

DISCOVER-AQ Outlook - Sept. 6, 2013

Thunderstorms throughout the Houston area played havoc with our flights today. However, I'm sure we'll have a lot of good data concerning the effects these storms had on the lower tropospheric composition. HSRL profiles showed a strong gradient in extinction between Galveston and points farther north.

A short wave trough coming around the 500 mb ridge is forecast to enter east Texas tomorrow, likely increasing the chances for cloudiness and showers. Therefore, a down day has been called for tomorrow. Sunday, some drying should occur and general cloudiness may be less than on Saturday. Flow from the east will continue, with a sea breeze developing in the afternoon, which again could lead to induced thunderstorms. Ozone is forecast to remain in the moderate range, and maxima will likely be to the NW of Houston.

Monday a vorticity maximum in the Gulf south of Houston will lead to an increase of cloudiness, and the trend will likely continue Tuesday and Wednesday as a strong easterly wave progresses across the Gulf and impacts our area.

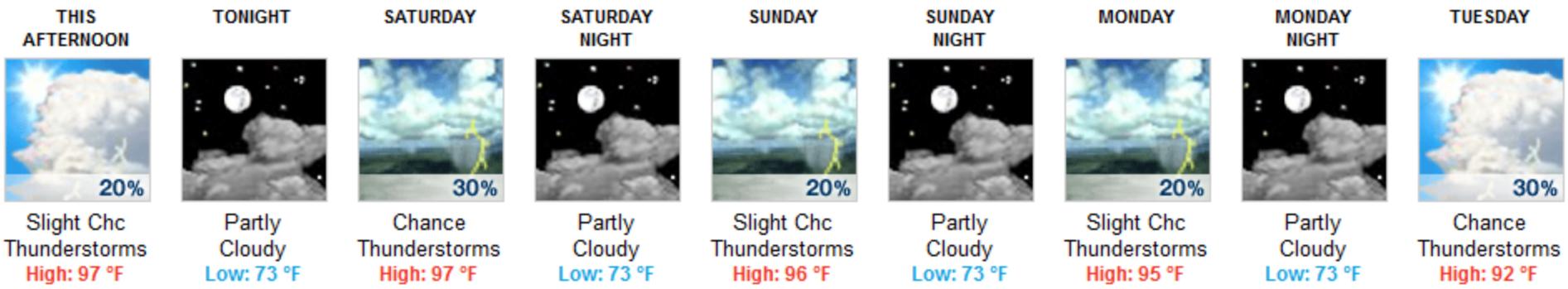
9/6/2013 Weather Briefing

Chris Loughner

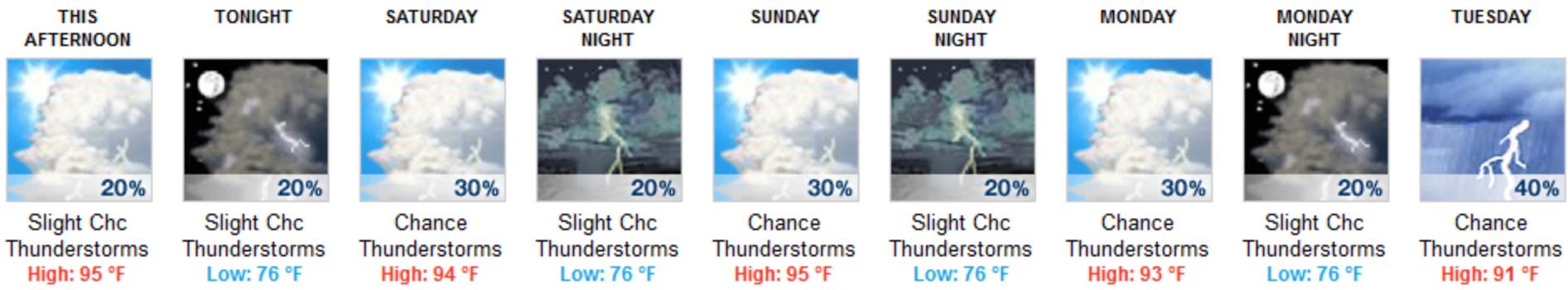
Ken Pickering

Bob Chatfield

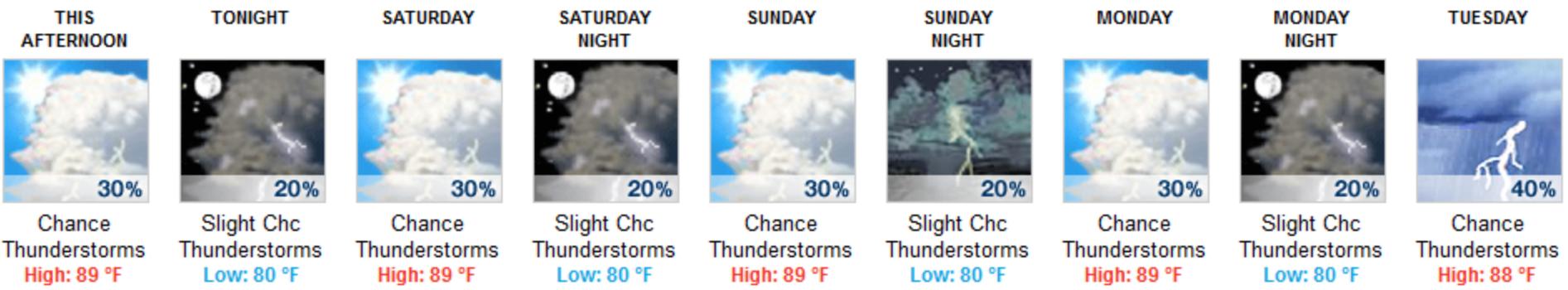
Conroe:



Houston Hobby:



Galveston:



Current Conditions

Conroe:



Partly Cloudy
90°F
 32°C

Humidity 54%
 Wind Speed Vrbl 5 mph
 Barometer 30.09 in (1018.4 mb)
 Dewpoint 71°F (22°C)
 Visibility 10.00 mi
 Heat Index 96°F (36°C)
 Last Update on 6 Sep 11:53 am CDT

Houston Hobby:

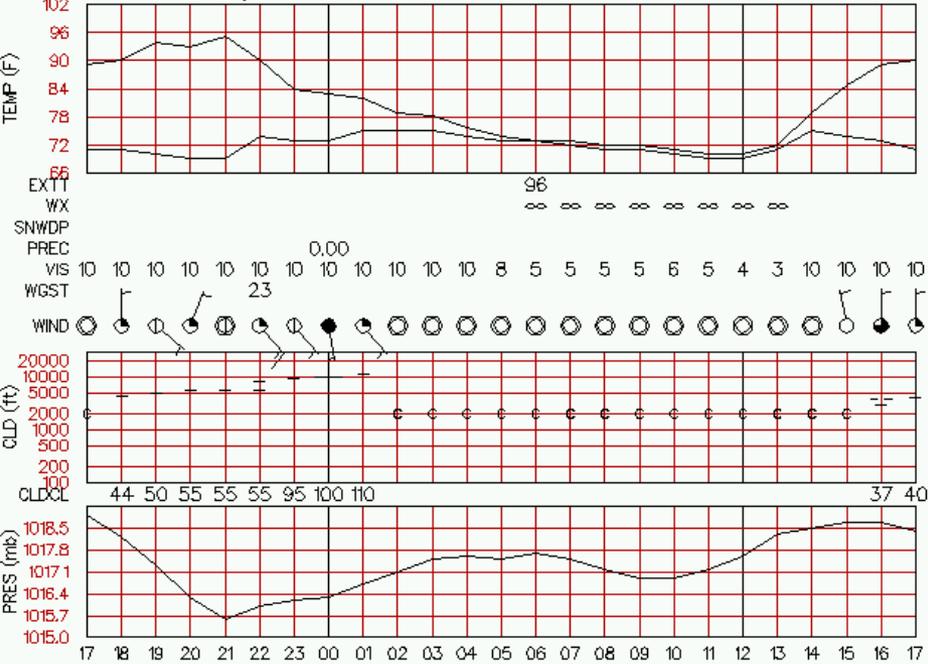


Mostly Cloudy
88°F
 31°C

Humidity 61%
 Wind Speed NE 13 mph
 Barometer 30.06 in (1018.4 mb)
 Dewpoint 73°F (23°C)
 Visibility 10.00 mi
 Heat Index 96°F (36°C)
 Last Update on 6 Sep 11:53 am CDT

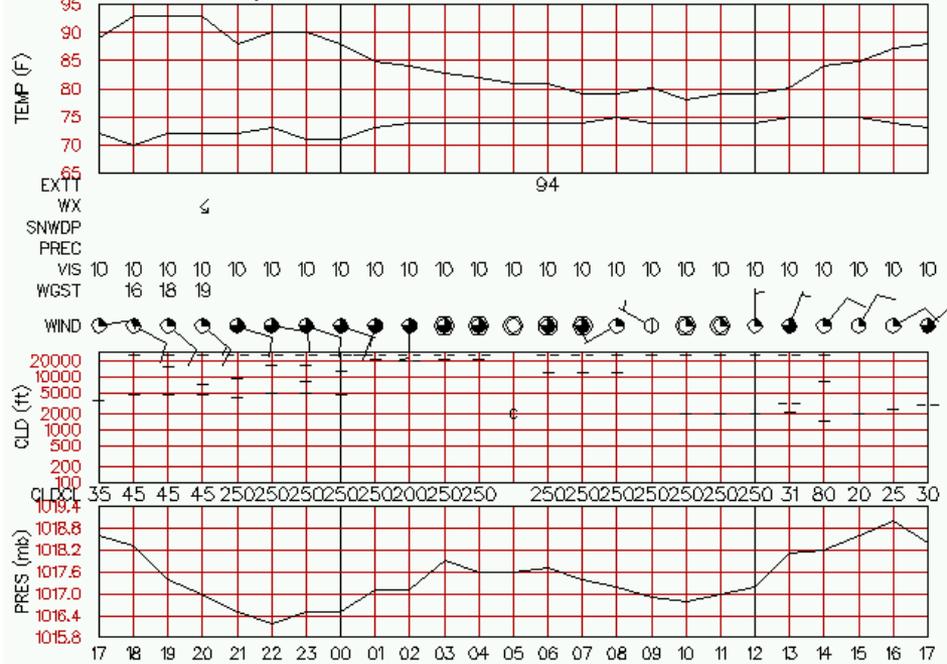
▼ Plymouth State Weather Center ▼

Meteogram for KCXO from 1700Z 5 SEP 13 to 1700Z 6 SEP 13



▼ Plymouth State Weather Center ▼

Meteogram for KHOU from 1700Z 5 SEP 13 to 1700Z 6 SEP 13



Current Conditions

Galveston:



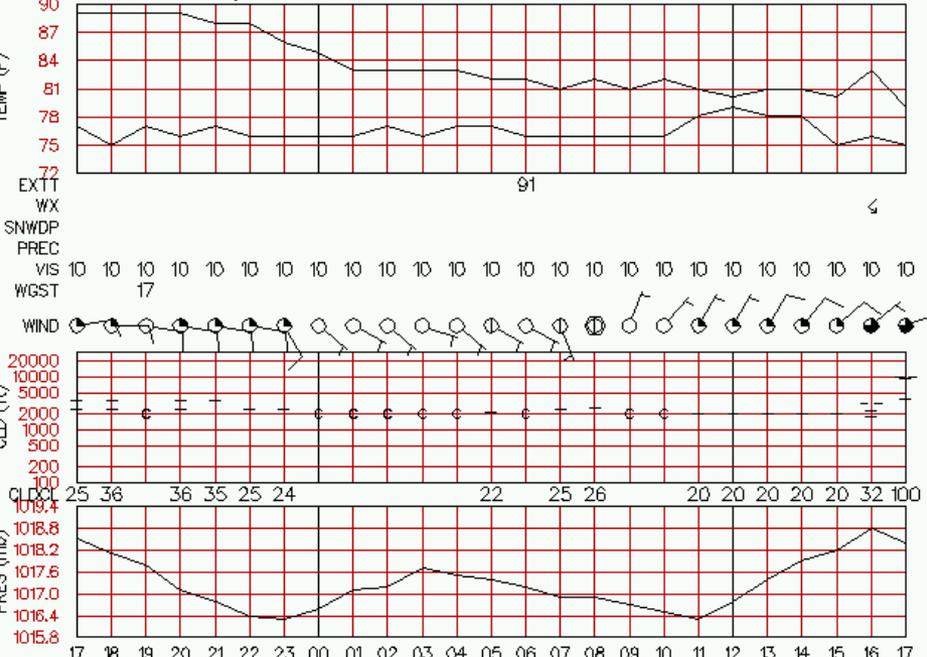
Mostly Cloudy
79°F
26°C

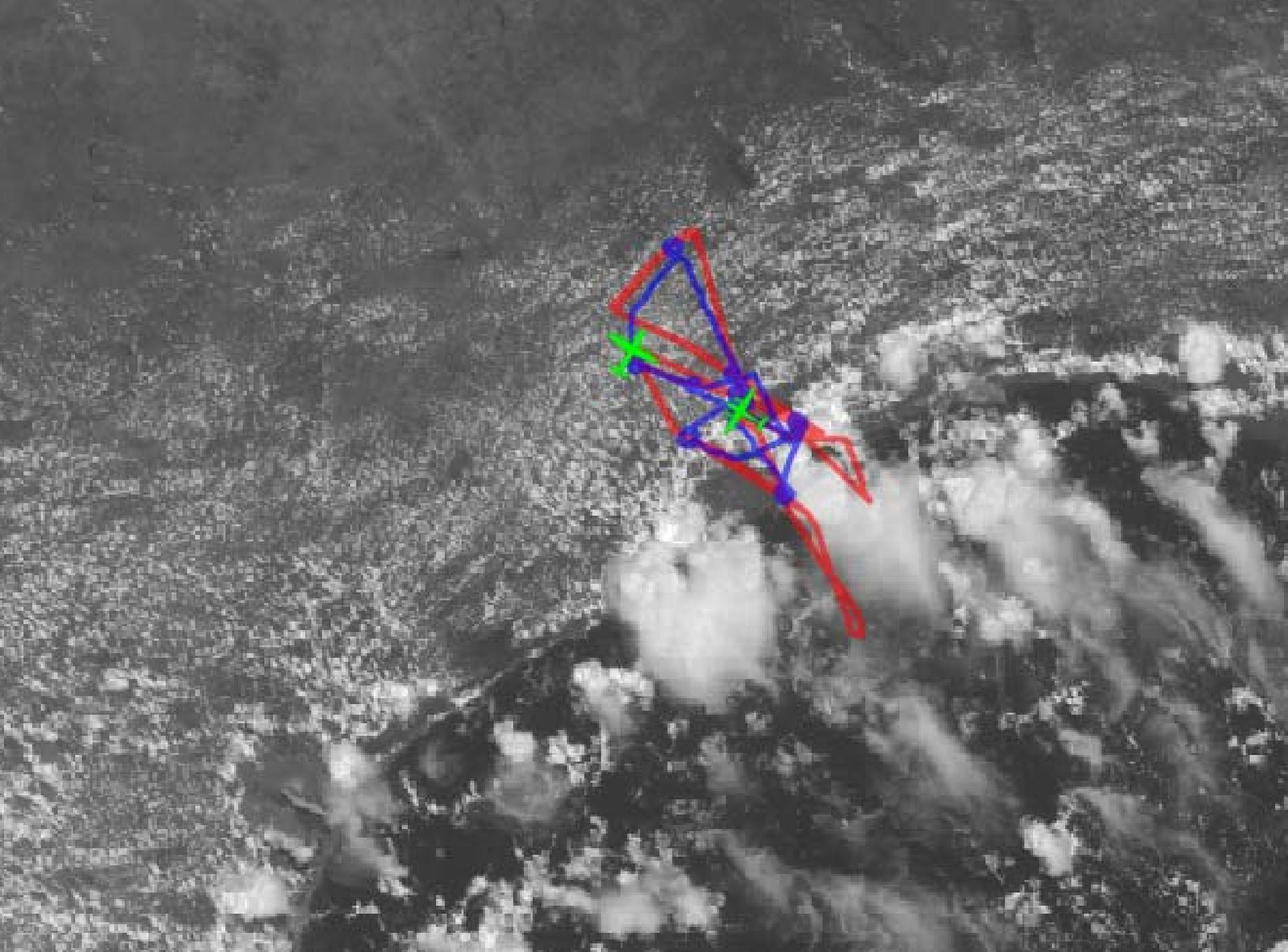
Humidity 88%
Wind Speed E 7 mph
Barometer 30.08 in (1018.4 mb)
Dewpoint 75°F (24°C)
Visibility 10.00 mi
Heat Index 83°F (28°C)

Last Update on 6 Sep 11:52 am CDT

▼ Plymouth State Weather Center ▼

Meteogram for KGLS from 1700Z 5 SEP 13 to 1700Z 6 SEP 13

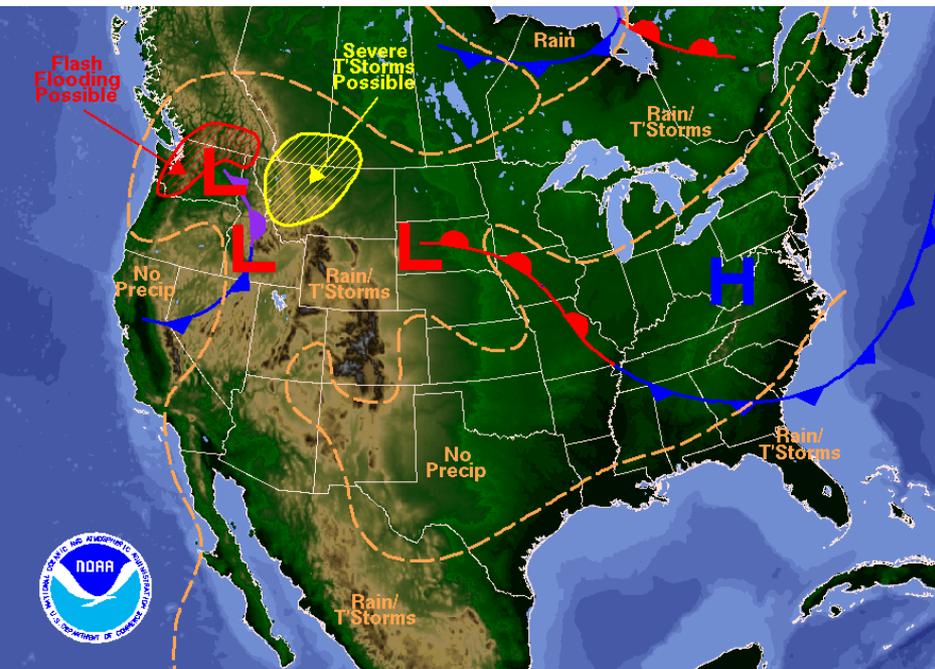




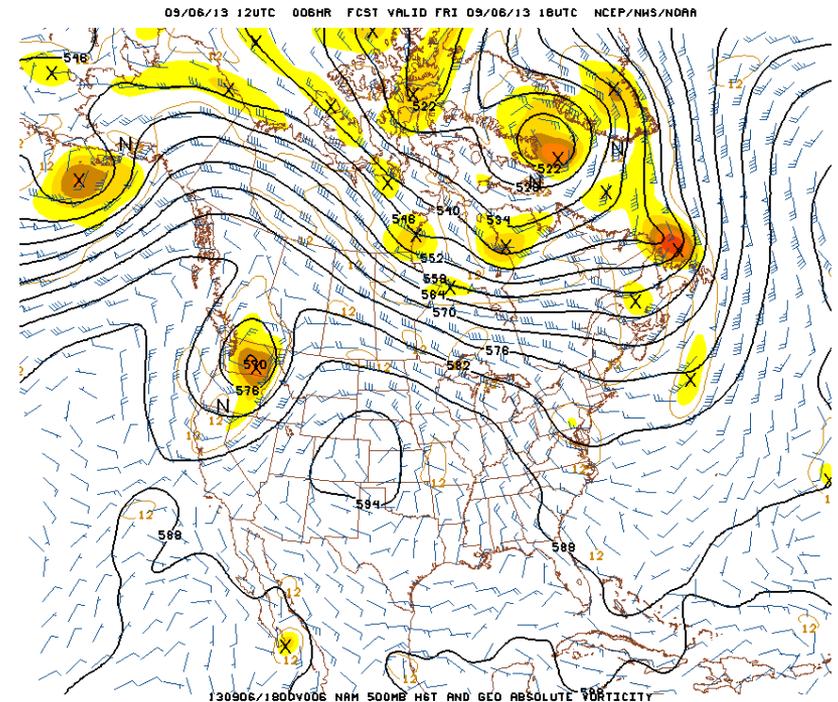


Today: Scattered thunderstorms. Northeasterly winds changing to southeasterly as sea breeze develops. Upper level high still to our north-northwest.

