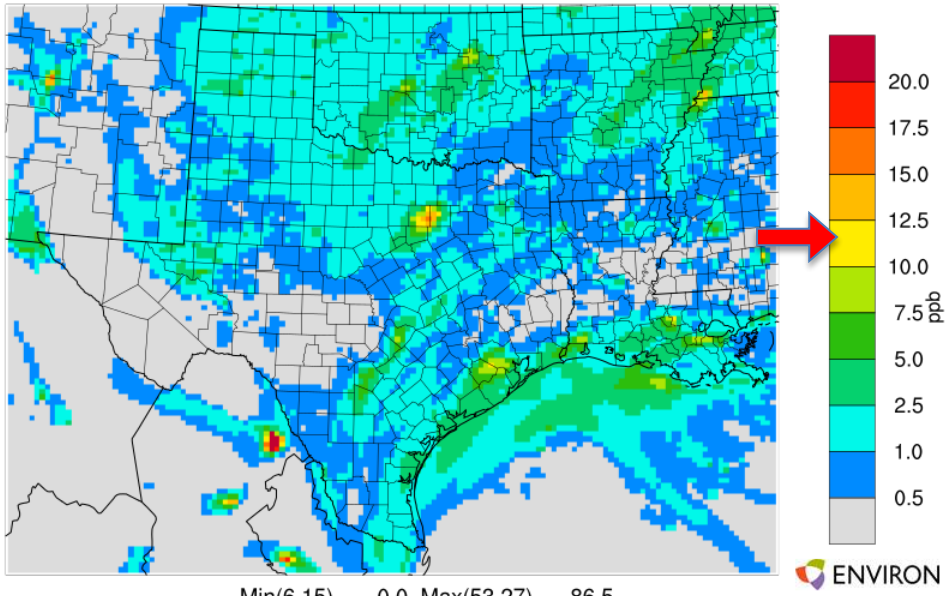


Min(82,2) = 0.0, Max(53,27) = 51.4

Fri September 13 09:00 CST

NOx 9 am

Best Case



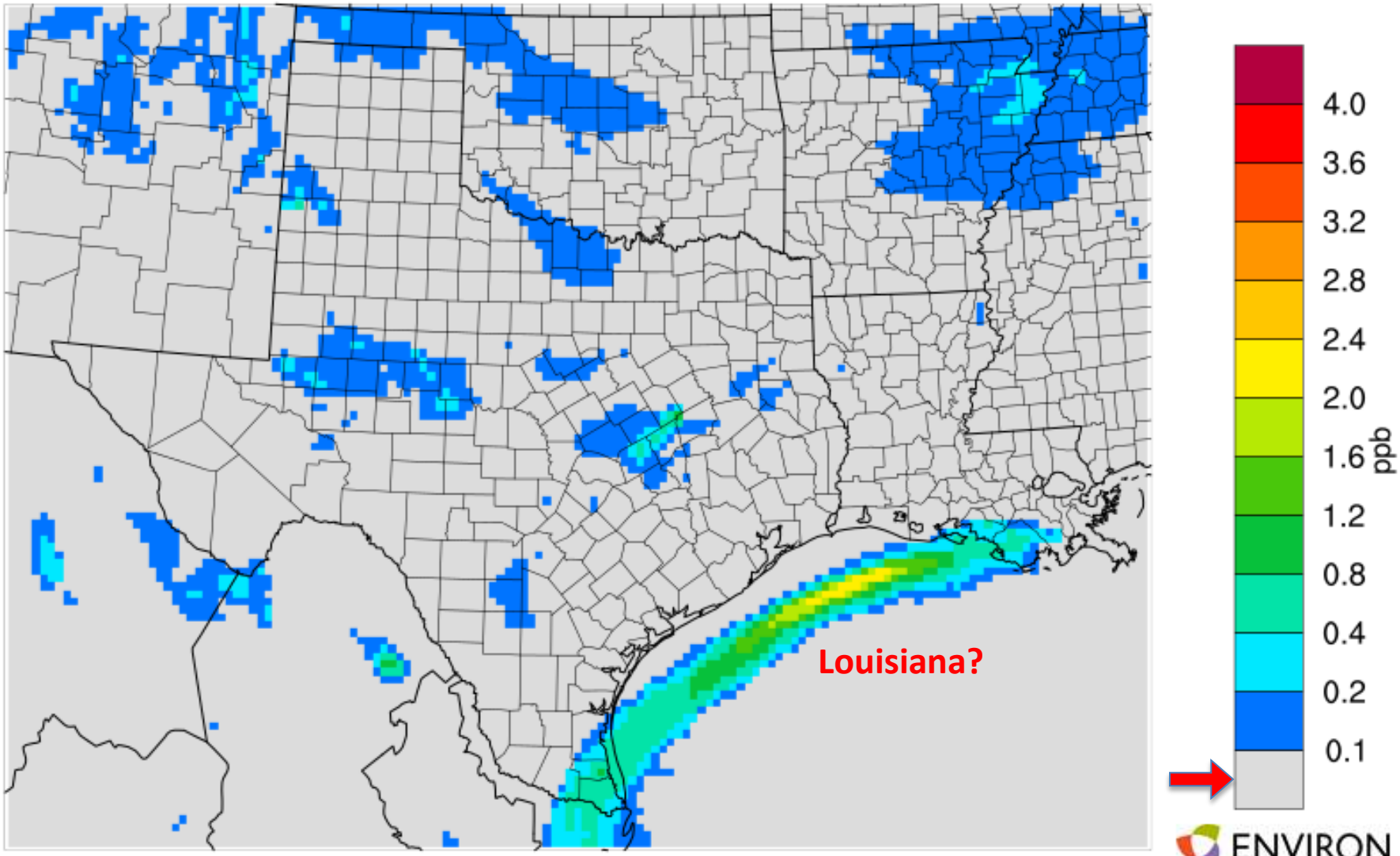
Min(6,15) = 0.0, Max(53,27) = 86.5

Fri September 13 09:00 CST

CAMx Model
1.2 km NO2

NO_2

Best Case: CAMx Layer 14

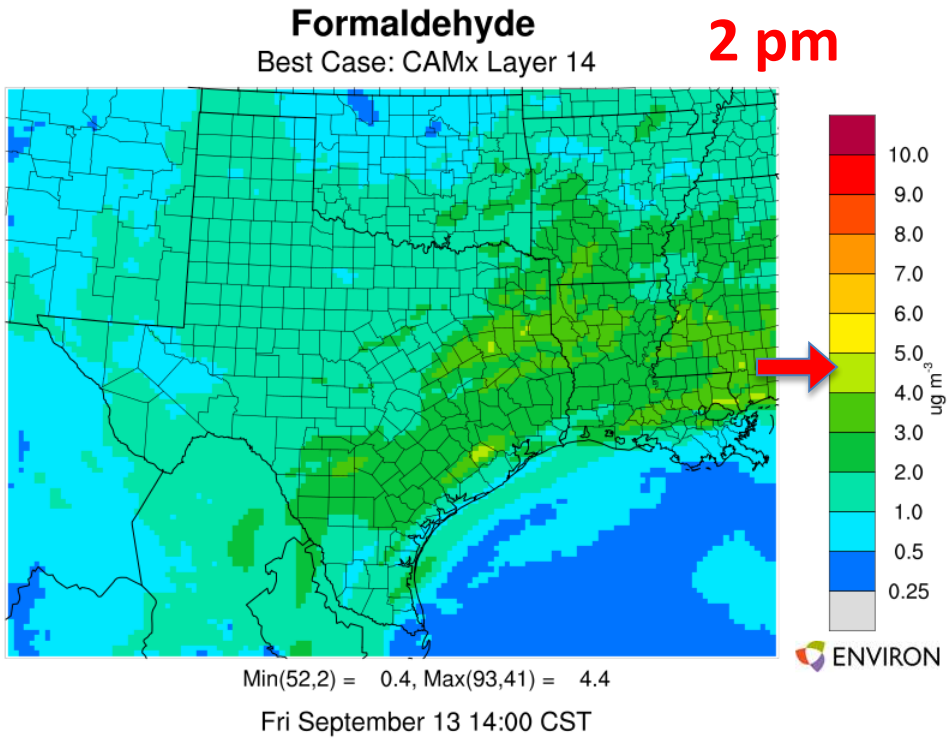


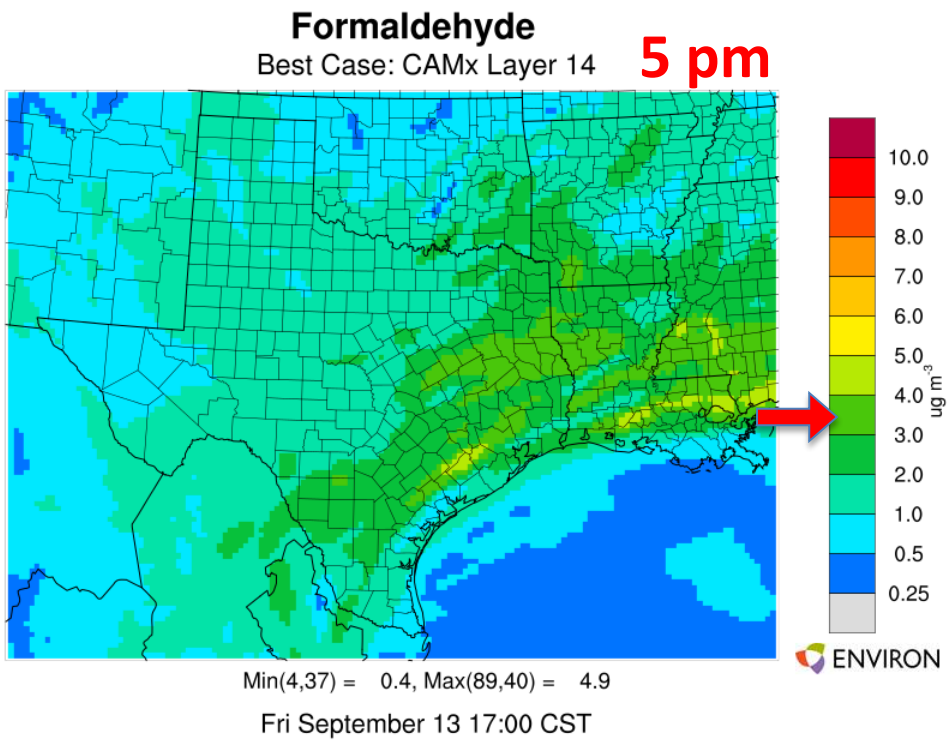
Min(48,3) = 0.0, Max(112,36) = 2.3

Fri September 13 09:00 CST **9 am**

FRIDAY

CAMx Model Formaldehyde
1.2 km (Layer 14)





OZONE

TODAY: Moderate (Code Yellow) ozone is expected today, with peaks W and S of Houston.

FRIDAY: light winds and higher background can lead to Code Orange (Unhealthy for Sensitive Groups) expected W, SW, and S sides of Houston.

