

DISCOVER-AQ Outlook - September 7, 2013

Thunderstorm activity is widespread today, moving inland from the coast during the morning and becoming extensive over the northern suburbs of Houston by early afternoon. Well-defined easterly flow was evident at the surface. Winds turned southeasterly by 2 PM at some locations.

On Sunday the surface high moves to the east and scattered thunderstorms again will develop offshore in the early AM and move inland throughout the day. Easterly winds near the surface will persist and perhaps be stronger than today. This will tend to dilute the Houston emissions and not allow extensive ozone buildup during the day. The low-level ozone plume (what there is) will be advected primarily to the west. Transport from Louisiana will take place above the surface layer during the day and will pass over Houston by late afternoon and into the evening.

Monday we again expect scattered thunderstorms, but perhaps not as extensive as today. Surface winds will turn to the southeast. Looking farther ahead, there is increased chance of more extensive cloudiness on Tuesday in response to the strong easterly wave approaching the Texas and Mexican coast. However, drying is expected by the middle to latter part of next week. Cloud conditions may be better off the Louisiana coast than in Houston on Tuesday, perhaps allowing a King Air flight in collaboration with the GEO-CAPE ship.

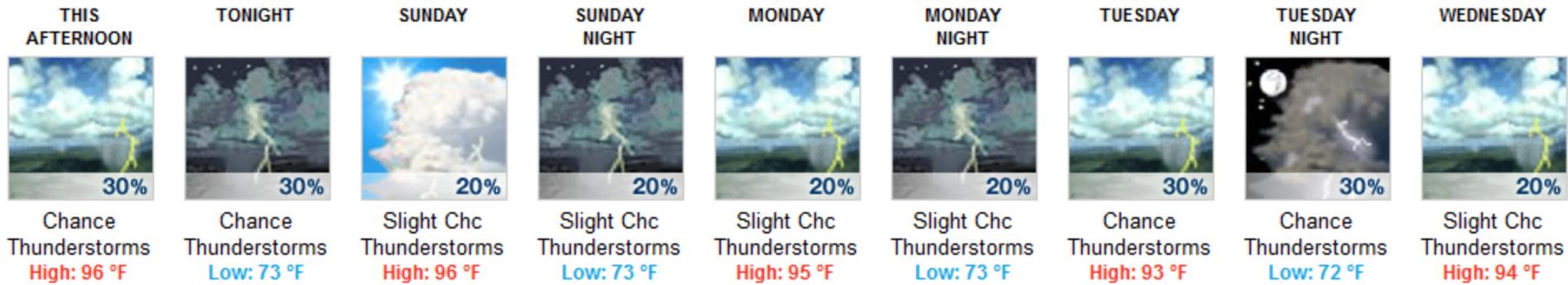
9/7/2013 Weather Briefing

Chris Loughner

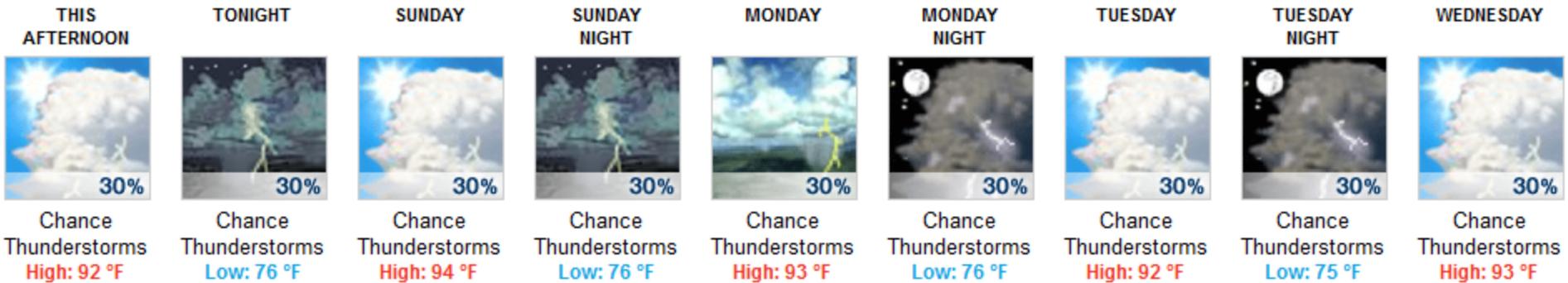
Ken Pickering

Bob Chatfield

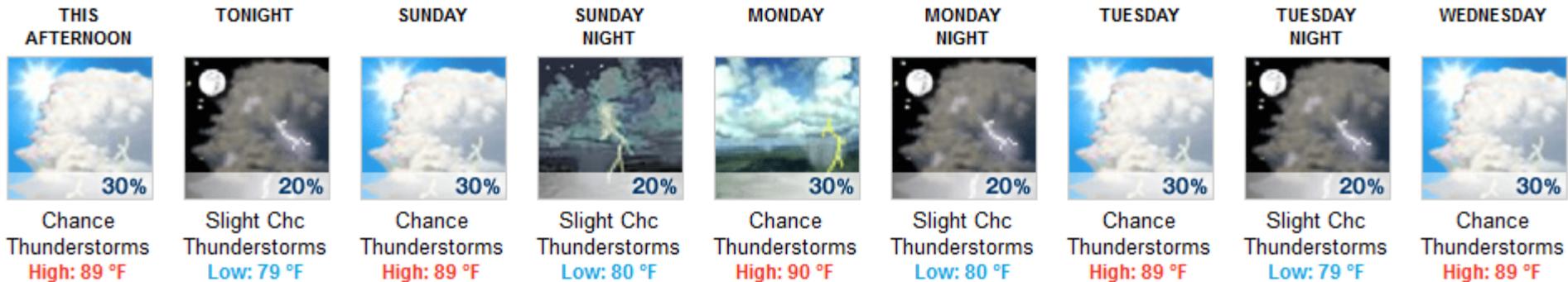
Conroe:



Houston Hobby:



Galveston:



Current Conditions

Conroe:



A Few Clouds
90°F
 32°C

Humidity 54%
 Wind Speed E 6 mph
 Barometer 30.04 in (1016.8 mb)
 Dewpoint 71°F (22°C)
 Visibility 10.00 mi
 Heat Index 96°F (36°C)
 Last Update on 7 Sep 11:53 am CDT

Houston Hobby:

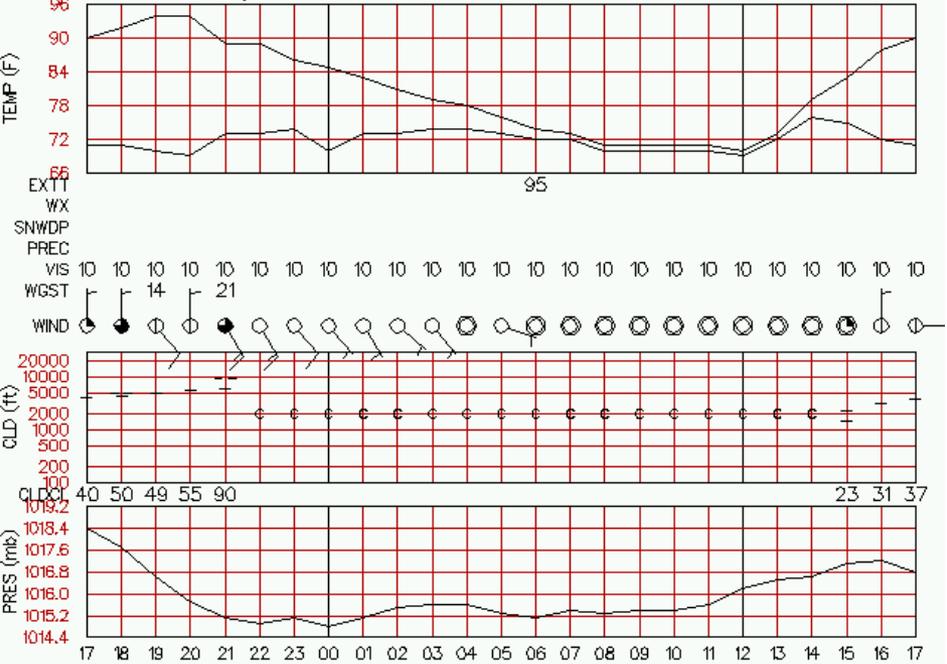


Mostly Cloudy
87°F
 31°C

Humidity 63%
 Wind Speed E 7 mph
 Barometer 30.03 in (1017.3 mb)
 Dewpoint 73°F (23°C)
 Visibility 10.00 mi
 Heat Index 94°F (34°C)
 Last Update on 7 Sep 11:53 am CDT

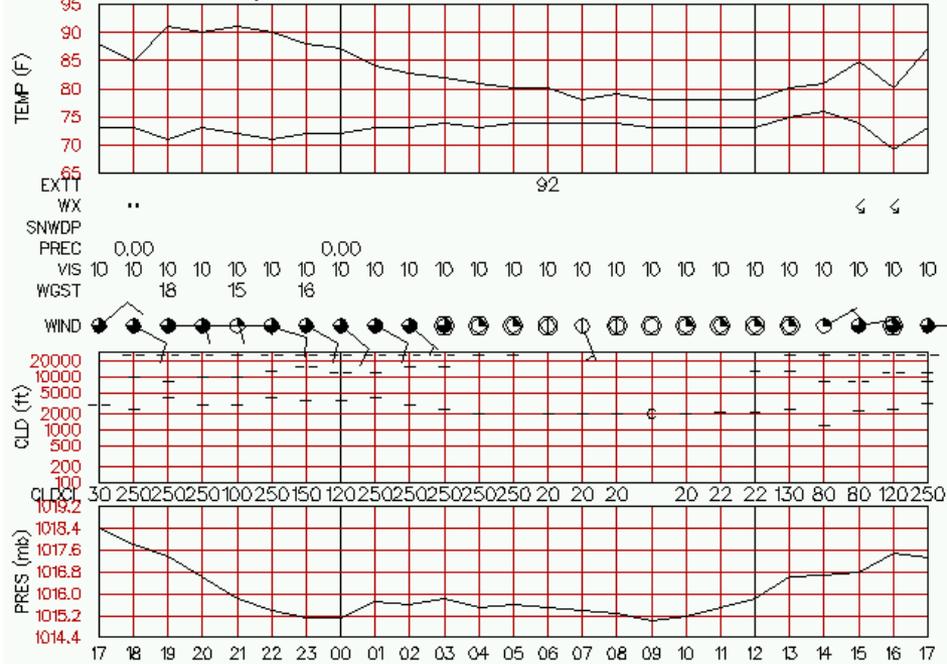
▼ Plymouth State Weather Center ▼

Meteogram for KCXO from 1700Z 6 SEP 13 to 1700Z 7 SEP 13



▼ Plymouth State Weather Center ▼

Meteogram for KHOU from 1700Z 6 SEP 13 to 1700Z 7 SEP 13



Current Conditions

Galveston:

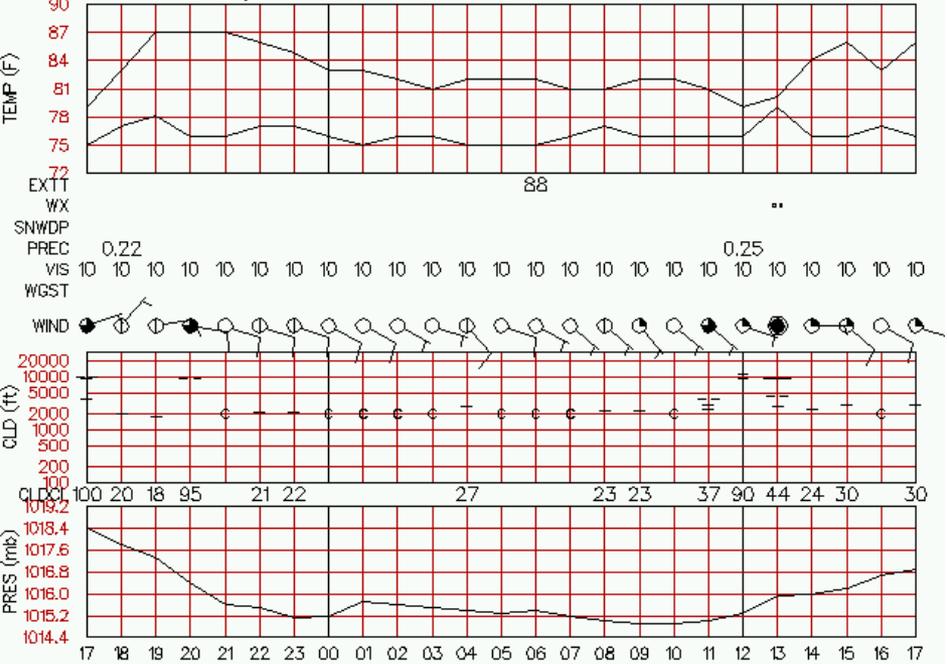


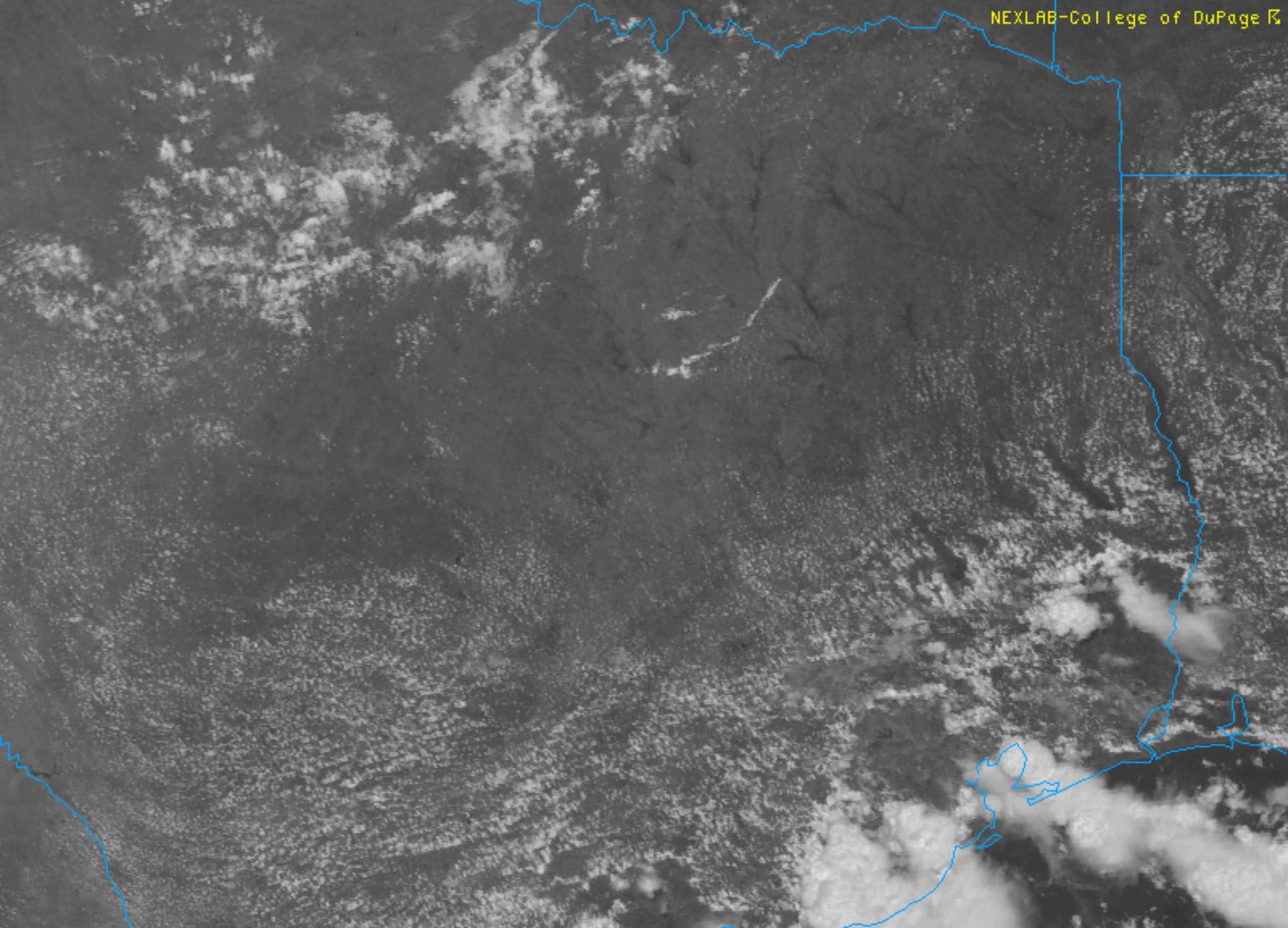
Partly Cloudy
86°F
30°C

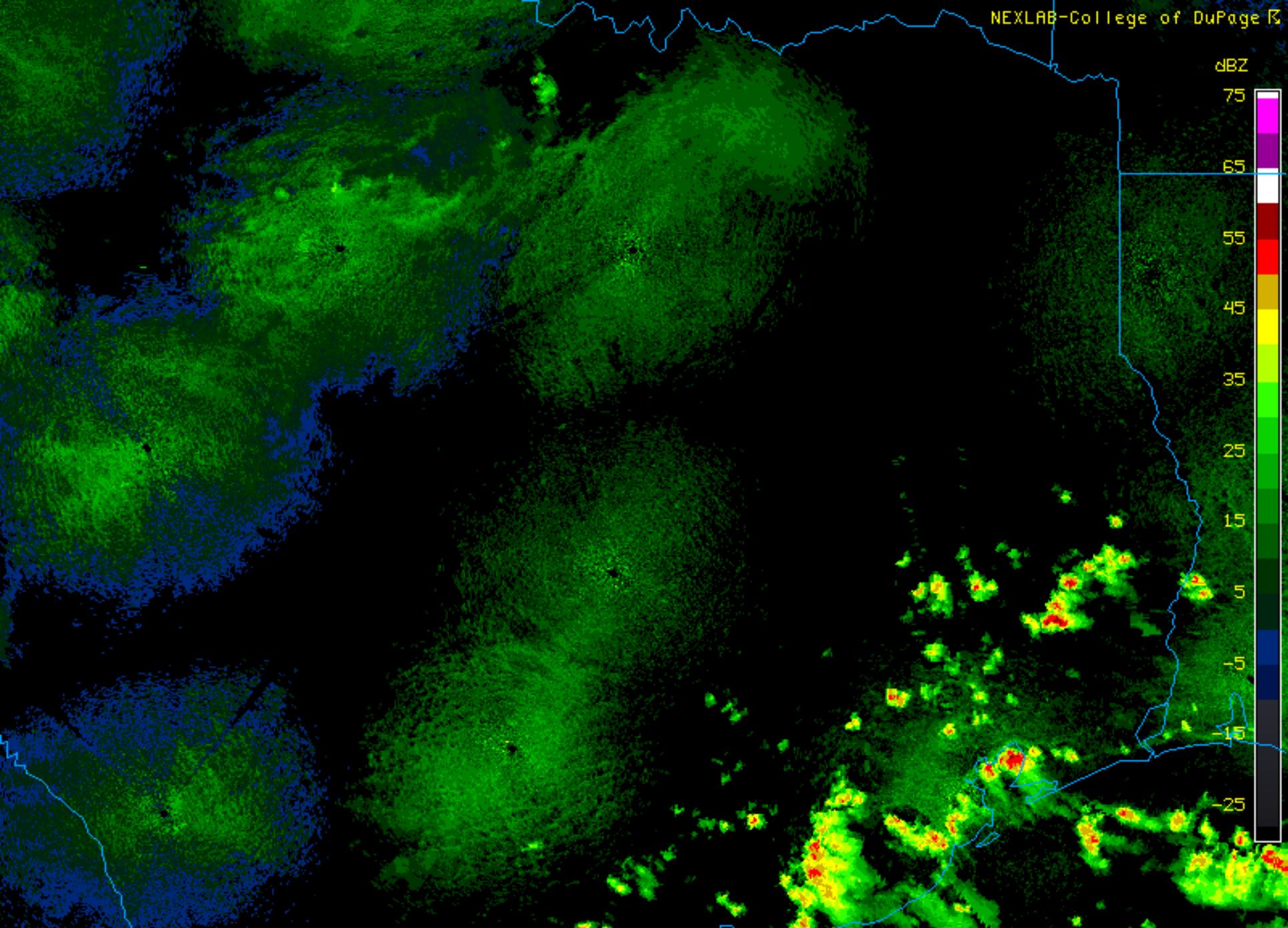
Humidity 72%
Wind Speed E 8 mph
Barometer 30.03 in (1016.9 mb)
Dewpoint 76°F (24°C)
Visibility 10.00 mi
Heat Index 96°F (36°C)
Last Update on 7 Sep 11:52 am CDT

▼ Plymouth State Weather Center ▼

Meteogram for KGLS from 1700Z 6 SEP 13 to 1700Z 7 SEP 13

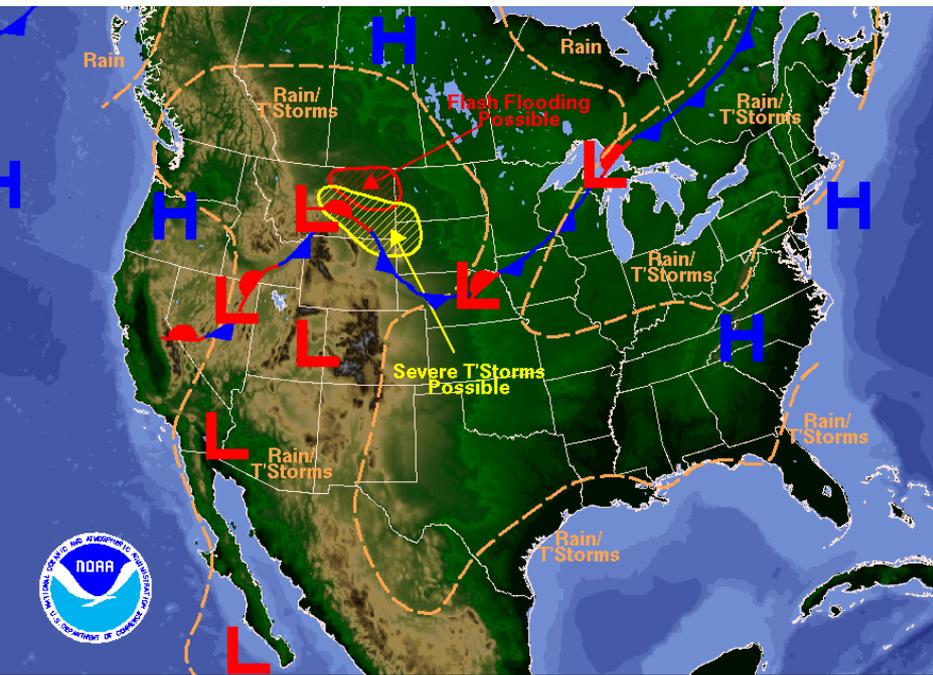




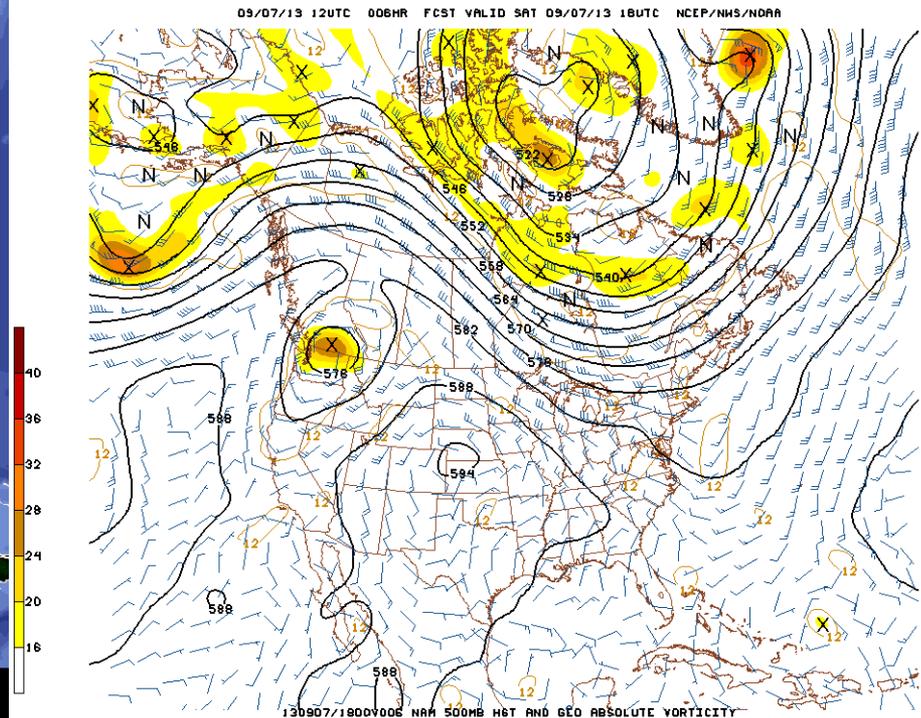


Today: Scattered thunderstorms. Shortwave trough entering east Texas. Easterly winds changing to southeasterly as sea breeze develops.

1 PM CDT
500 mb vorticity



Weather Forecast for Sat, Sep 07, 2013, issued 4:35 AM EDT
DOC/NOAA/NWS/NCEP/Weather Prediction Center
Prepared by Fanning based on WPC, SPC and NHC forecasts



1309071800V006 NAW 500MB HGT AND GEO ABSOLUTE VORTICITY

10 m winds at 1 PM today

WRF 3-KM

Fcst: 12 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

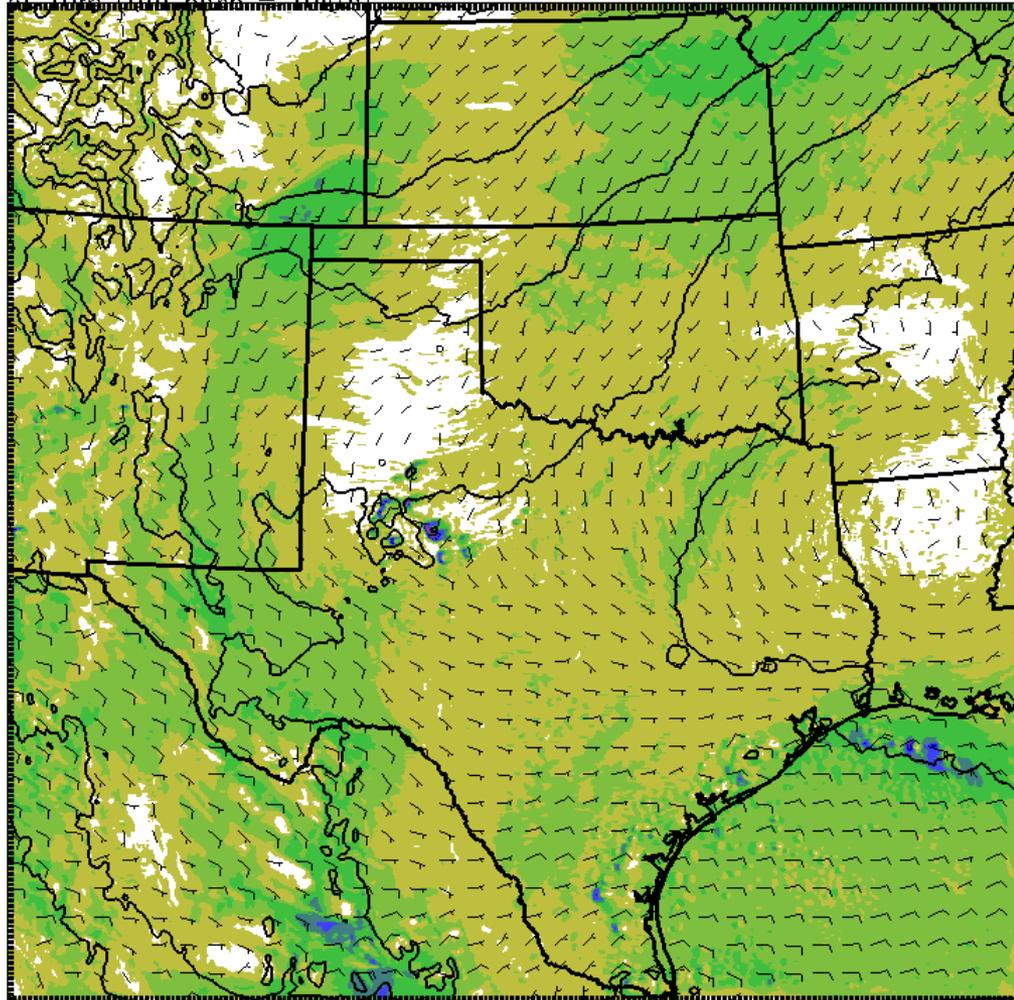
Wind at 10m (full hour = 1010)

Init: 06 UTC Sat 07 Sep 13

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

100 W

90 W



30 N

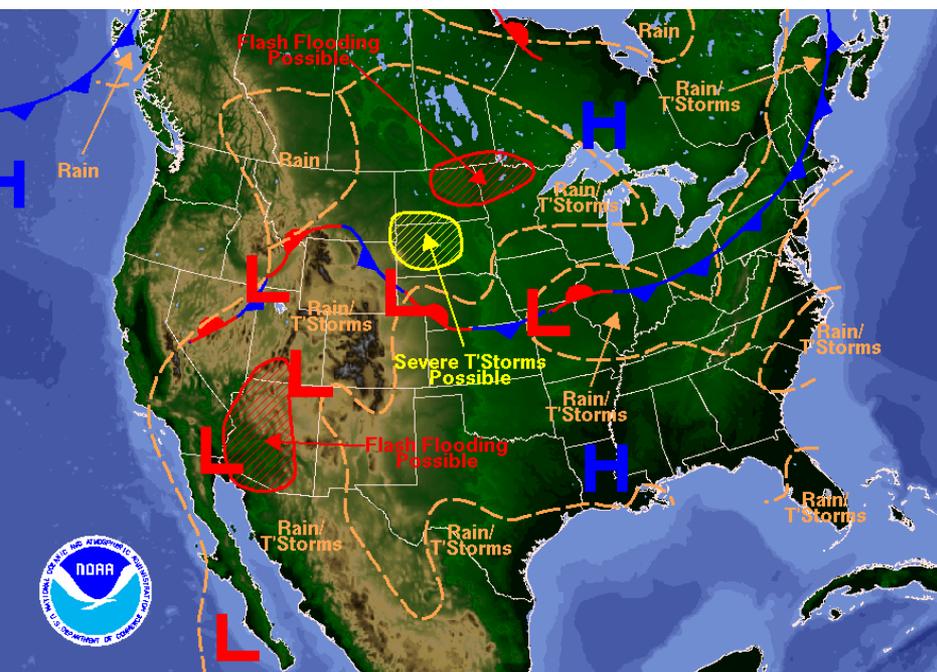
CONTOURS: UNITS=hPa LOW= 1008.0 HIGH= 1016.0 INTERVAL= 2.0000



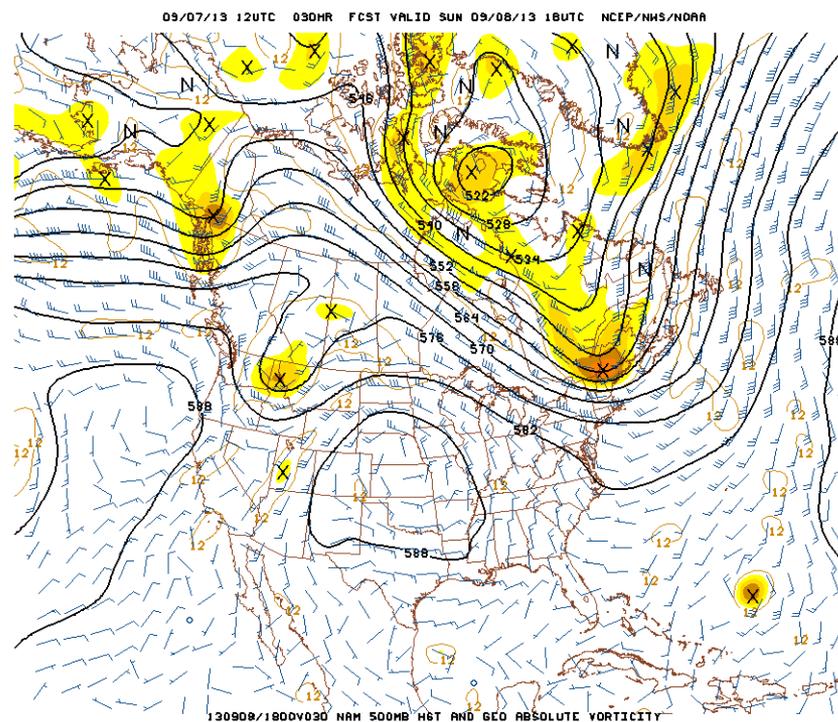
Model Info: V3.3 No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec
LW: RRTM SW: Dudhia DIFF: simple KM: ED Smagor

Tomorrow: Scattered thunderstorms. Surface high pressure moves east of Texas. Easterly winds changing to southeasterly as sea breeze develops.