1 PM CDT
500 mb vorticity



Weather Forecast for Fri, Sep 06, 2013, issued 3:03 AM EDT
DOC/NOAA/NWS/NCEP/Weather Prediction Center
Prepared by McReynolds based on WPC, SPC and NHC forecasts



10 m winds at 1 PM today

WRF 3-KM

Fcst: 12 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

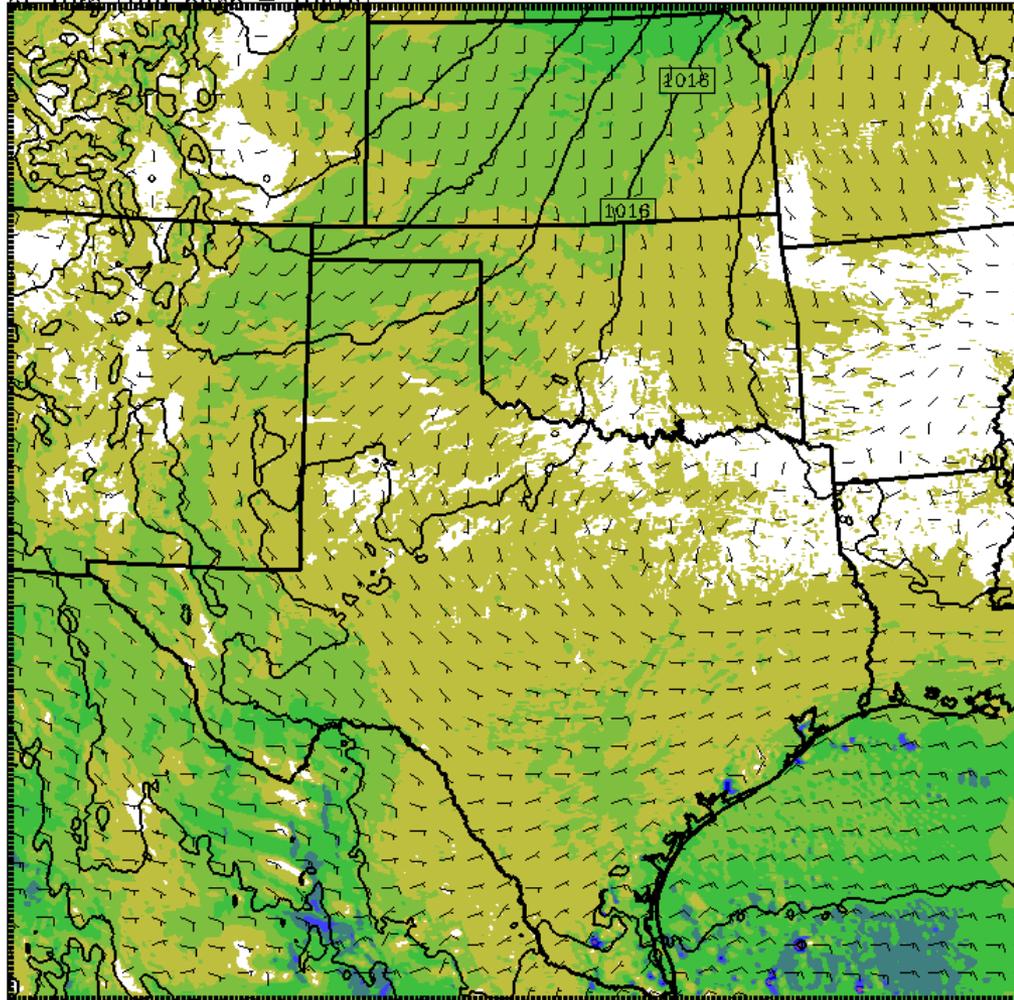
Wind at 10m (full height)

Init: 06 UTC Fri 06 Sep 13

Valid: 18 UTC Fri 06 Sep 13 (13 CDT Fri 06 Sep 13)

100 W

90 W



30 N

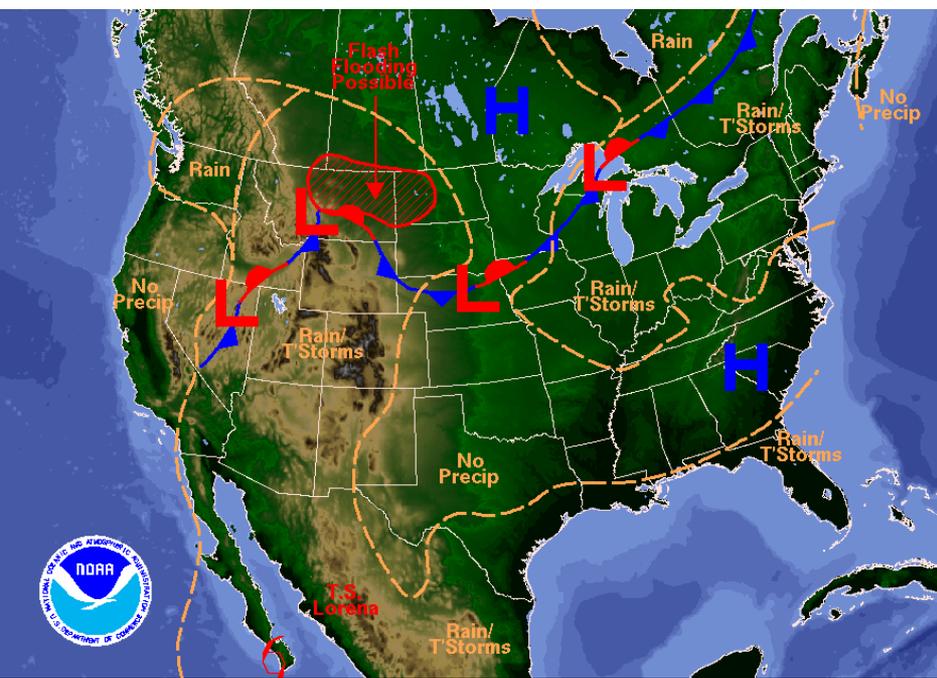
CONTOURS: UNITS=hPa LOW= 1008.0 HIGH= 1018.0 INTERVAL= 2.0000



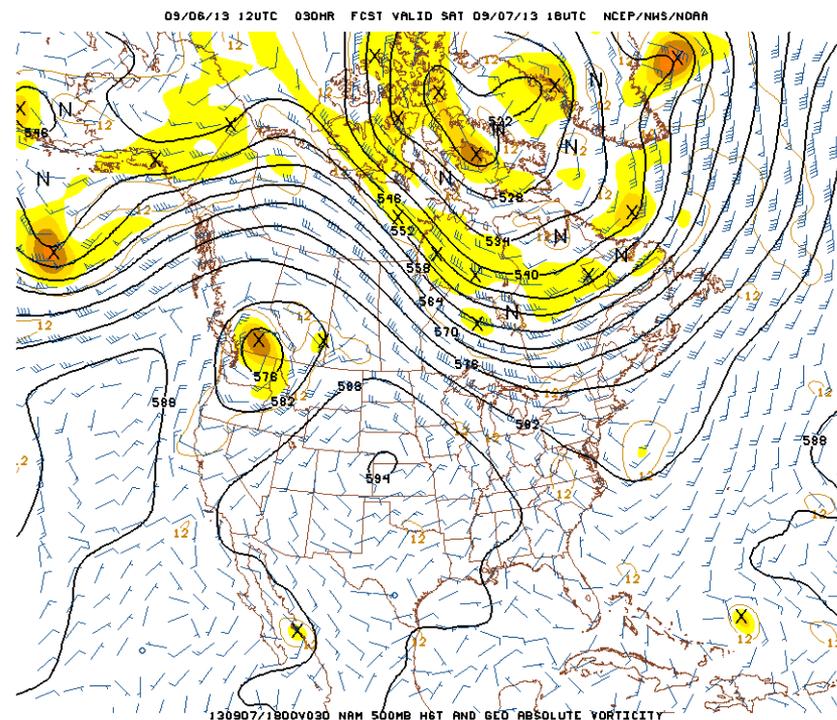
Model Info: V3.3 No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec
LW: RRTM SW: Dudhia DIFF: simple KM: ED Smagor

Tomorrow: Scattered thunderstorms. Northeasterly winds changing to southeasterly as sea breeze develops. Shortwave trough entering east Texas.

1 PM CDT
500 mb vorticity



Weather Forecast for Sat, Sep 07, 2013, issued 4:00 AM EDT Fri, Sep 06, 2013
DOC/NOAA/NWS/NCEP/Weather Prediction Center
Prepared by McCreynolds based on WPC, SPC and NHC forecasts



10 m winds at 1 PM tomorrow

WRF 3-KM

Fcst: 36 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

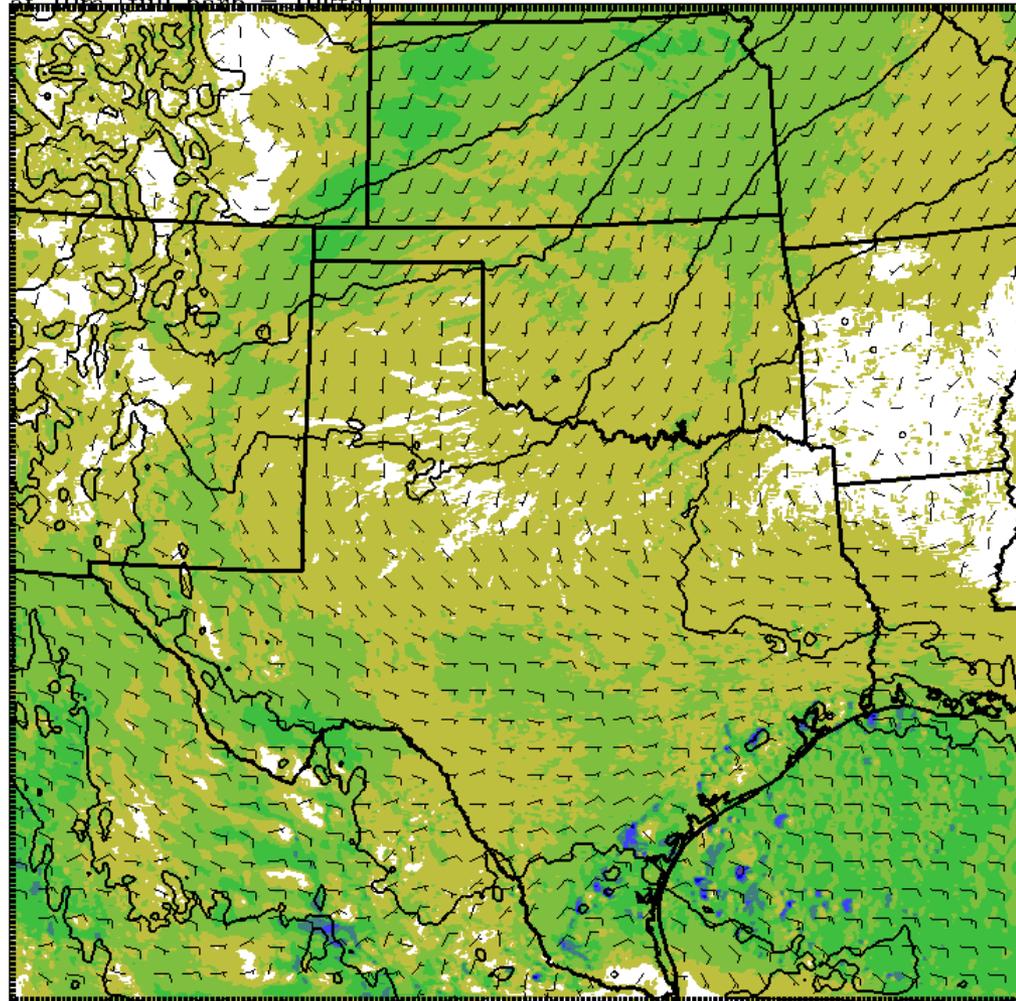
Wind at 10m (full hash = 10kts)

Init: 06 UTC Fri 06 Sep 13

Valid: 18 UTC Sat 07 Sep 13 (13 CDT Sat 07 Sep 13)

100 W

90 W



30 N

CONTOURS: UNITS=hPa LOW= 1008.0 HIGH= 1016.0 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: ED Smagor

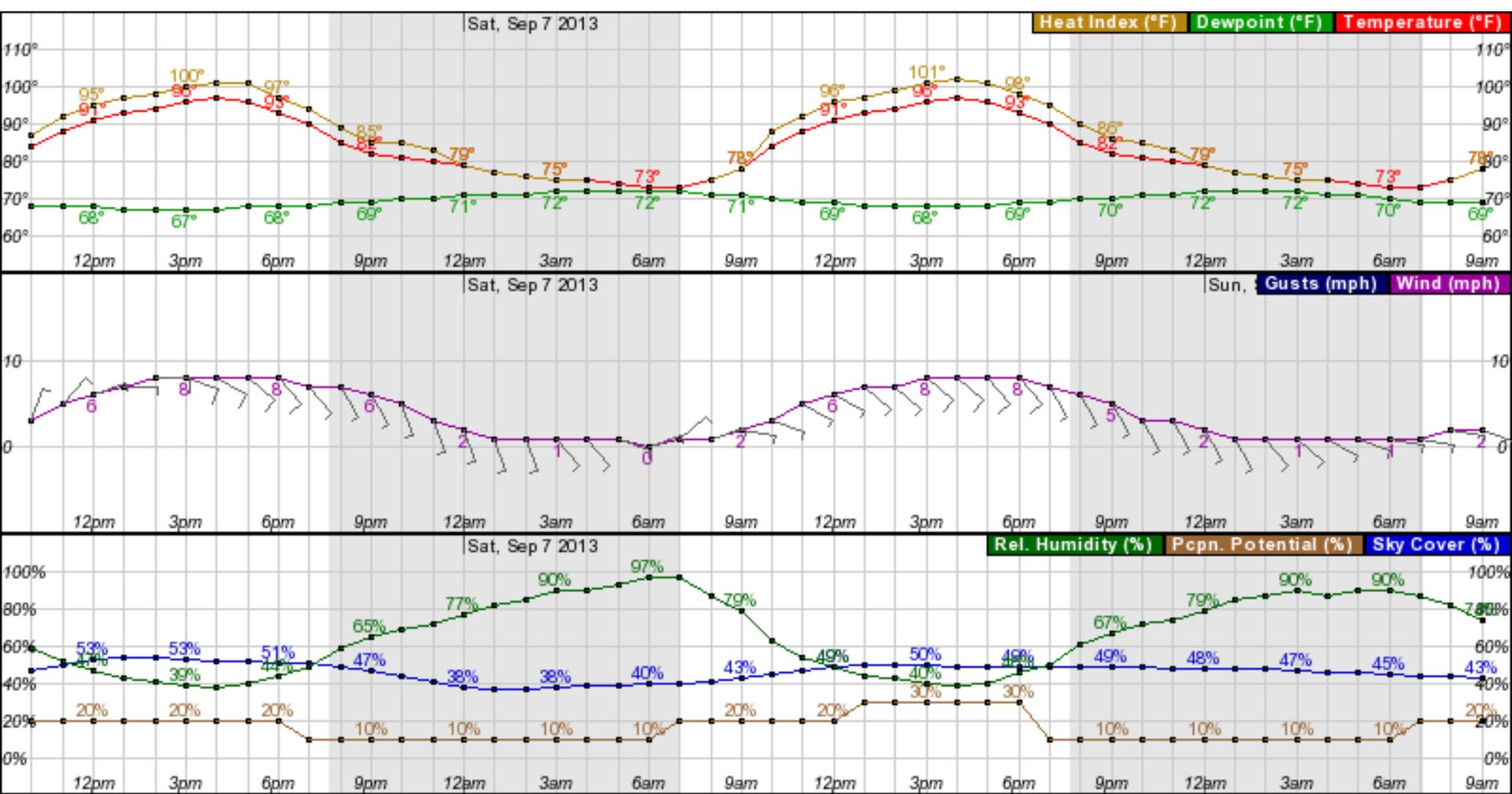
Conroe

Today: Cloud cover around 50%

Tomorrow: Cloud cover around 50%

Today →

Tomorrow →



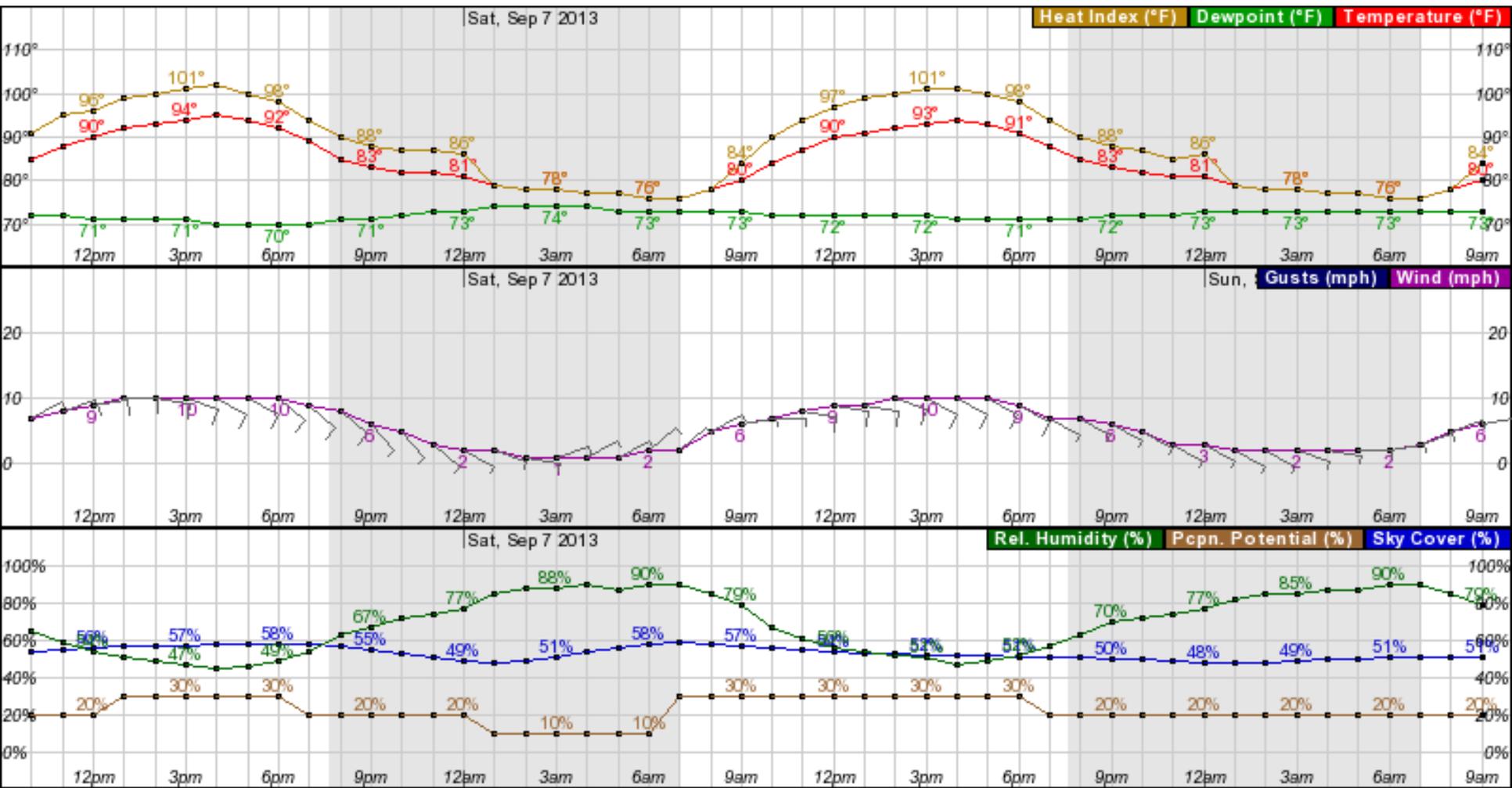
Houston Hobby

Today: Mostly cloudy

Tomorrow: Mostly cloudy

Today →

Tomorrow →



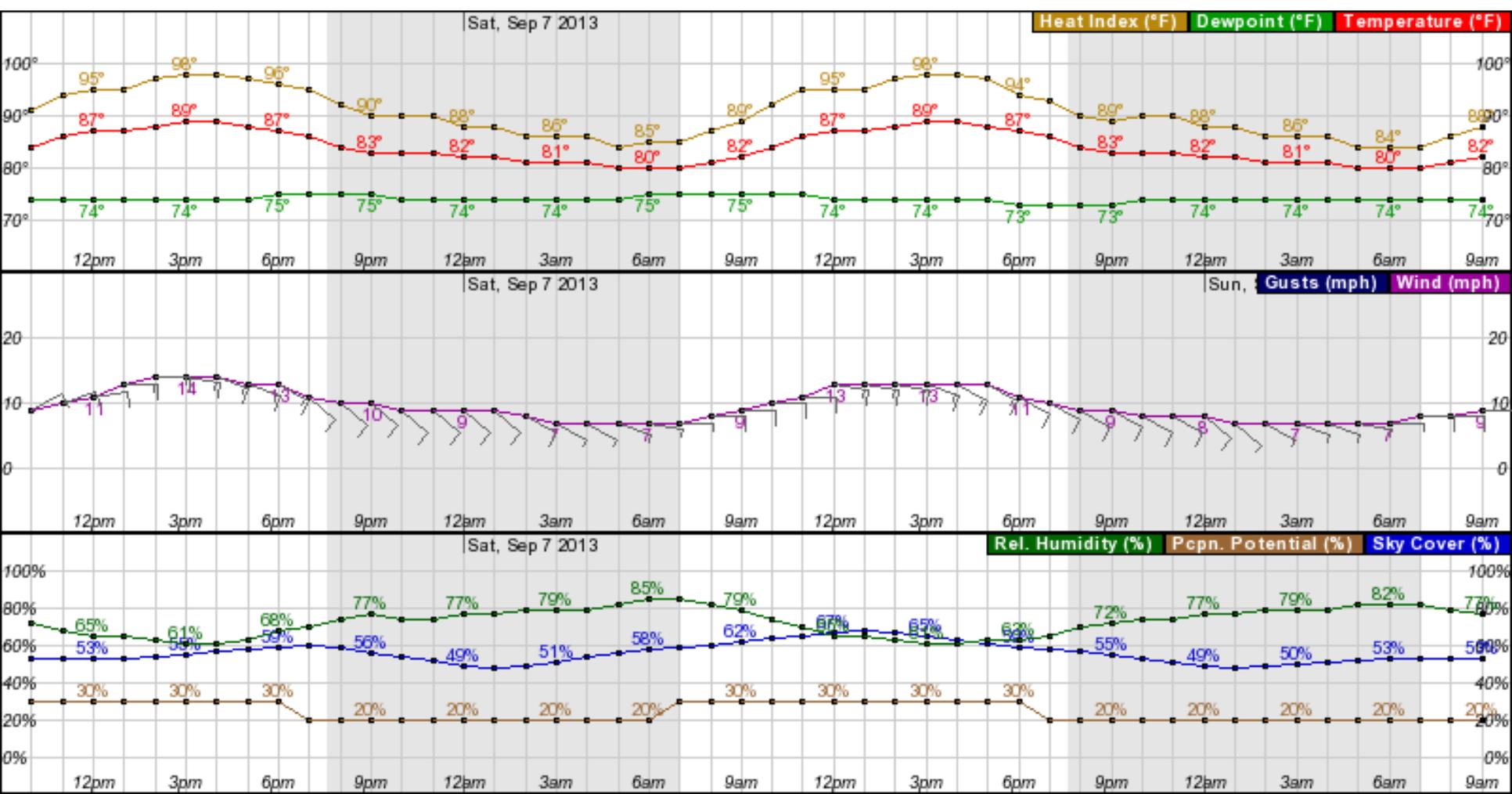
Galveston

Today: Mostly cloudy

Tomorrow: Mostly cloudy

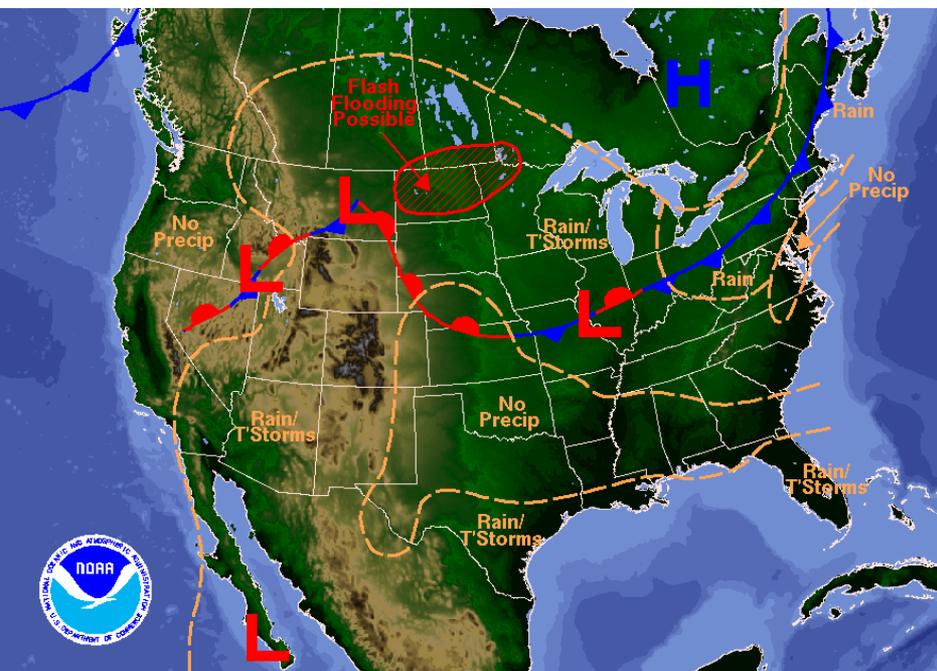
Today →

Tomorrow →

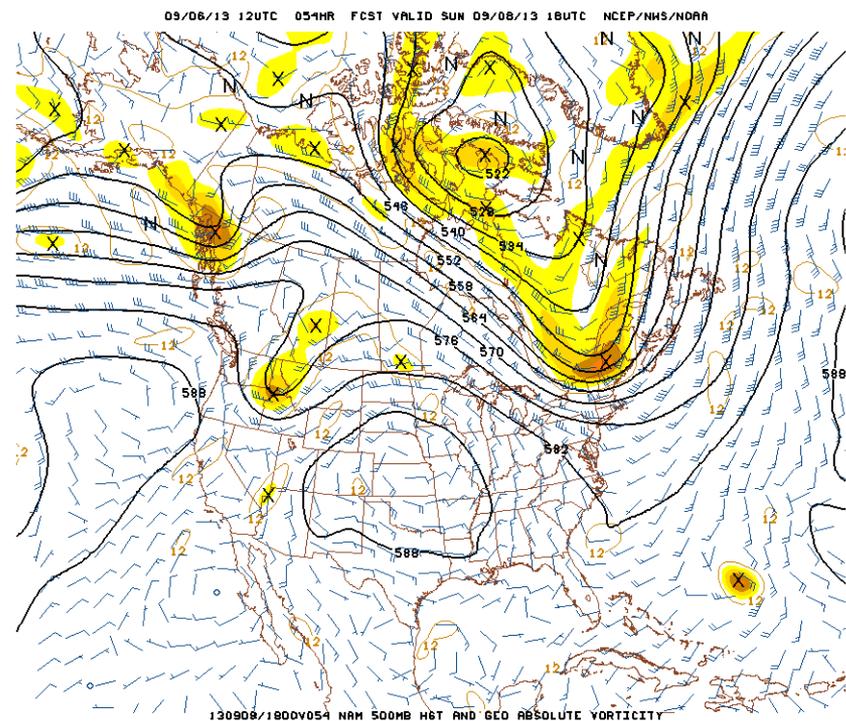


Sunday: Scattered thunderstorms. Easterly winds changing to southeasterly as sea breeze develops.