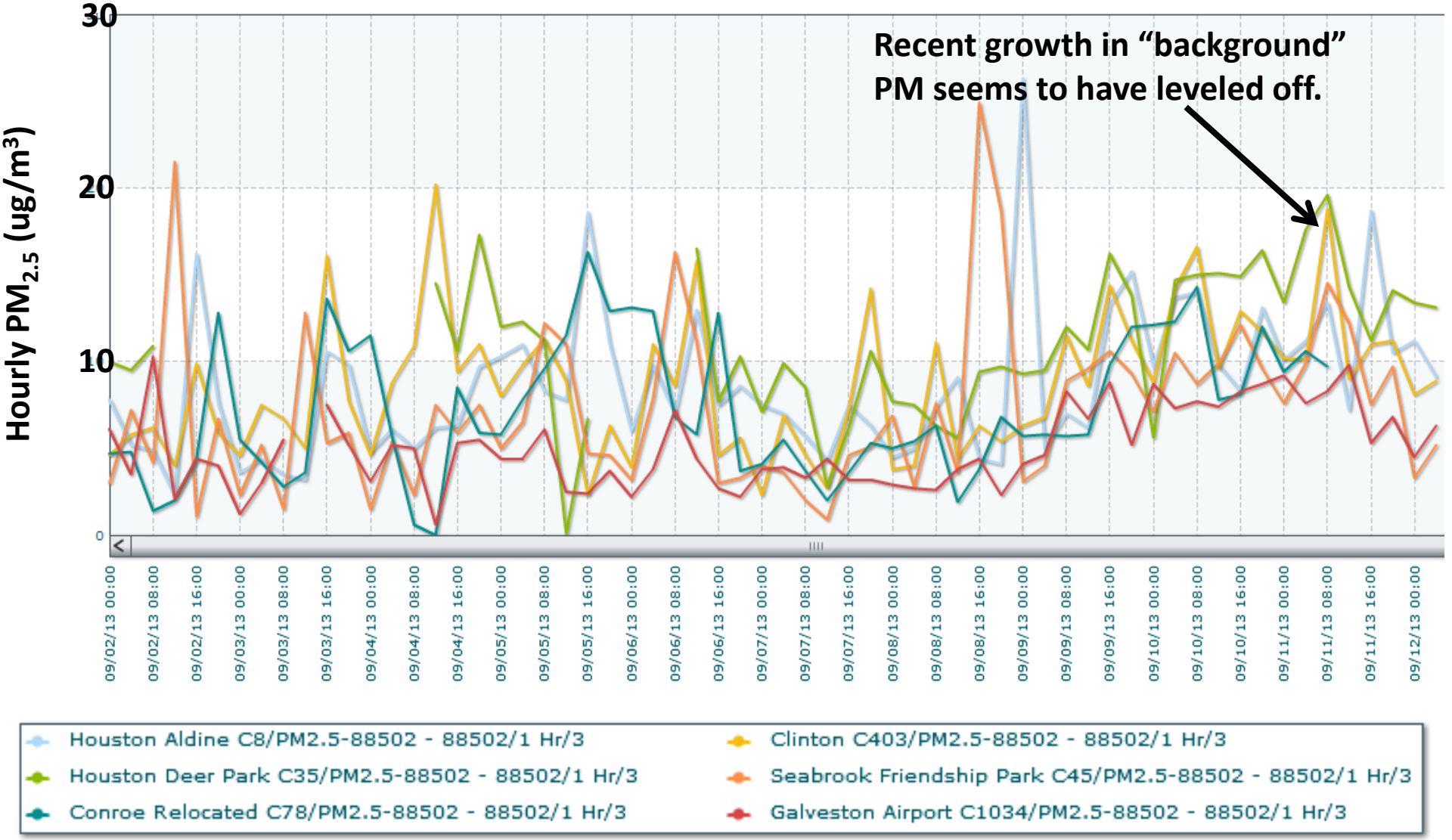
SATURDAY (W and SW side) and **SUNDAY**: Code Yellow

PM2.5 will continue in the low end of the moderate range.

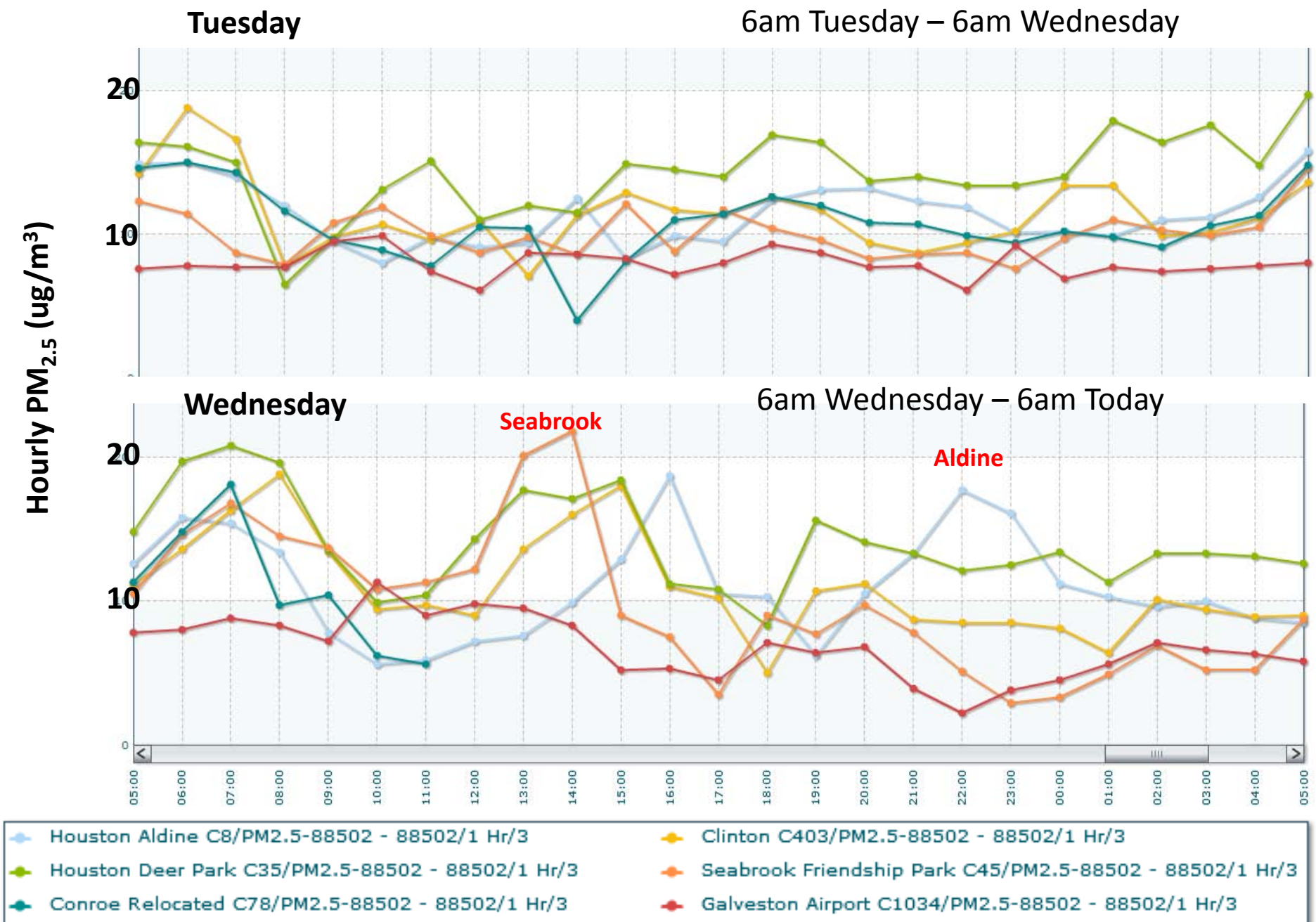
Hourly $PM_{2.5}$ (airnowtech.org)**

September 2nd – 11th

** EVERY 4th HOUR PLOTTED!!!!!



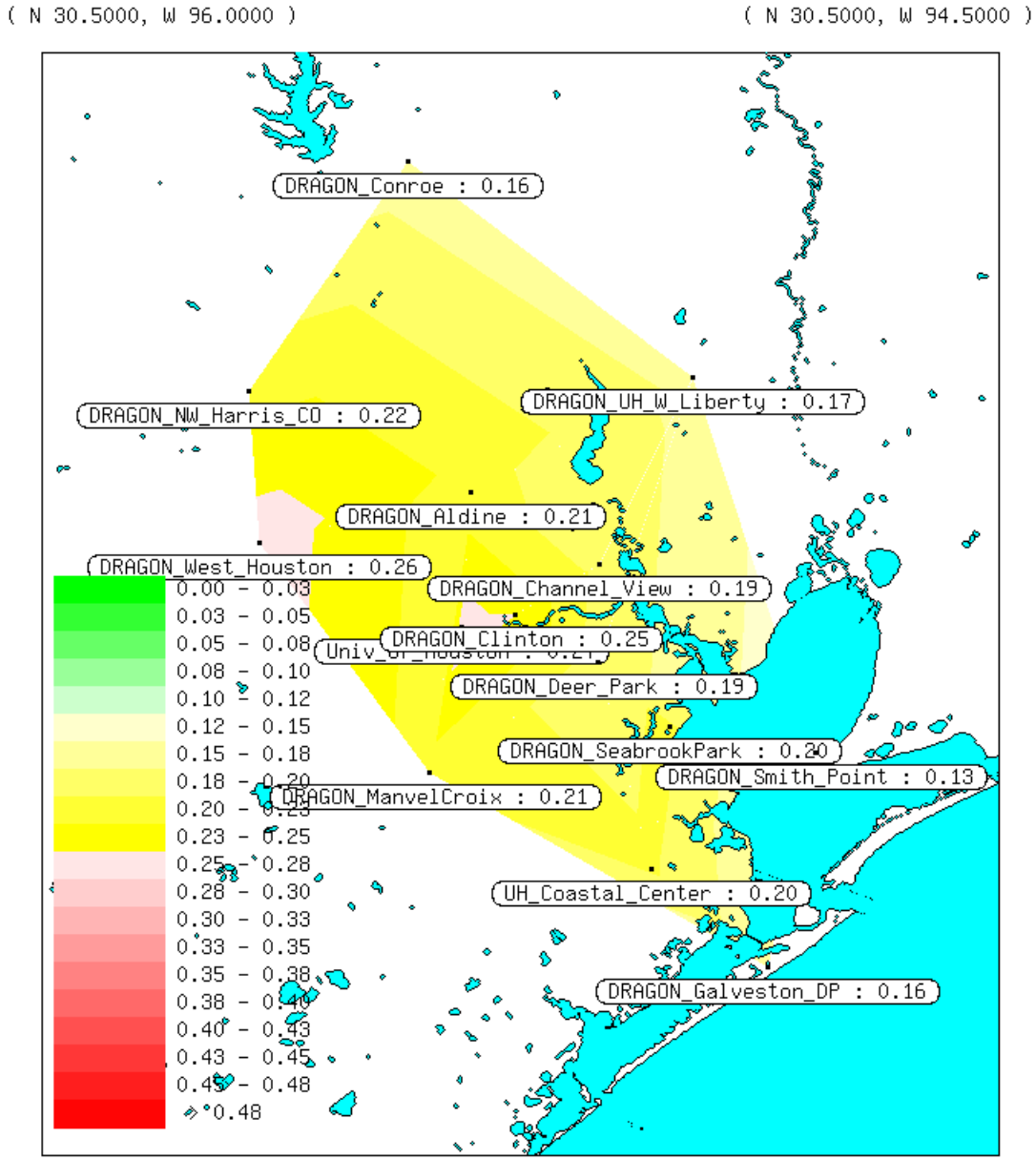
Hourly $PM_{2.5}$ (airnowtech.org)



DRAGON : September 11th (Wednesday) at Level 1.5

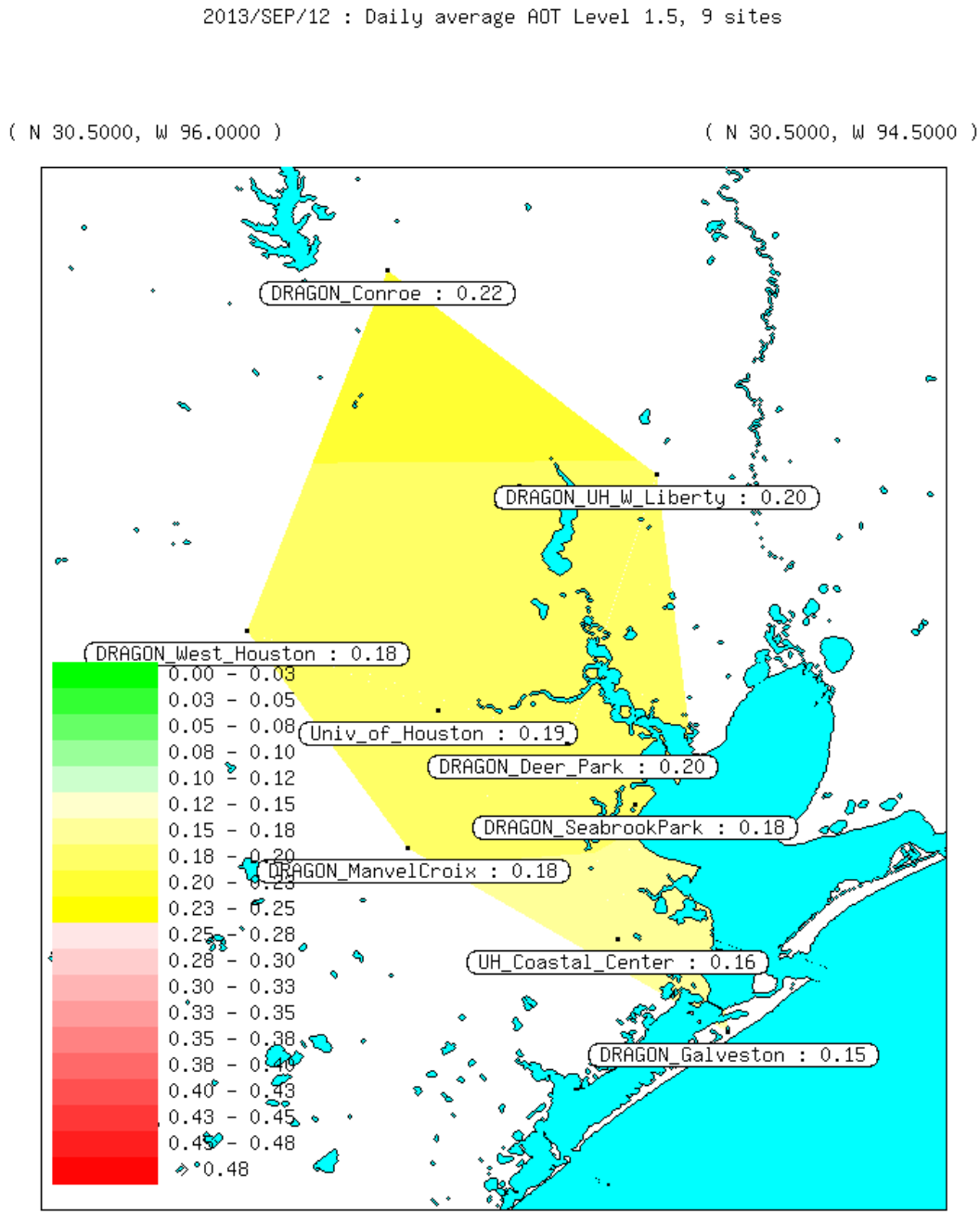
2013/SEP/11 : Daily average AOT Level 1.5, 15 sites