1 PM CDT
500 mb vorticity



Weather Forecast for Sun, Sep 08, 2013, issued 4:37 AM EDT Sat, Sep 07, 2013
DOC/NOAA/NWS/NCEP/Weather Prediction Center
Prepared by Fanning based on WPC, SPC and NHC forecasts



120908/1800V030 NH 500MB HGT AND GEO ABSOLUTE VORTICITY

10 m winds at 1 PM tomorrow

WRF 3-KM

Fcst: 36 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

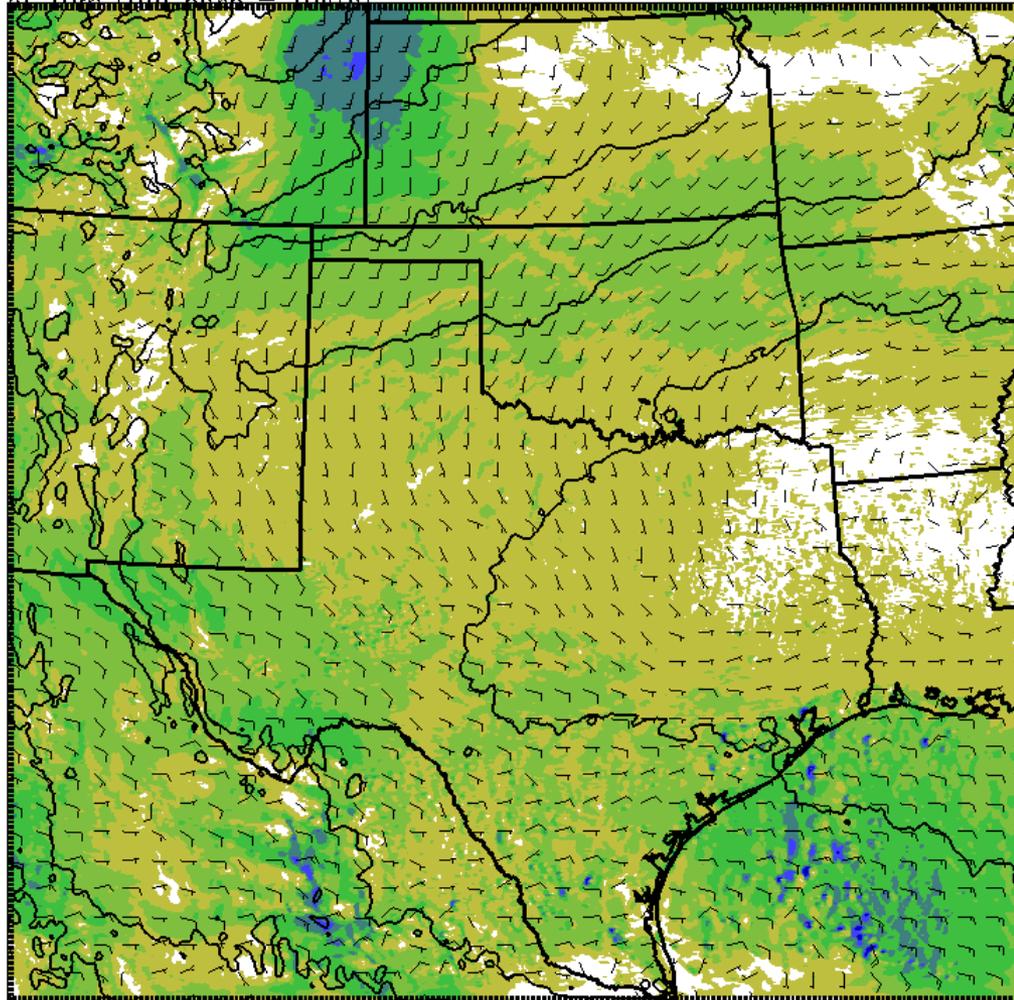
Wind at 10m (full hour @ 10m)

Init: 06 UTC Sat 07 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= 1004.0 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

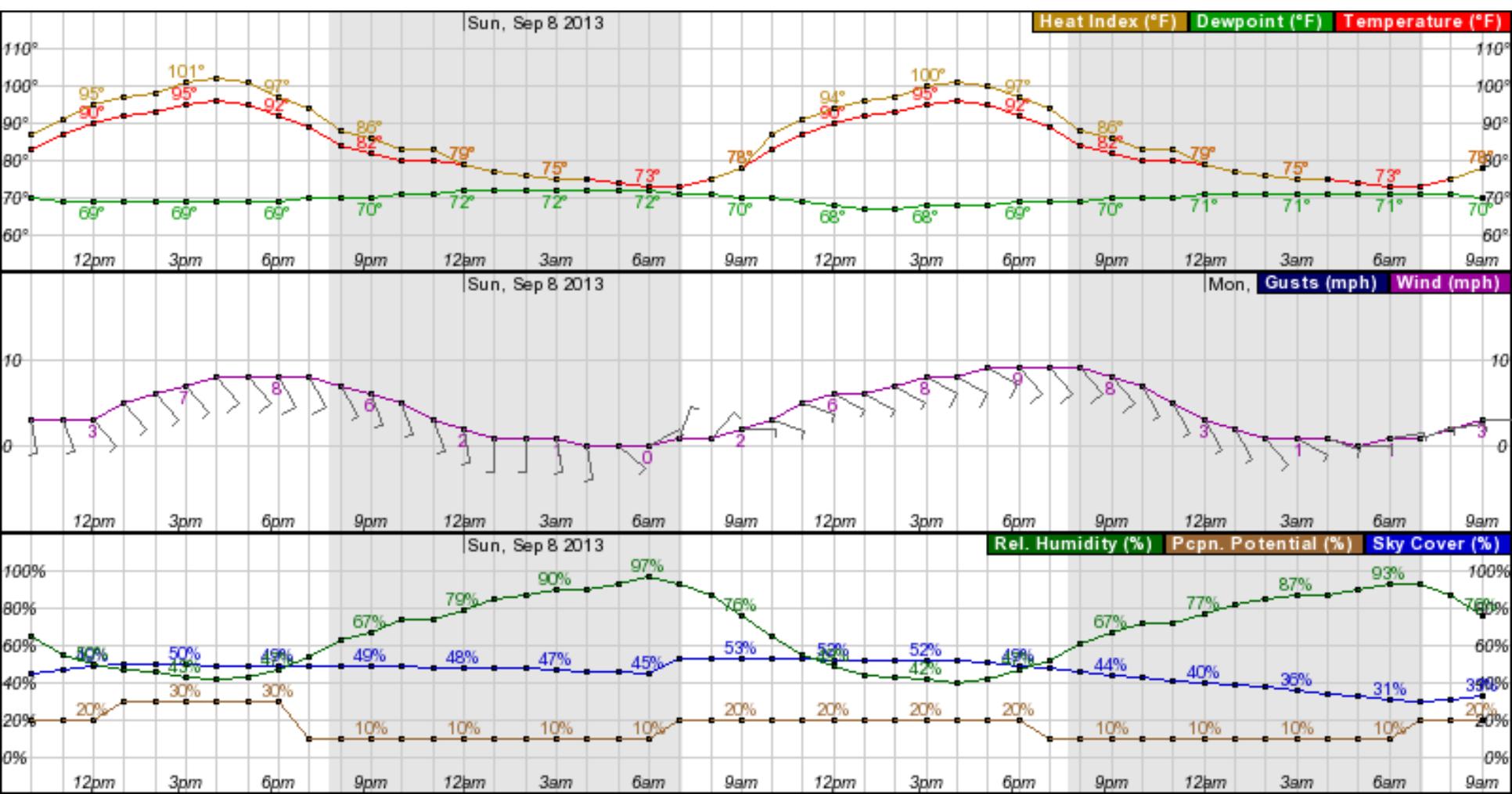
Conroe

Today: Cloud cover around 50%

Tomorrow: Cloud cover around 50%

Today →

Tomorrow →



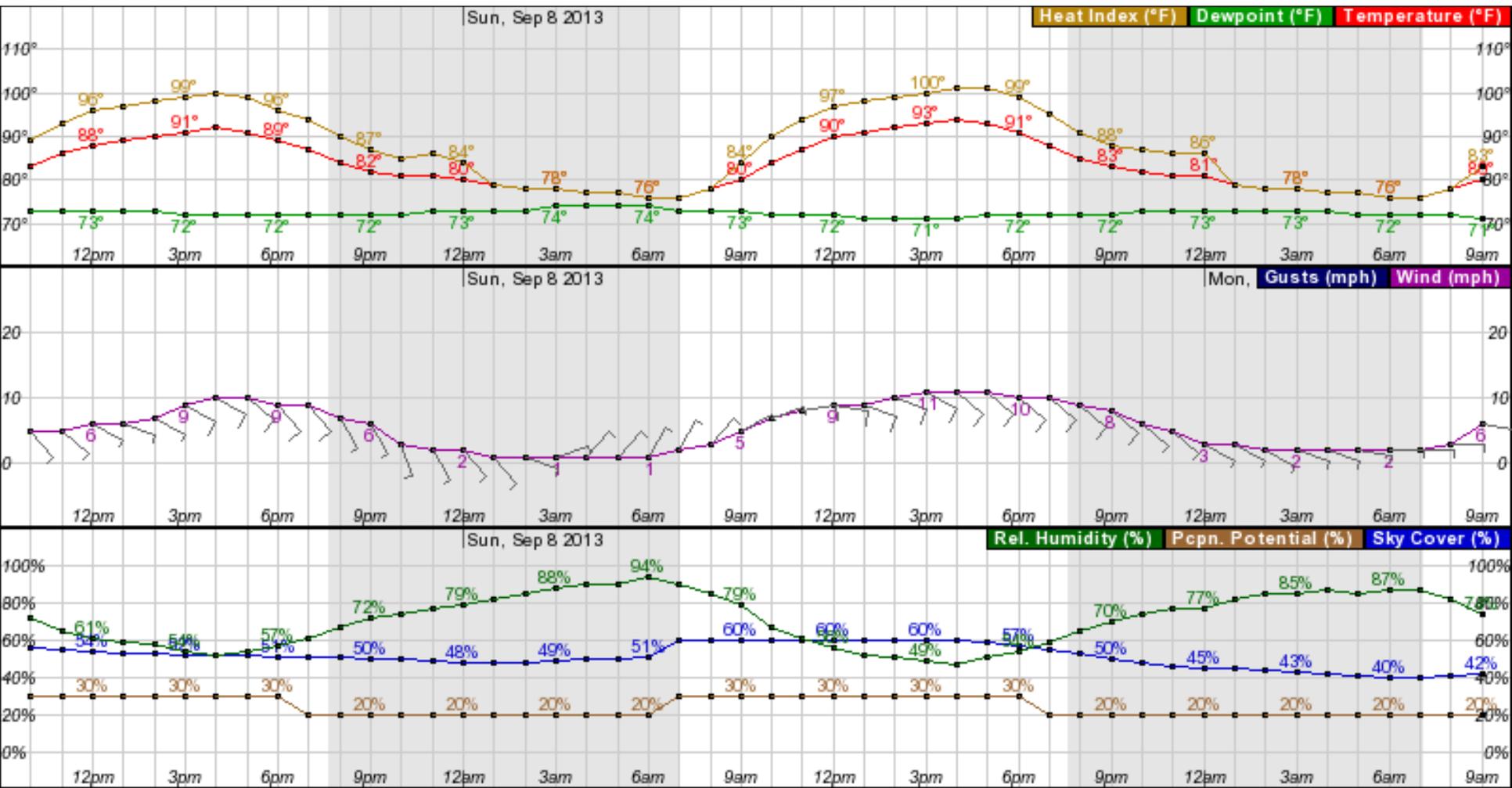
Houston Hobby

Today: Cloud cover around 50%

Tomorrow: Mostly cloudy

Today →

Tomorrow →



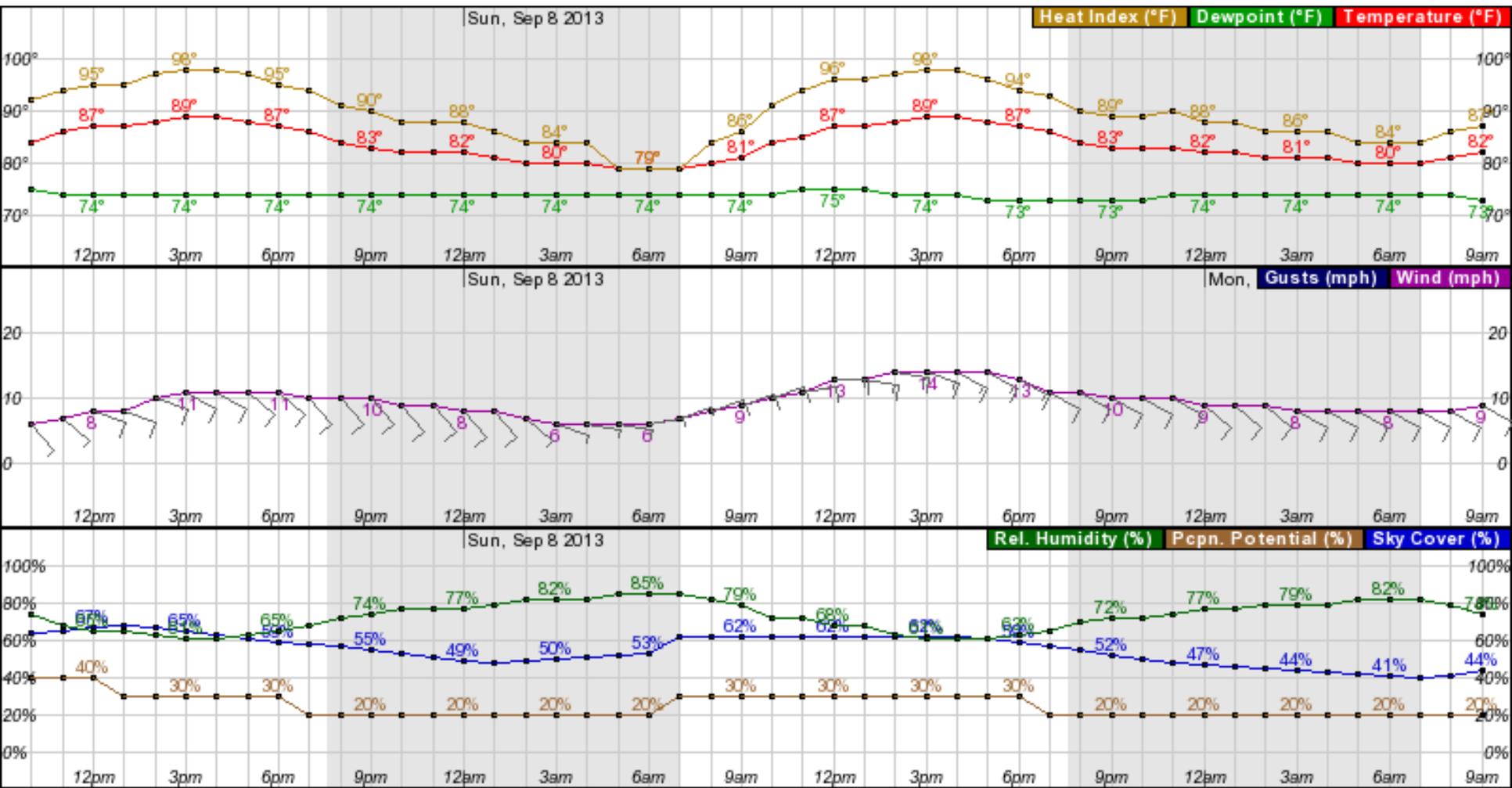
Galveston

Today: Mostly cloudy

Tomorrow: Mostly cloudy

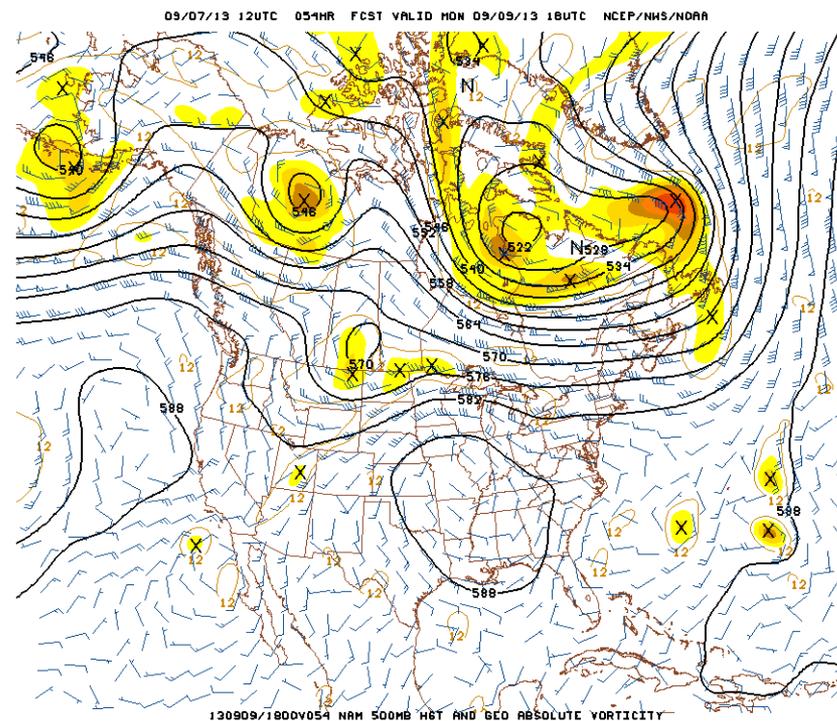
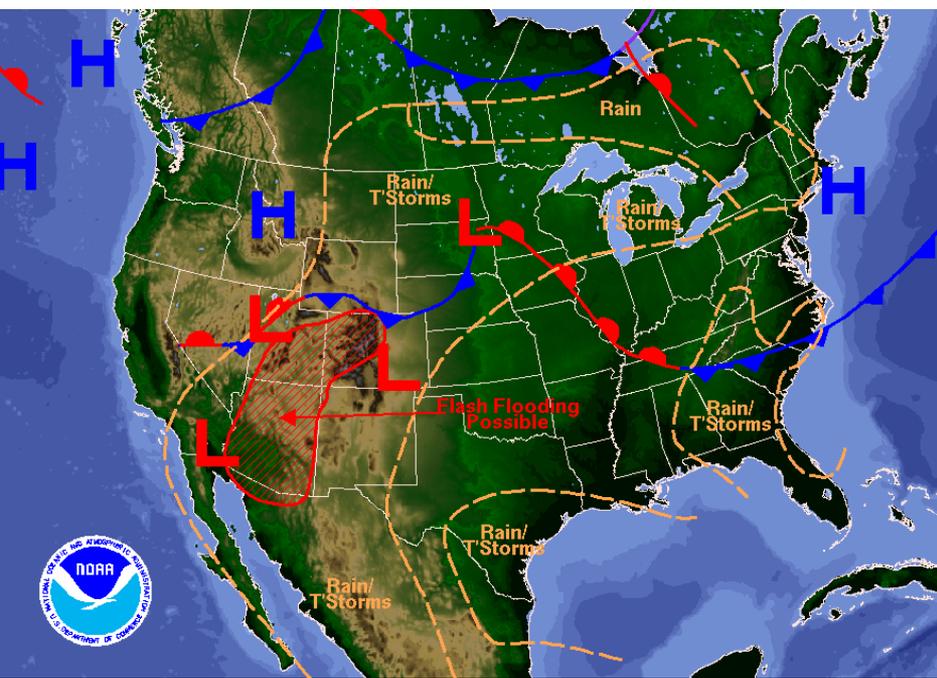
Today →

Tomorrow →



Monday: Scattered thunderstorms. Upper level high pressure moves east of Texas. Easterly winds changing to southeasterly as sea breeze develops.