1 PM CDT
500 mb vorticity



Weather Forecast for Sun, Sep 08, 2013, issued 4:47 AM EDT Fri, Sep 06, 2013
DOC/NOAA/NWS/NCEP/Weather Prediction Center
Prepared by McReynolds based on WPC, SPC and NHC forecasts



10 m winds at 1 PM Sunday

WRF 3-KM

Fcst: 60 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

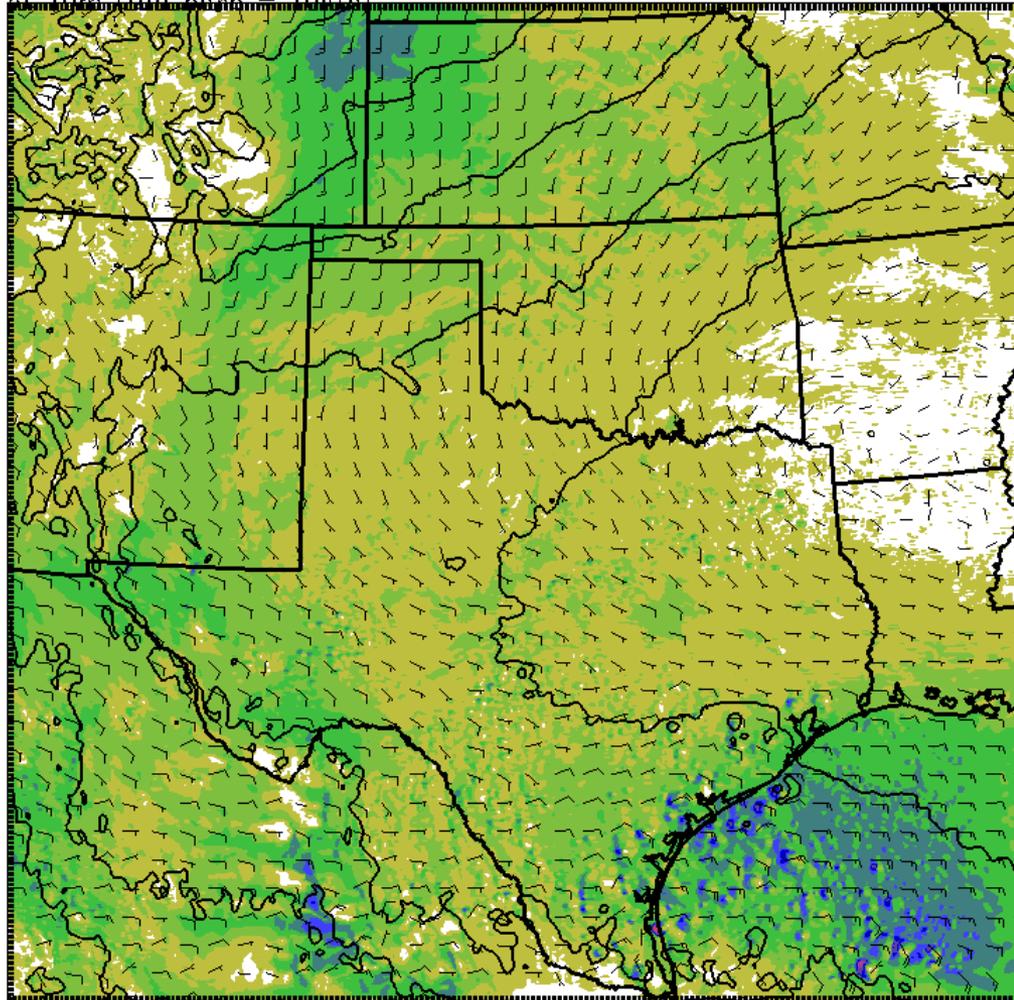
Wind at 10m (full barb = 10 m/s)

Init: 06 UTC Fri 06 Sep 13

Valid: 18 UTC Sun 08 Sep 13 (13 CDT Sun 08 Sep 13)

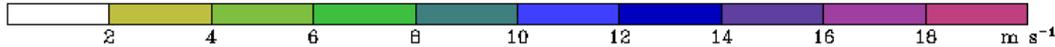
100 W

90 W



30 N

CONTOURS: UNITS=hPa LOW= 1008.0 HIGH= 1014.0 INTERVAL= 2.0000

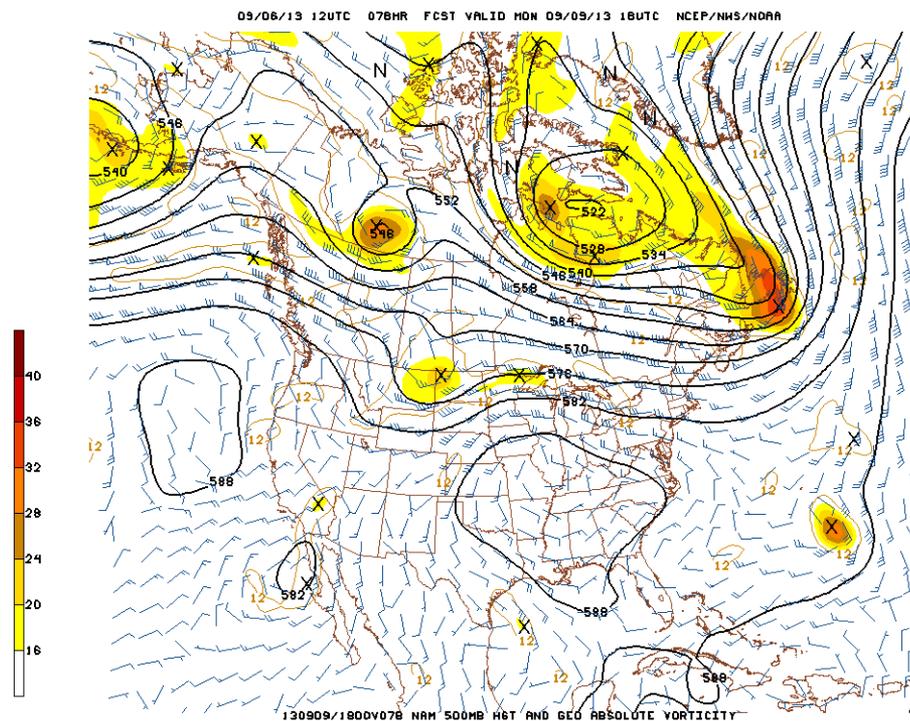
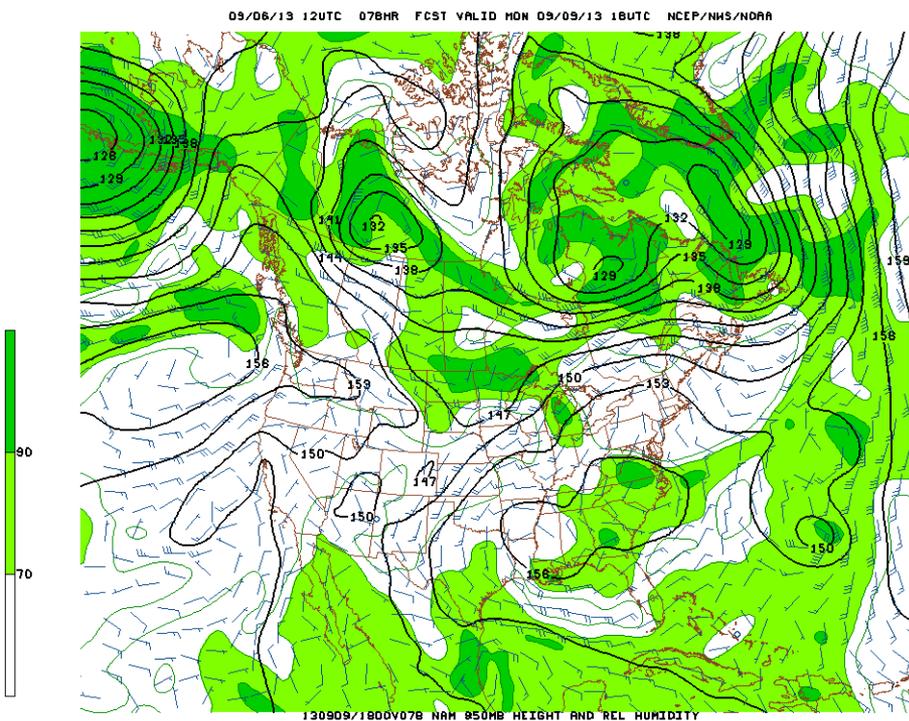


Model Info: V3.3 No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec
LW: RRTM SW: Dudhia DIFF: simple KM: ED Smagor

Monday: Scattered thunderstorms. Vorticity max south of Houston.