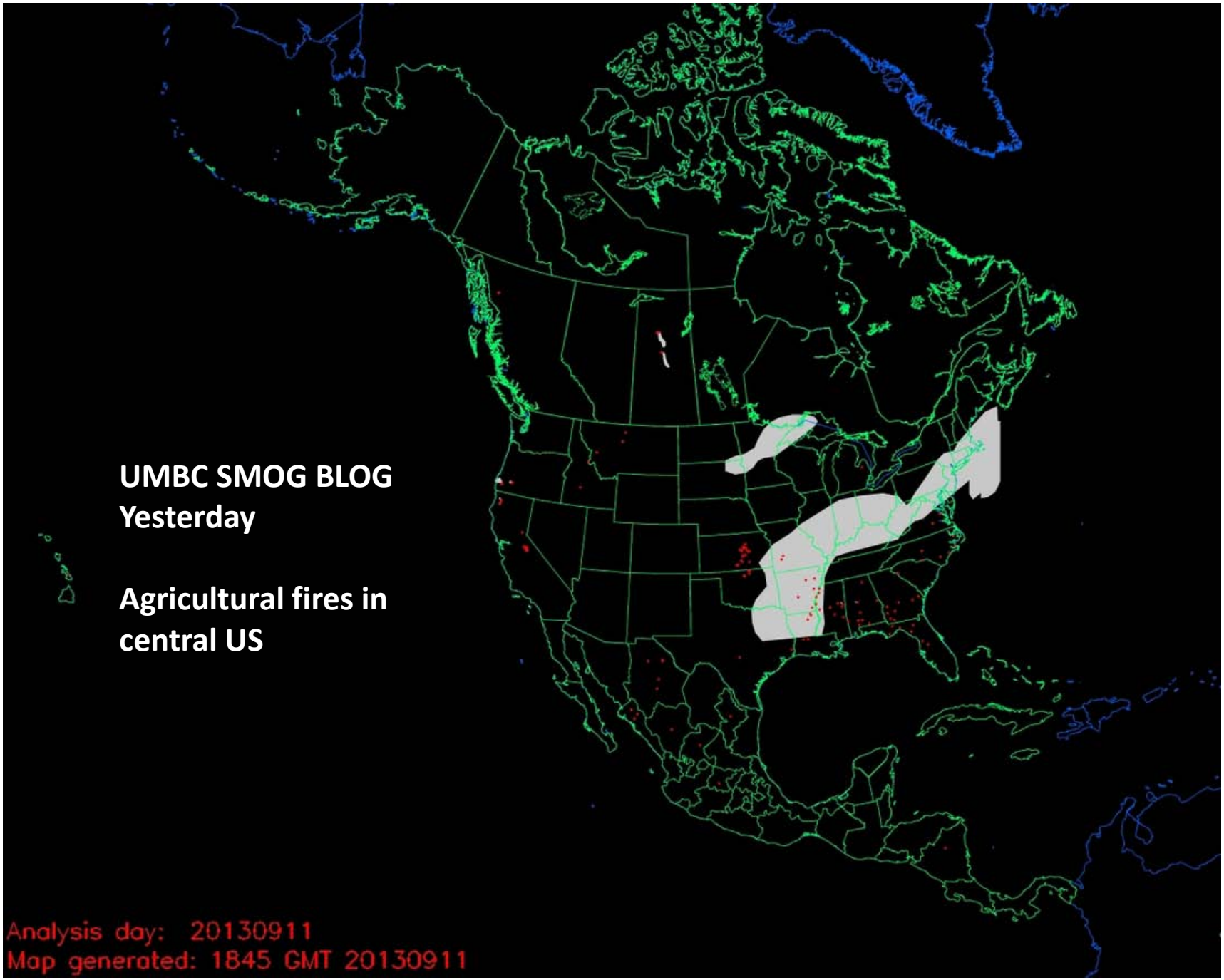
0.13-0.30



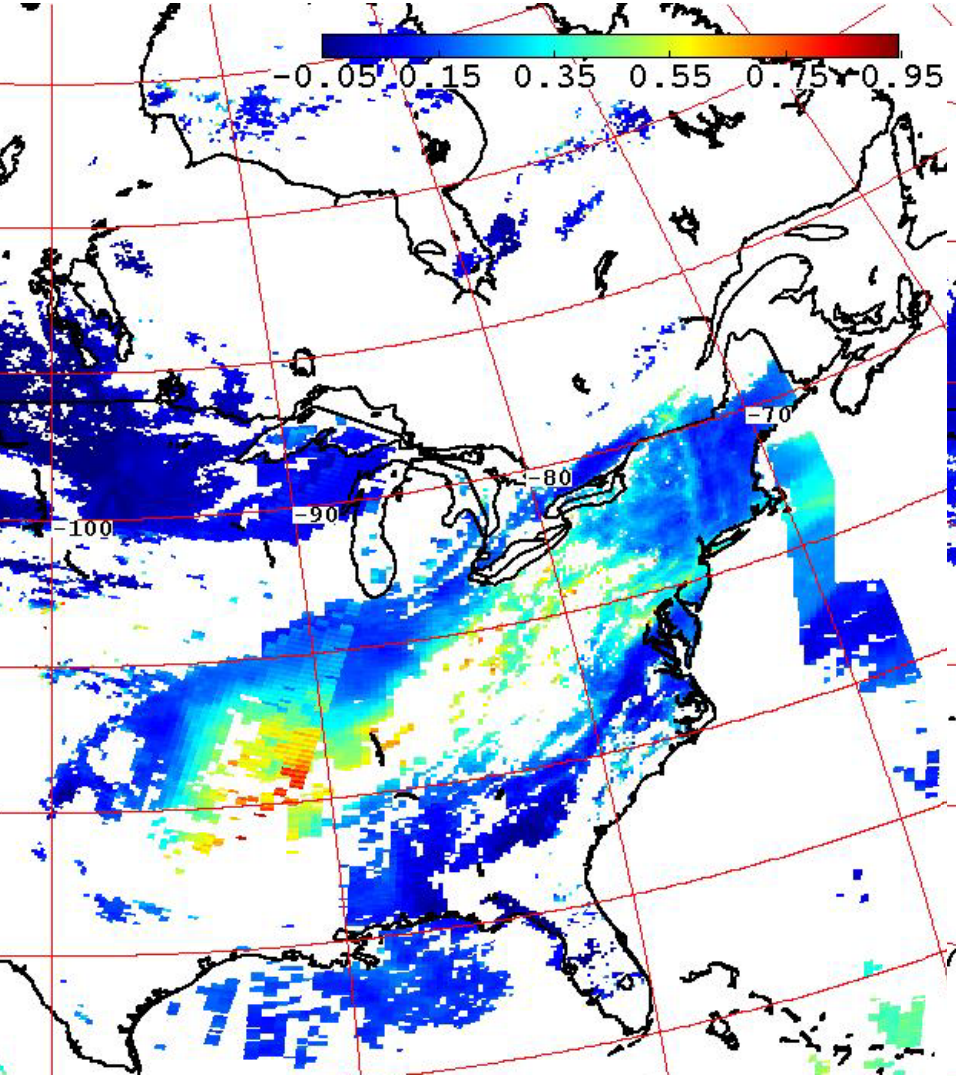
DRAGON : September 12th (Today) at Level 1.5

0.15-0.22

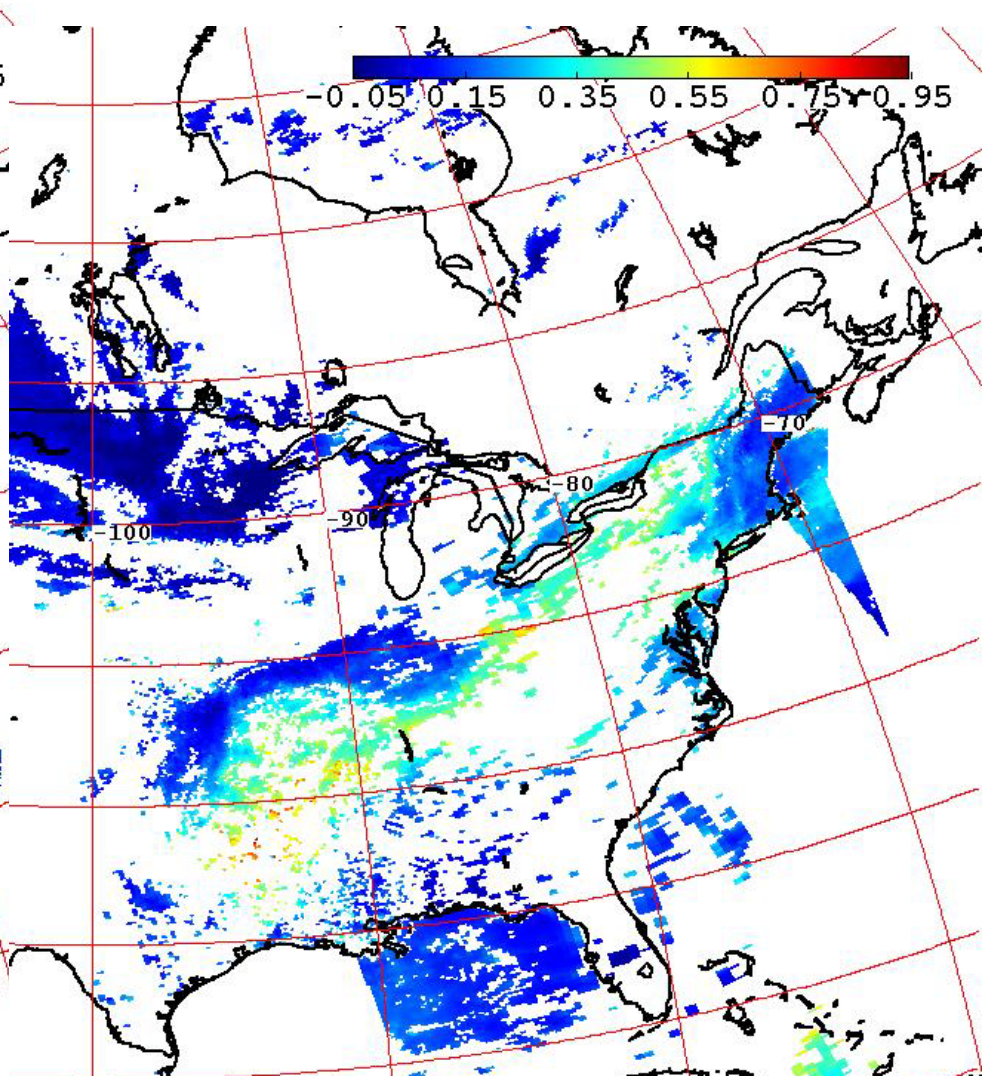



UMBC SMOG BLOG
Yesterday
Agricultural fires in central US
Analysis day: 20130911
Map generated: 1845 GMT 20130911