1 PM CDT
500 mb vorticity



10 m winds at 1 PM Monday

WRF 3-KM

Fcst: 60 h

Sigma1 Windspeed (m/s)

Sea Level Pressure (hPa)

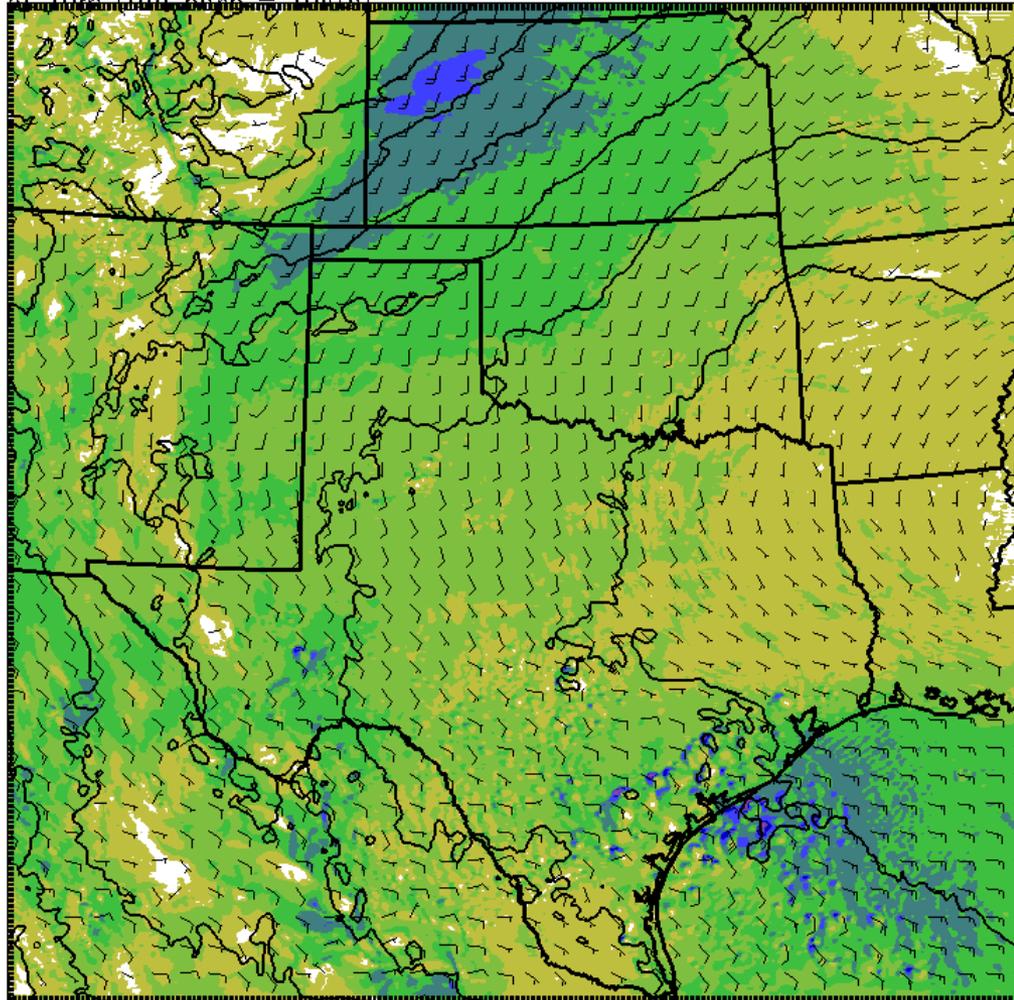
Wind at 10m (full barb = 10kts)

Init: 06 UTC Sat 07 Sep 13

Valid: 18 UTC Mon 09 Sep 13 (13 CDT Mon 09 Sep 13)

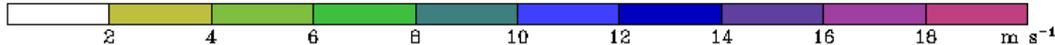
100 W

90 W



30 N

CONTOURS: UNITS=hPa LOW= 1004.0 HIGH= 1014.0 INTERVAL= 2.0000

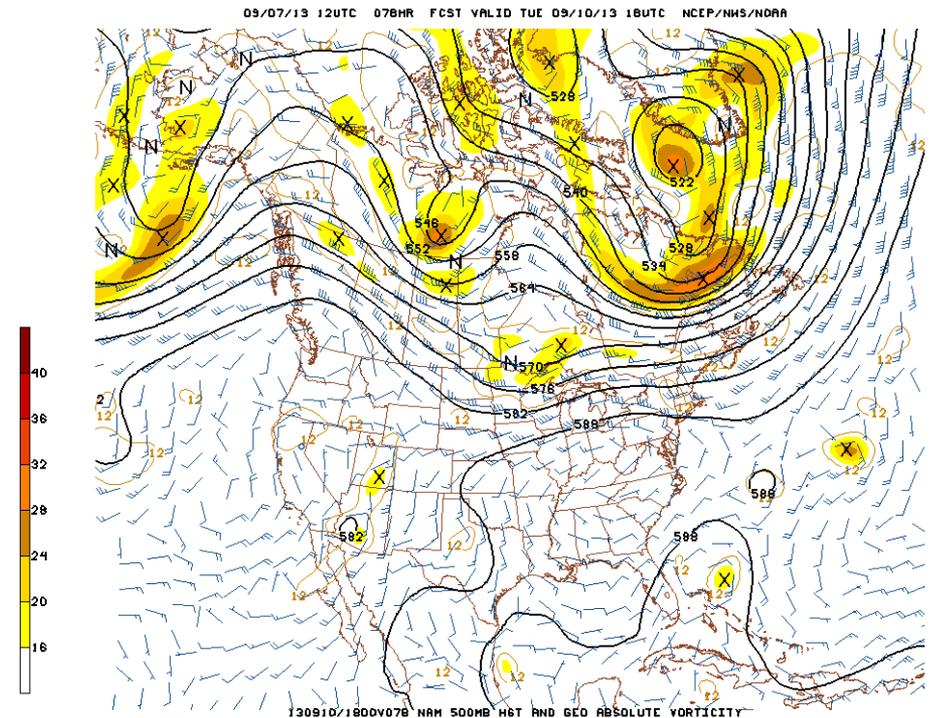
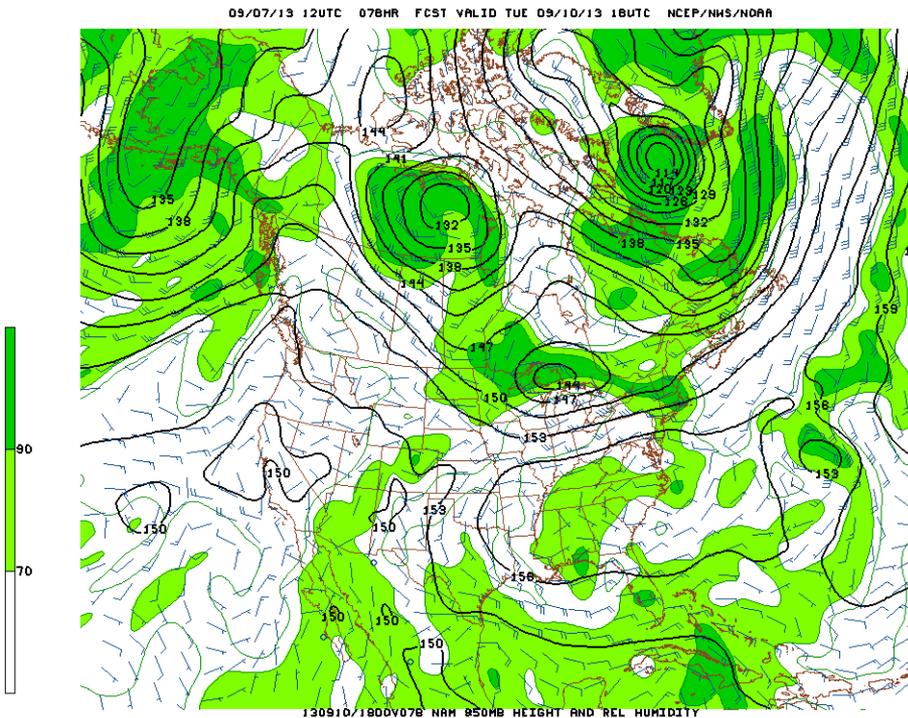


Model Info: V3.3 No Cu YSU PBL Thompson Noah LSM 3.0 km, 37 levels, 18 sec
LW: RRTM SW: Dudhia DIFF: simple KM: ED Smagor

Tuesday: Scattered thunderstorms. Upper level trough over east Texas.