1 PM CDT
850 mb RH

500 mb vorticity



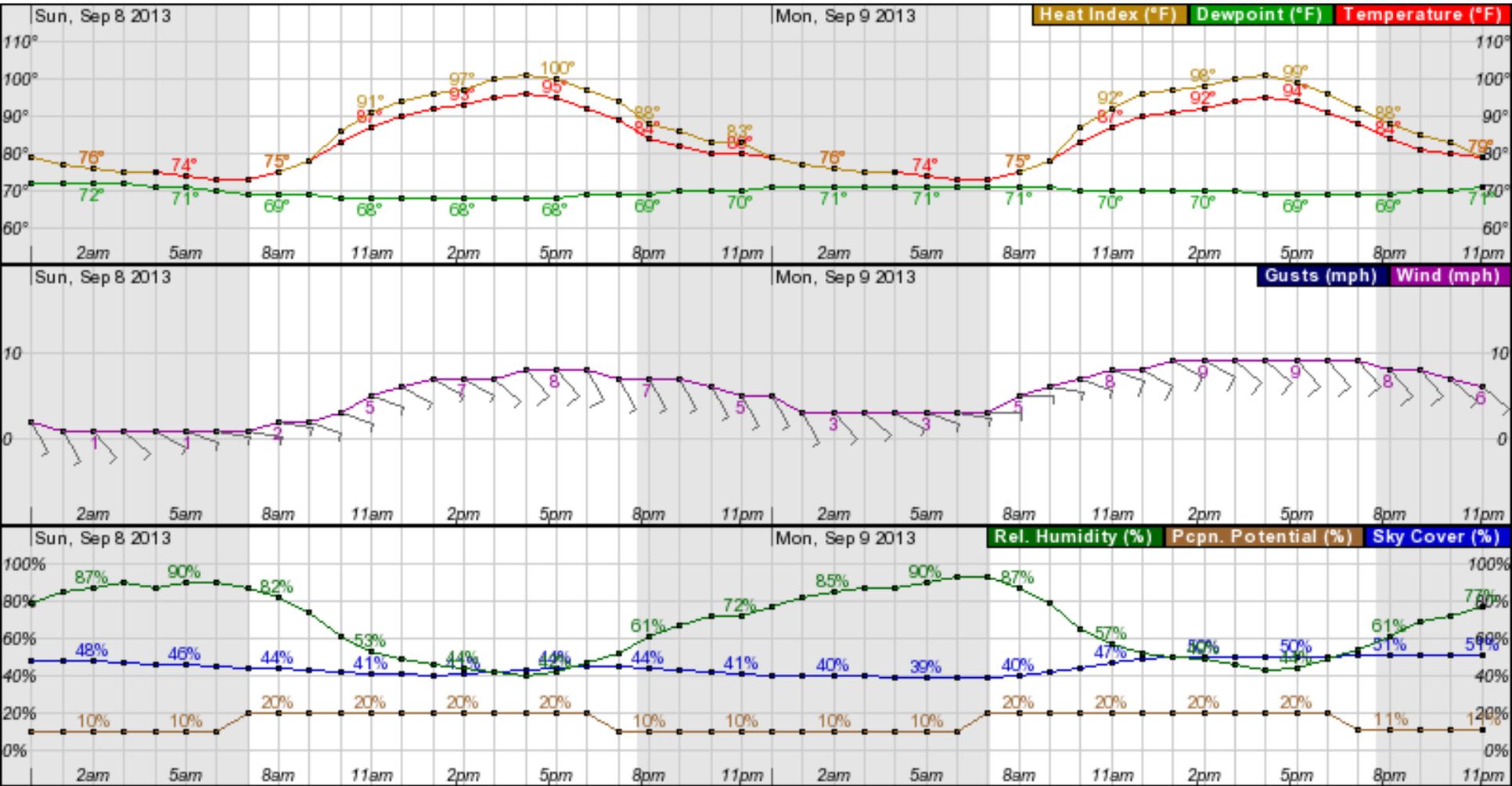
Conroe

Sunday: Partly cloudy

Monday: Cloud cover around 50%

Sunday →

Monday →



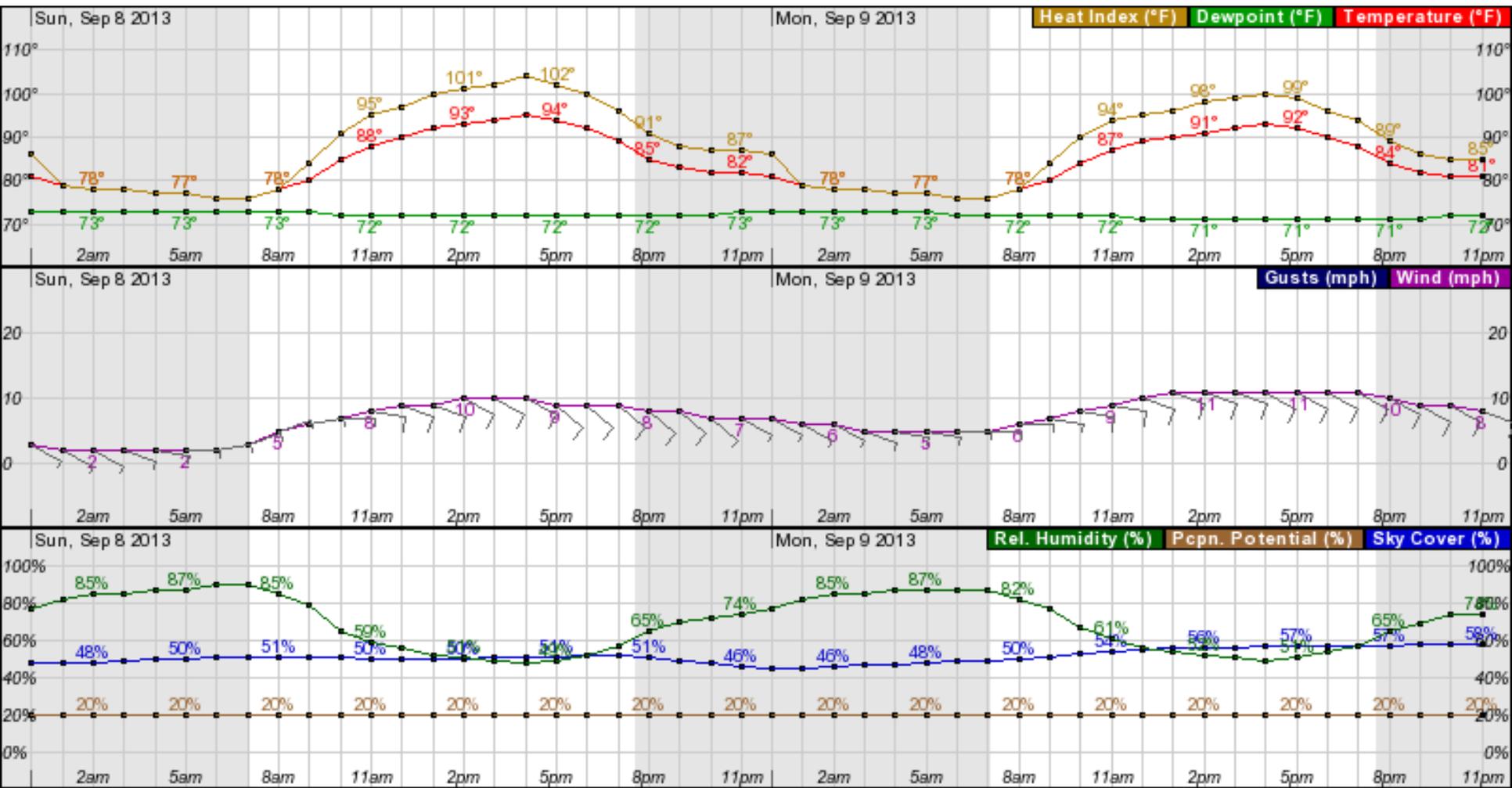
Houston Hobby

Sunday: Cloud cover around 50%

Monday: Cloud cover around 50%

Sunday →

Monday →



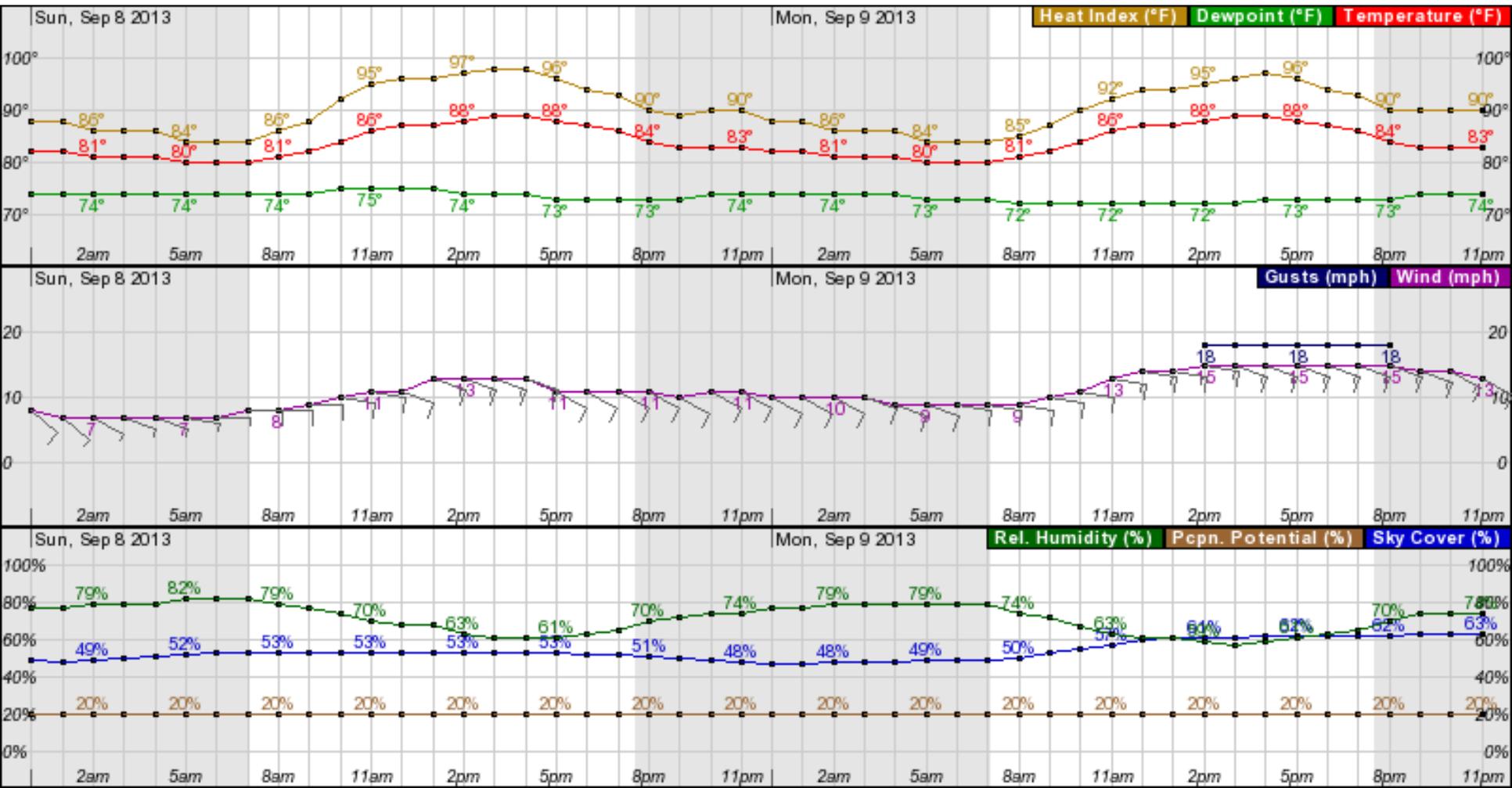
Galveston

Sunday: Cloud cover around 50%

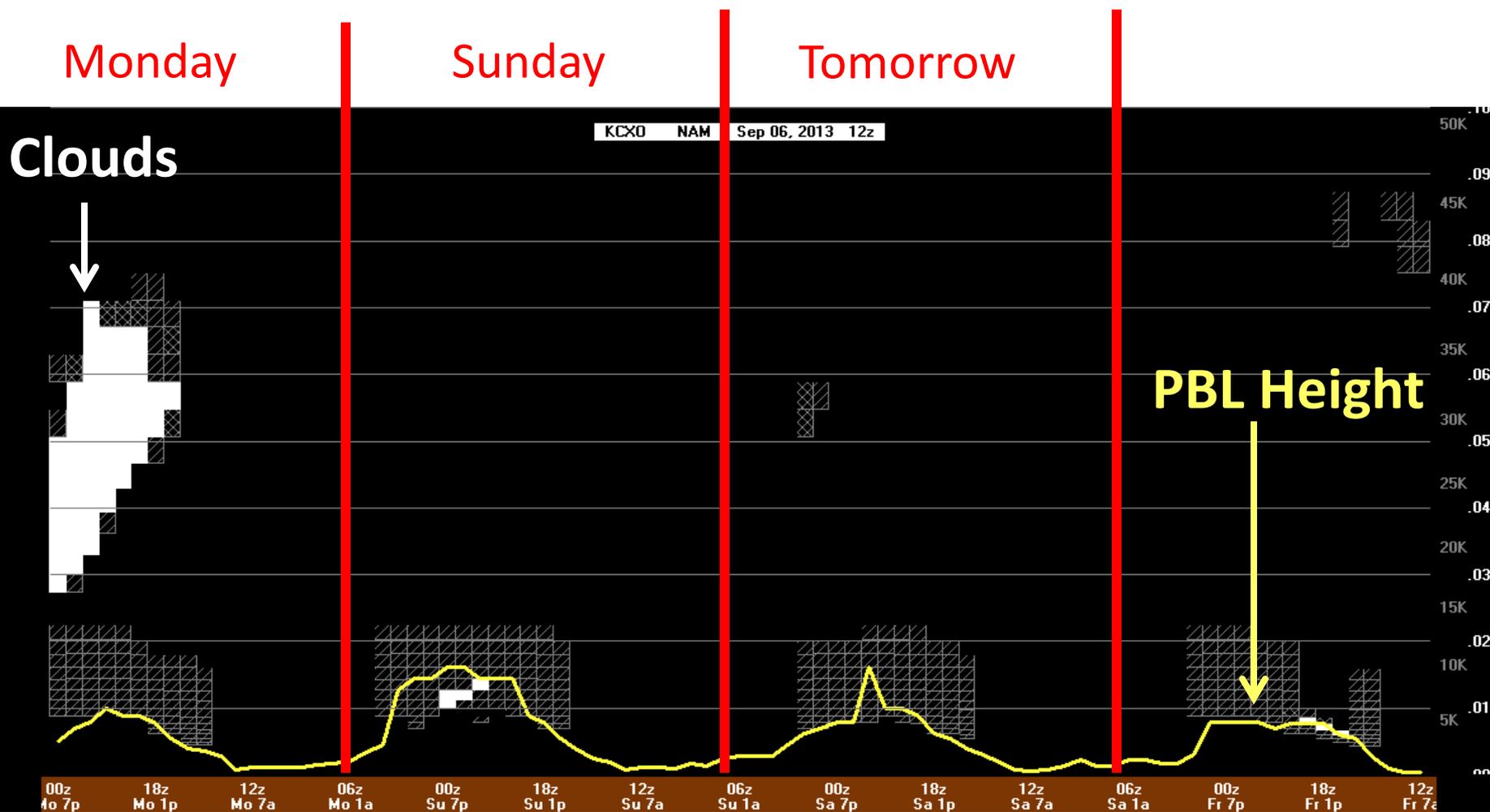
Monday: Mostly cloudy

Sunday →

Monday →

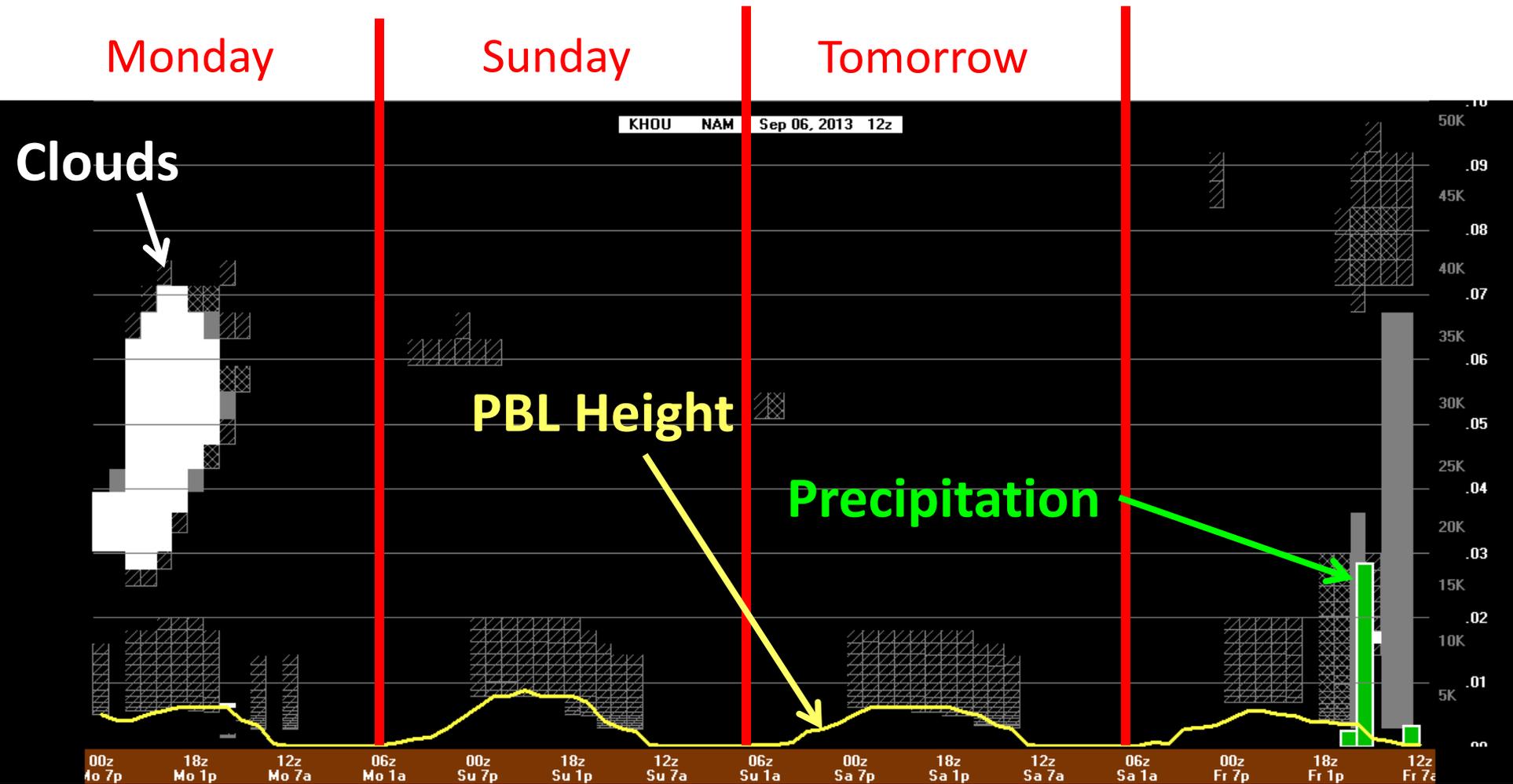


Conroe; BUFKIT – NAM (12 UTC 6 September)



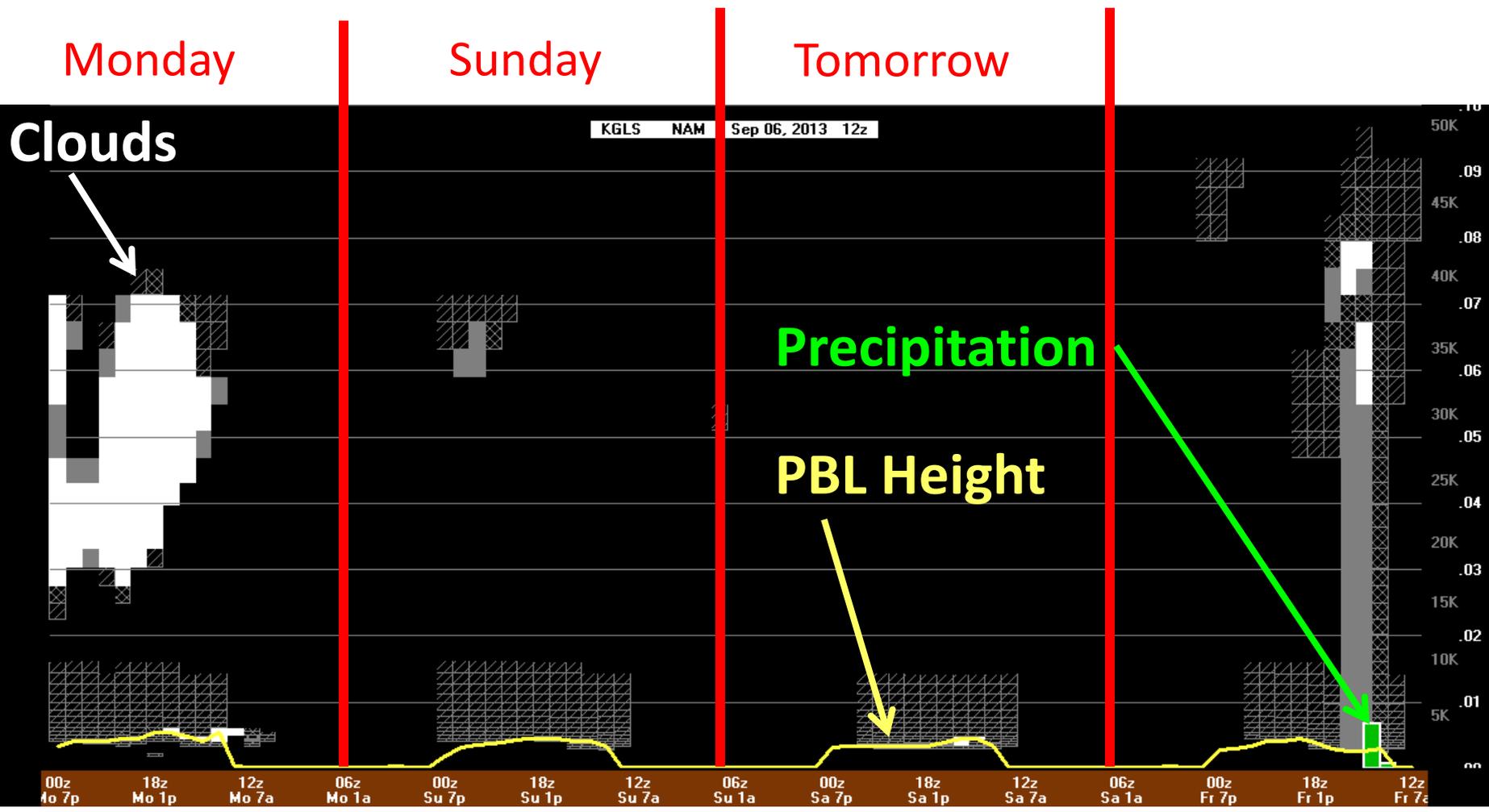
- Tomorrow: Partly cloudy.
- Sunday: Mostly cloudy around mid-day.
- Monday: Mostly cloudy.

Houston Hobby; BUFKIT – NAM (12 UTC 6 September)



- Tomorrow: Partly cloudy.
- Sunday: Partly cloudy.
- Monday: Mostly cloudy.

Galveston; BUFKIT – NAM (12 UTC 6 September)

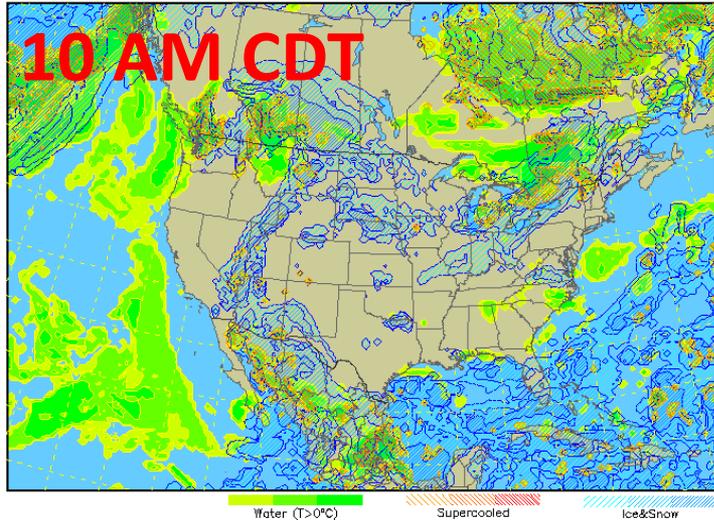


- Tomorrow: Partly cloudy.
- Sunday: Partly cloudy.
- Monday: Mostly cloudy.

Tomorrow: NAM – a few low and high level clouds

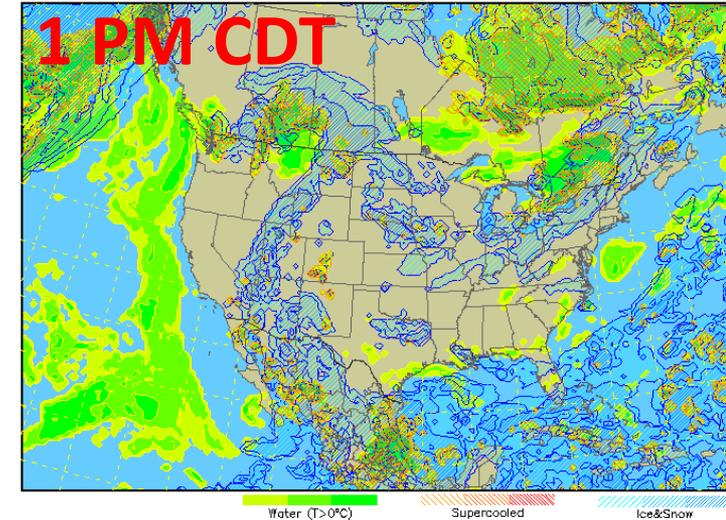
Integrated liquid and frozen hydrometeors (all levels)

27-hour forecast valid 1500 UTC Sat 07 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



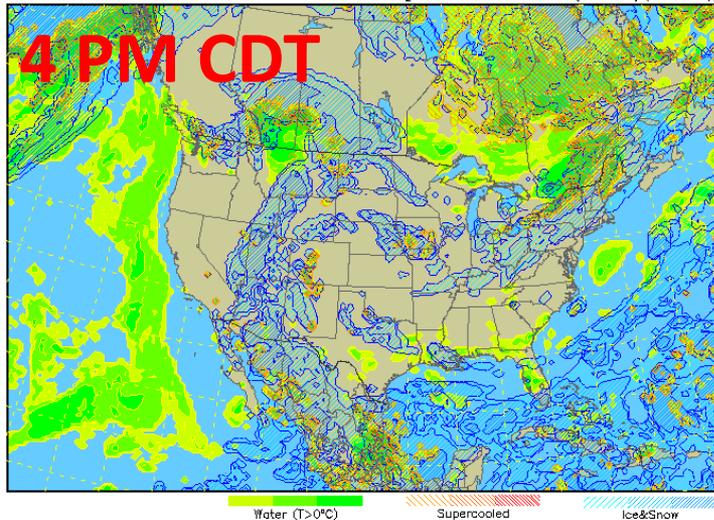
Integrated liquid and frozen hydrometeors (all levels)

30-hour forecast valid 1800 UTC Sat 07 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



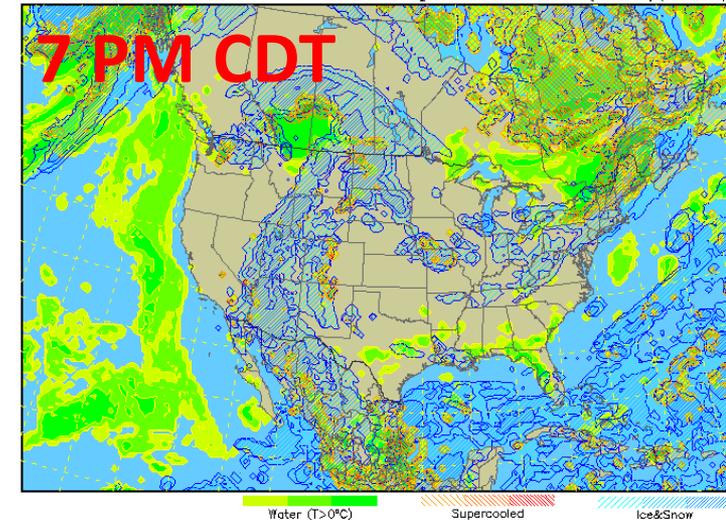
Integrated liquid and frozen hydrometeors (all levels)

33-hour forecast valid 2100 UTC Sat 07 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)

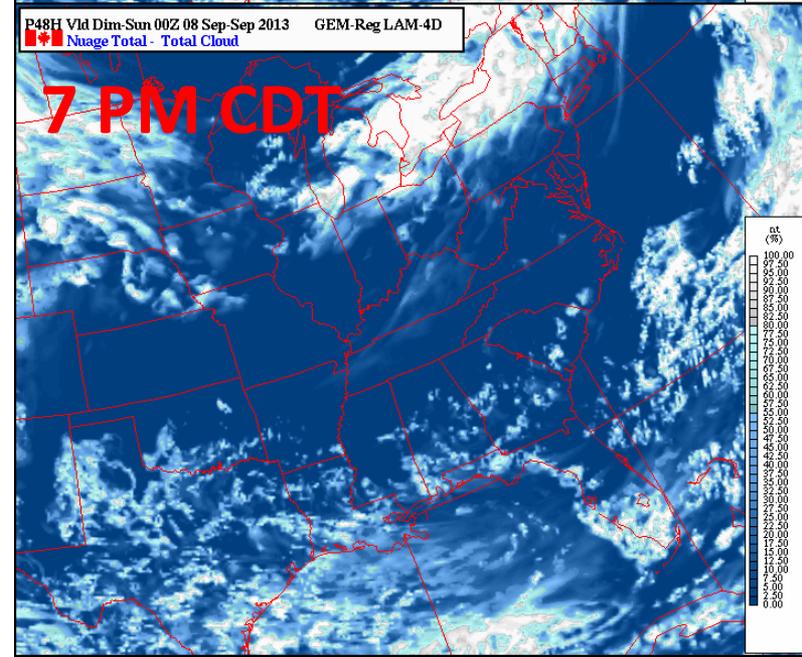
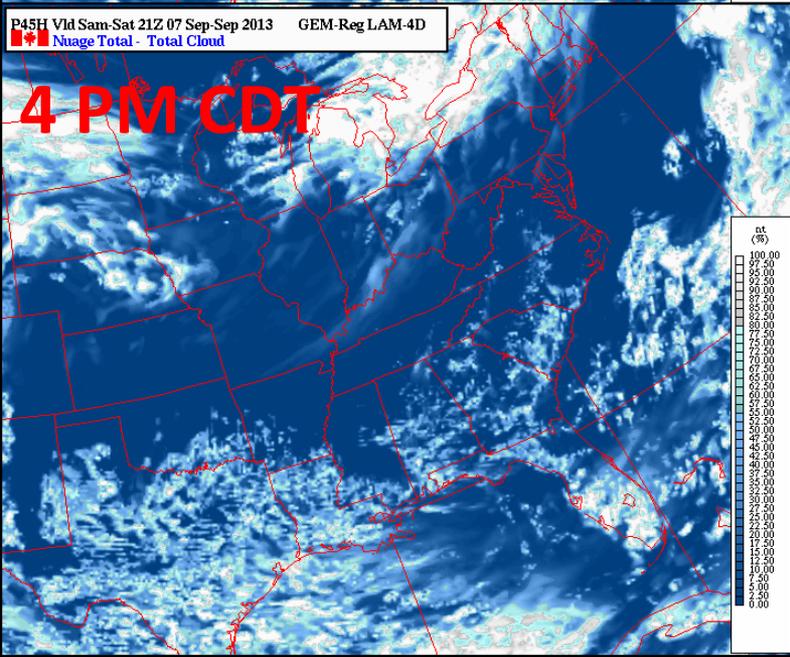
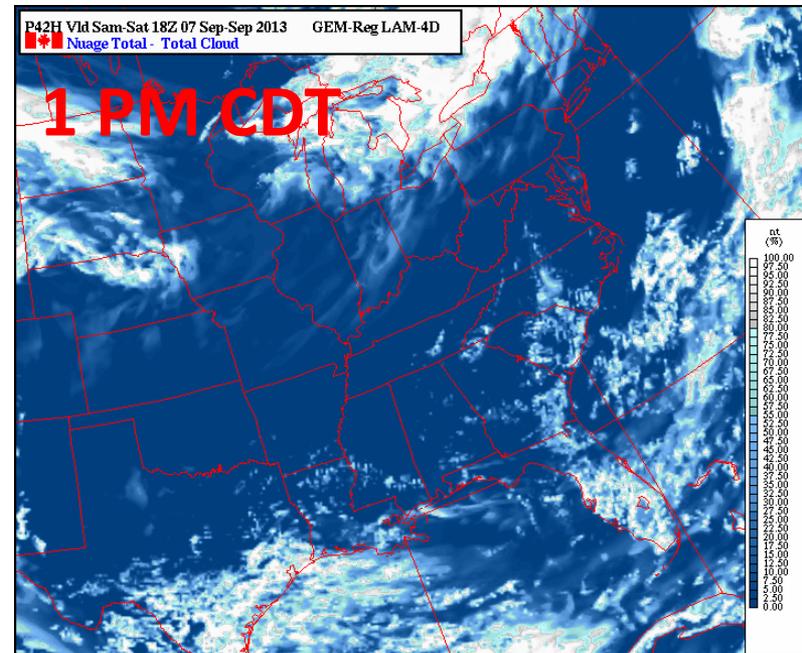
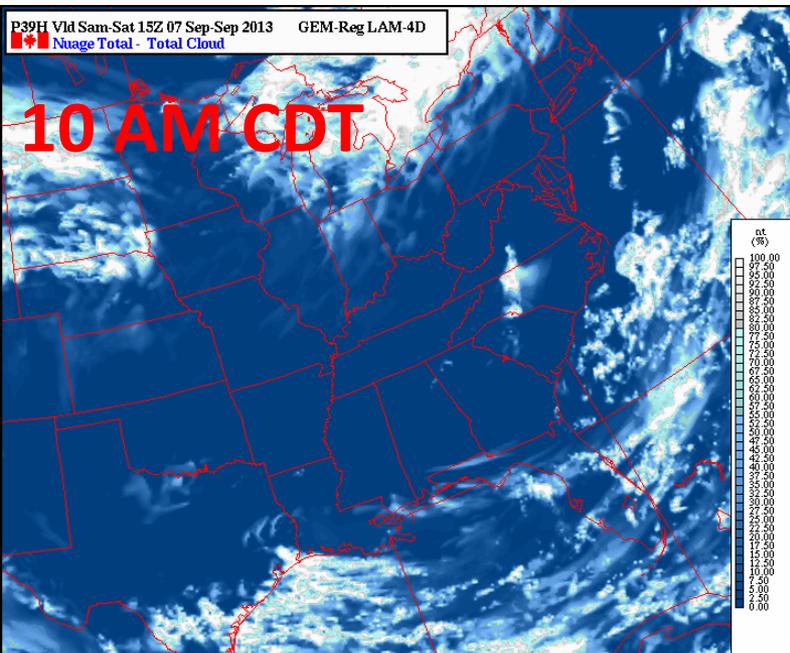


Integrated liquid and frozen hydrometeors (all levels)

36-hour forecast valid 0000 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



Tomorrow: Canadian - scattered clouds



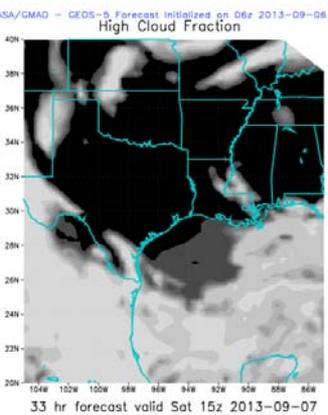
Tomorrow: GEOS-5 – low level clouds in the afternoon

10 am

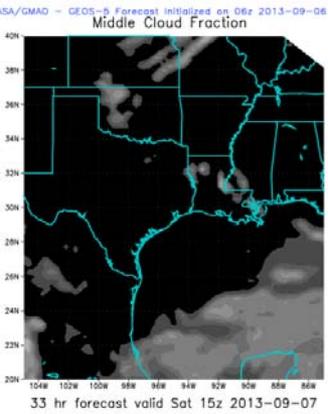
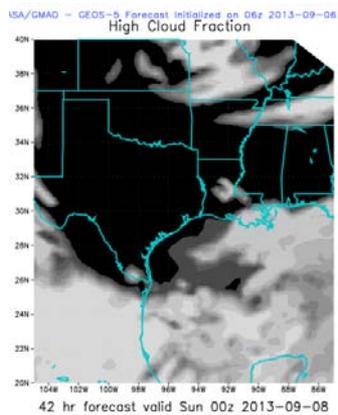
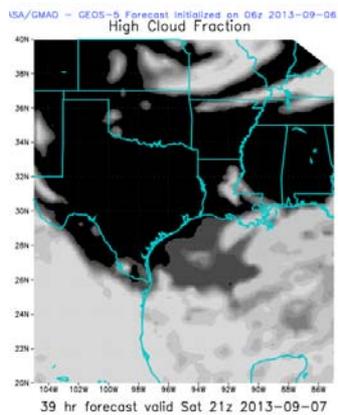
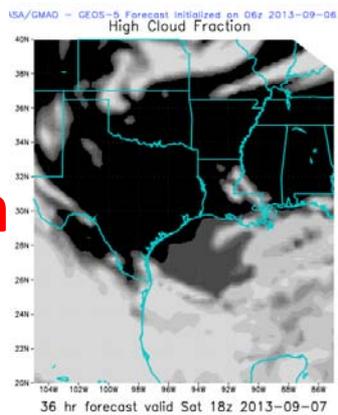
1 pm

4 pm

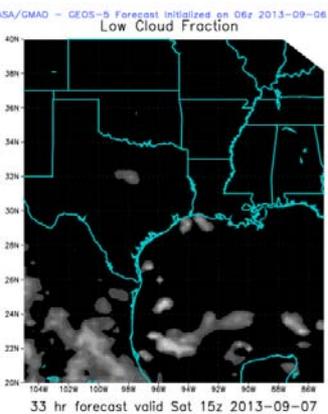
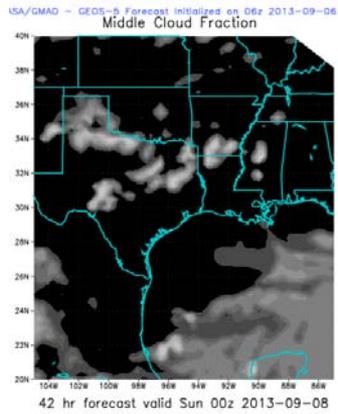
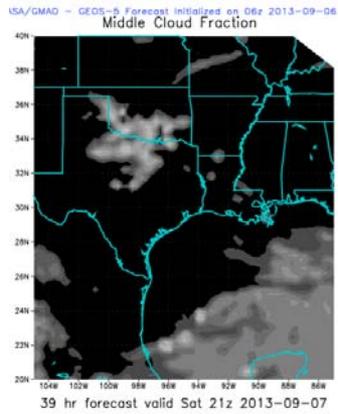
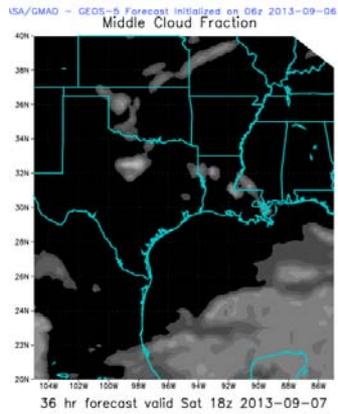
7 pm