Terra AOD - Yesterday



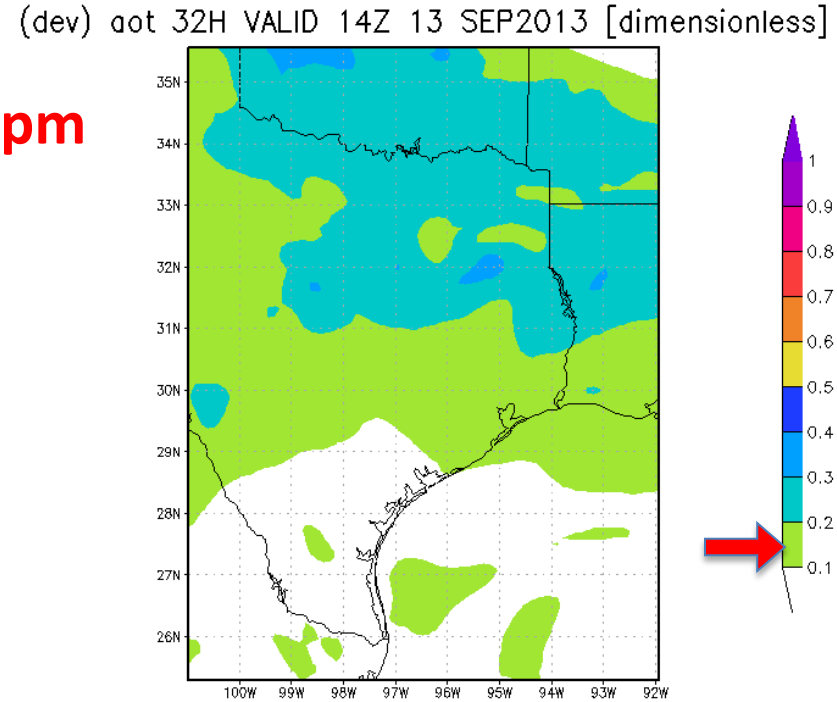
Aqua AOD - Yesterday



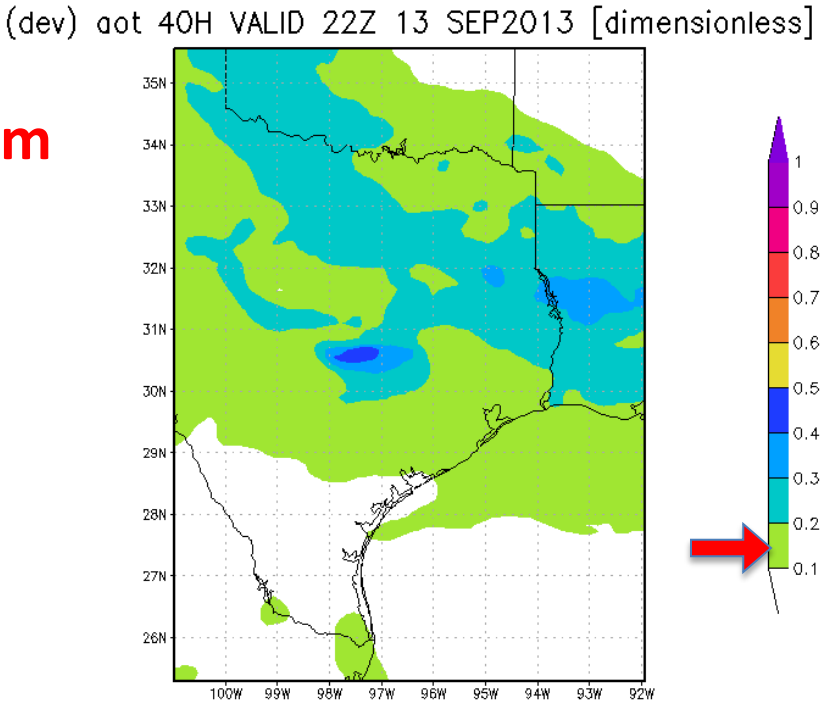
FRIDAY

NOAA Experimental CMAQ AOT

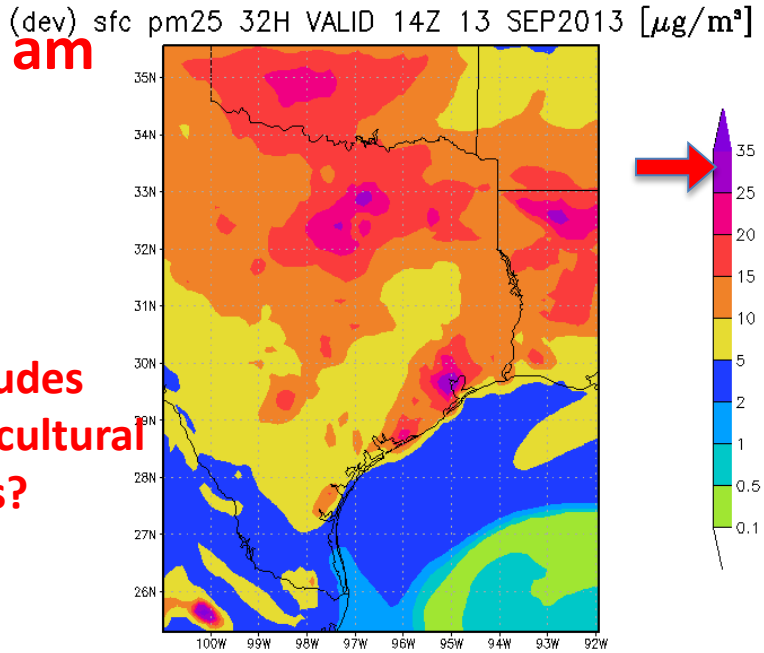
2 pm



5 pm



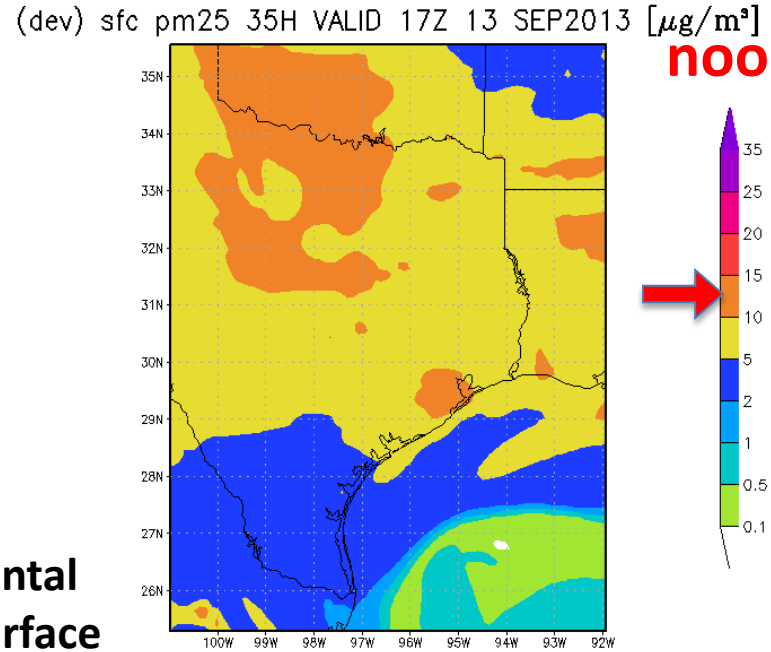
9 am



ncludes
agricultural
fires?