1 PM CDT
850 mb RH

500 mb vorticity



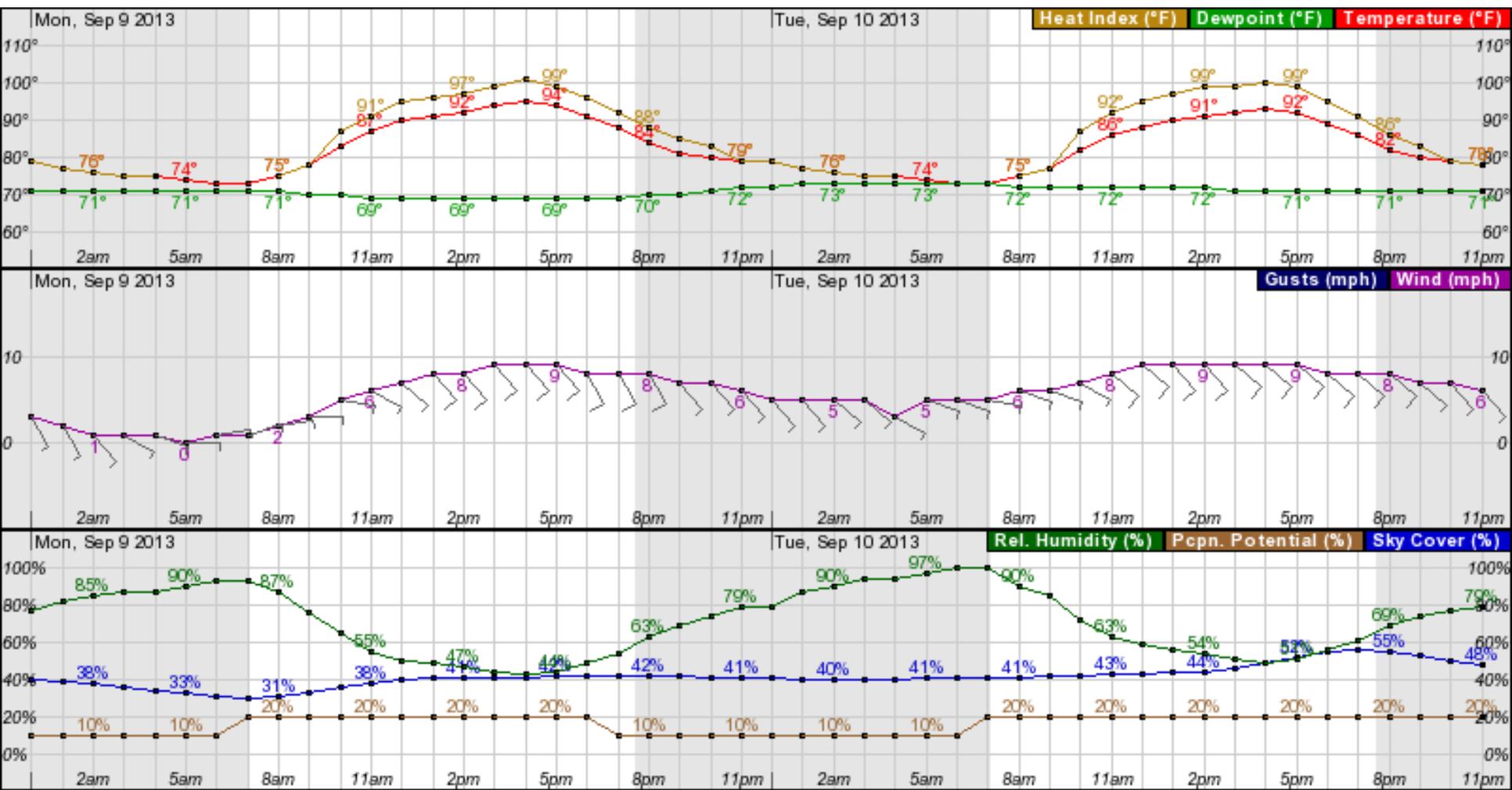
Conroe

Monday: Partly cloudy

Tuesday: Cloud cover around 50%

Monday →

Tuesday →



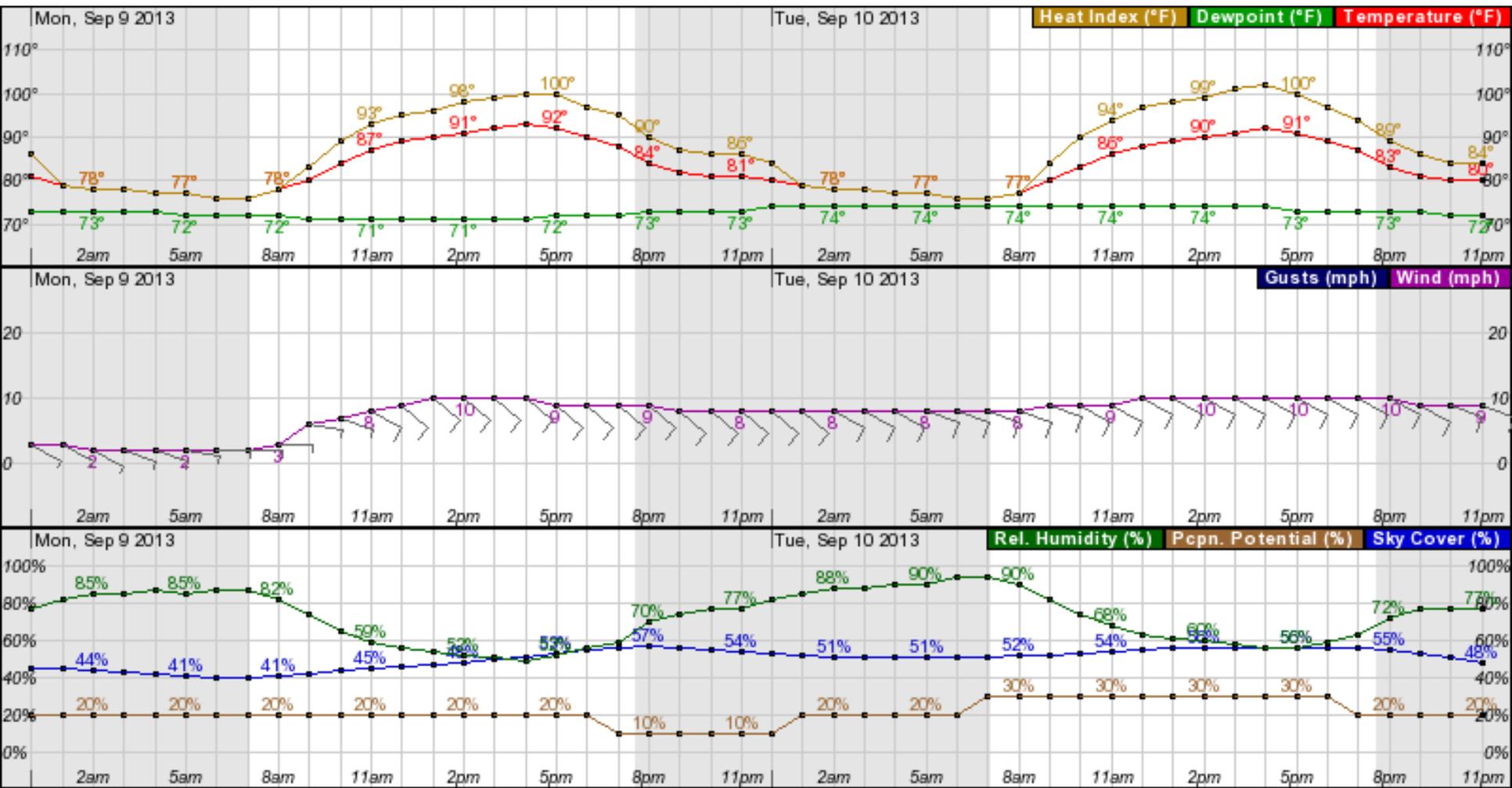
Houston Hobby

Monday: Cloud cover around 50%

Tuesday: Cloud cover around 50%

Monday →

Tuesday →



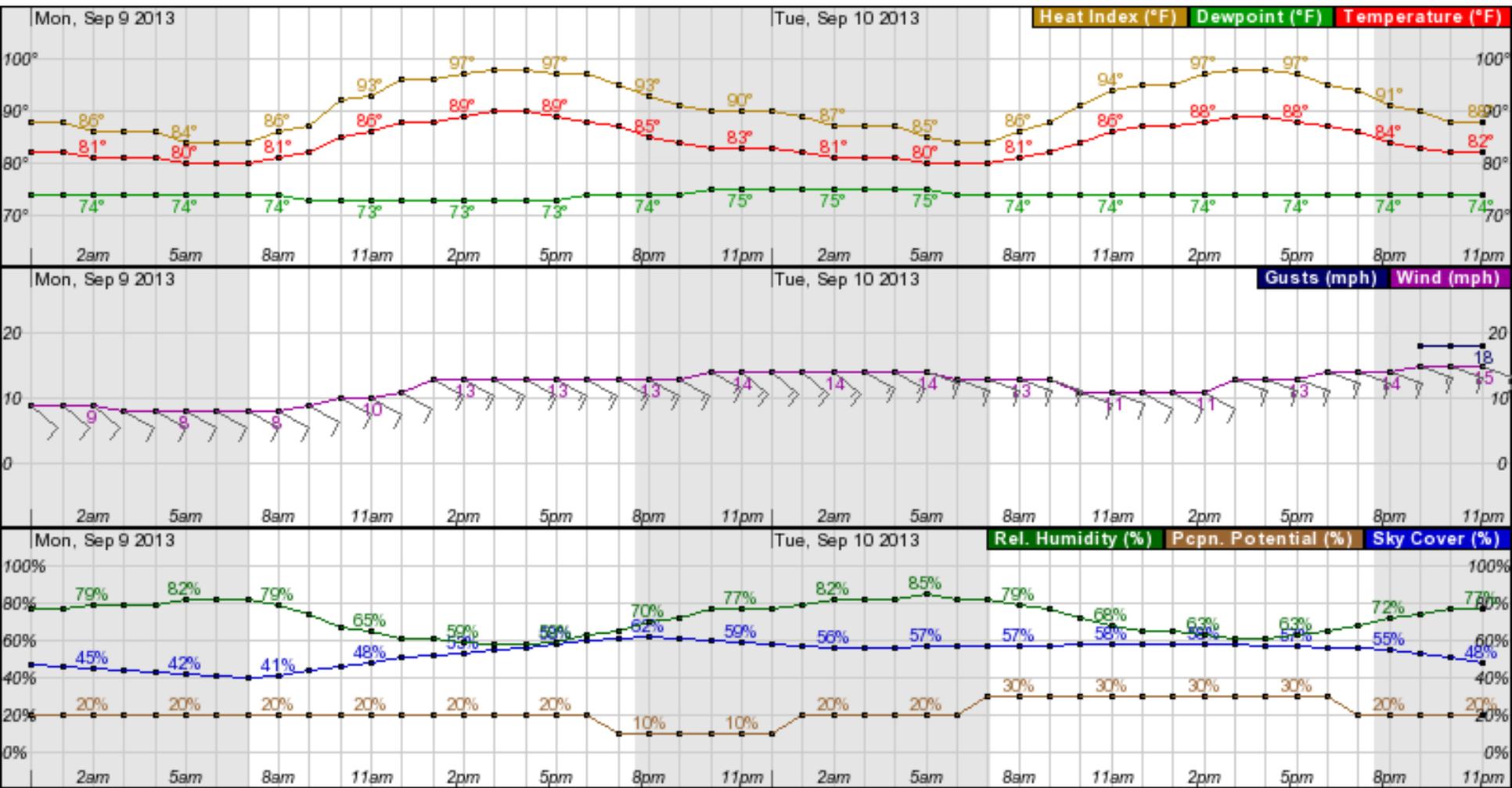
Galveston

Monday: Cloud cover around 50%

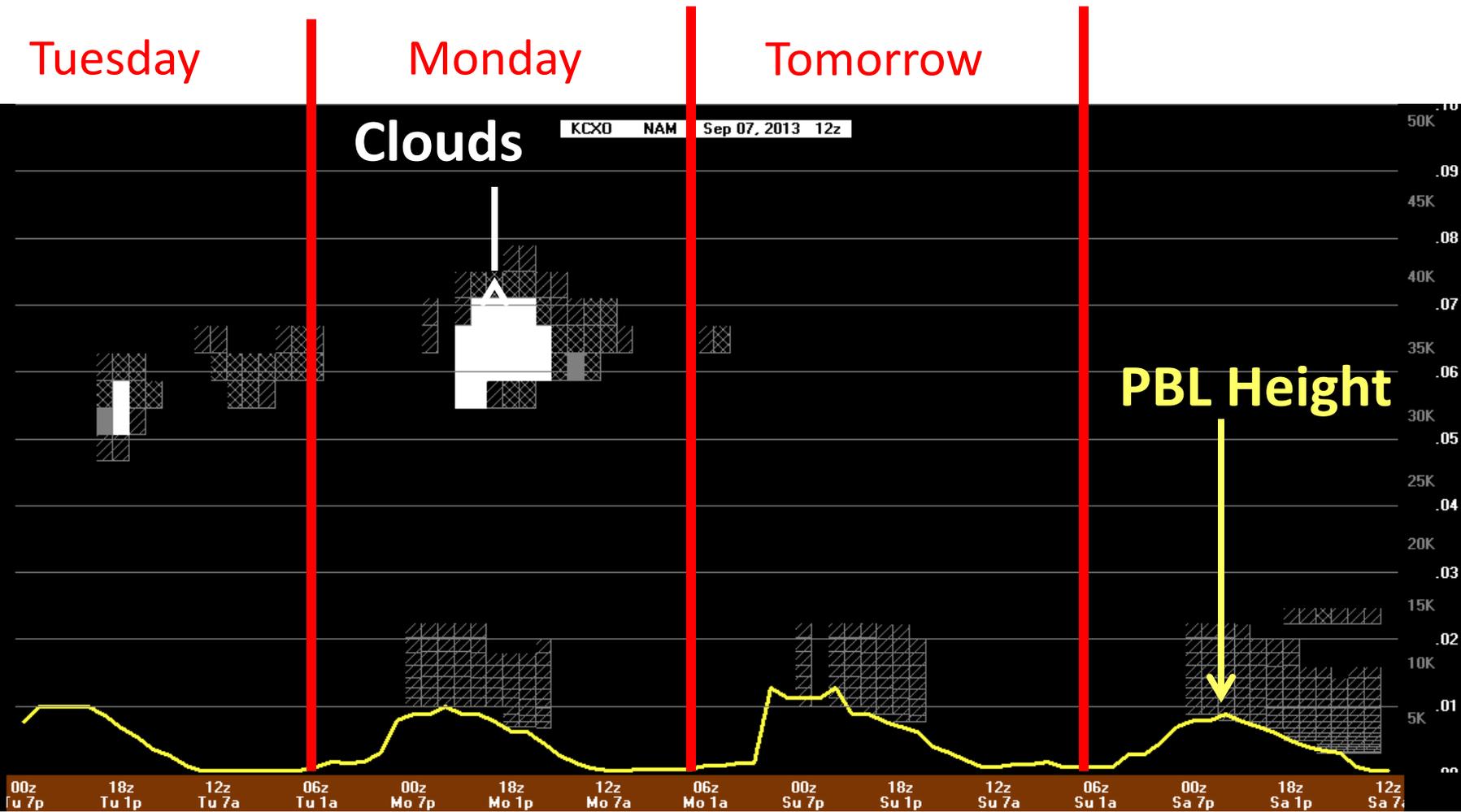
Tuesday: Mostly cloudy

Monday →

Tuesday →

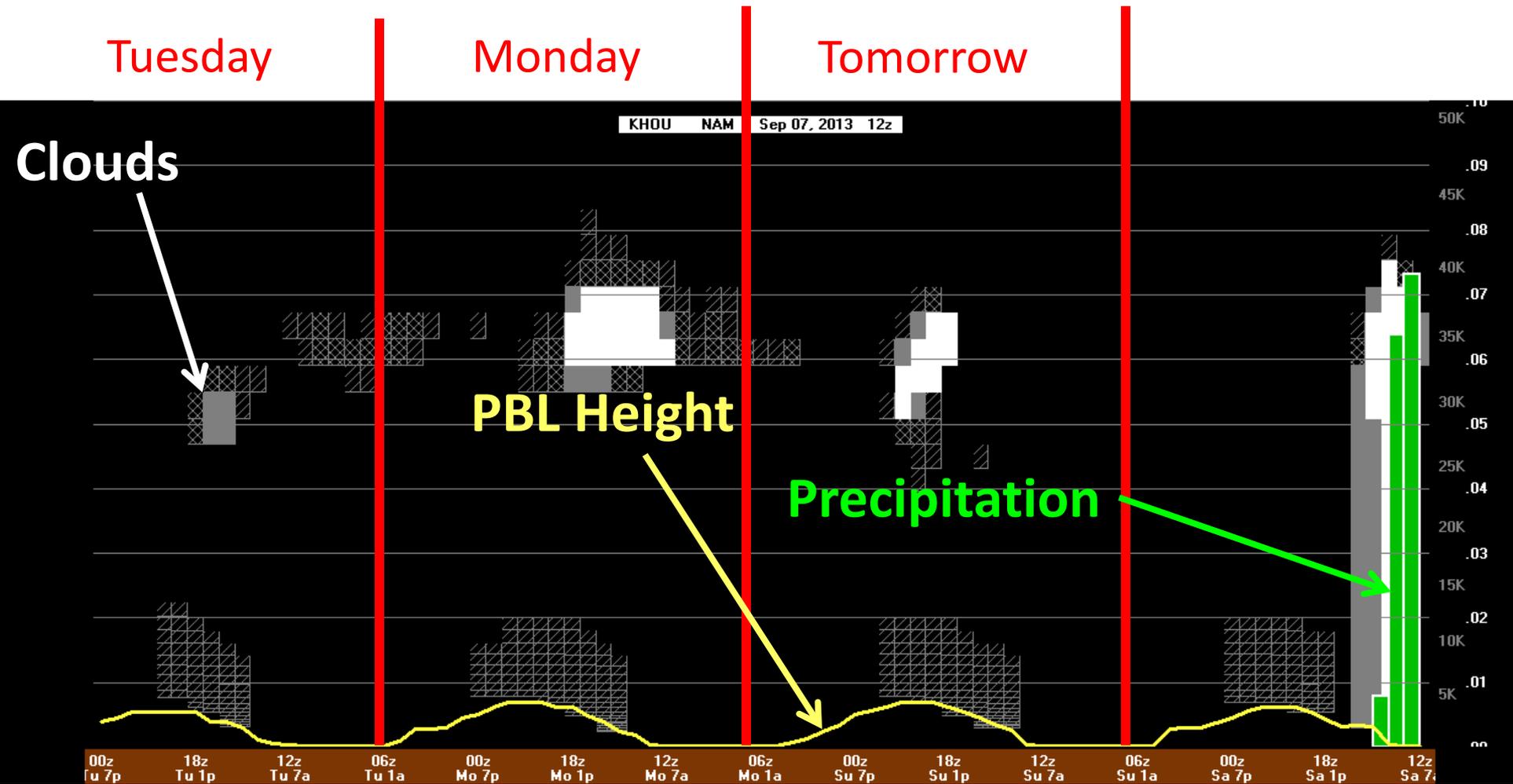


Conroe; BUFKIT – NAM (12 UTC 7 September)



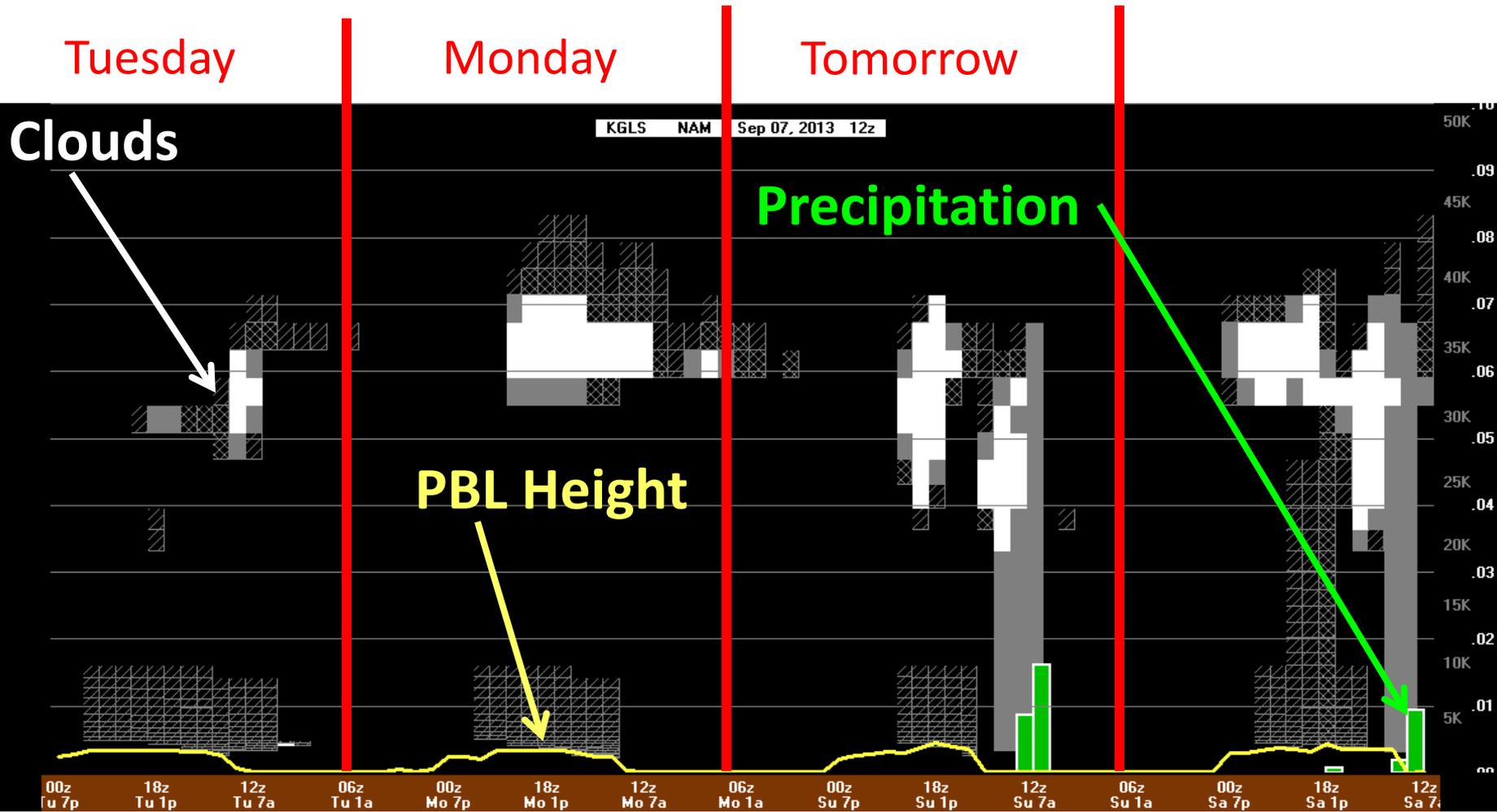
- Tomorrow: Partly cloudy.
- Monday: Mostly cloudy.
- Tuesday: Mostly cloudy in the morning.

Houston Hobby; BUFKIT – NAM (12 UTC 7 September)



- Tomorrow: Mostly cloudy.
- Monday: Mostly cloudy.
- Tuesday: Mostly cloudy in the morning.

Galveston; BUFKIT – NAM (12 UTC 7 September)

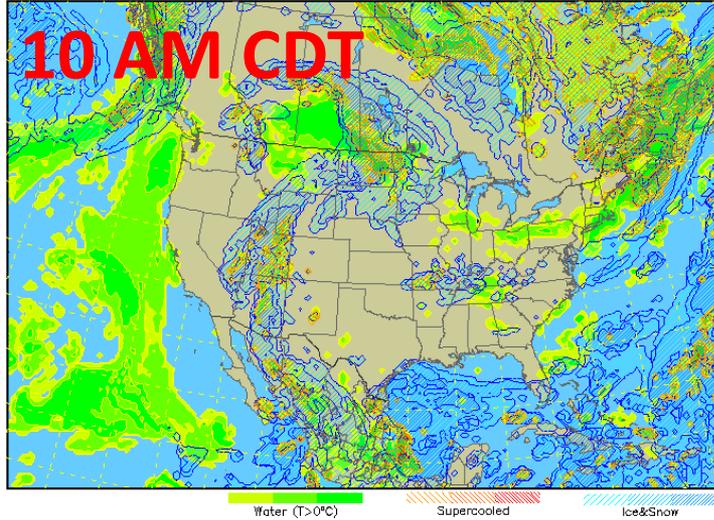


- Tomorrow: Mostly cloudy.
- Monday: Mostly cloudy.
- Tuesday: Mostly cloudy.

Tomorrow: NAM – high level clouds

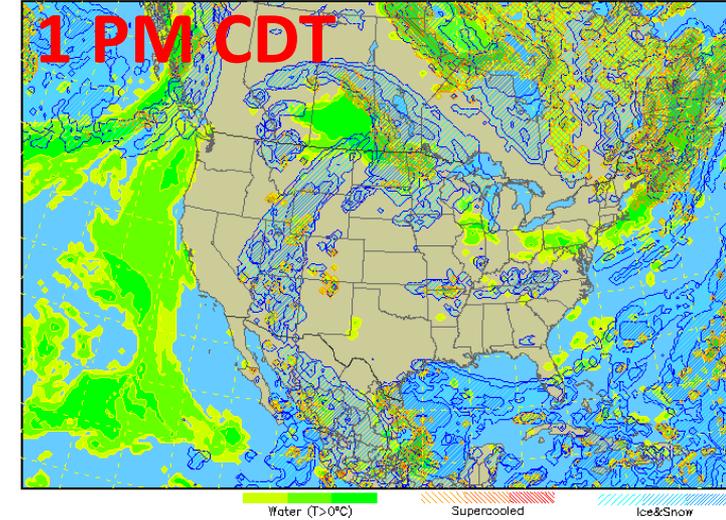
Integrated liquid and frozen hydrometeors (all levels)

27-hour forecast valid 1500 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



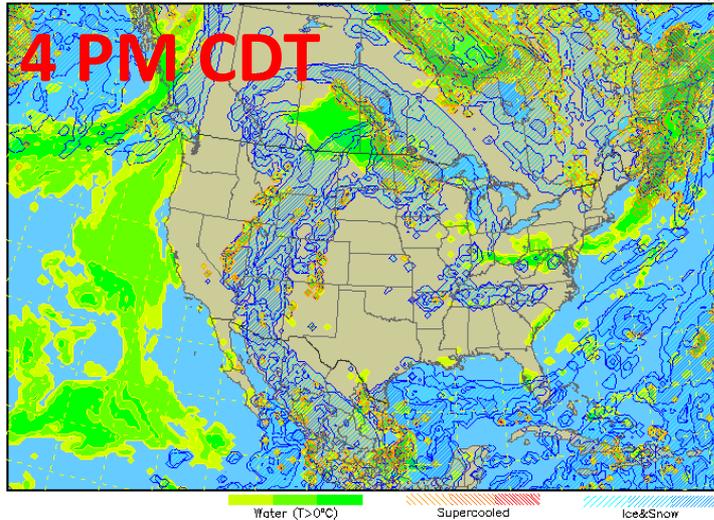
Integrated liquid and frozen hydrometeors (all levels)

30-hour forecast valid 1800 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