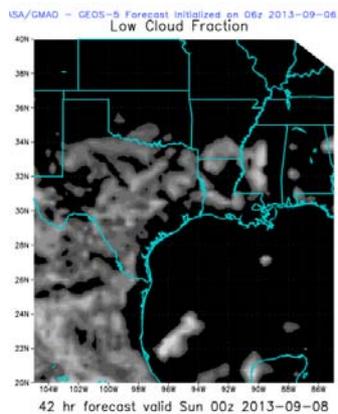
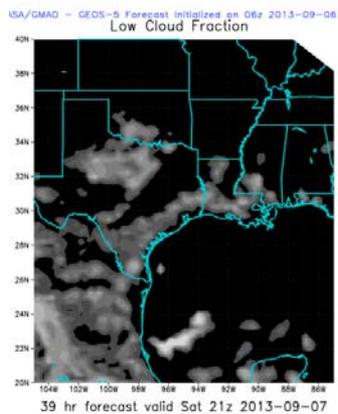
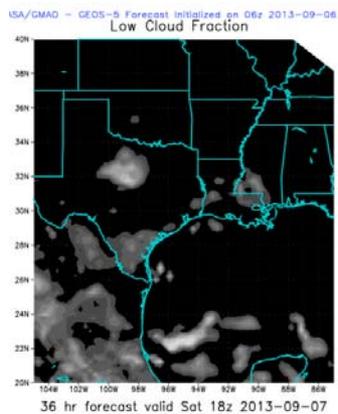
High



Mid



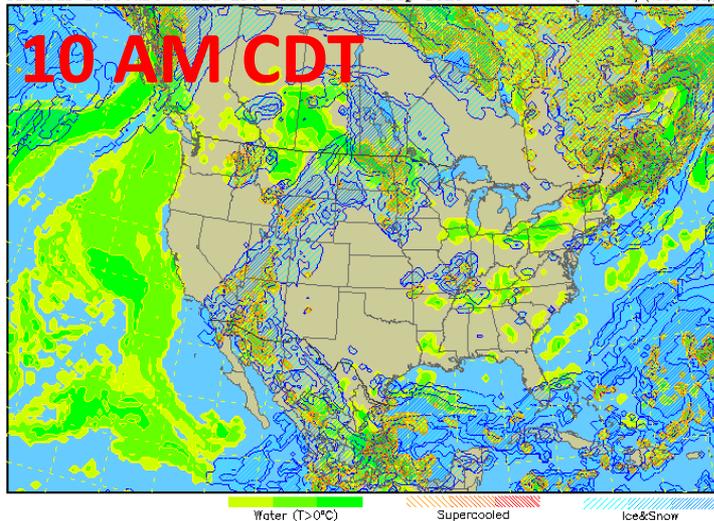
Low



Sunday: NAM – a few low and high level clouds in the afternoon

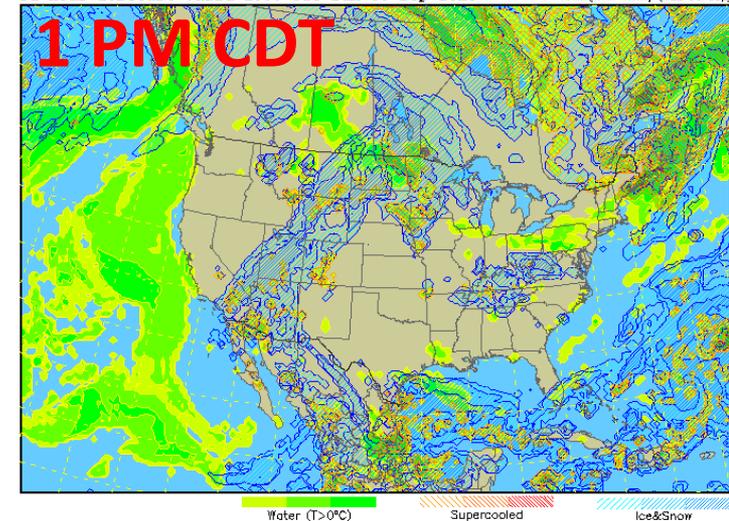
Integrated liquid and frozen hydrometeors (all levels)

51-hour forecast valid 1500 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



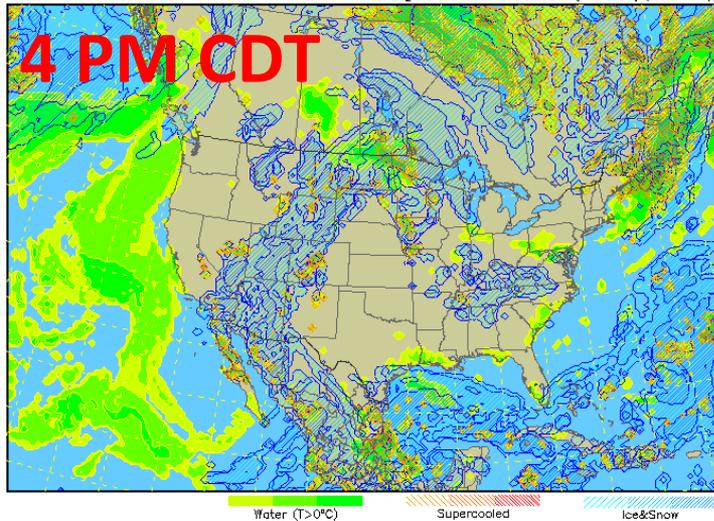
Integrated liquid and frozen hydrometeors (all levels)

54-hour forecast valid 1800 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



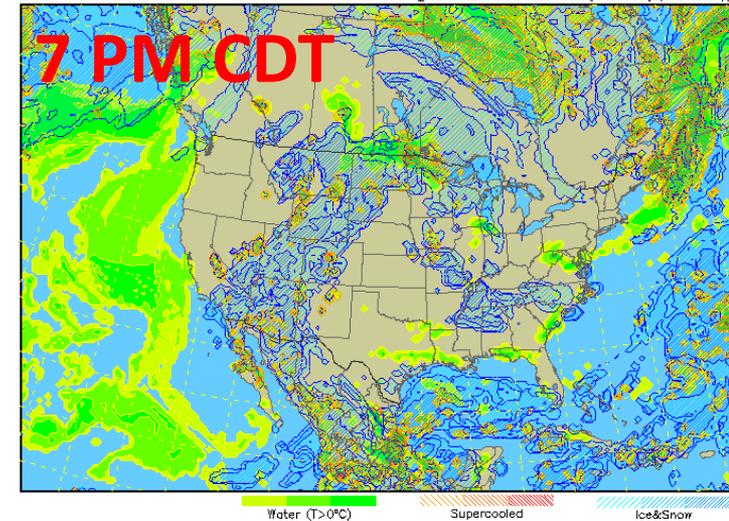
Integrated liquid and frozen hydrometeors (all levels)

57-hour forecast valid 2100 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



Integrated liquid and frozen hydrometeors (all levels)

60-hour forecast valid 0000 UTC Mon 09 Sep 2013 NAM (WRF-NMM) (12z 06 Sep)



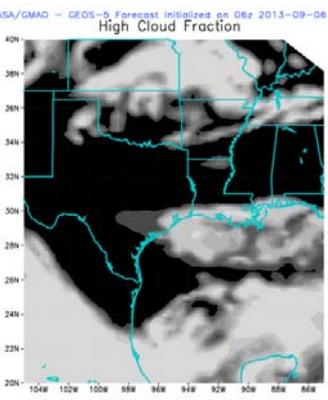
Sunday: GEOS-5 – high level clouds

10 am

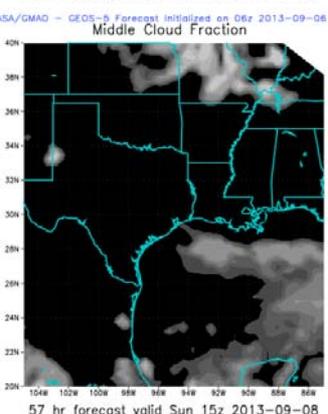
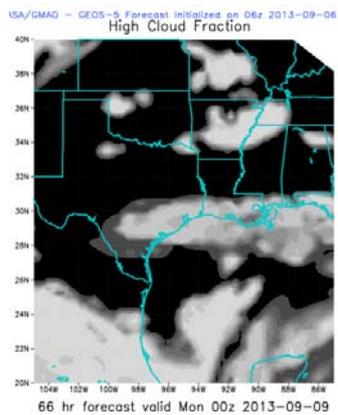
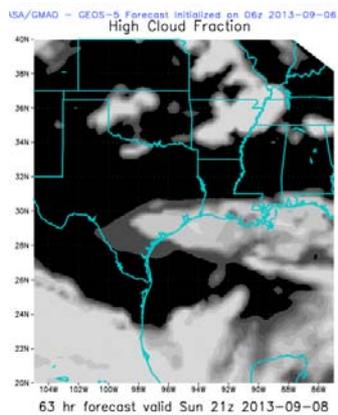
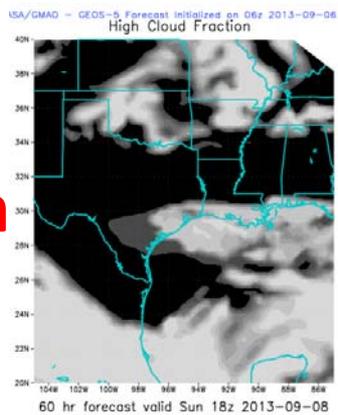
1 pm

4 pm

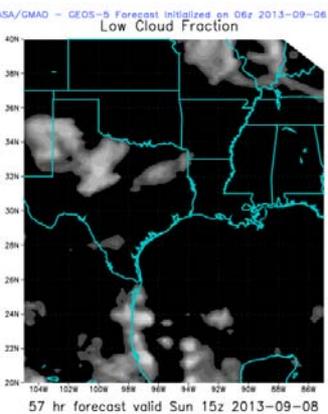
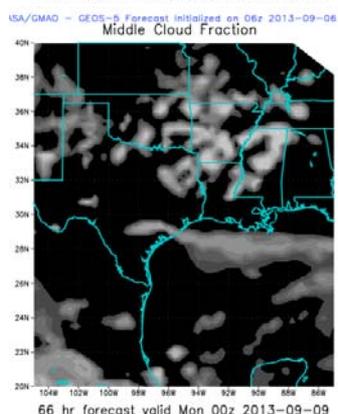
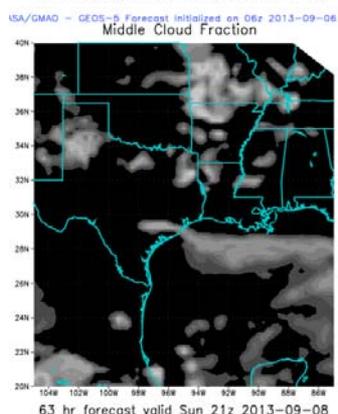
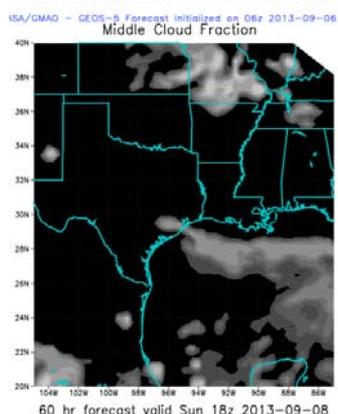
7 pm



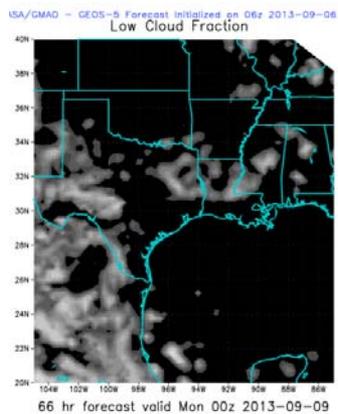
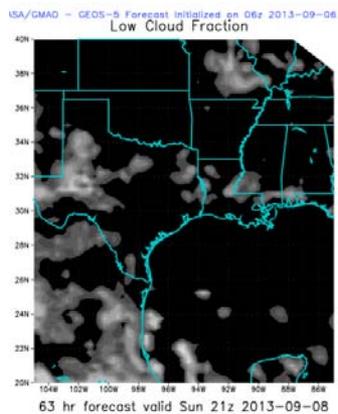
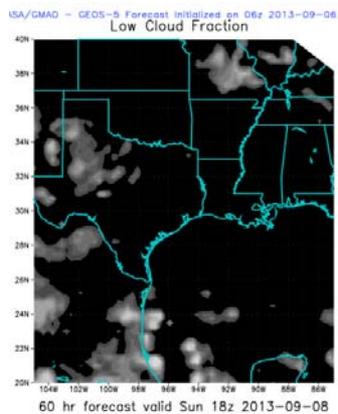
High



Mid

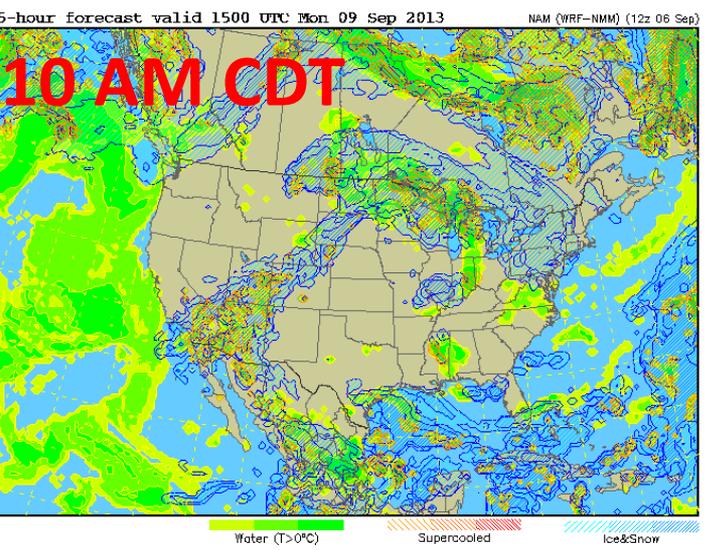


Low

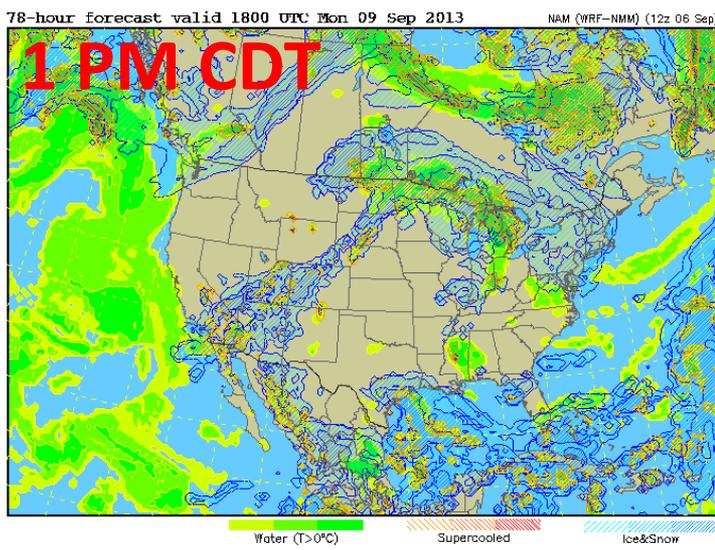


Monday: NAM – low, mid, and high level clouds

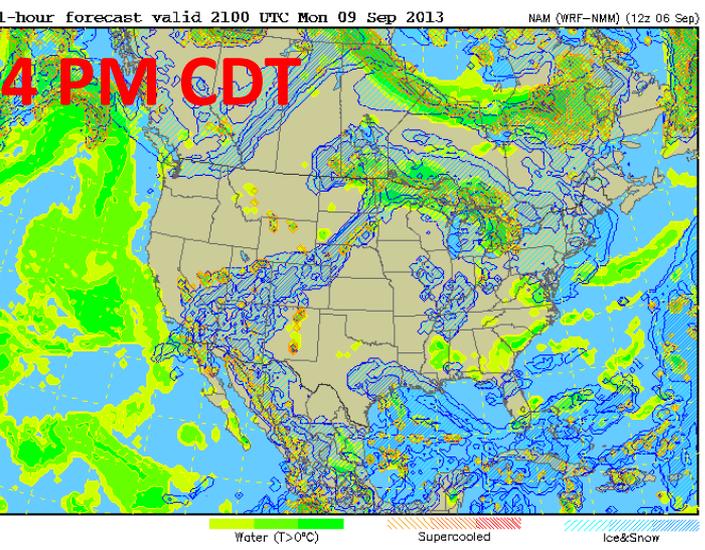
Integrated liquid and frozen hydrometeors (all levels)



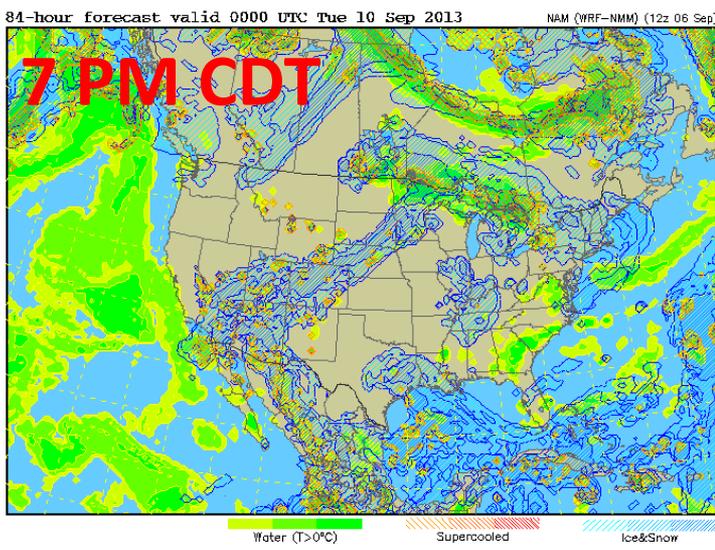
Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)



Monday: GEOS-5 – high and mid level clouds

10 am

1 pm

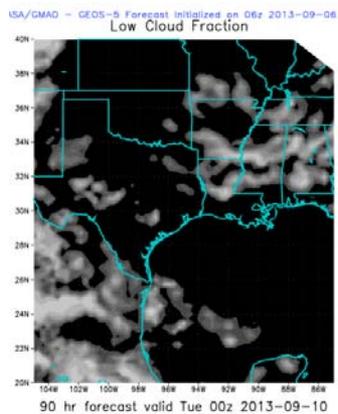
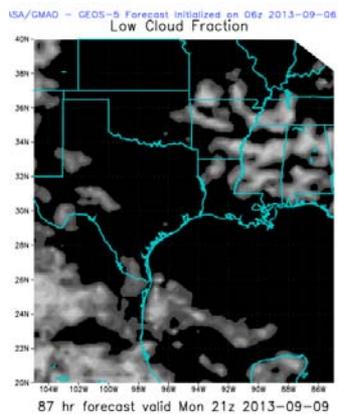
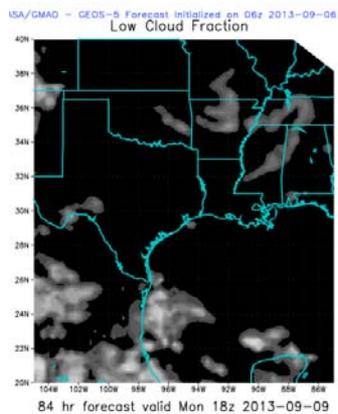
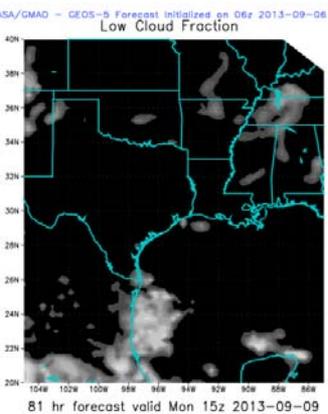
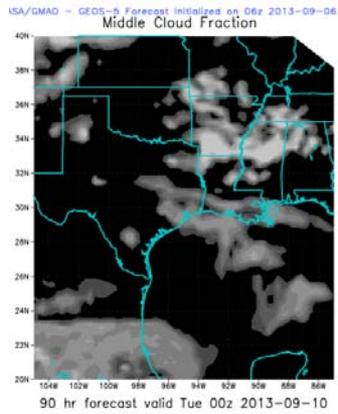
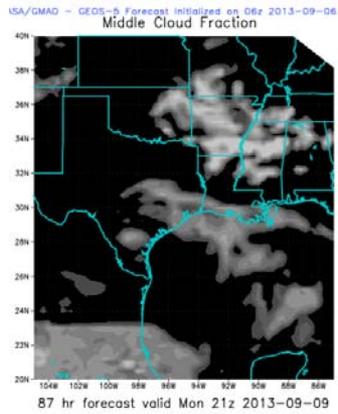
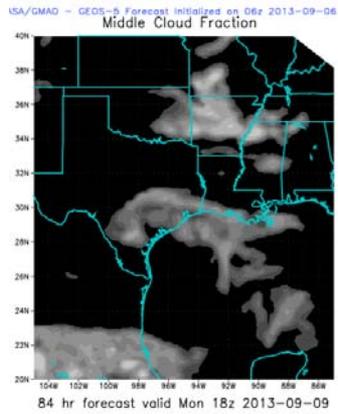
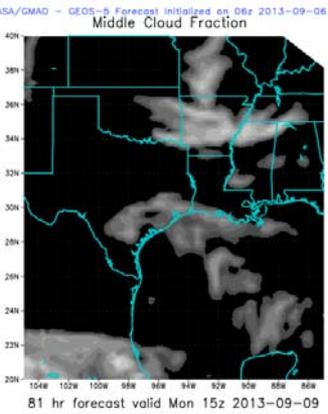
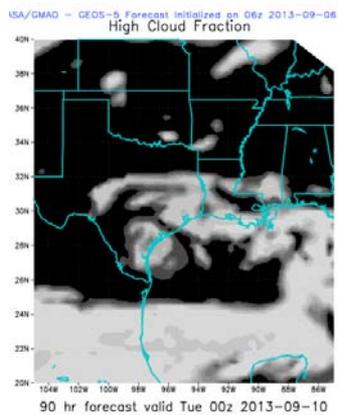
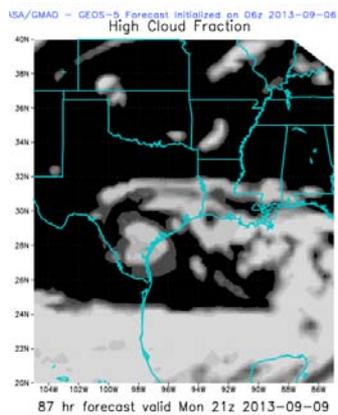
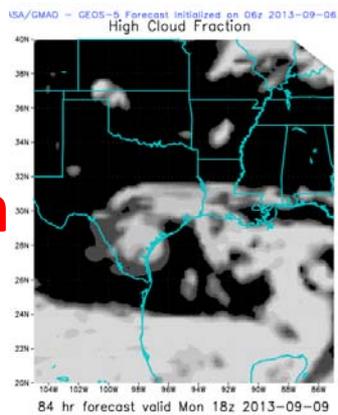
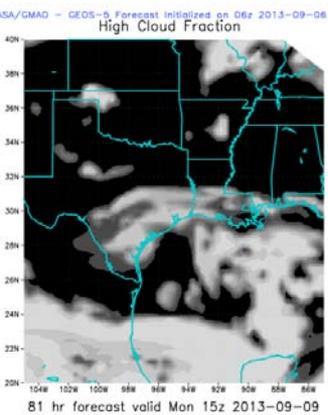
4 pm

7 pm

High

Mid

Low



Recommendations

- Tomorrow: A few more clouds due to a shortwave trough moving into Texas.
- Sunday: Possible flight day.
- Monday: Cloudy ahead of strong easterly wave that will impact Houston Tuesday and Wednesday.