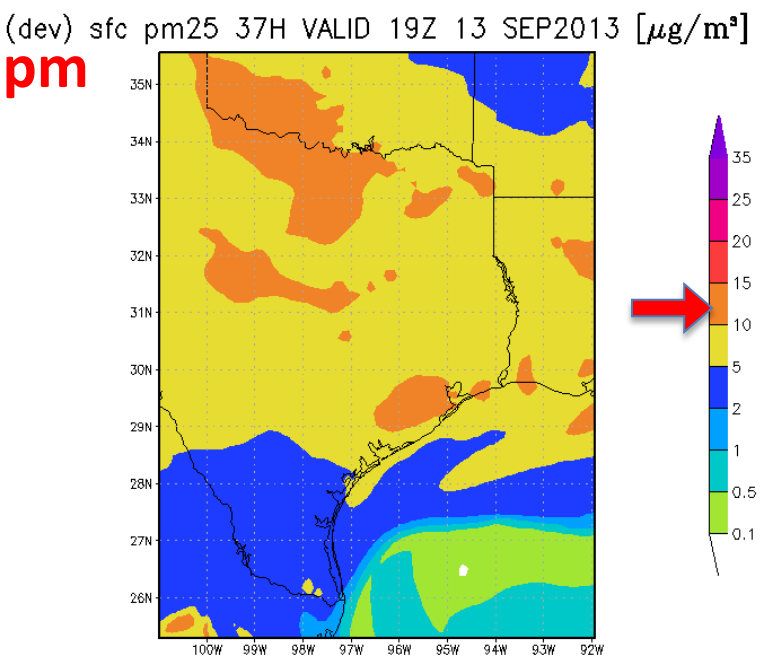
FRIDAY

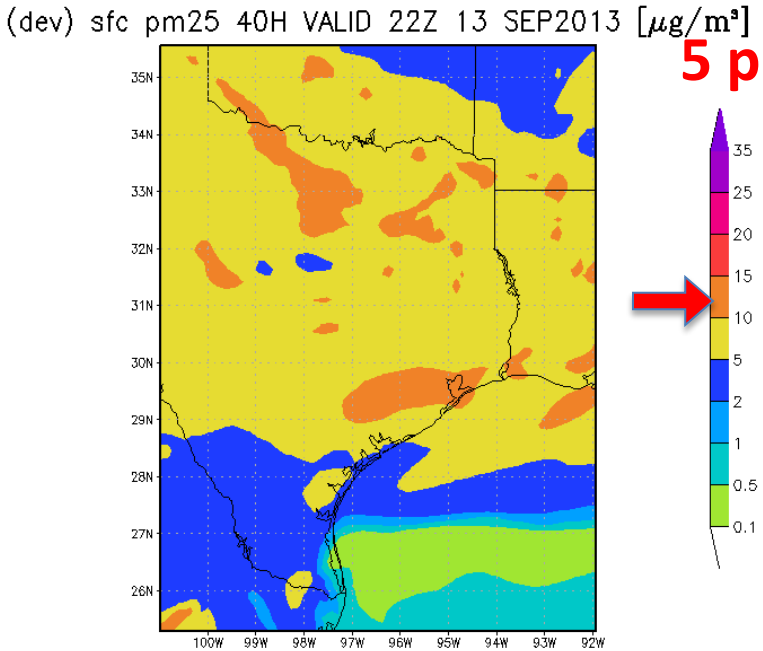
NOAA
Experimental
CMAQ Surface
Pm 2.5



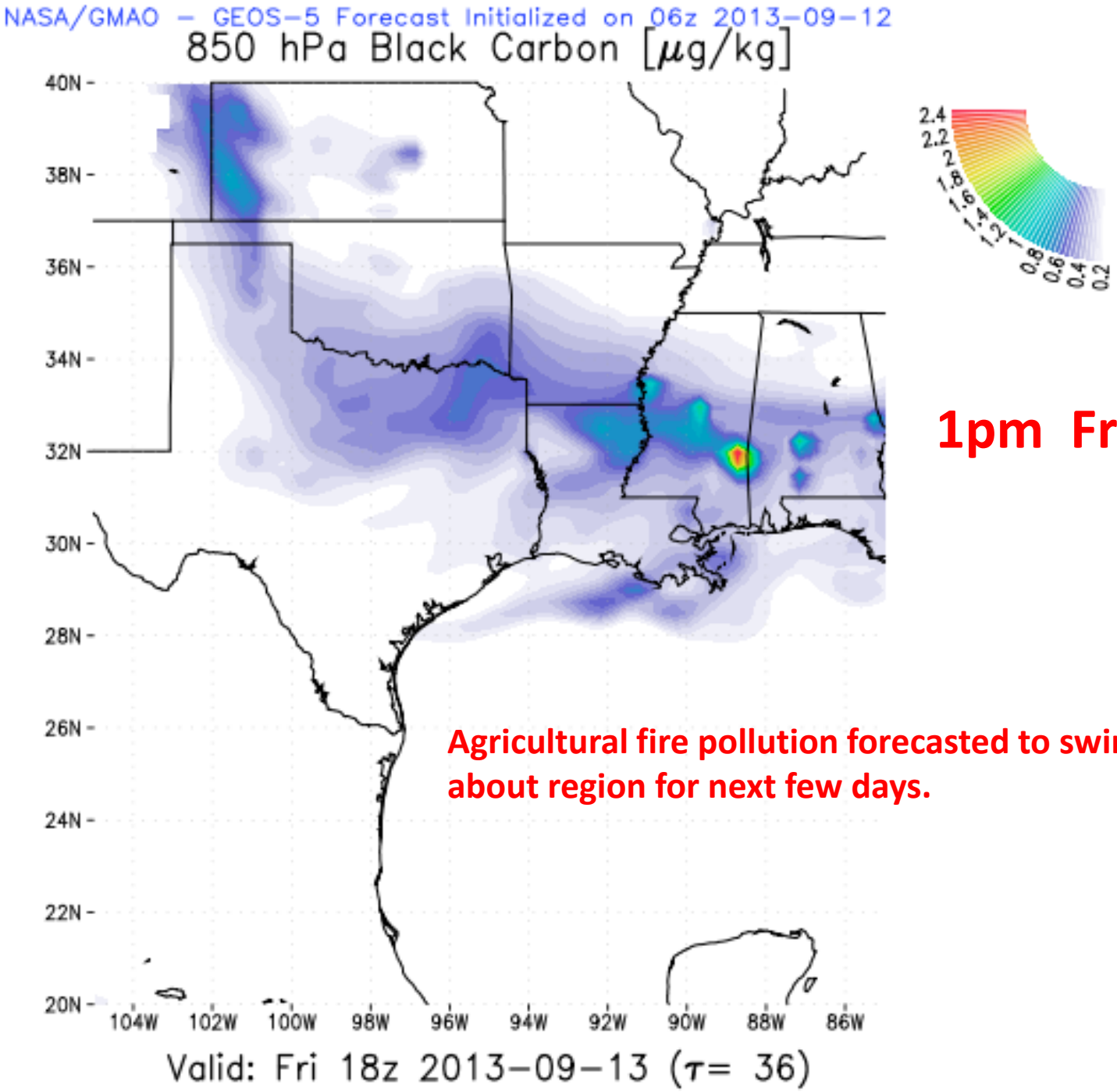
noon

2 pm



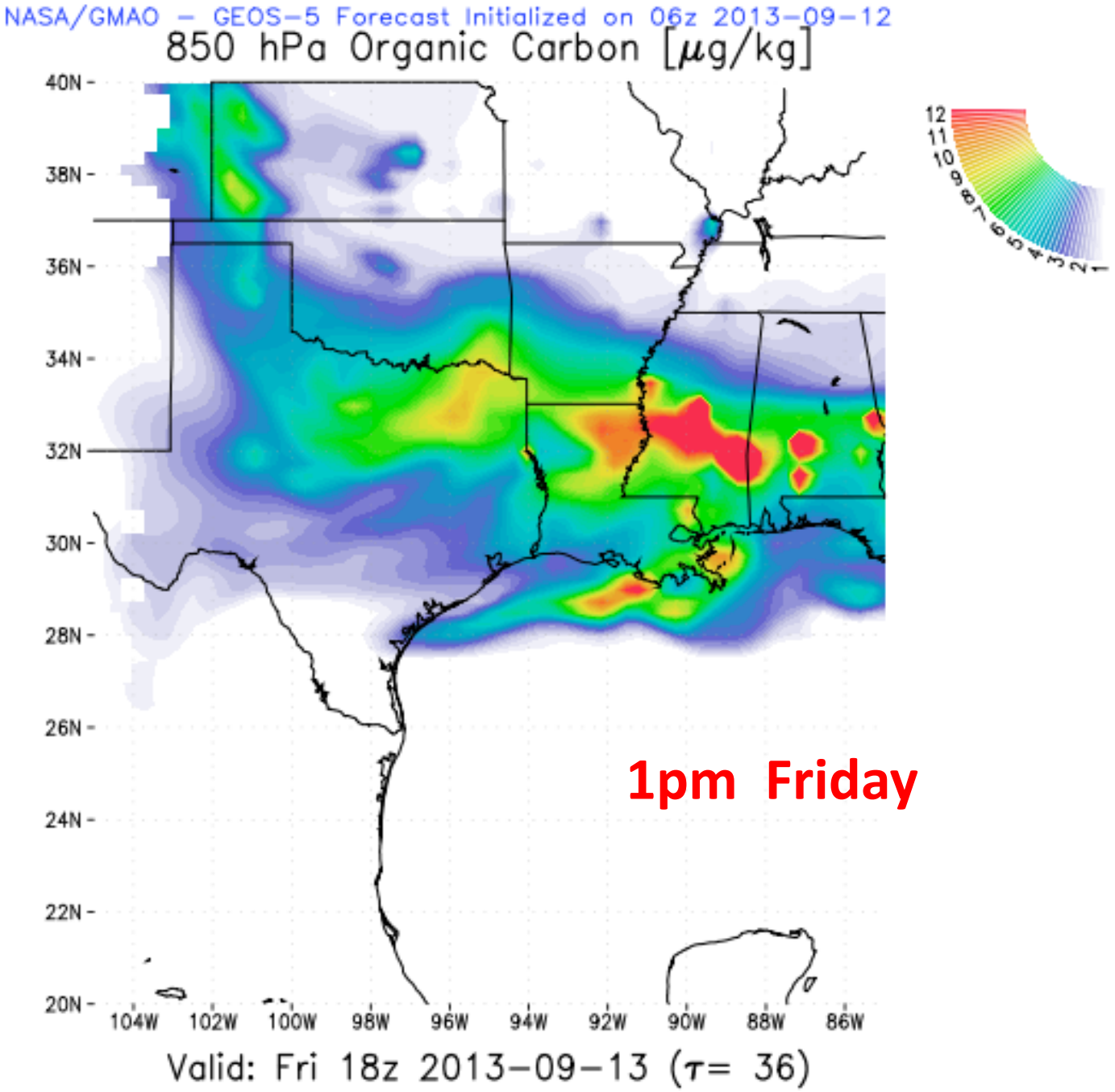


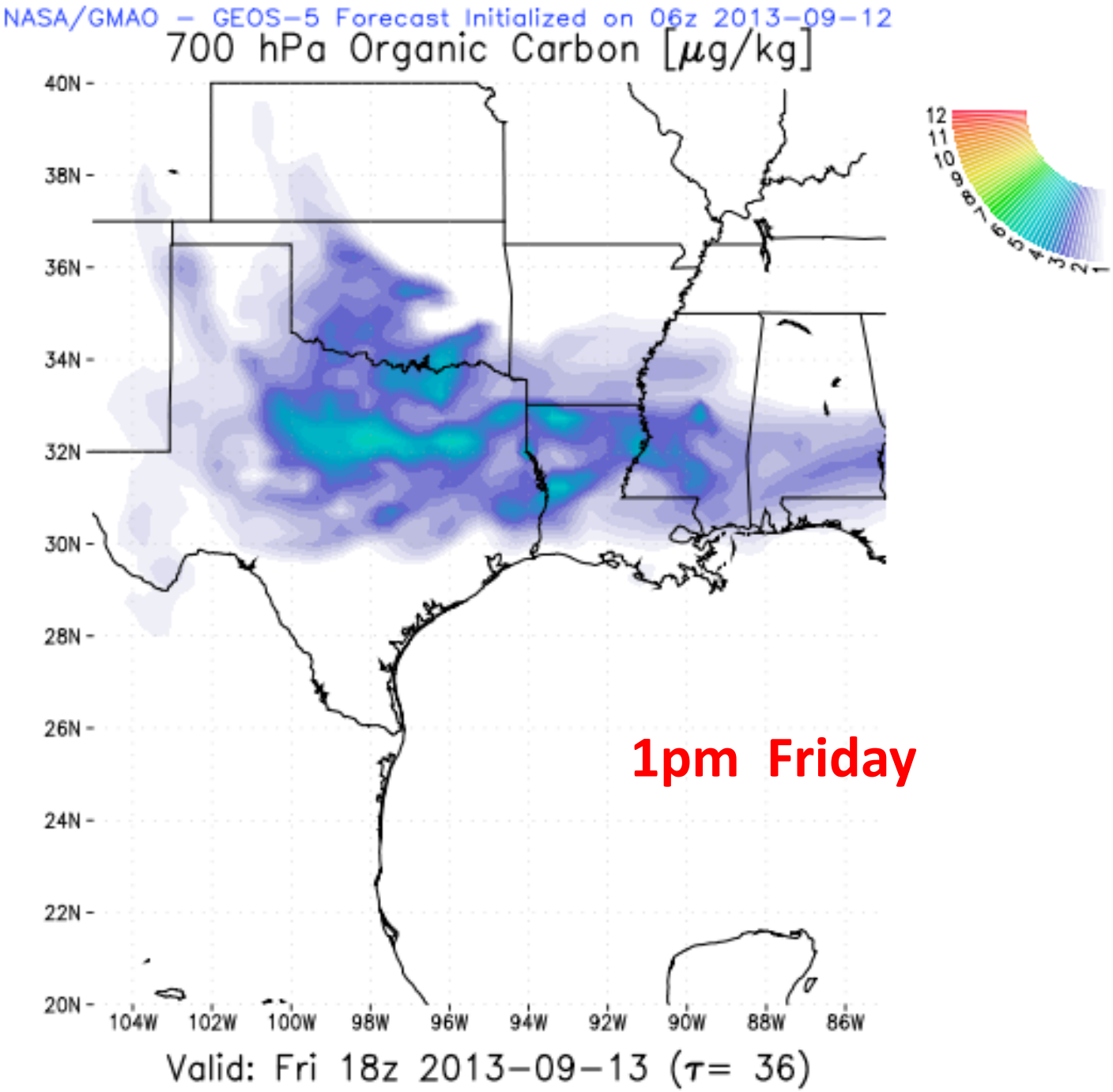
5 pm

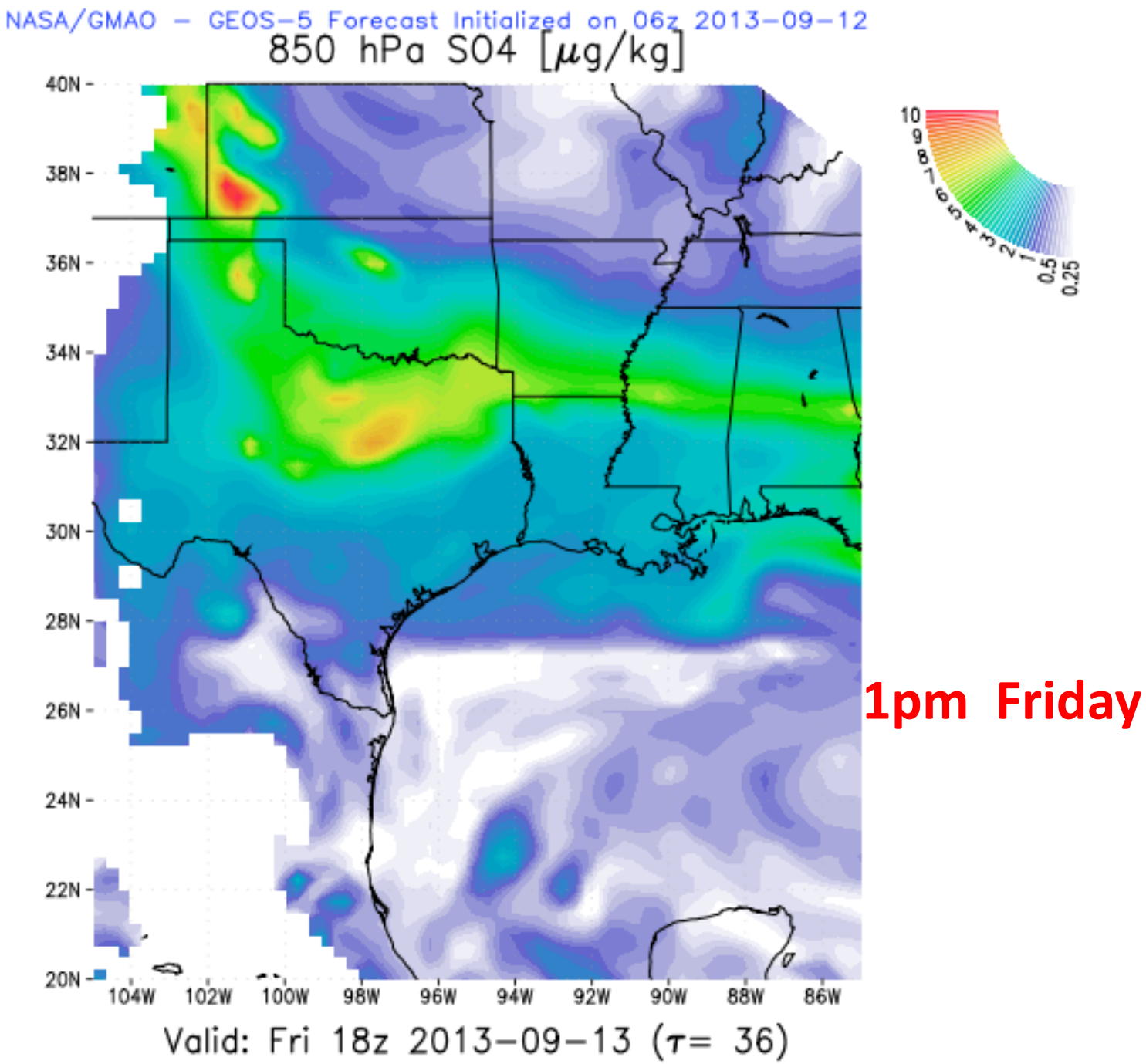


1pm Friday

Agricultural fire pollution forecasted to swirl about region for next few days.