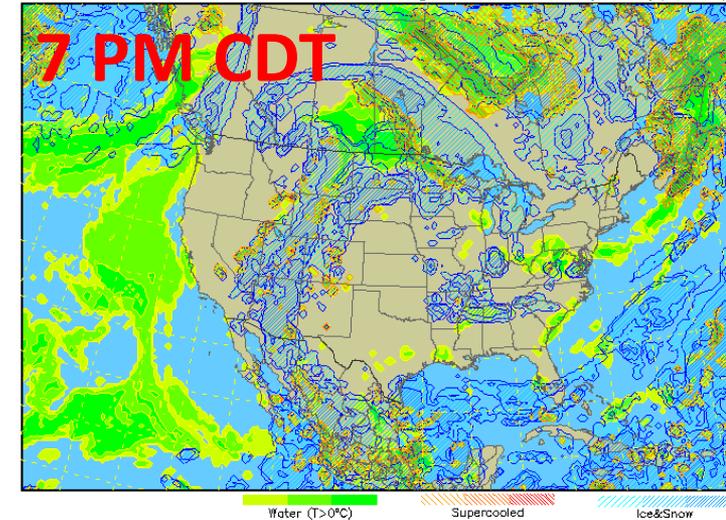
Integrated liquid and frozen hydrometeors (all levels)

33-hour forecast valid 2100 UTC Sun 08 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)

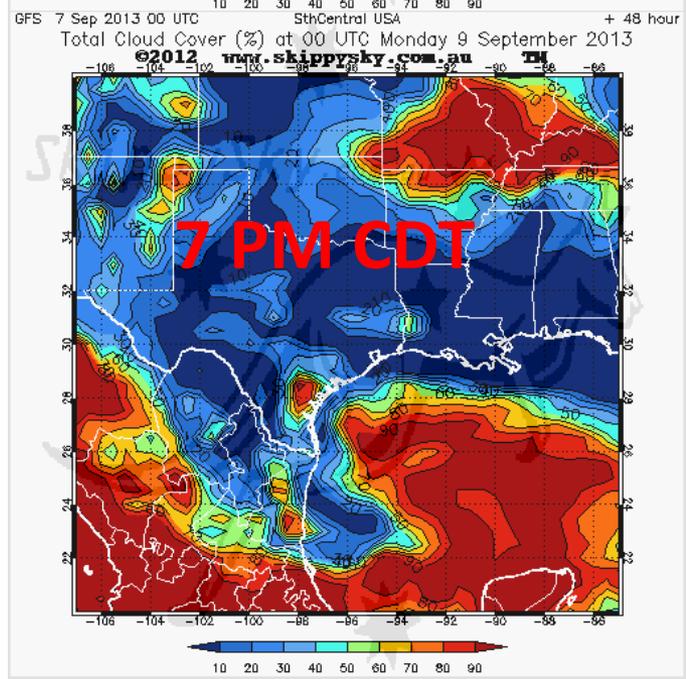
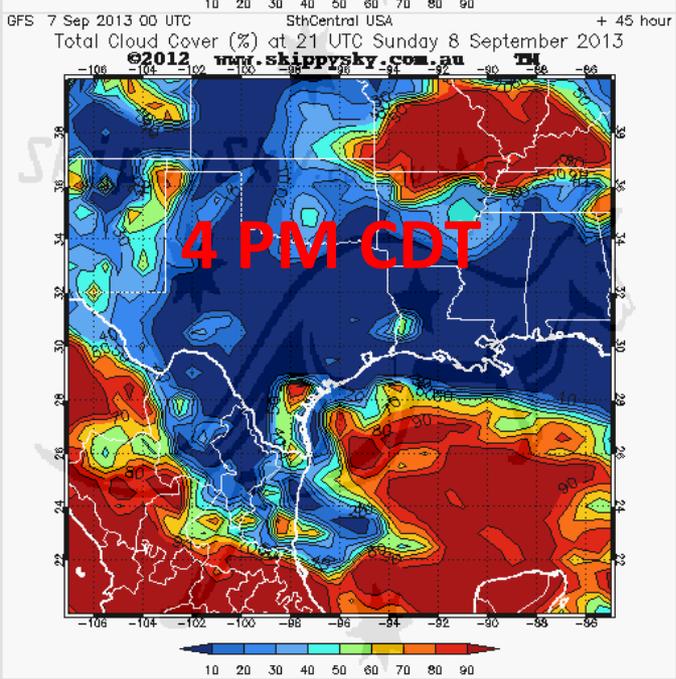
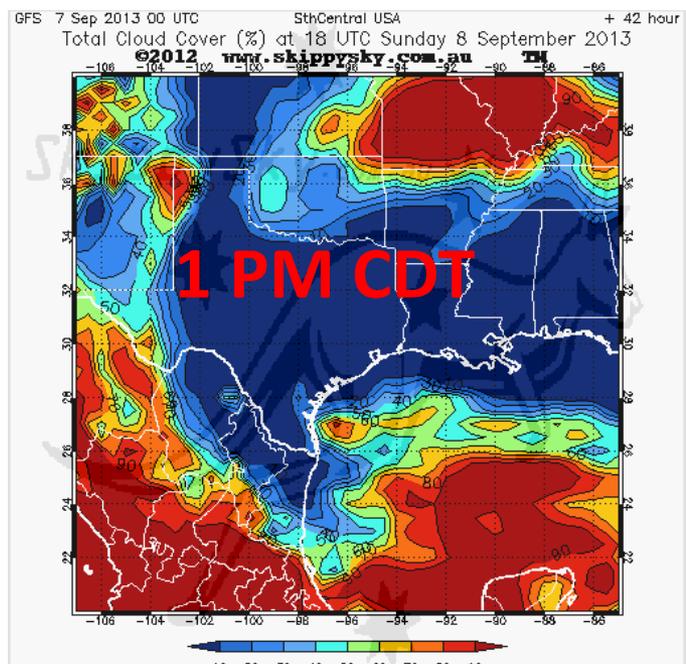
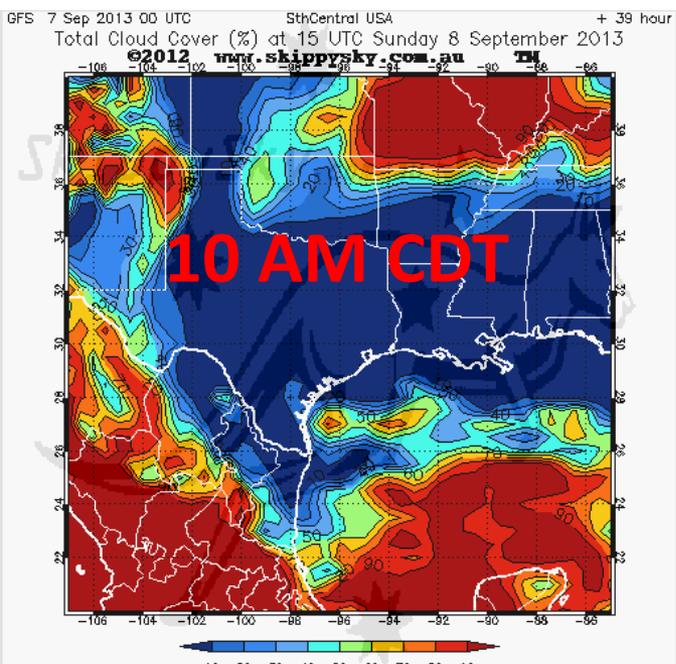


Integrated liquid and frozen hydrometeors (all levels)

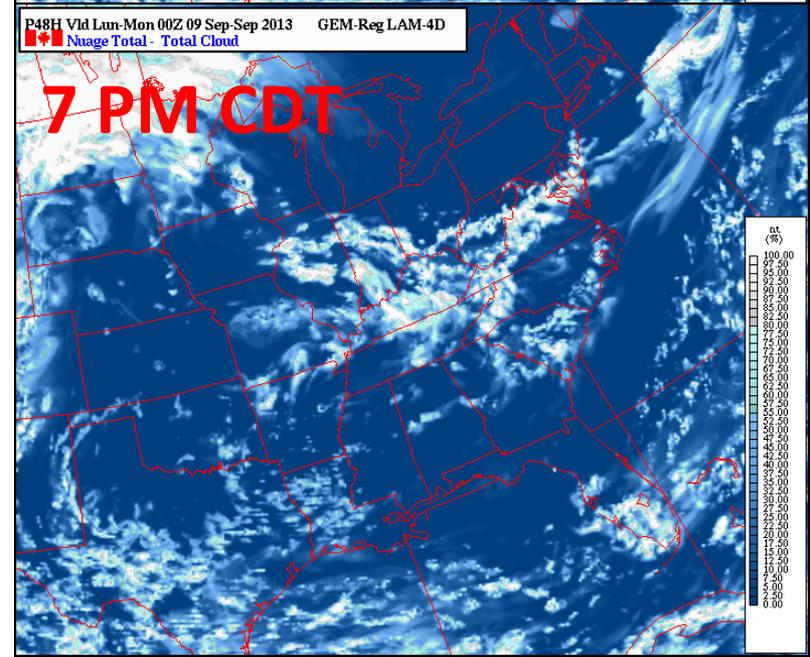
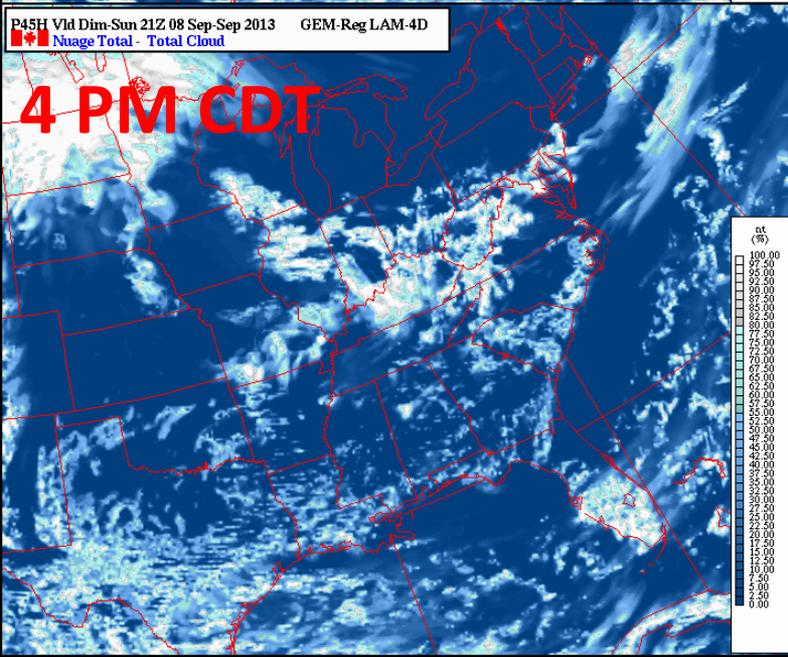
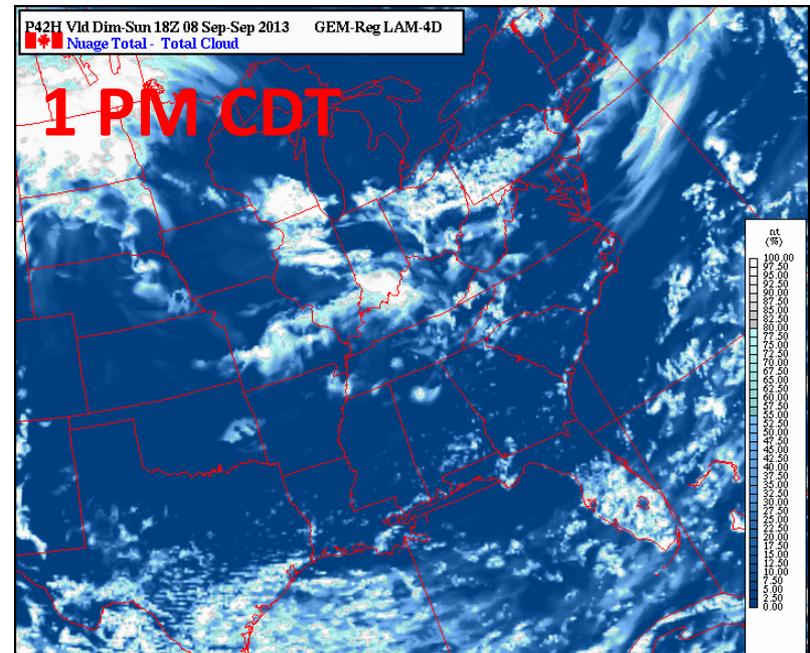
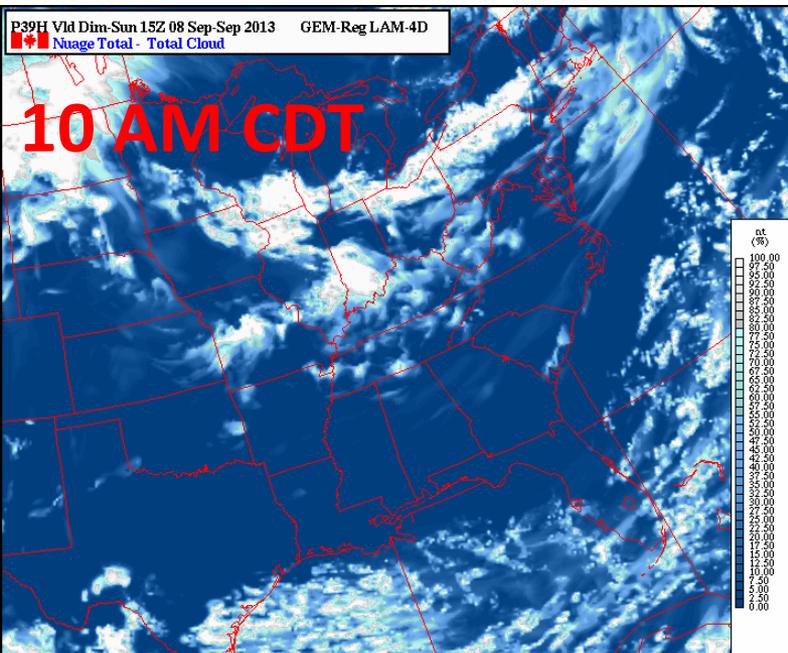
36-hour forecast valid 0000 UTC Mon 09 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



Tomorrow: GFS – afternoon low level clouds; high level clouds to the south



Tomorrow: Canadian - scattered clouds



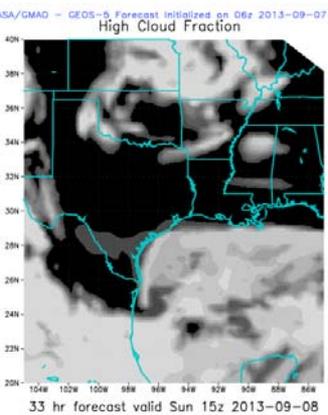
Tomorrow: GEOS-5 – high level clouds; low clouds to the north.

10 am

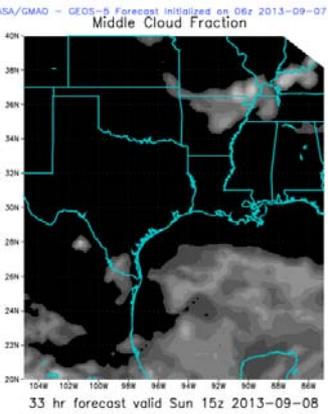
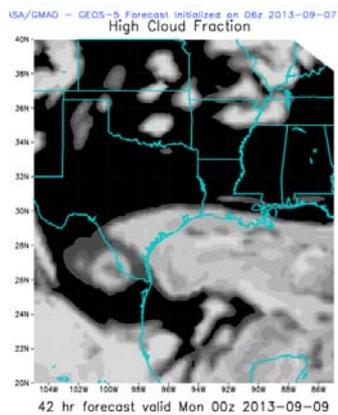
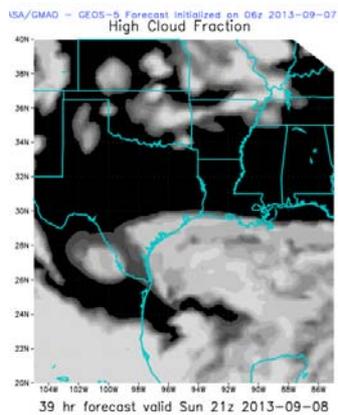
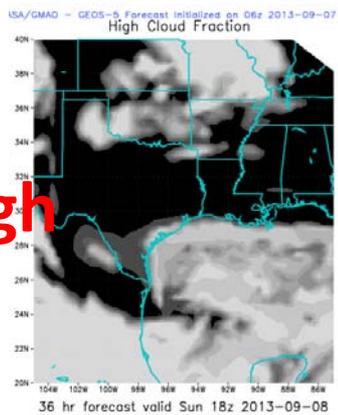
1 pm

4 pm

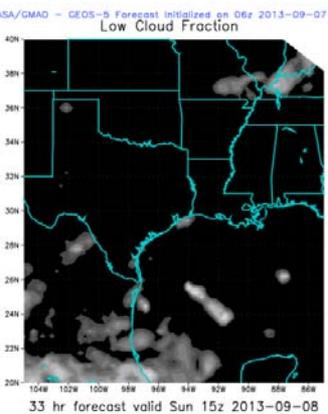
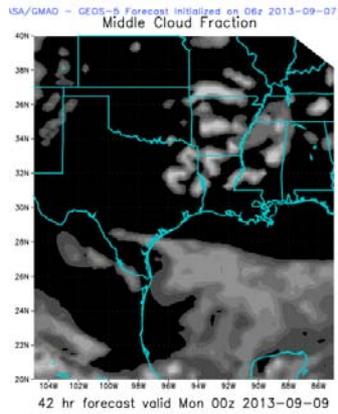
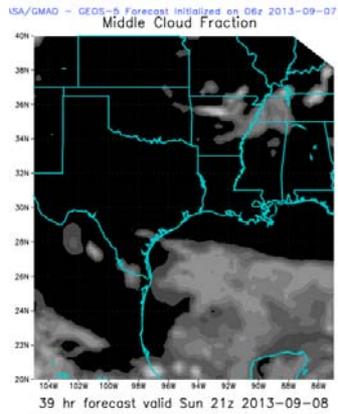
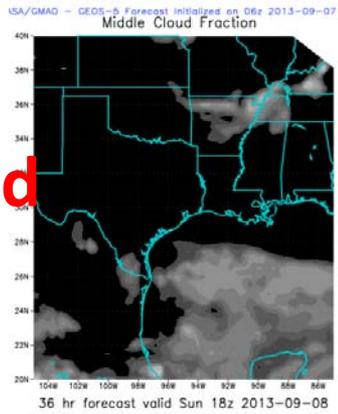
7 pm