DISCOVER-AQ Air Quality Outlook

September 6, 2013

Ken Pickering

Bob Chatfield

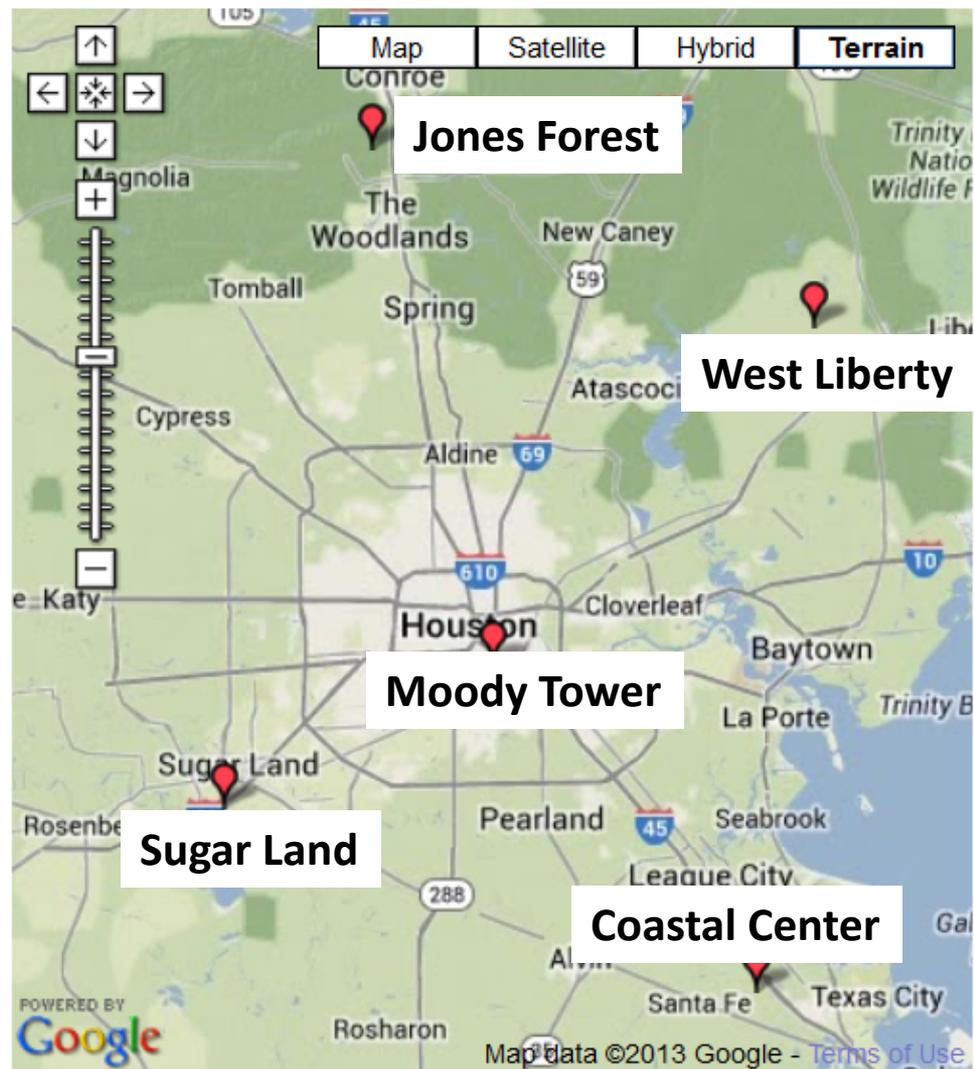
Houston - Network of Environmental Towers (H-NET)

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.

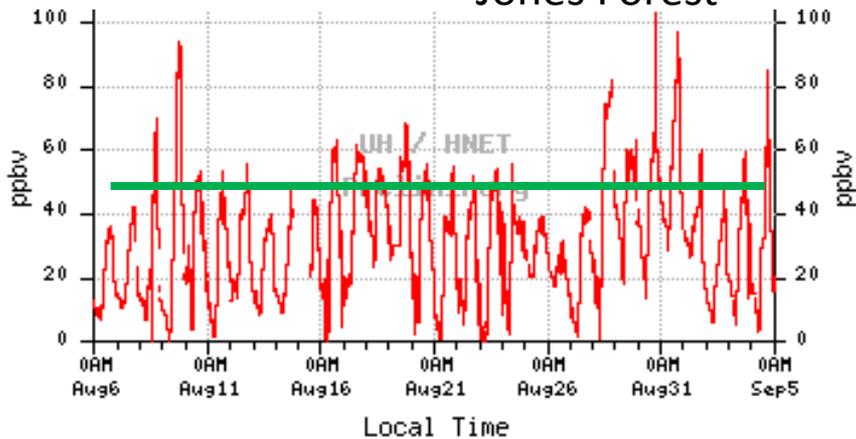
Currently, **five sites** have been set up in

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

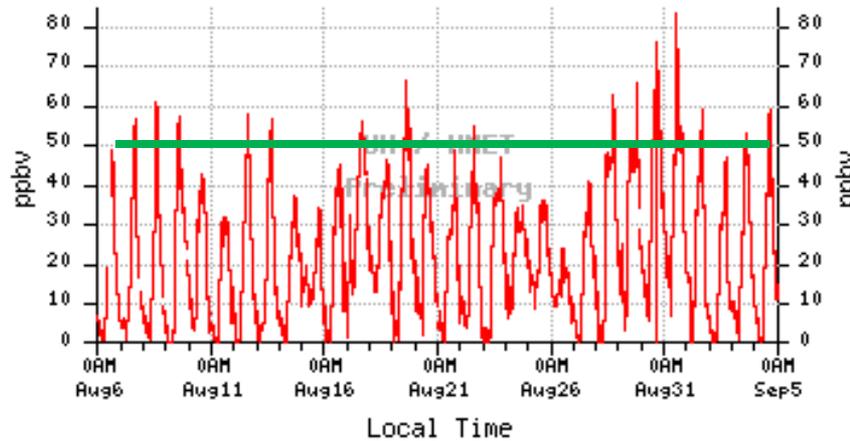
[More about this project.](#)



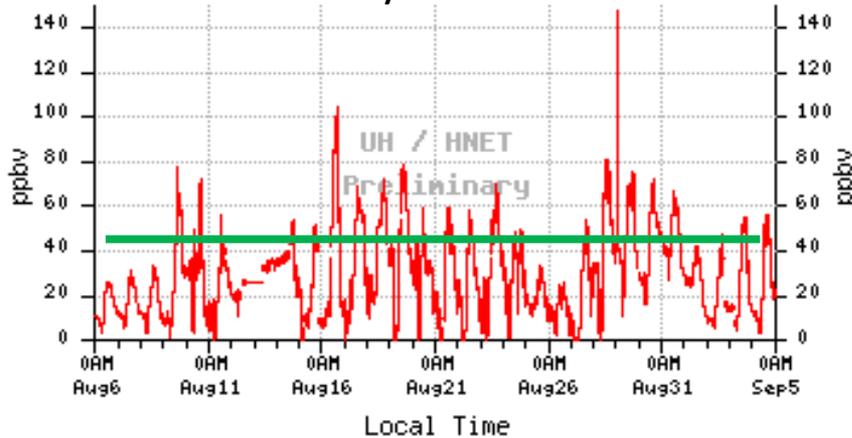
Jones Forest



West Liberty



Moody Tower

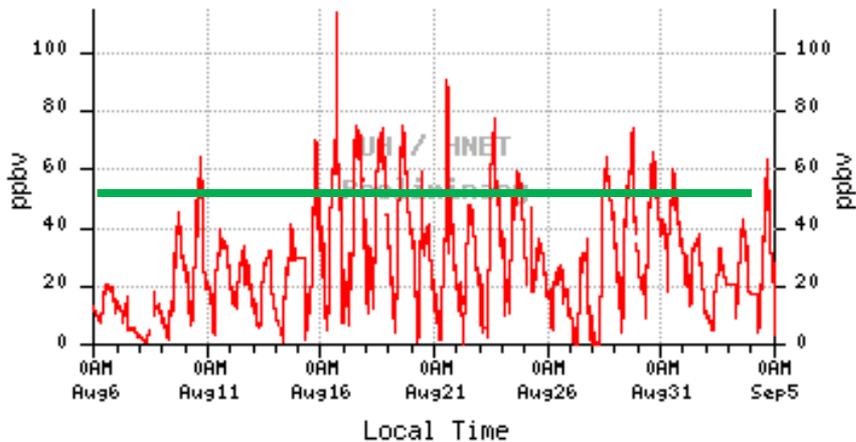


Ozone (ppbv)
Aug. 6th – Sept. 5th

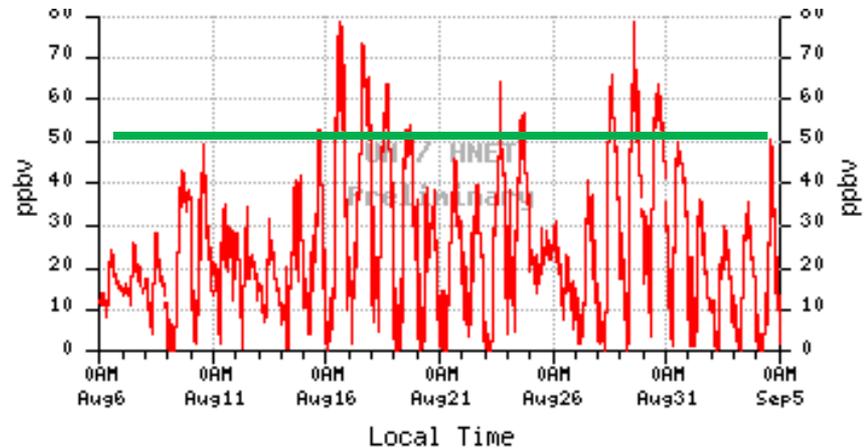
— = 50 ppbv

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

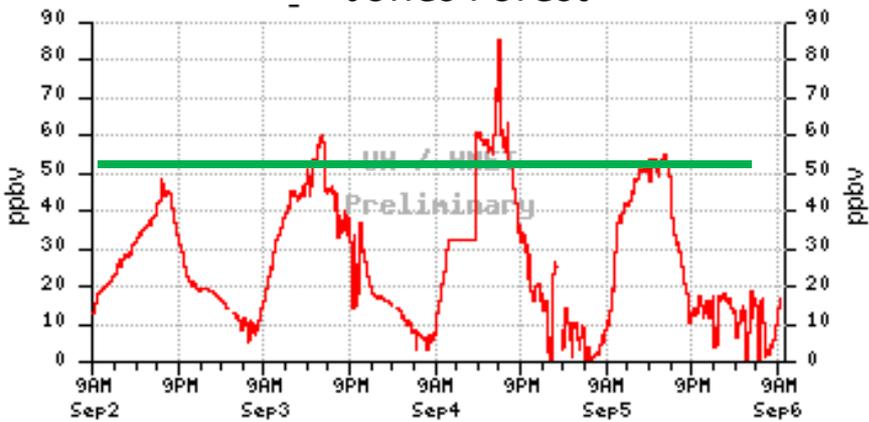
Sugar Land



Coastal Center

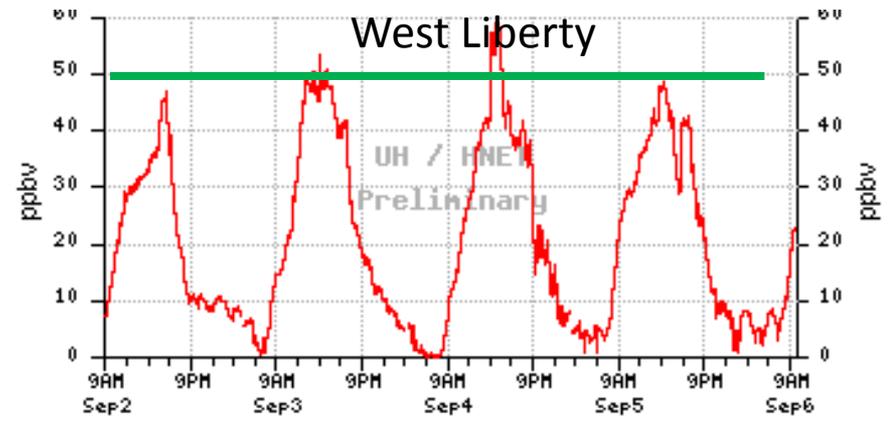


Jones Forest



Local Time

West Liberty

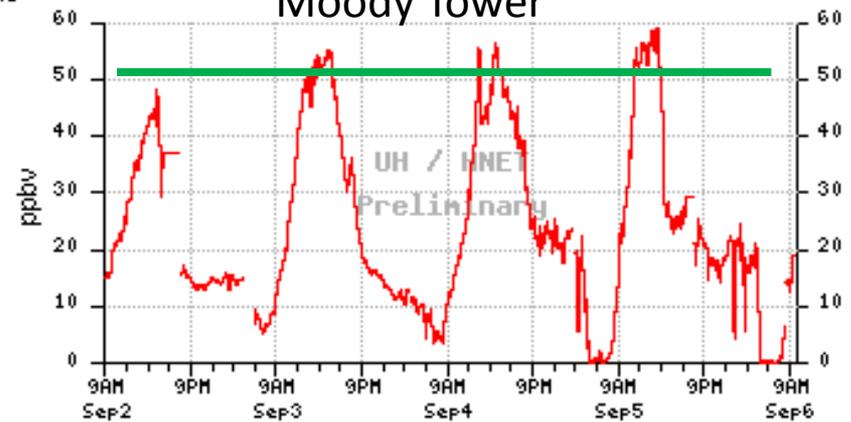


Local Time

Ozone (ppbv)
Sep. 2nd – Sept. 6th

———— = 50 ppbv

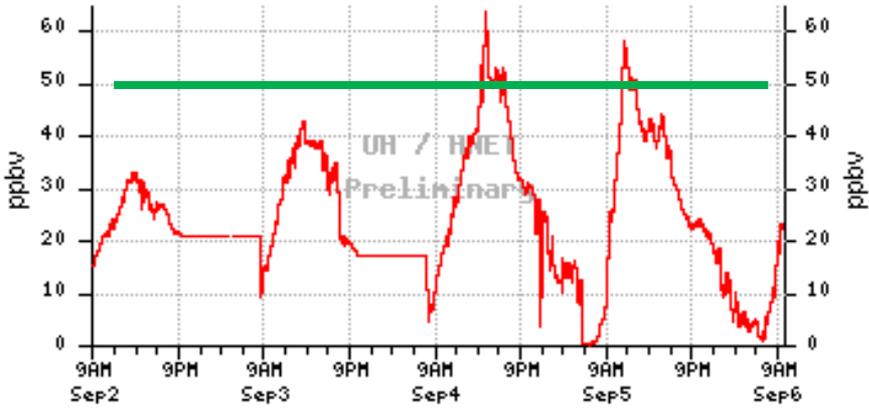
Moody Tower



Local Time

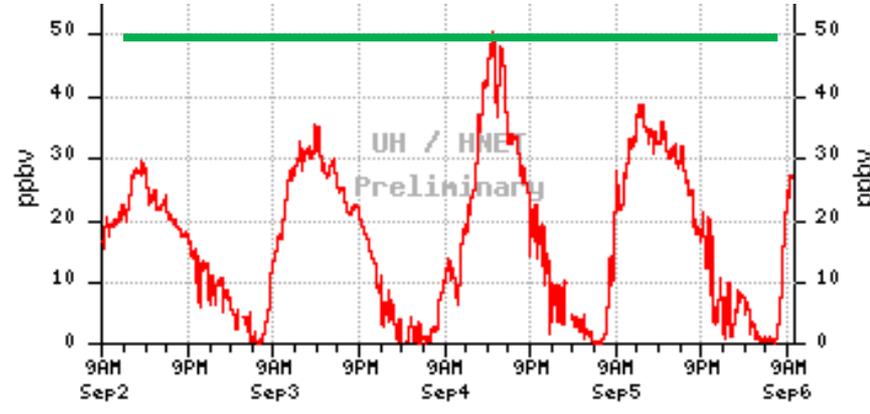
**Houston – Network of
Environmental Towers
(H-NET)**

Sugar Land



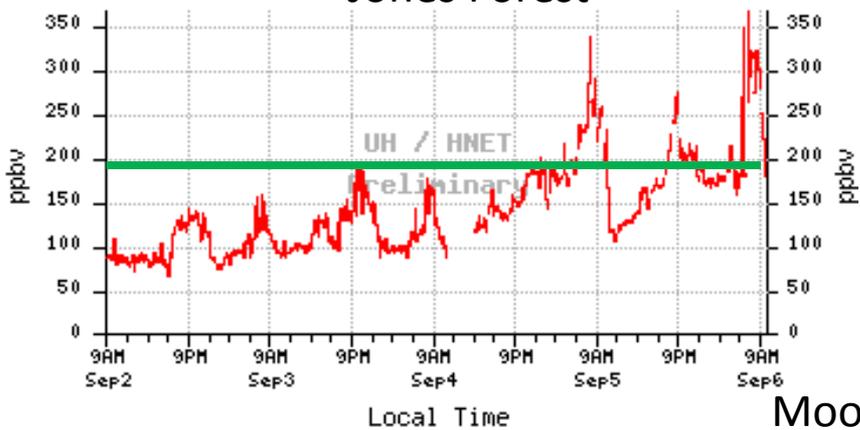
Local Time

Coastal Center

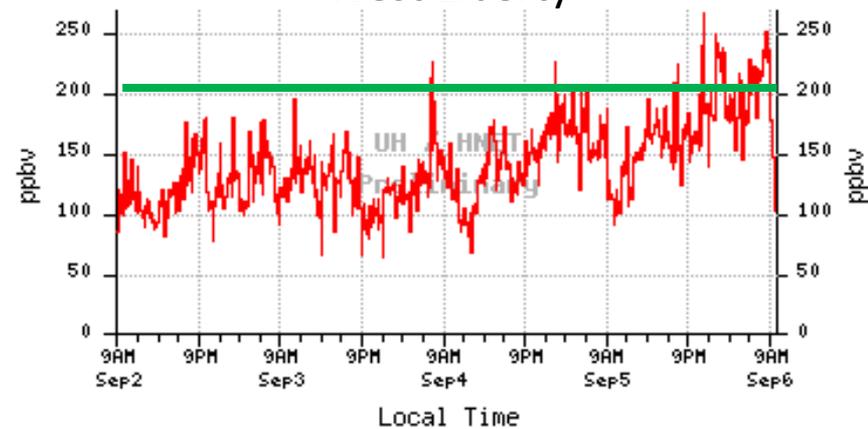


Local Time

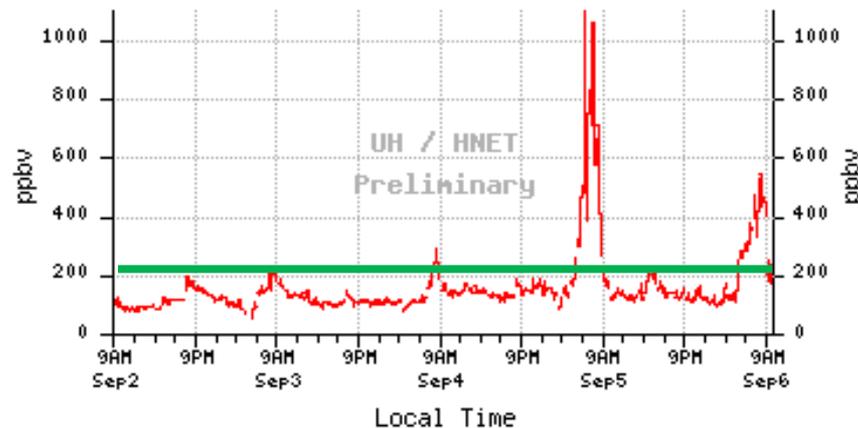
Jones Forest



West Liberty

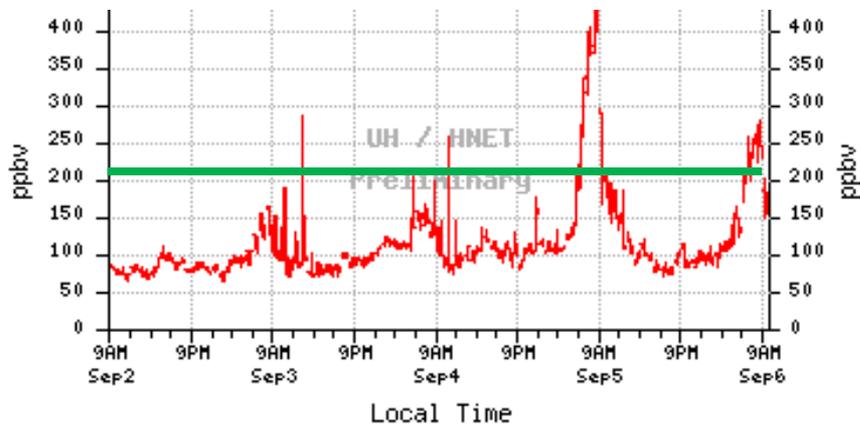


Moody Tower

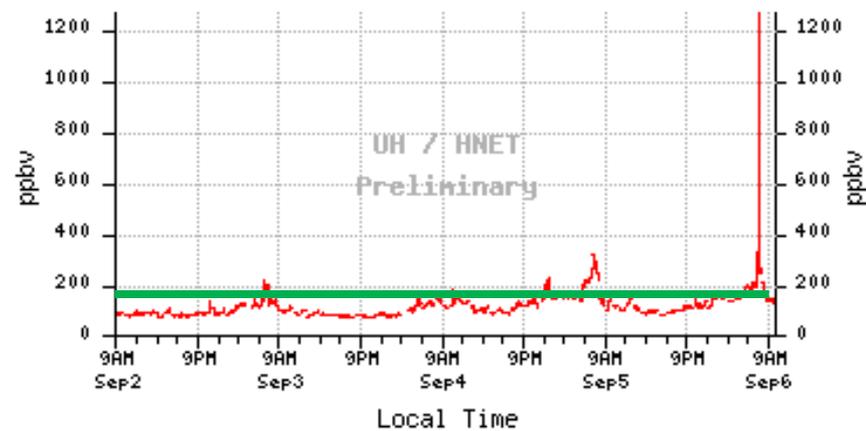


**Houston – Network of
Environmental Towers
(H-NET)**

Sugar Land

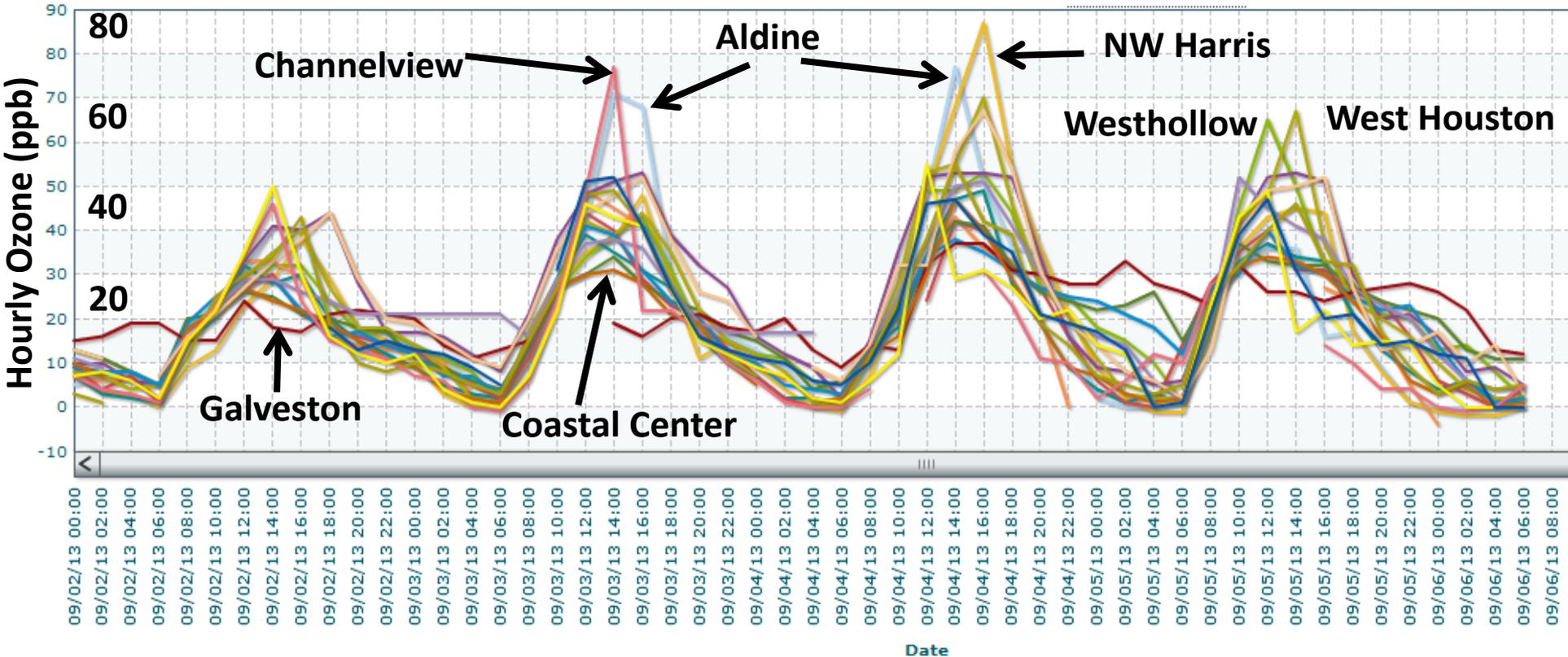


Coastal Center



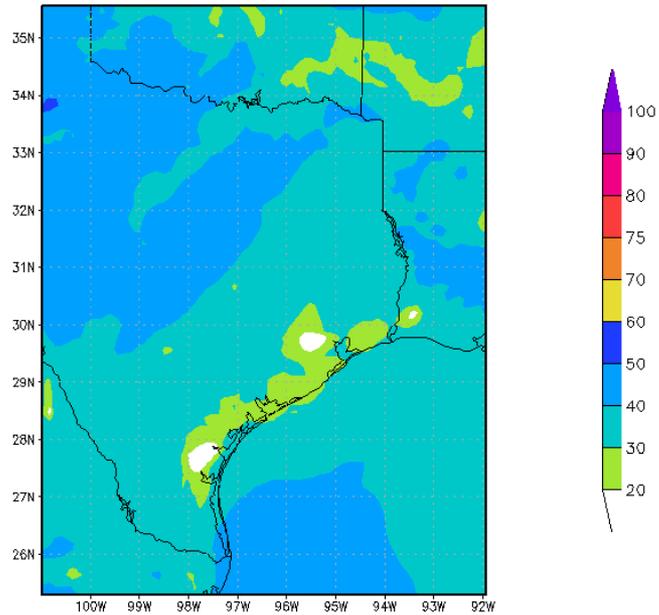
Hourly Ozone (airnowtech.org)