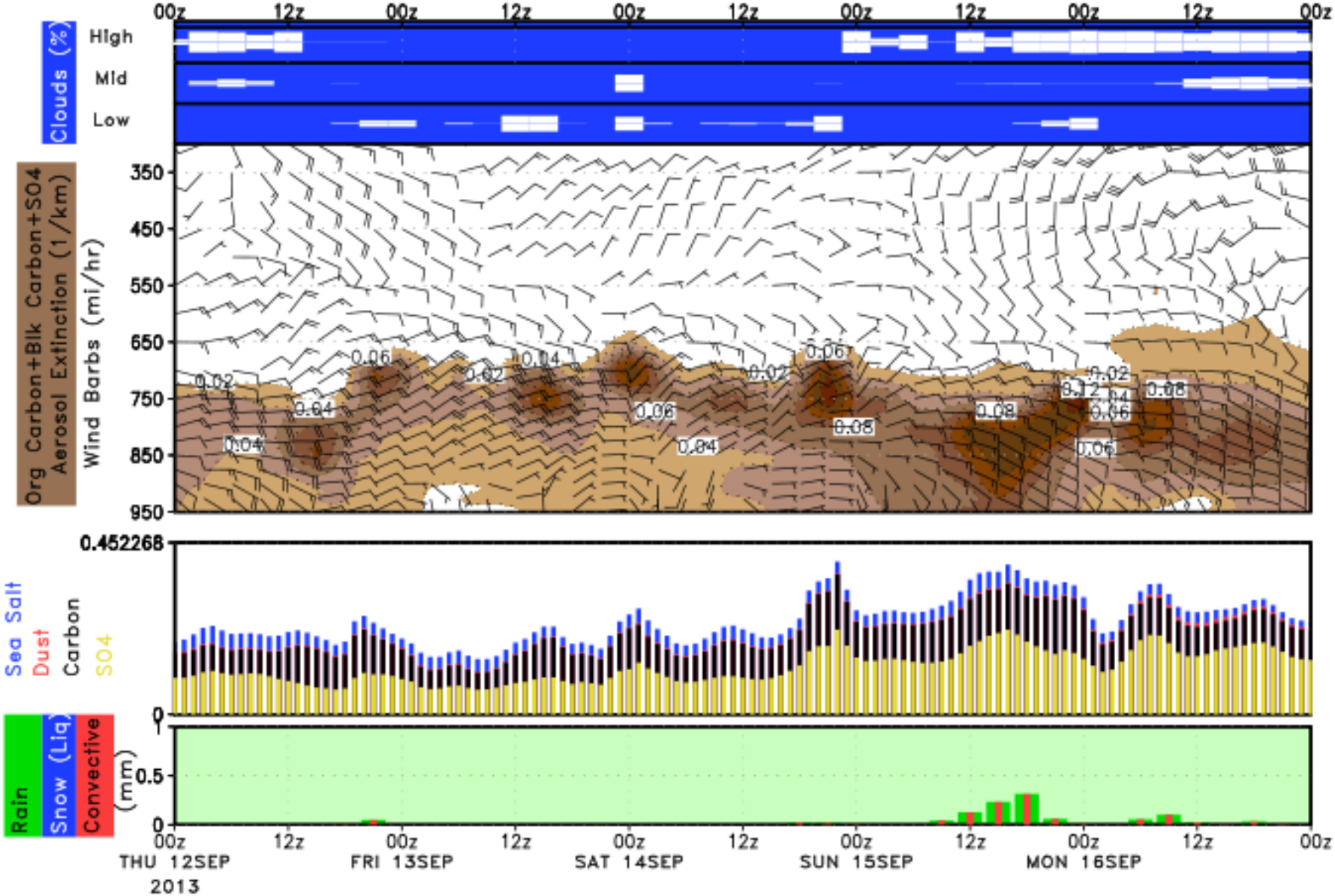

NASA/GMAO – GEOS-5 Forecast Initialized on 06z 2013-09-12
850 hPa Organic Carbon [μg/kg]
40N
38N
36N
34N
32N
30N
28N
26N
24N
22N
20N
104W
102W
100W
98W
96W
94W
92W
90W
88W
86W
12
11
10
9
8
7
6
5
4
3
2
1
1pm Friday
Valid: Fri 18z 2013-09-13 (τ= 36)


NASA/GMAO – GEOS-5 Forecast Initialized on 06z 2013-09-12
700 hPa Organic Carbon [μg/kg]
40N
38N
36N
34N
32N
30N
28N
26N
24N
22N
20N
104W
102W
100W
98W
96W
94W
92W
90W
88W
86W
12
11
10
9
8
7
6
5
4
3
2
1
1pm Friday
Valid: Fri 18z 2013-09-13 (τ= 36)


NASA/GMAO – GEOS-5 Forecast Initialized on 06z 2013-09-12
850 hPa SO4 [μg/kg]
40N
38N
36N
34N
32N
30N
28N
26N
24N
22N
20N
104W
102W
100W
98W
96W
94W
92W
90W
88W
86W
10
9
8
7
6
5
4
3
2
1
0.5
0.25
Valid: Fri 18z 2013-09-13 (τ= 36)

1pm Friday

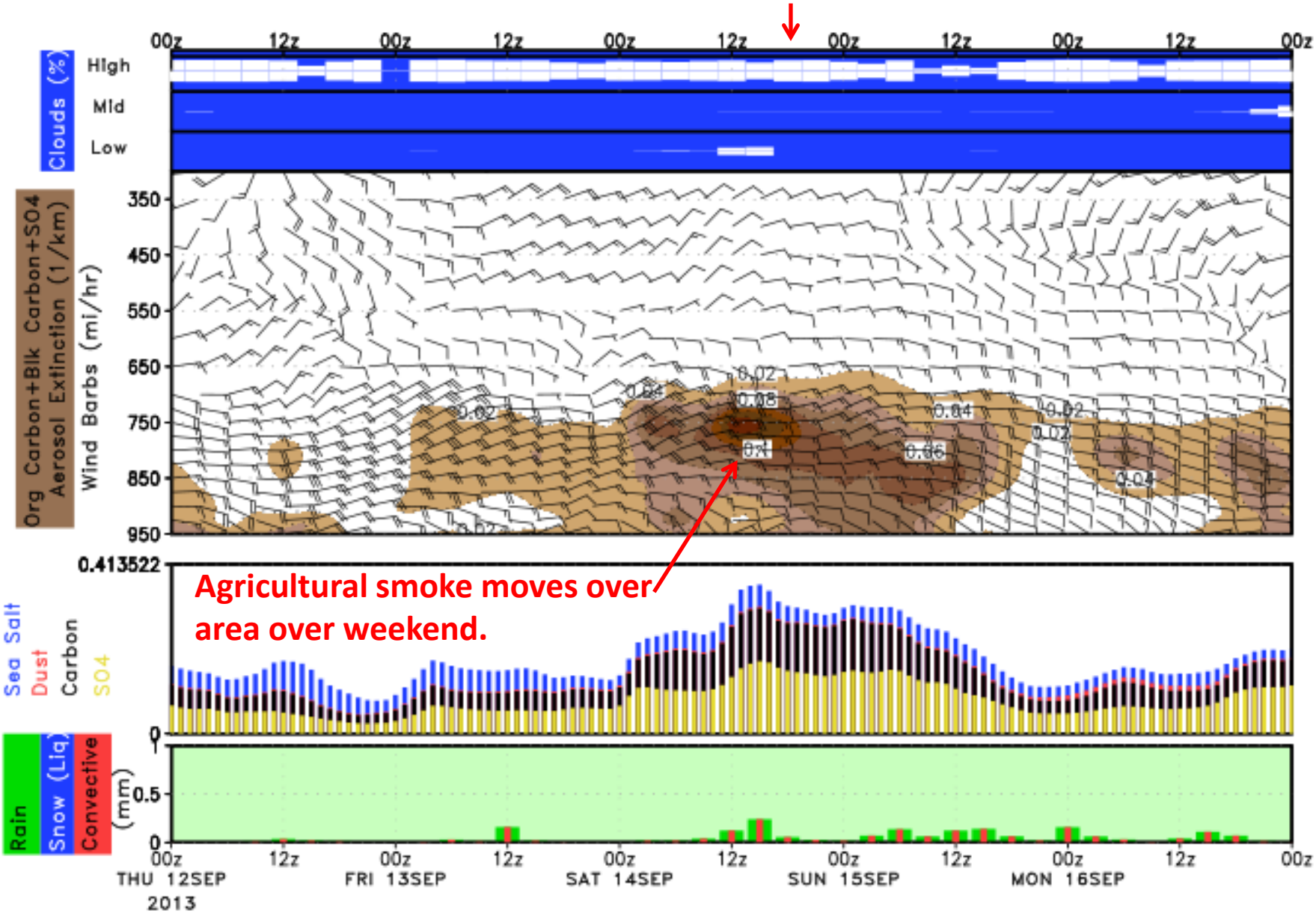
CONROE



LAT = 30.3 , LON = −95.4, Location = Conroe, Fcst_init = 20130912

GALVESTON

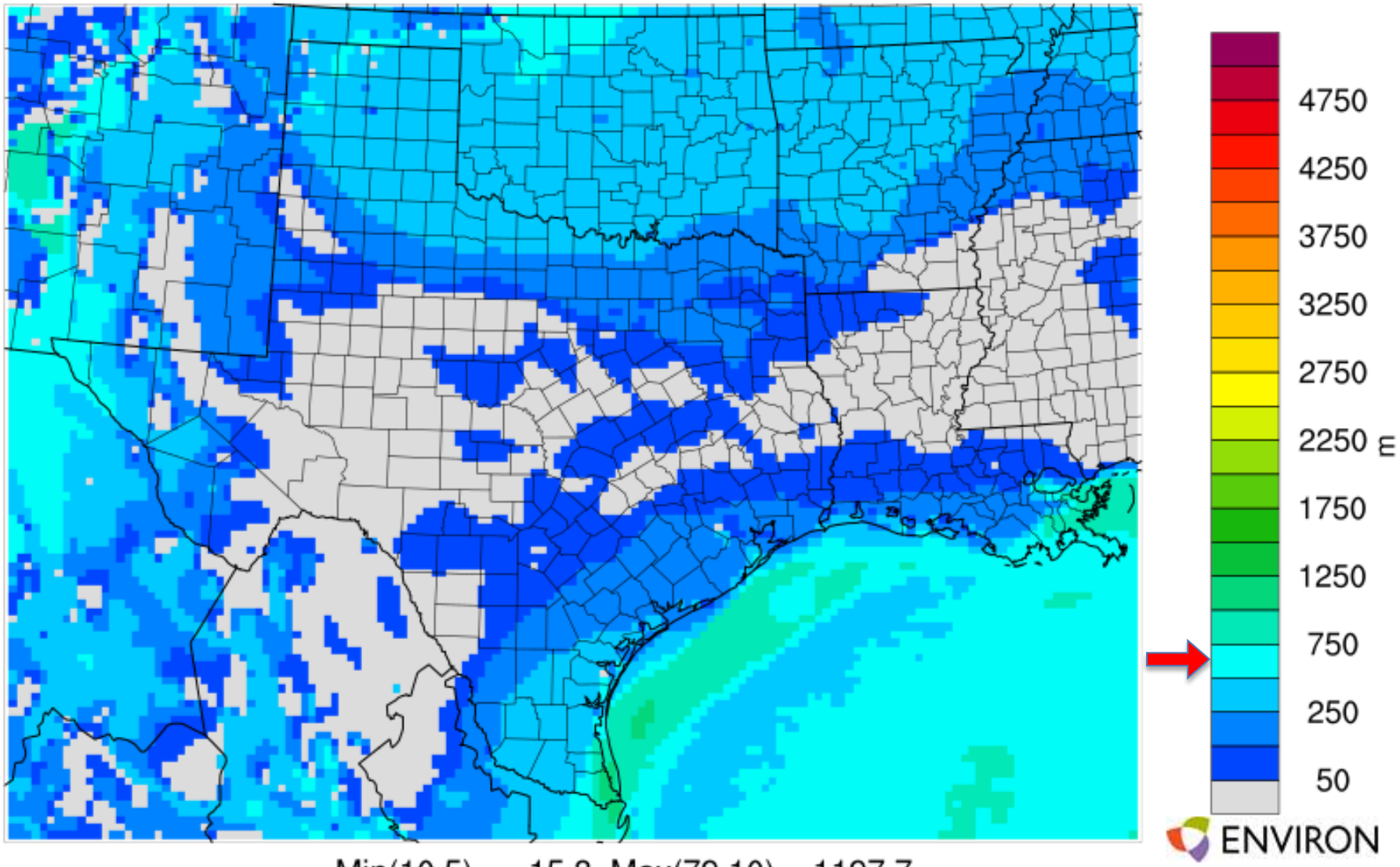
But likely cloudy.