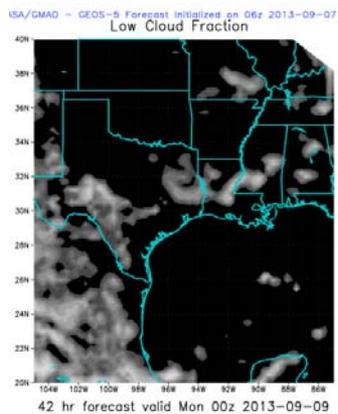
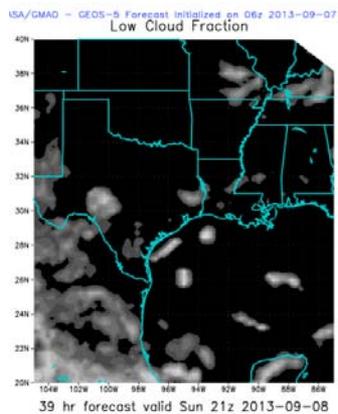
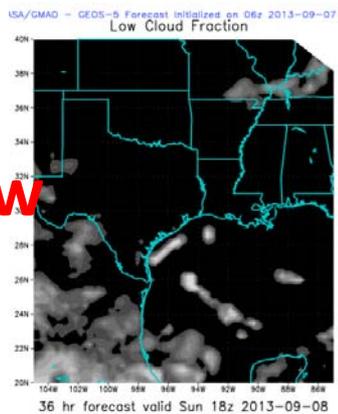
High



Mid

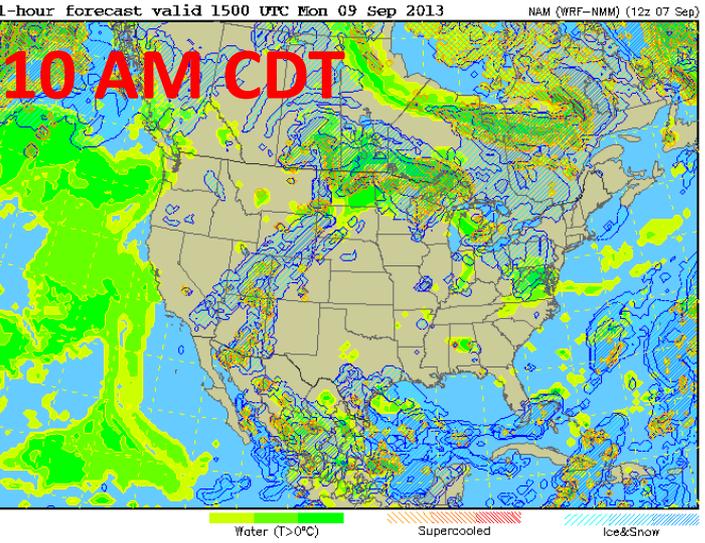


Low

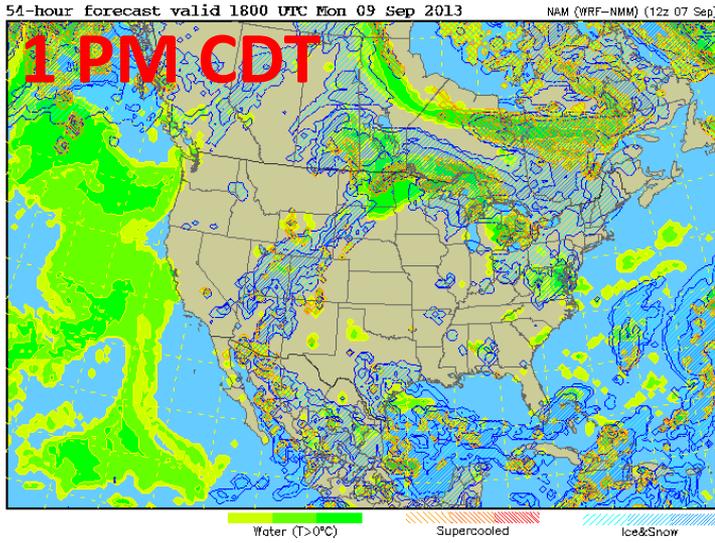


Monday: NAM – high level clouds

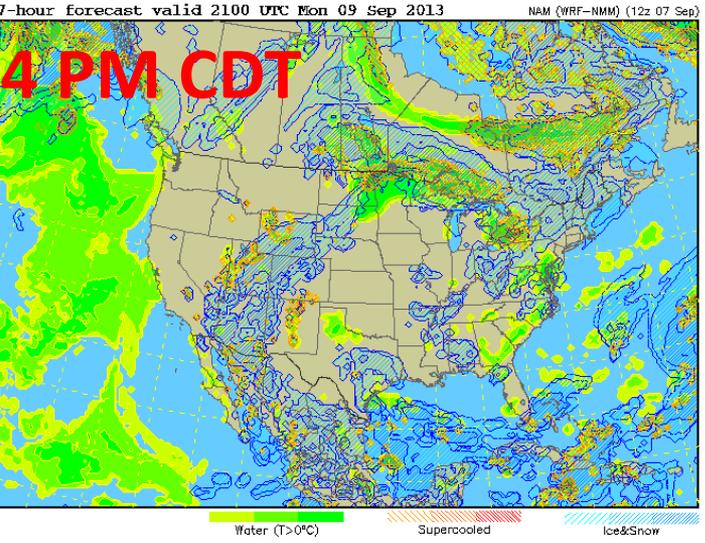
Integrated liquid and frozen hydrometeors (all levels)



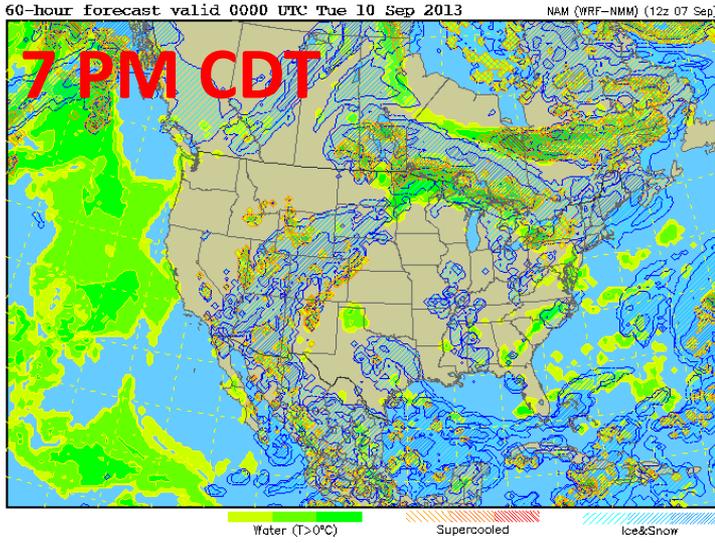
Integrated liquid and frozen hydrometeors (all levels)



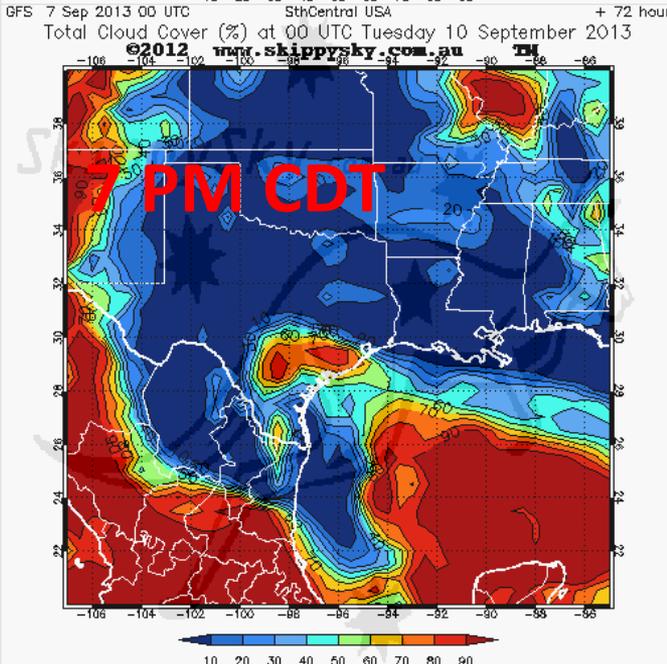
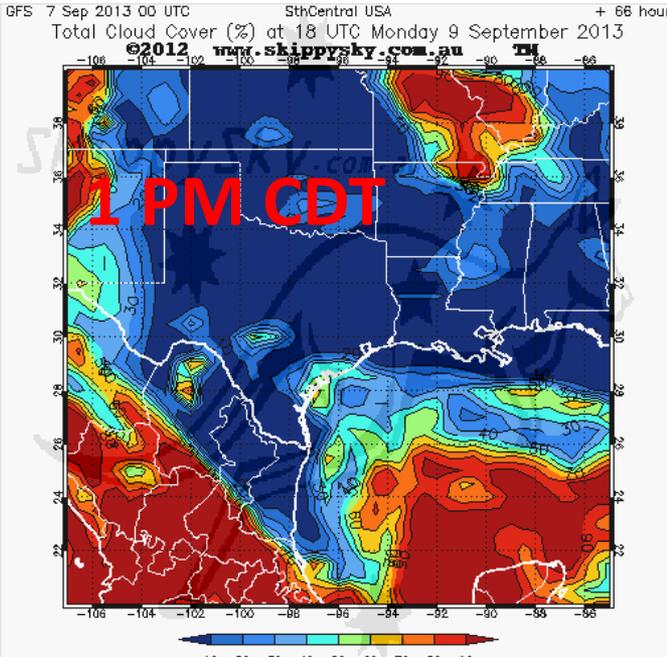
Integrated liquid and frozen hydrometeors (all levels)



Integrated liquid and frozen hydrometeors (all levels)



Monday: GFS – high level clouds to the south



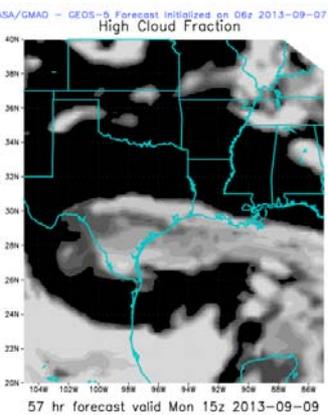
Monday: GEOS-5 – high level clouds; mid level clouds to the south

10 am

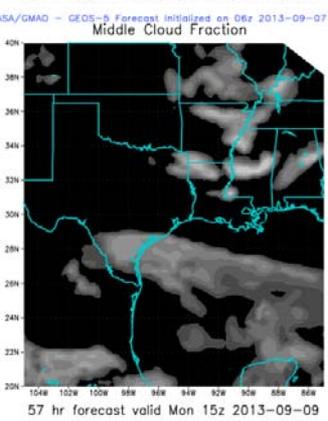
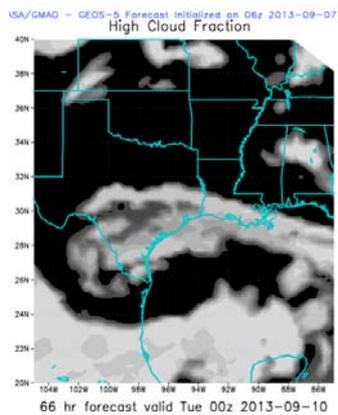
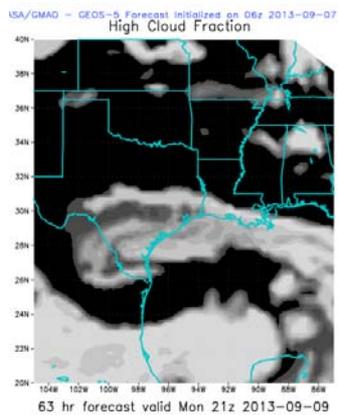
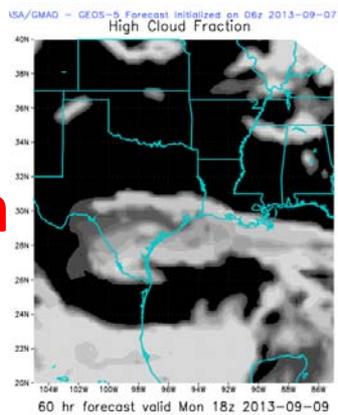
1 pm

4 pm

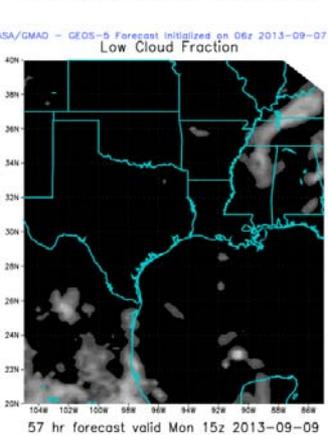
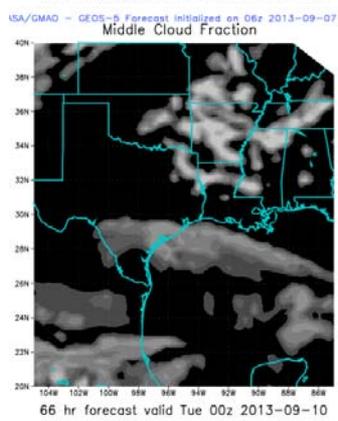
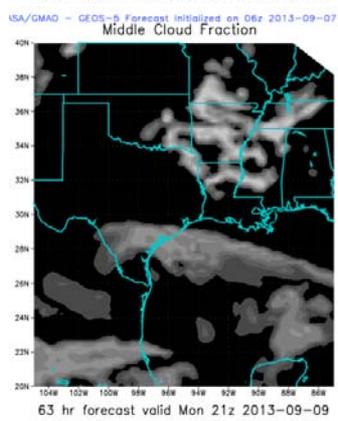
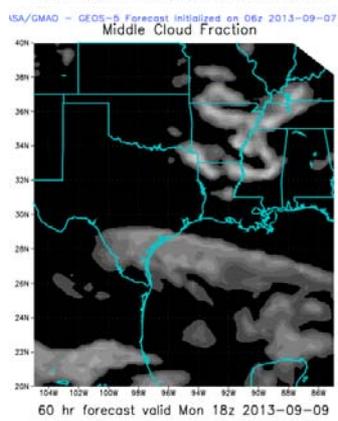
7 pm



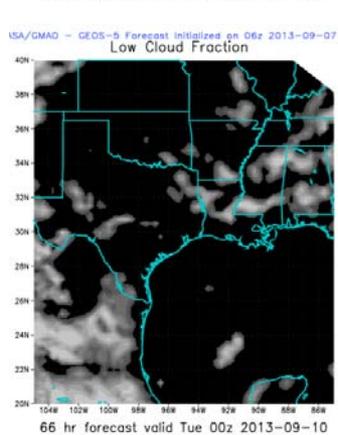
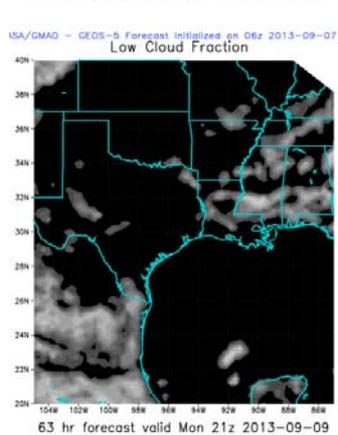
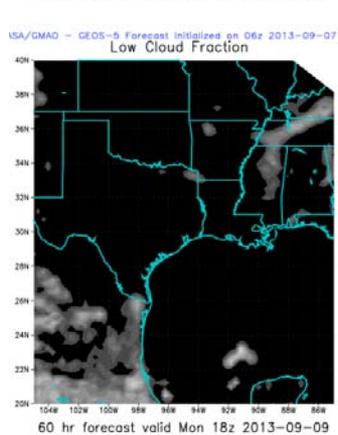
High



Mid



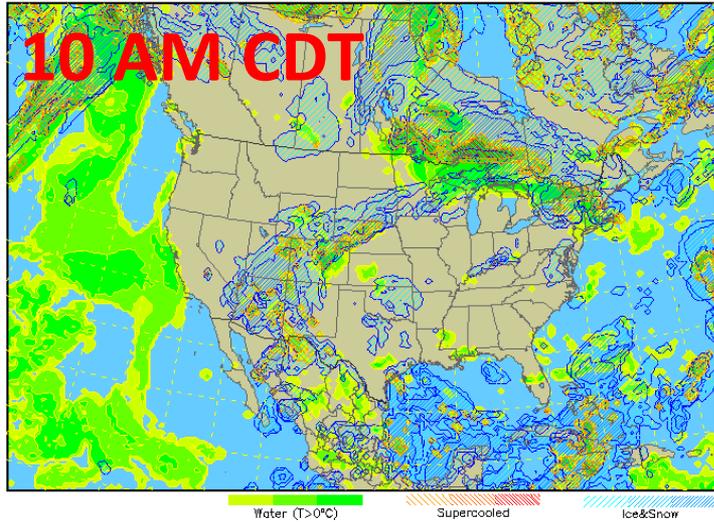
Low



Tuesday: NAM – high level clouds

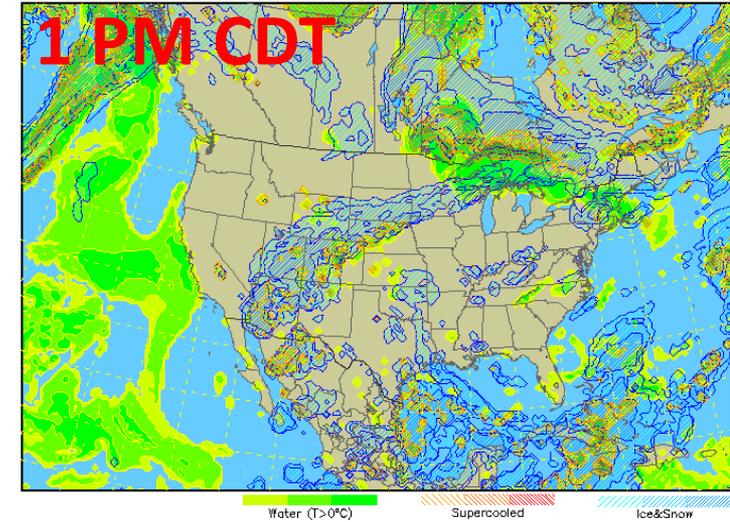
Integrated liquid and frozen hydrometeors (all levels)