Monday – Friday morning (6 am)



- | Date | |
|---|---|
| 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) |

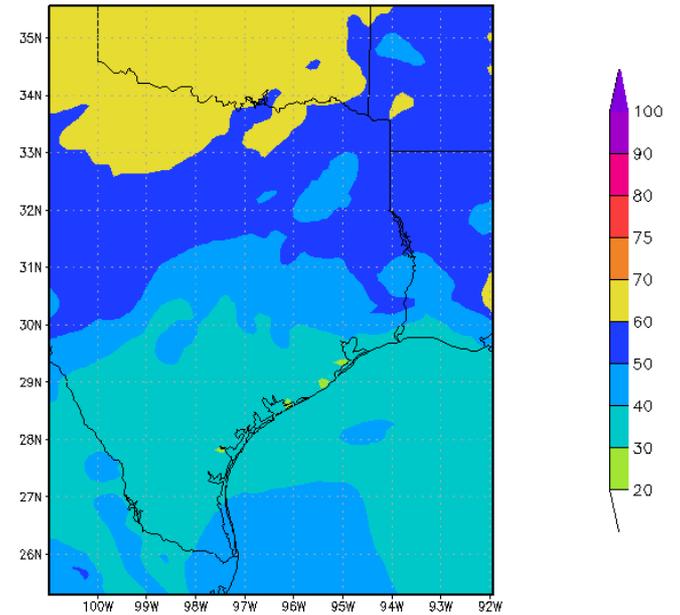
O3 [ppb] at 1013 [hPa] Valid 14Z SEP 07 2013



GRADS: COLA/IGES

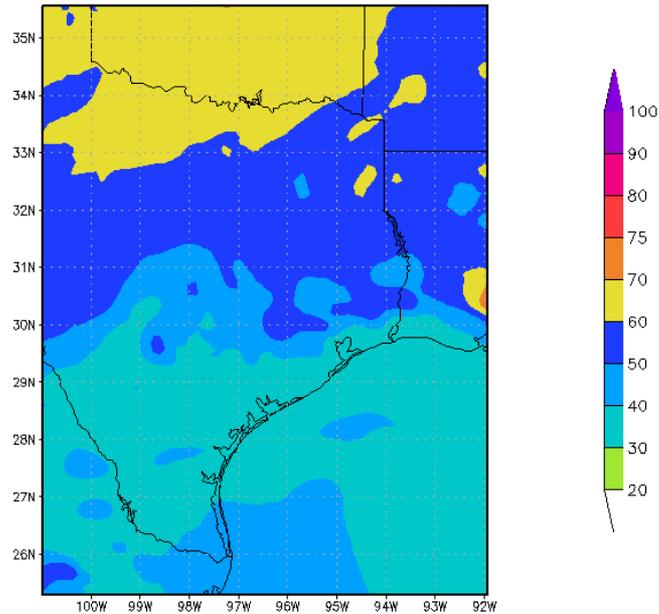
O3 [ppb] at 1013 [hPa] Valid 17Z SEP 07 2013

**NOAA/ARL
Experim.
CMAQ**



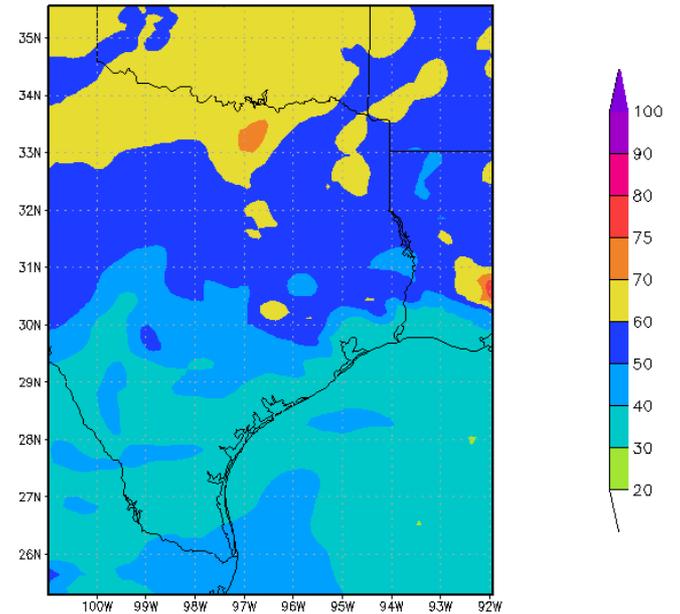
GRADS: COLA/IGES

O3 [ppb] at 1013 [hPa] Valid 19Z SEP 07 2013



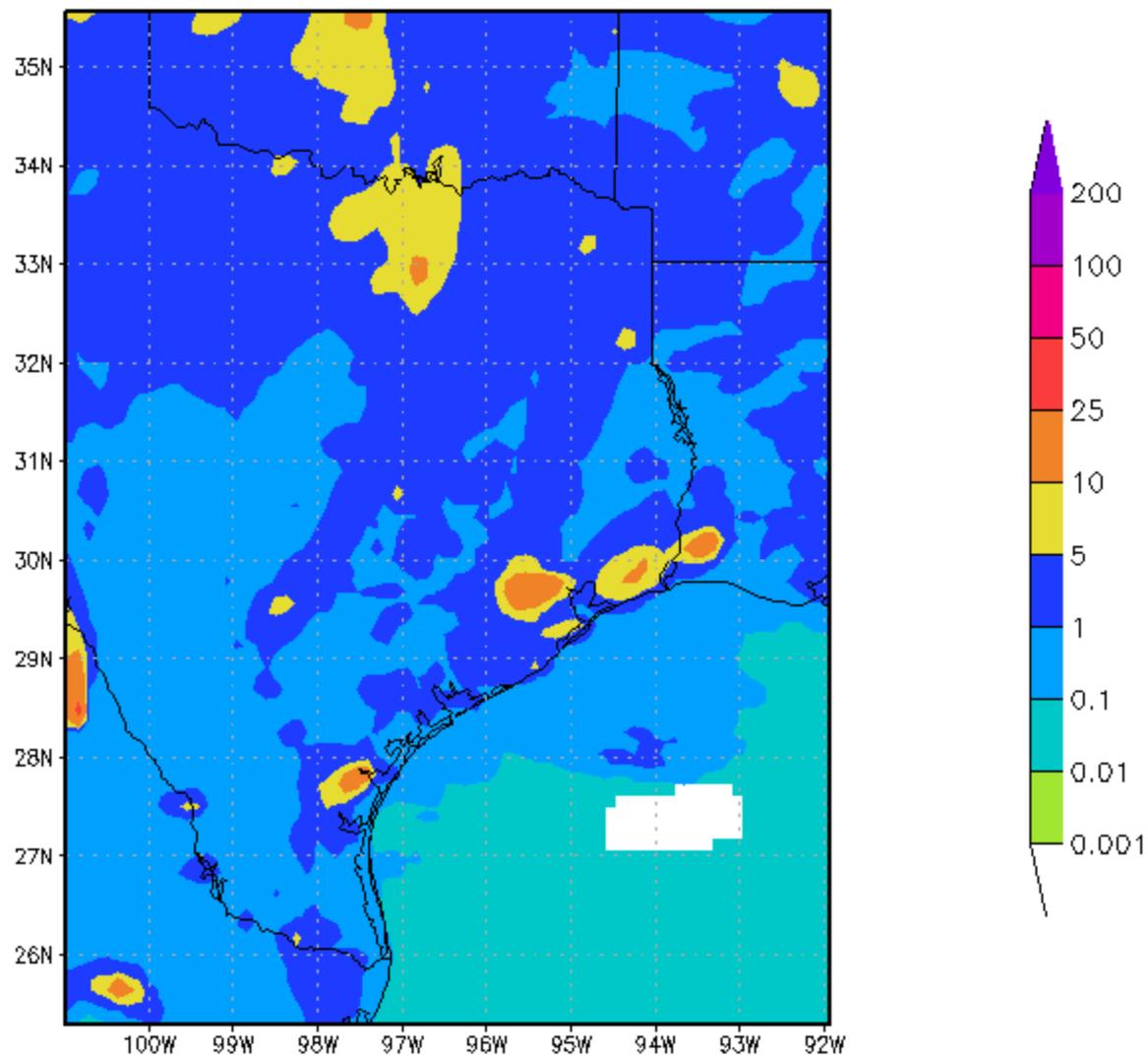
GRADS: COLA/IGES

O3 [ppb] at 1013 [hPa] Valid 22Z SEP 07 2013

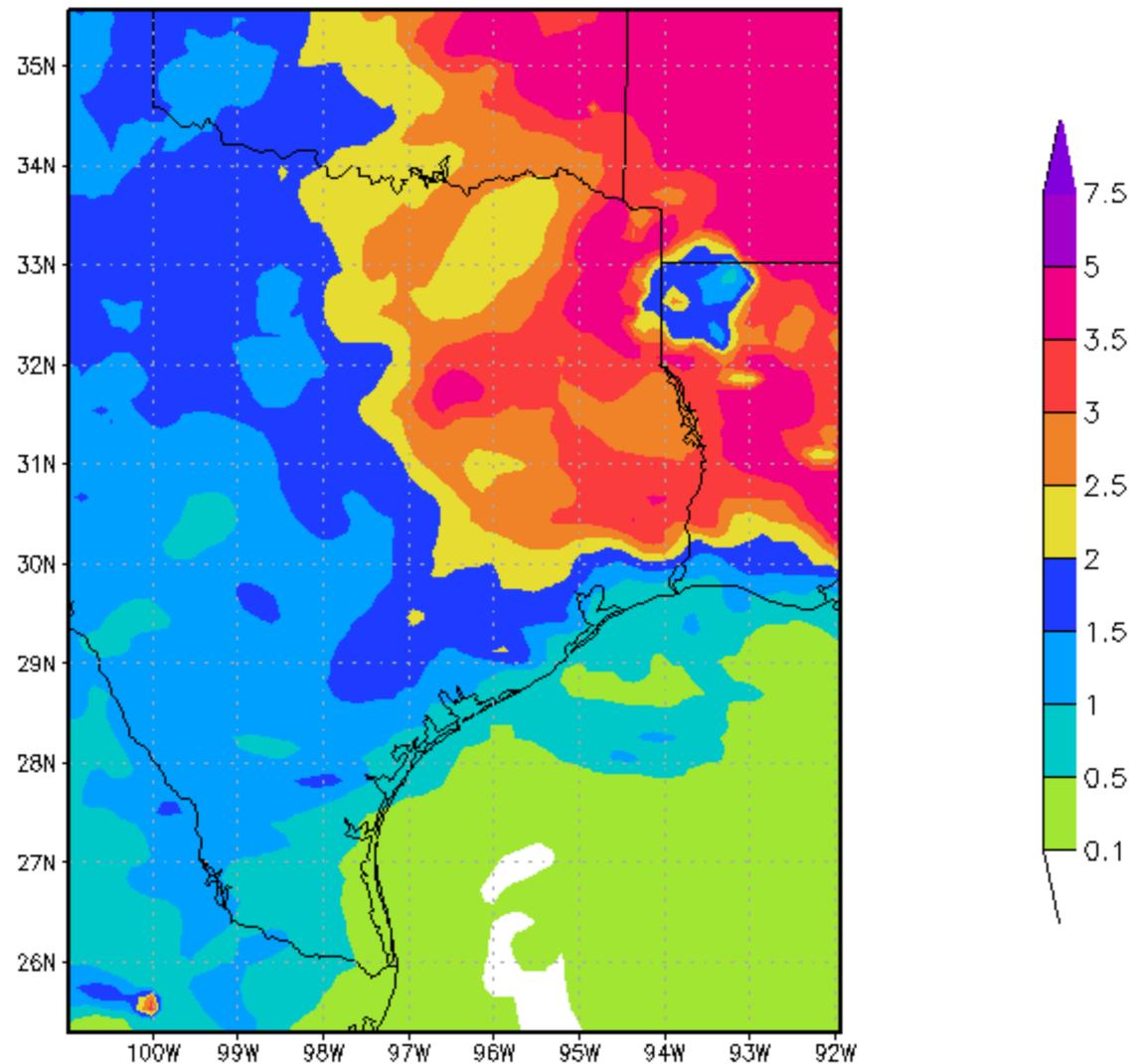


GRADS: COLA/IGES

NO2 [ppb] at 1013 [hPa] Valid 14Z SEP 07 2013



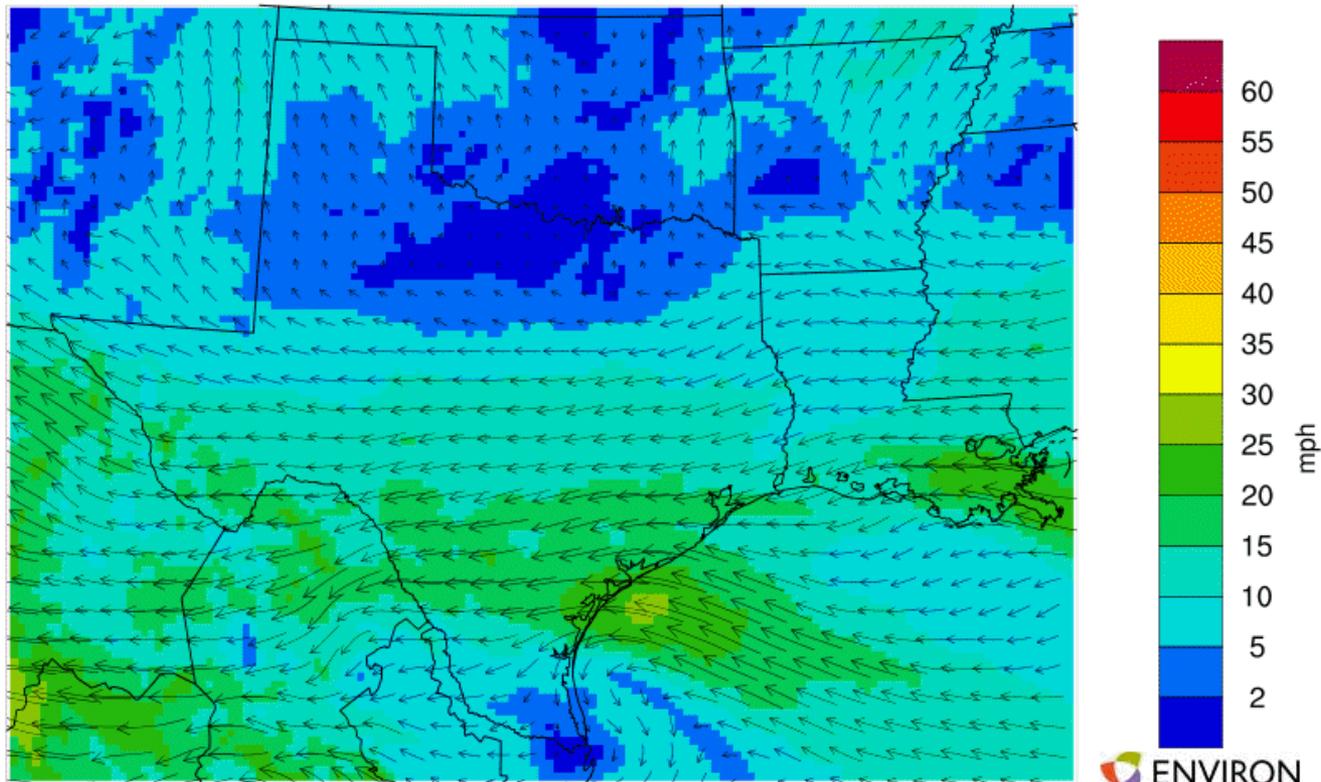
FORM [ppb] at 1013 [hPa] Valid 22Z SEP 07 2013



* *TCEQ: WRF Model suggests winds even a bit stronger, diluting Houston emissions to produce an even weaker plume extending towards the WSW*

CAMx Layer 14 Winds

Texas 12km



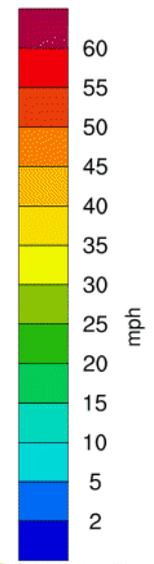
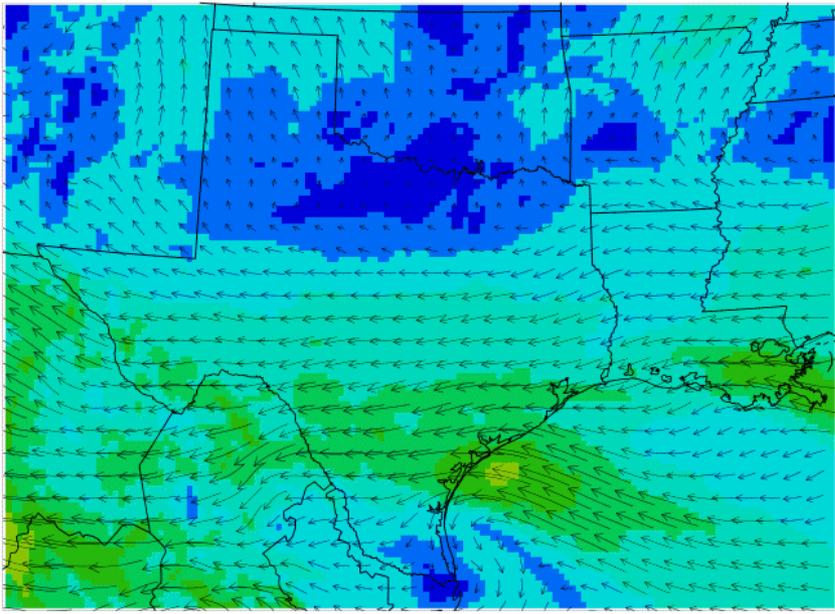
Min(13,95) = 0.1, Max(2,15) = 29.8

Sat September 7 06:00 CST

10
→
mph

CAMx Layer 14 Winds

Texas 12km



Min(13,95) = 0.1, Max(2,15) = 29.8
Sat September 7 06:00 CST

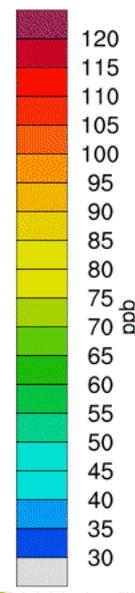
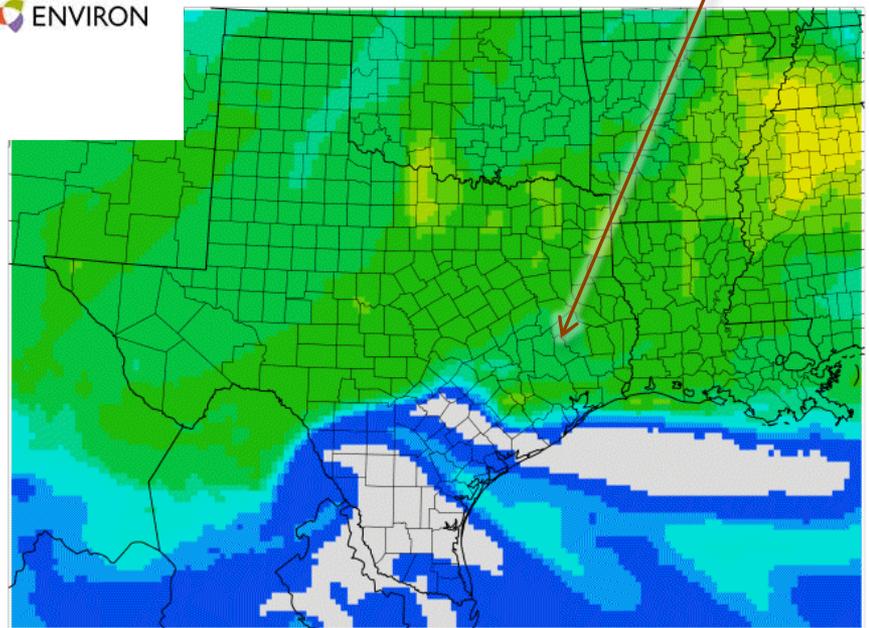


ENVIRON

Novel: inflow ozone from ENE ~ Houston's own production at 3-5 CDT

Ozone

Best Case: CAMx Layer 14



Min(55,4) = 25.2, Max(139,83) = 81.6

Sat September 7 06:00 CST

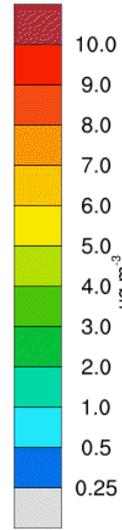
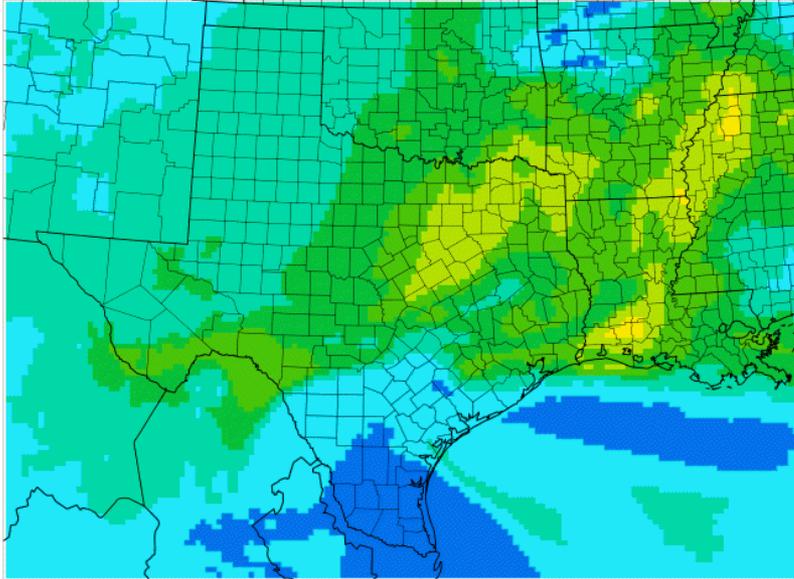
ENVIRON