LAT = 29.2 , LON = −94.8, Location = Galveston, Fcst_init = 20130912

PBL Height

Texas 12km

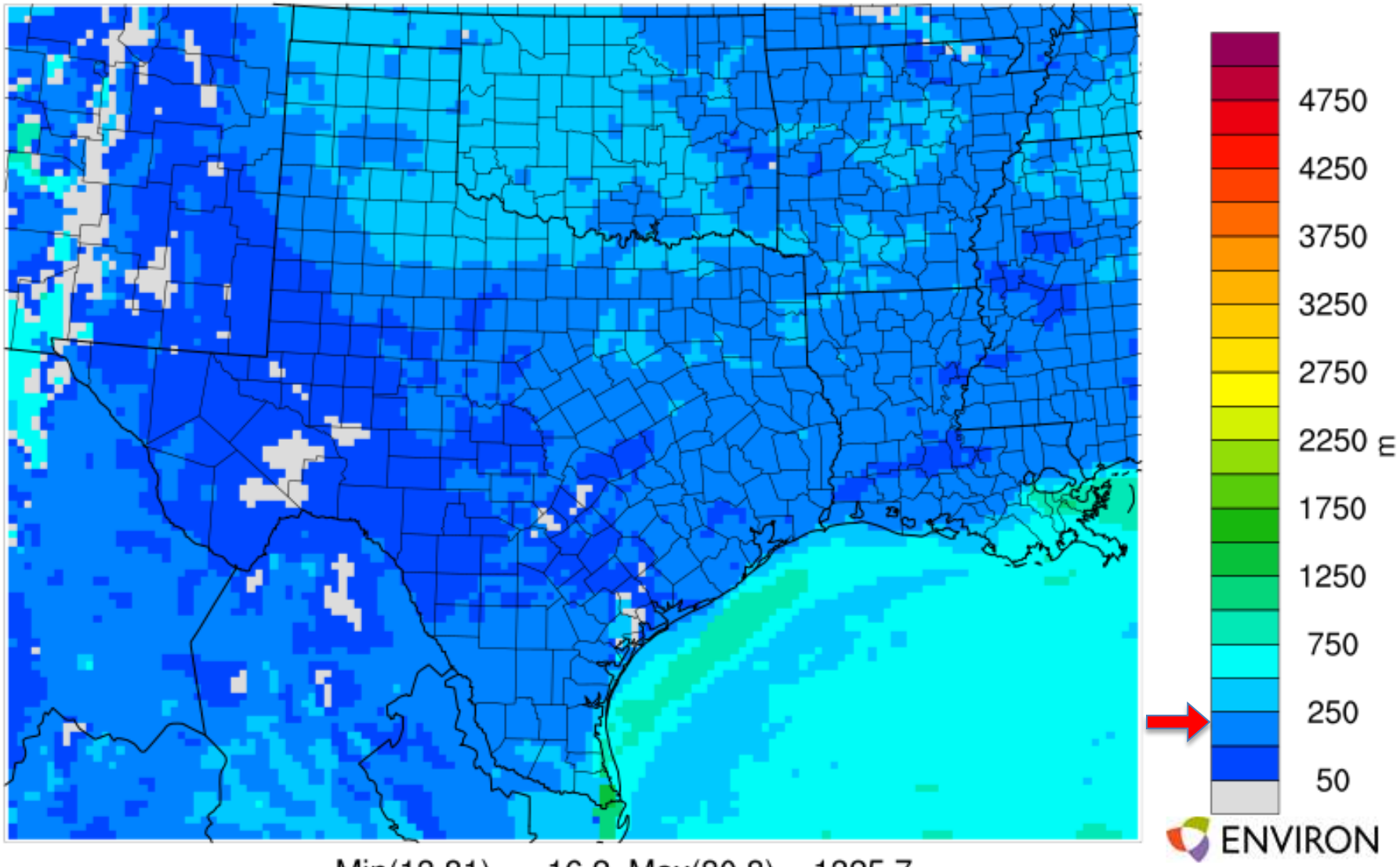


Min(10,5) = 15.8, Max(79,10) = 1197.7

Fri September 13 06:00 CST

PBL Height

Texas 12km

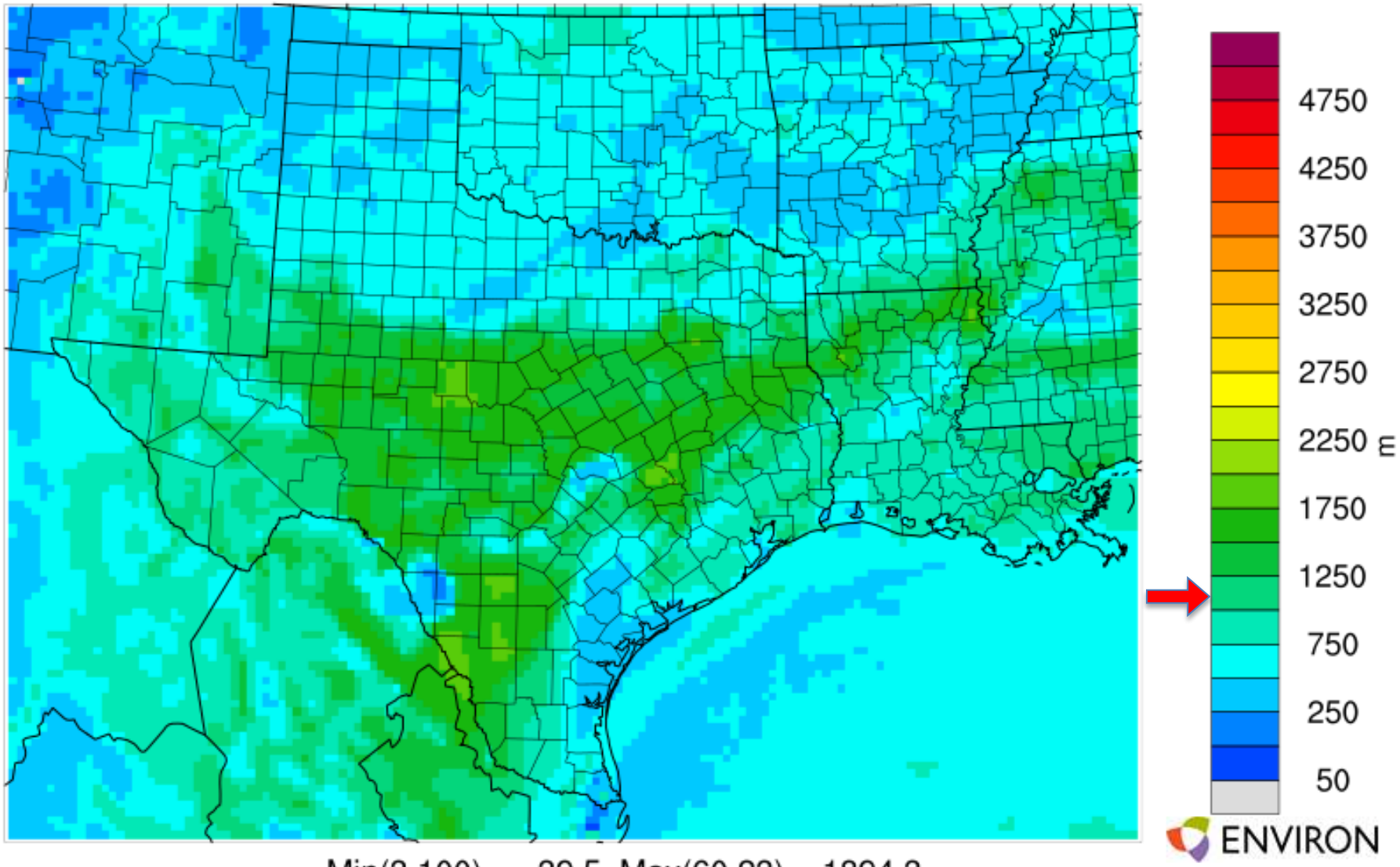


Min(13,81) = 16.2, Max(80,8) = 1325.7

Fri September 13 08:00 CST

PBL Height

Texas 12km

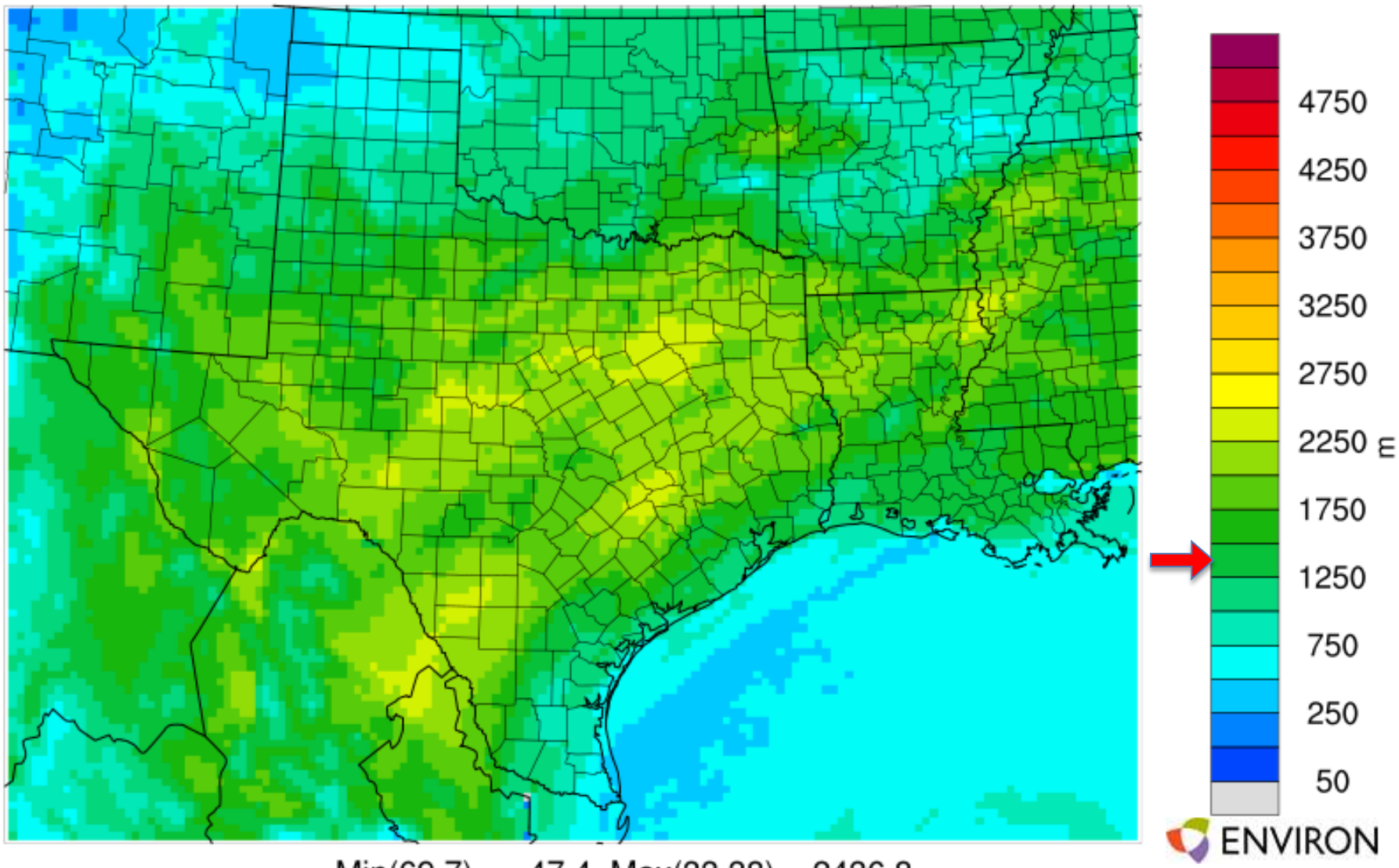


Min(3,100) = 39.5, Max(60,23) = 1894.3

Fri September 13 10:00 CST

PBL Height