** TCEQ: WRF Model suggests low ozone production in diluted plume*

** TCEQ: WRF Model suggests strong winds dilute Houston plume greatly on Saturday*

Formaldehyde

Best Case: CAMx Layer 14



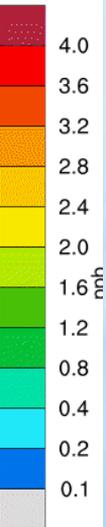
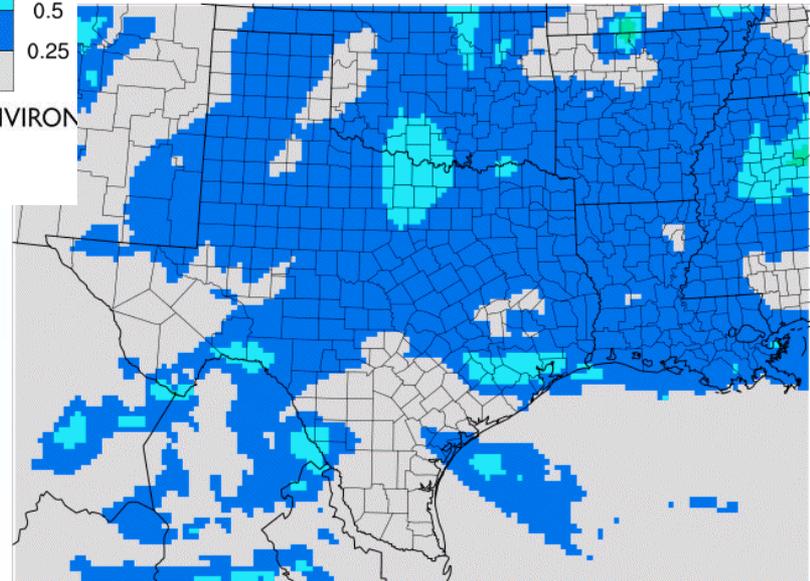
Min(109,98) = 0.3, Max(136,87) = 5.2

Sat September 7 06:00 CST



NO₂

Best Case: CAMx Layer 14



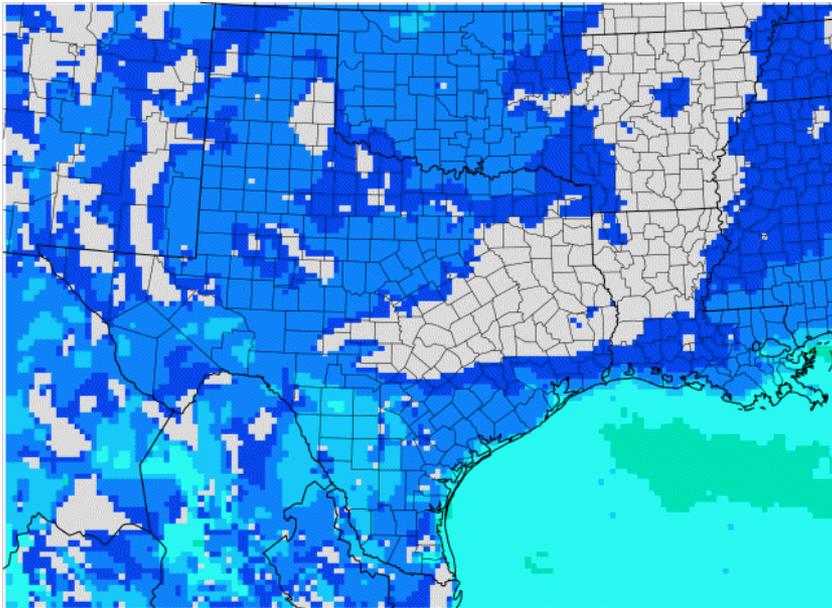
Min(116,28) = 0.0, Max(148,82) = 0.6

Sat September 7 06:00 CST



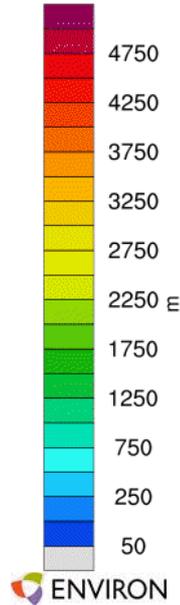
PBL Height

Texas 12km



Min(20,108) = 15.6, Max(148,47) = 945.2

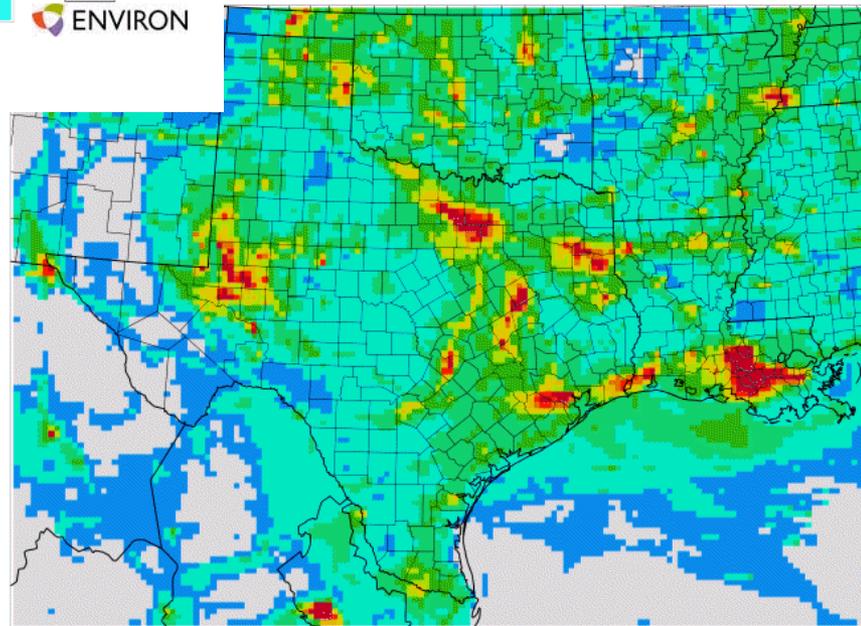
Sat September 7 06:00 CST



Somewhat lower PBL heights

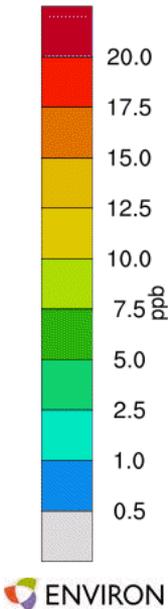
NOx

Best Case



Min(117,2) = 0.1, Max(55,4) = 98.7

Sat September 7 06:00 CST



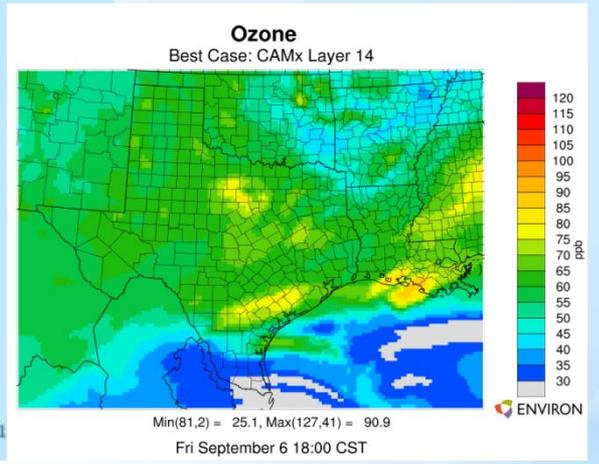
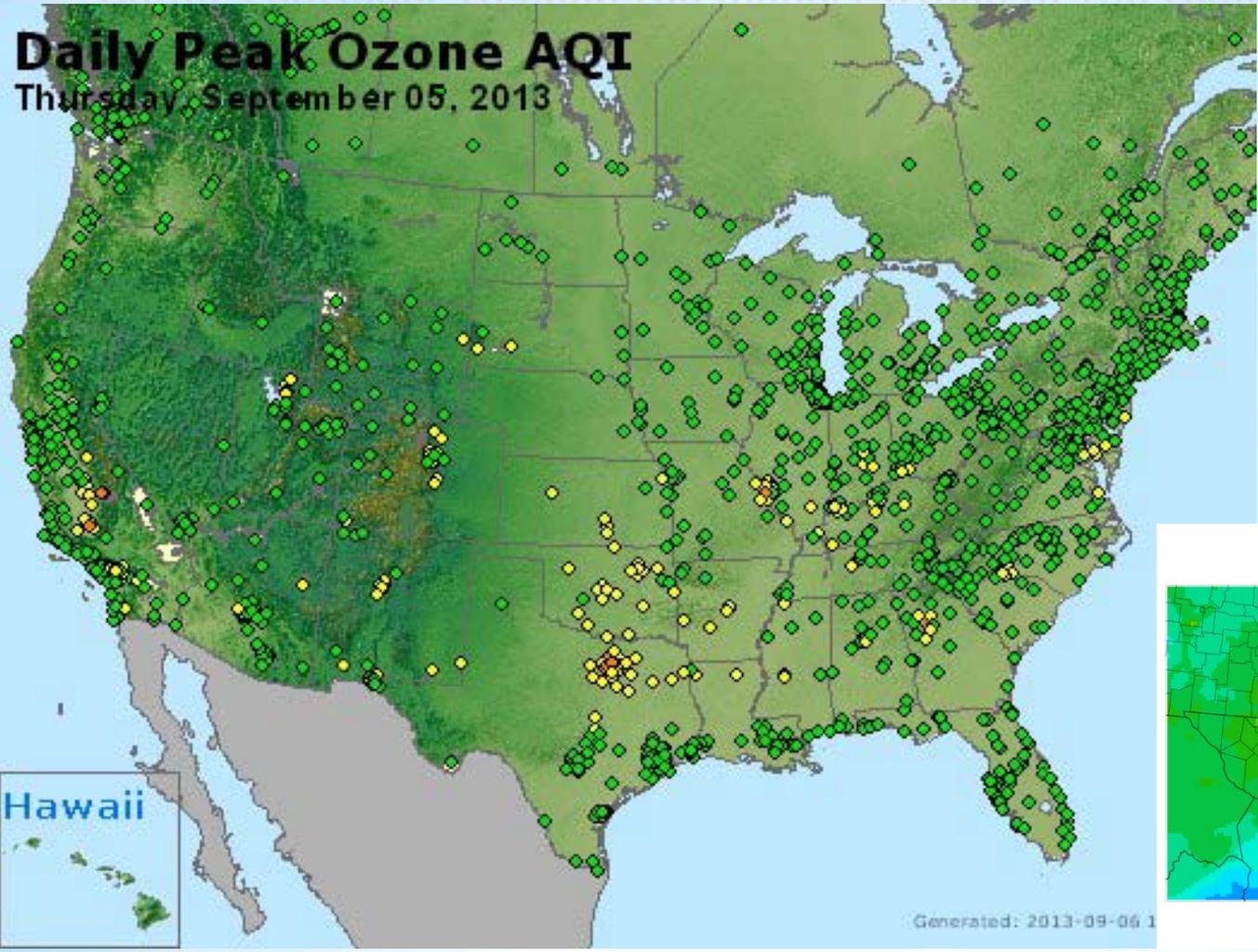
Surface Forecast emphasizes traffic NOx

Environ model inventory stresses rush-hour contribution to NOx ...but do midday concentrations bear this out??

Dallas continues to have the highest ozone of the region

Daily Peak Ozone AQI

Thursday, September 05, 2013



Good

Moderate

USG

Unhealthy

Very Unhealthy

Hazardous

! Action Day

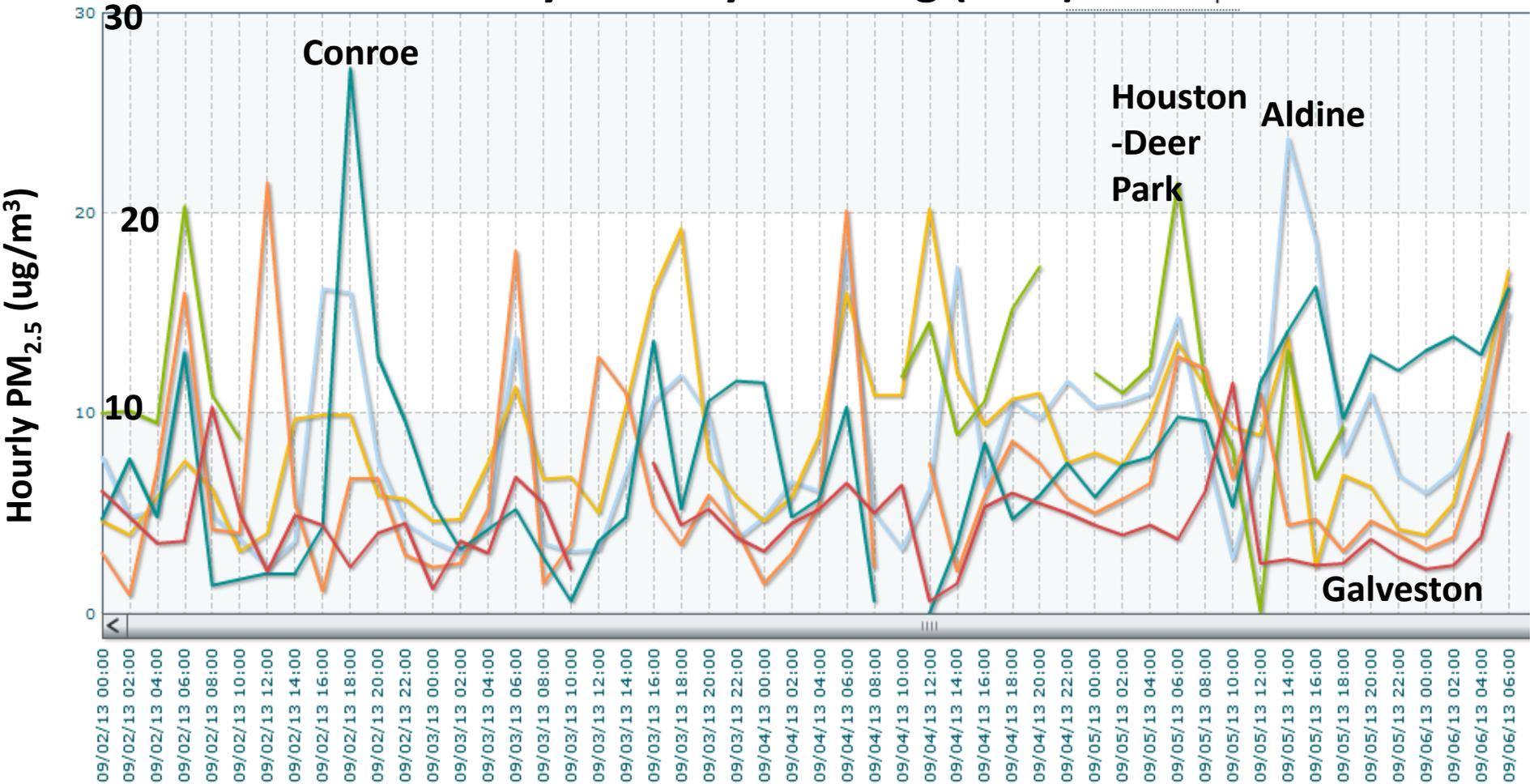


Moderate ozone (Code Yellow) expected Fri., Sat., Sun., Mon., Tues.

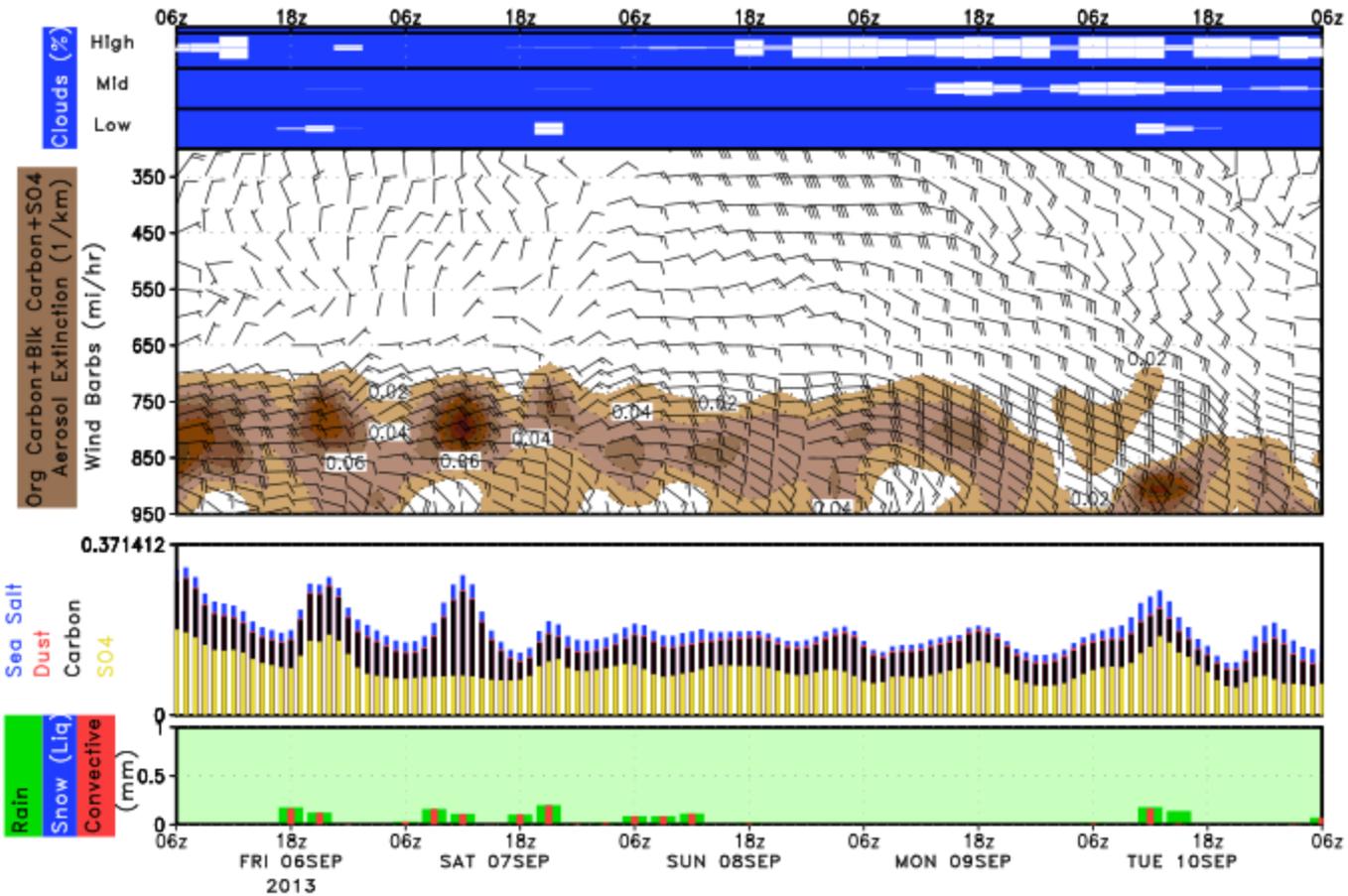
Peak ozone will be generally on the NW side of Houston (may vary from W to N day to day)

Hourly PM_{2.5} (airnowtech.org)

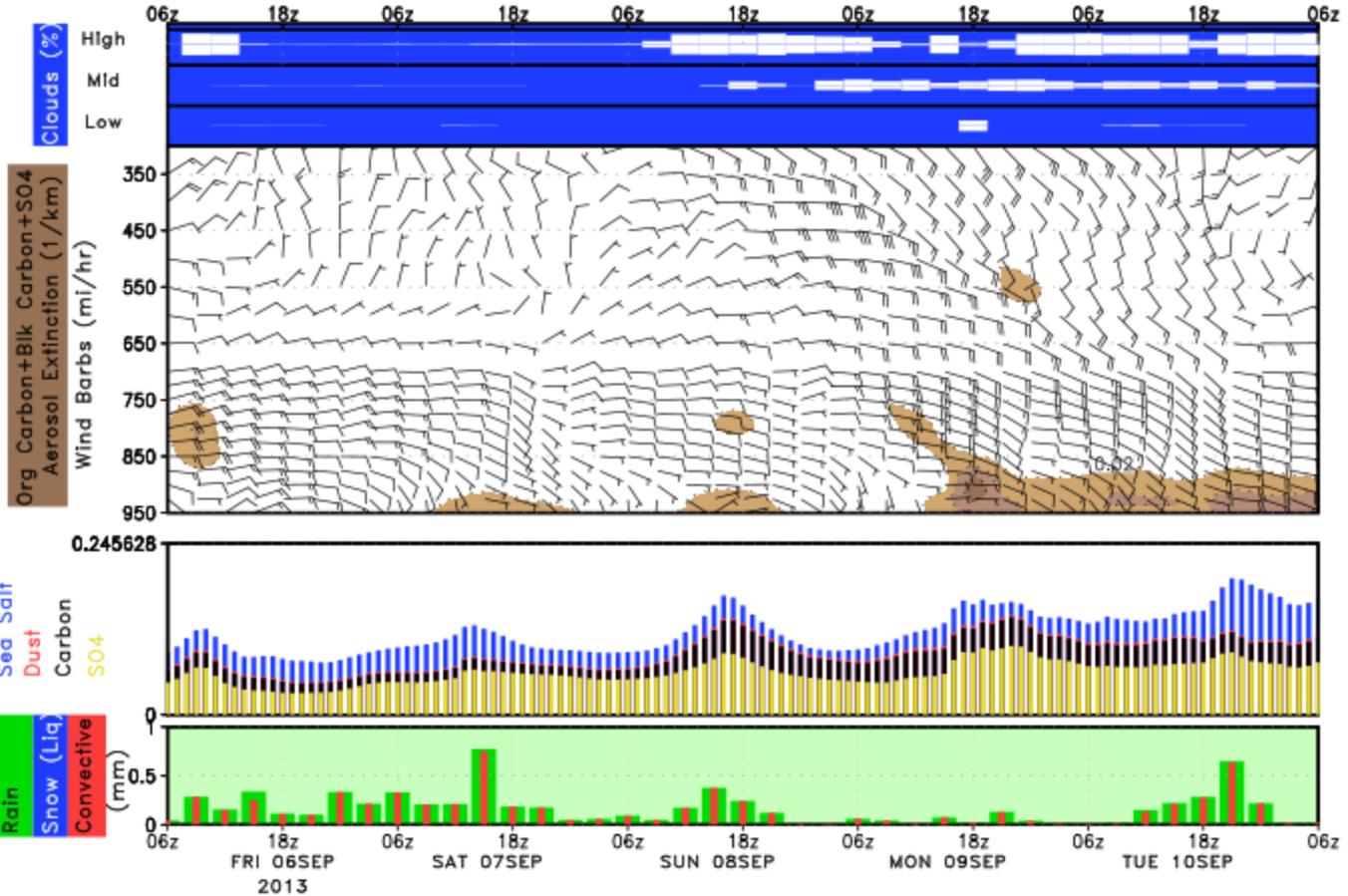
Monday – Friday morning (6am)



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



LAT = 30.3 , LON = -95.4, Location = Conroe, Fcst_init = 20130906



LAT = 29.2 , LON = -94.8, Location = Galveston, Fcst_init = 20130906