Texas 12km

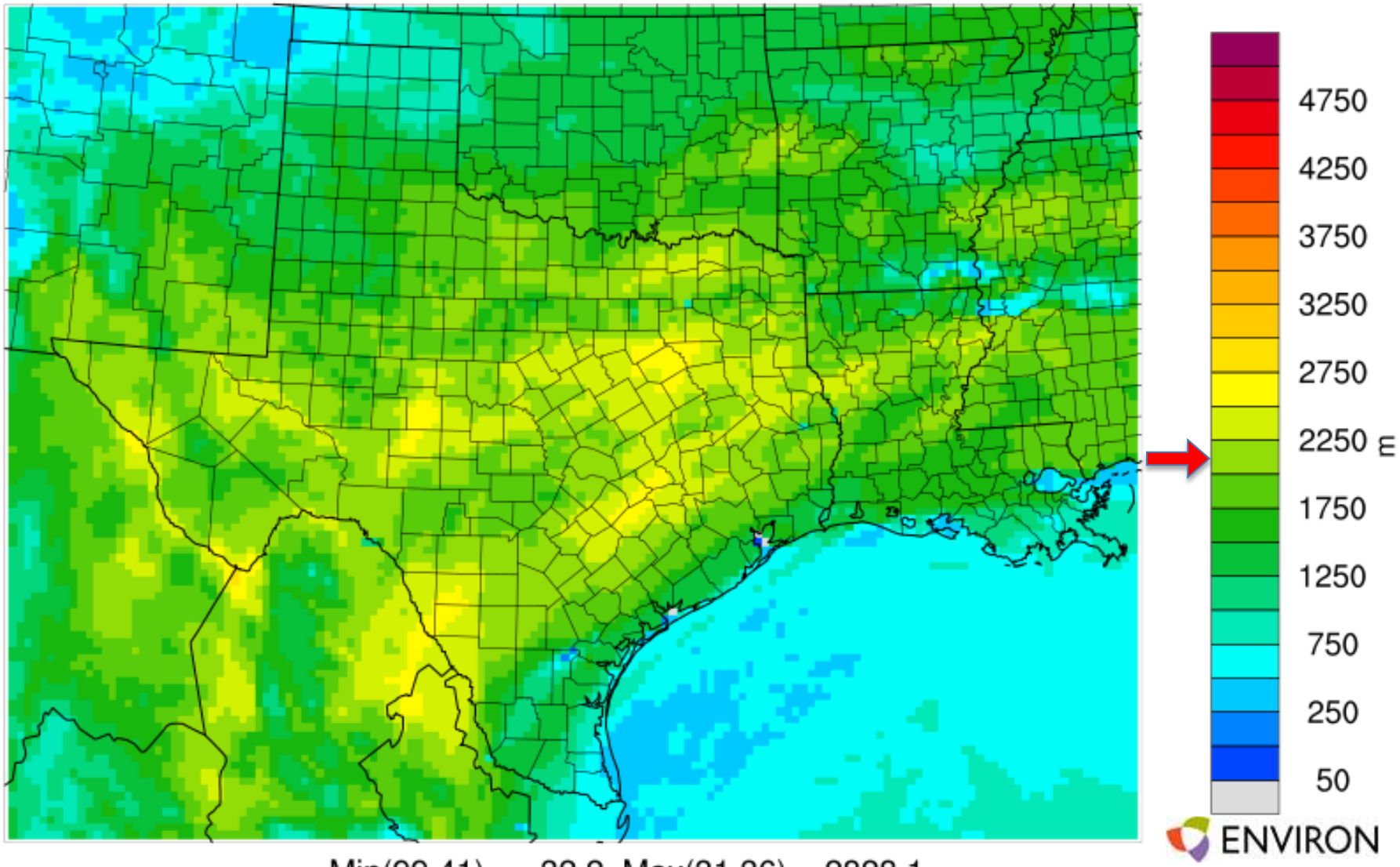


Min(69,7) = 47.4, Max(33,38) = 2436.8

Fri September 13 12:00 CST

PBL Height

Texas 12km

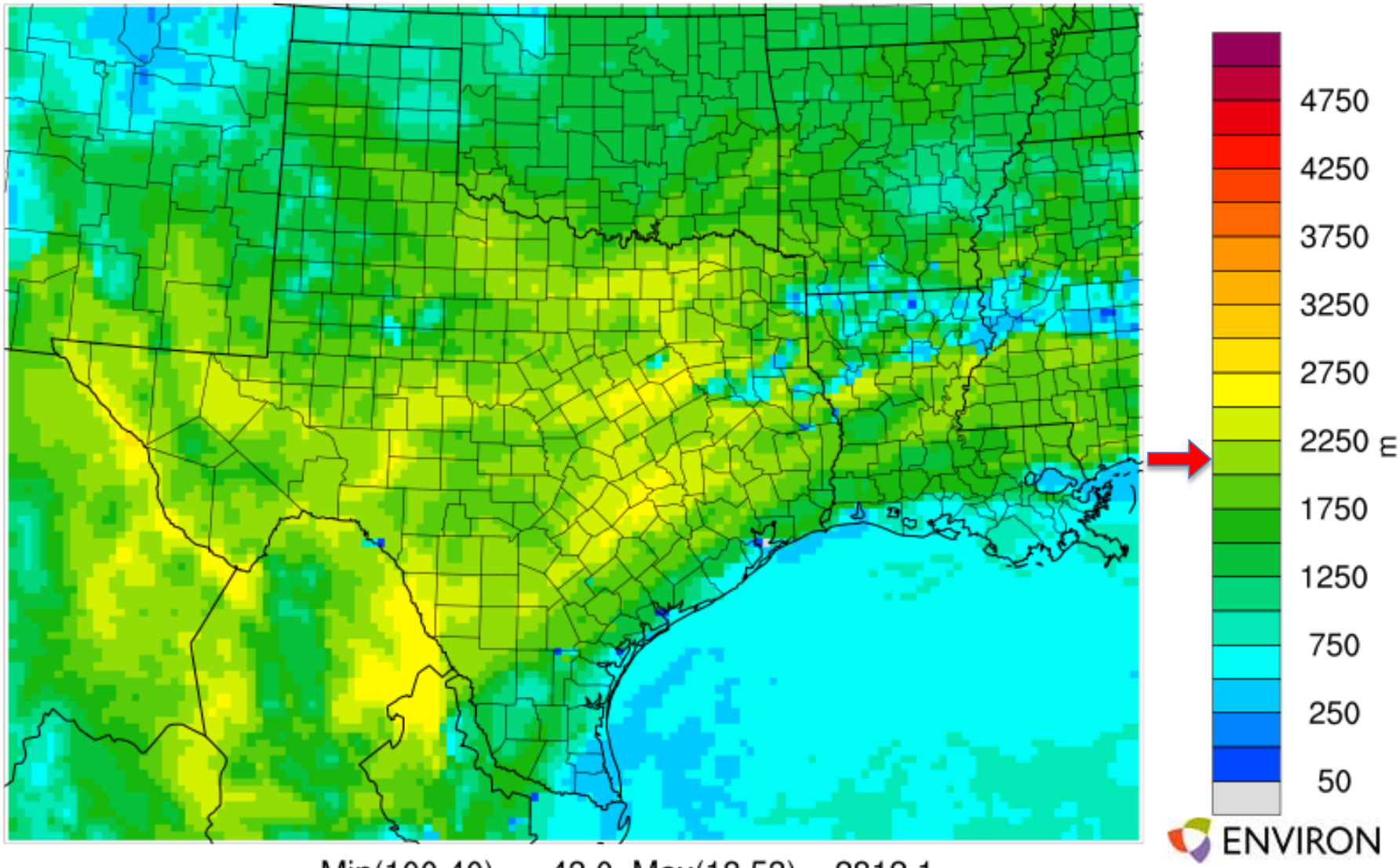


Min(99,41) = 32.2, Max(31,36) = 2828.1

Fri September 13 14:00 CST

PBL Height

Texas 12km

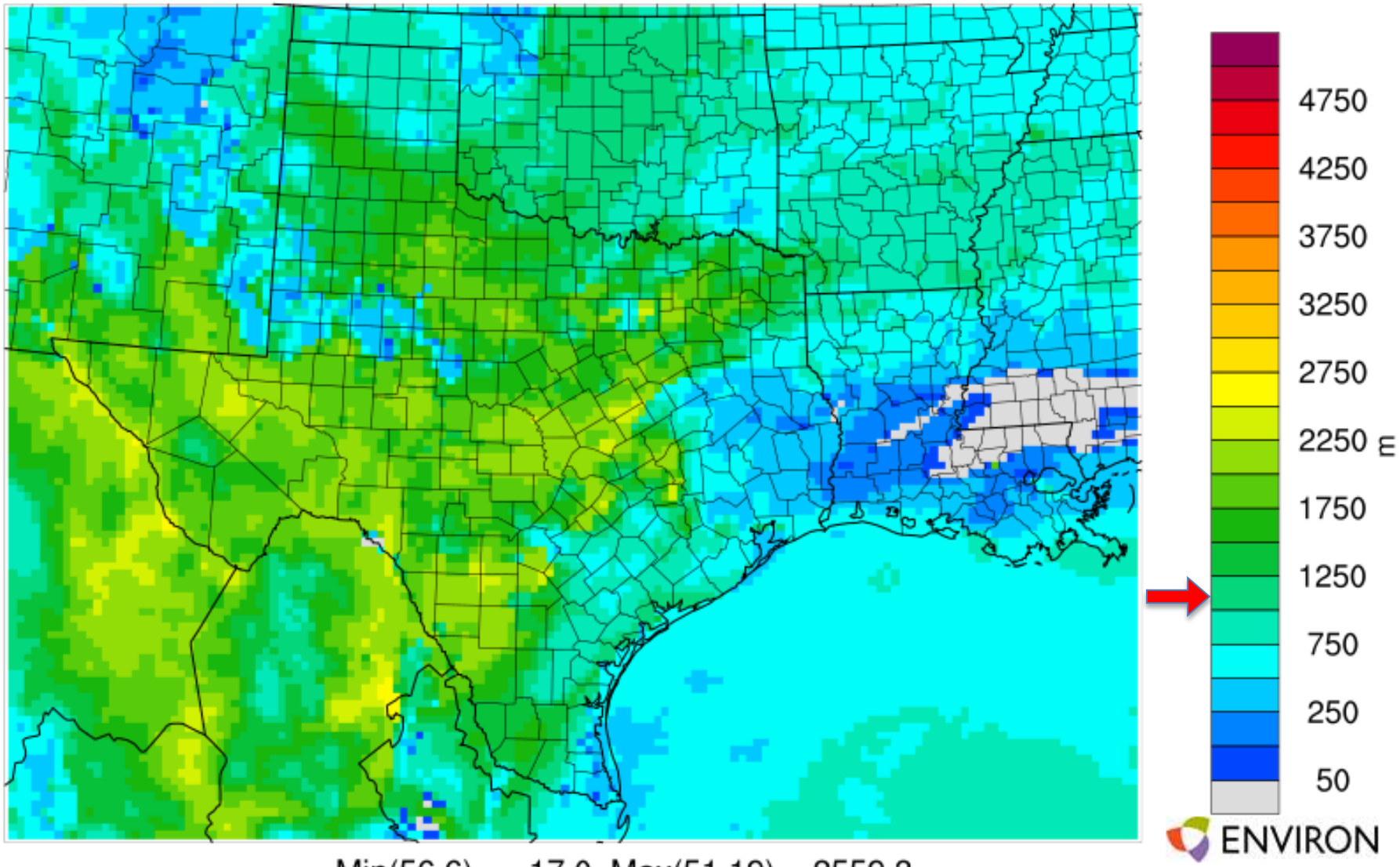


Min(100,40) = 43.0, Max(18,53) = 2812.1

Fri September 13 16:00 CST

PBL Height

Texas 12km



Min(56,6) = 17.0, Max(51,19) = 2559.3

Fri September 13 18:00 CST