75-hour forecast valid 1500 UTC Tue 10 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



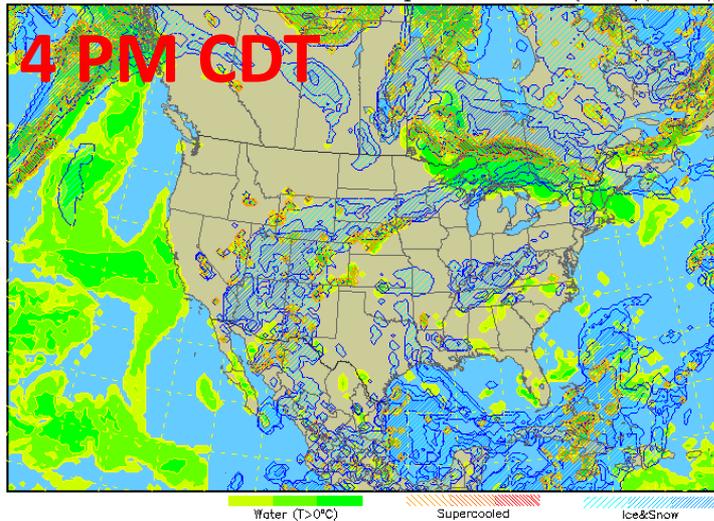
Integrated liquid and frozen hydrometeors (all levels)

78-hour forecast valid 1800 UTC Tue 10 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



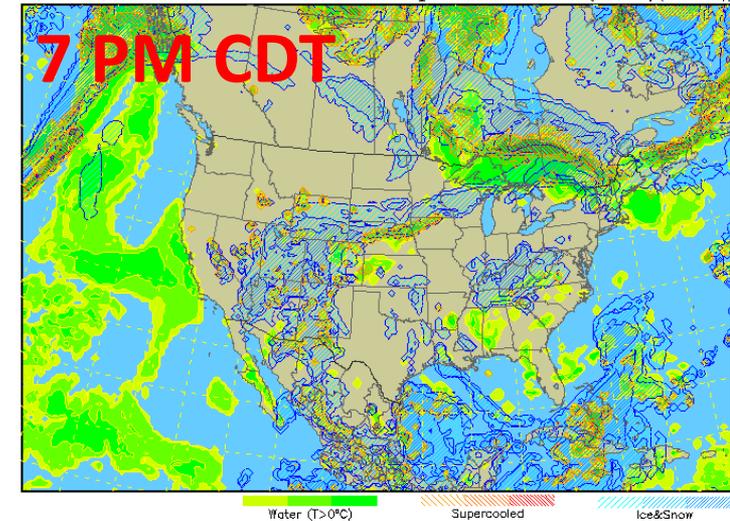
Integrated liquid and frozen hydrometeors (all levels)

81-hour forecast valid 2100 UTC Tue 10 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



Integrated liquid and frozen hydrometeors (all levels)

84-hour forecast valid 0000 UTC Wed 11 Sep 2013 NAM (WRF-NMM) (12z 07 Sep)



Tuesday: GEOS-5 – high, mid, and low level clouds

10 am

1 pm

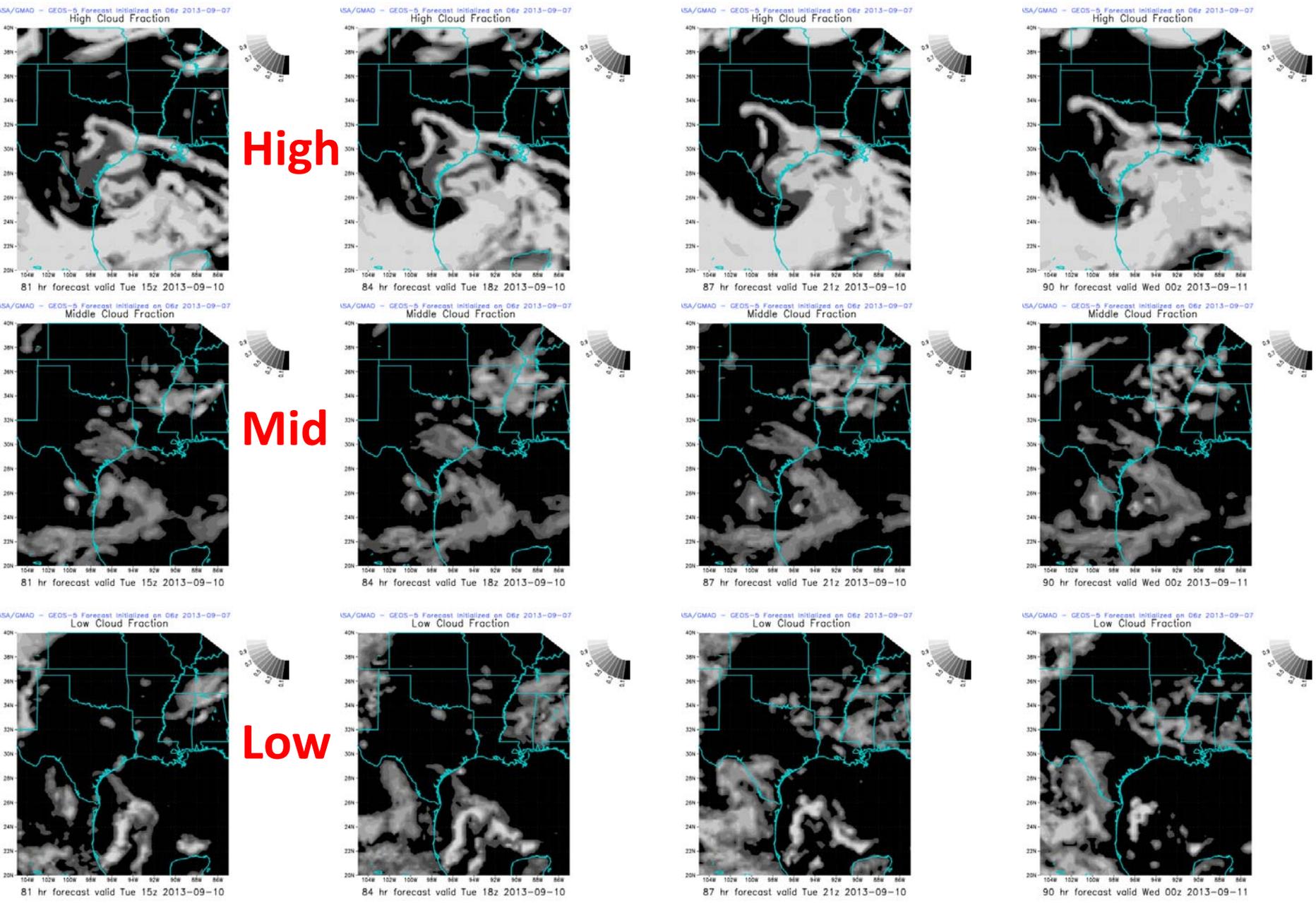
4 pm

7 pm

High

Mid

Low



Recommendations

- Tomorrow: Similar day to today. Mostly cloudy and scattered thunderstorms.
- Monday: Similar day to yesterday. Thunderstorms move inland with the sea breeze.
- Tuesday: Strong easterly wave impacts our region.

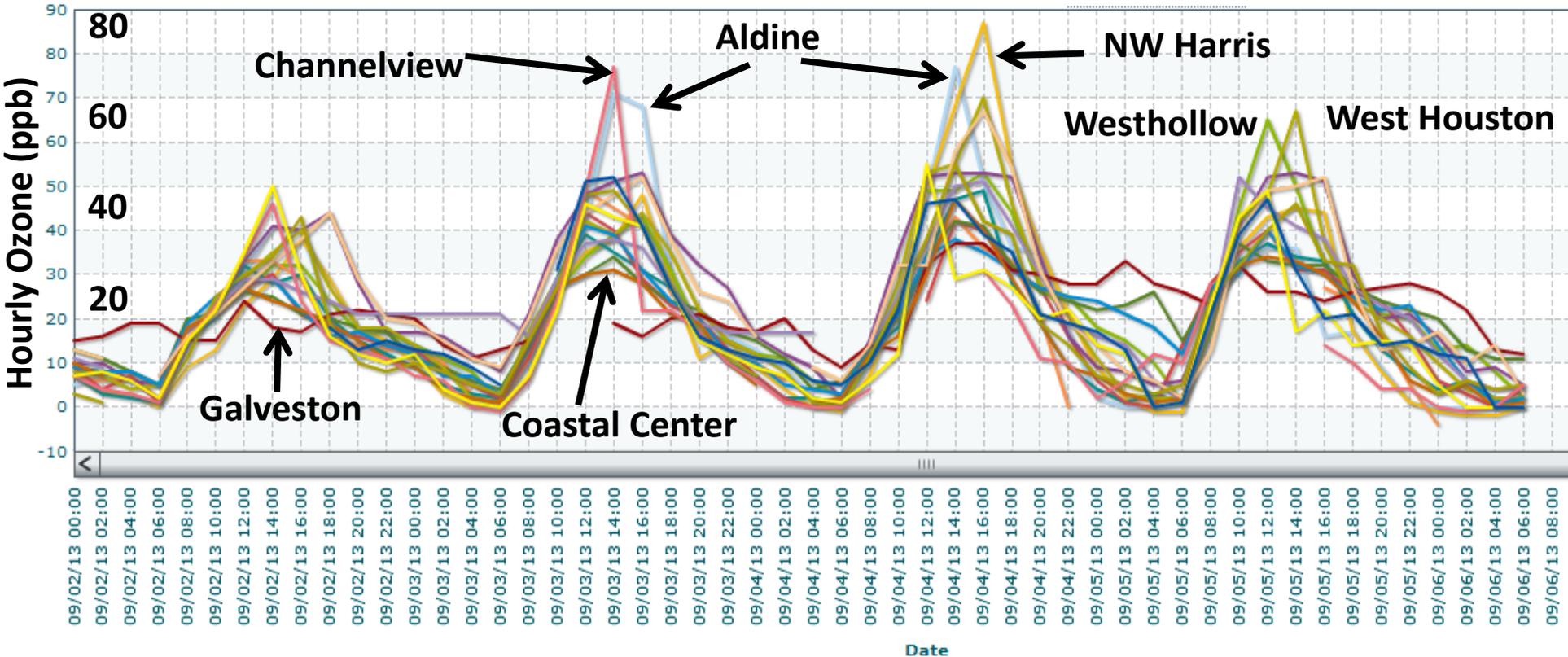
DISCOVER-AQ Air Quality Outlook
September 7, 2013

Ken Pickering

Bob Chatfield

Hourly Ozone (airnowtech.org)

Monday – Friday morning (6 am)

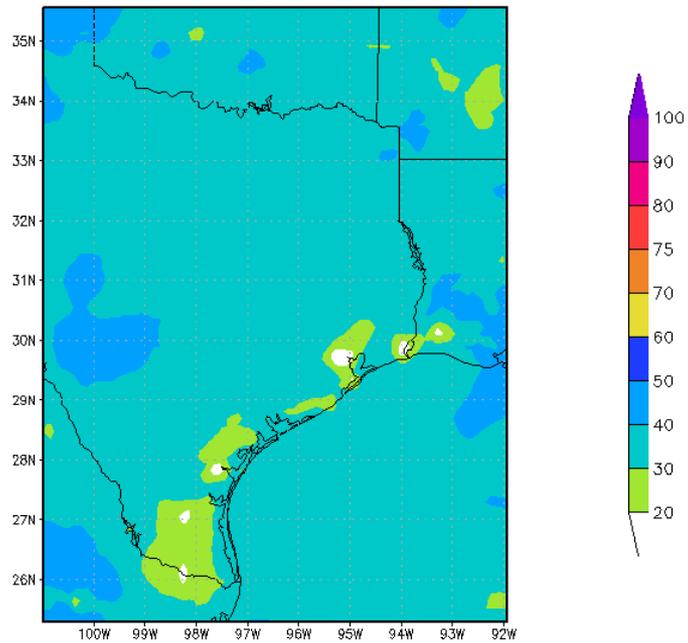


- | Date | |
|---|---|
| Houston Aldine C8/O3 - 44201/1 Hr/2 | Northwest Harris Co. C26/C110/C154/O3 - 44201/1 Hr/2 |
| Houston Westhollow C410/O3 - 44201/1 Hr/1 | Houston Deer Park C35/O3 - 44201/1 Hr/1 |
| Manvel Croix Park C84/O3 - 44201/1 Hr/1 | Seabrook Friendship Park C45/O3 - 44201/1 Hr/1 |
| 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) |

**Surface Ozone – Maximum 1-hr average
September 6, 2013**

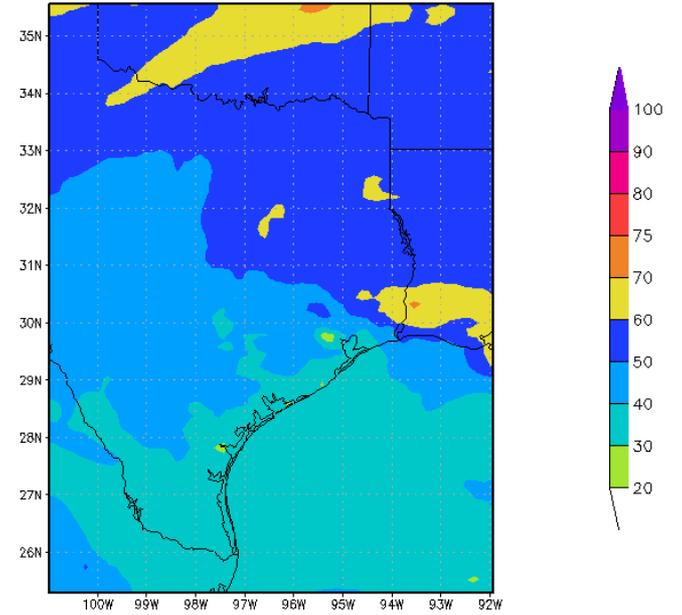
West Houston	56 ppbv	3 PM
NW Harris Co.	52	2 PM
Westhollow	48	Noon
Conroe	46	Noon
Manvel Croix	38	10 AM

O3 [ppb] at 1013 [hPa] Valid 14Z SEP 08 2013



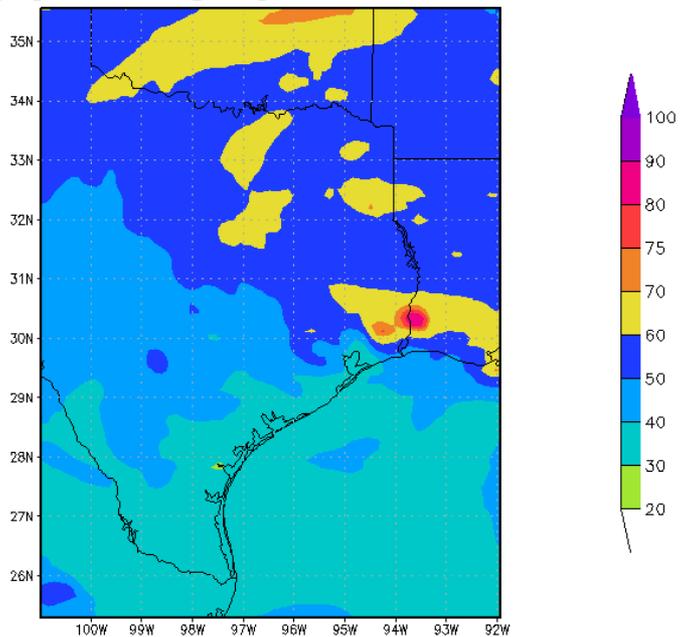
GRADS: COLA/IGES

O3 [ppb] at 1013 [hPa] Valid 17Z SEP 08 2013

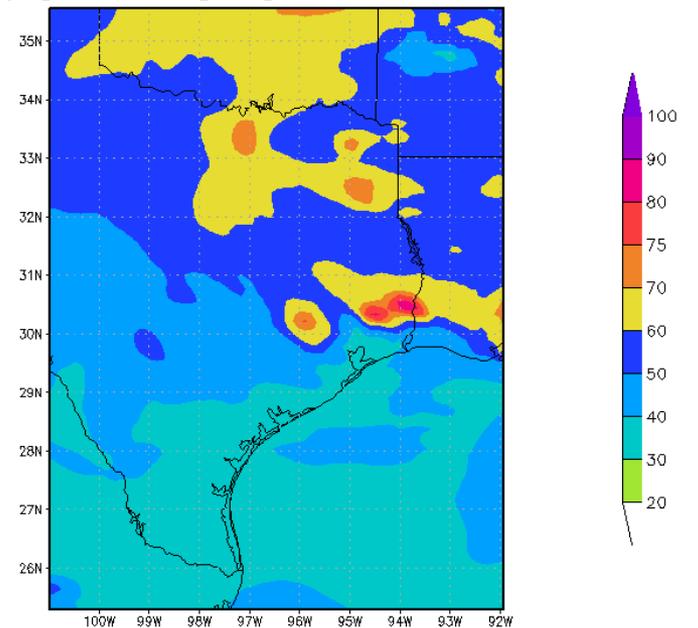


GRADS: COLA/IGES

O3 [ppb] at 1013 [hPa] Valid 22Z SEP 08 2013

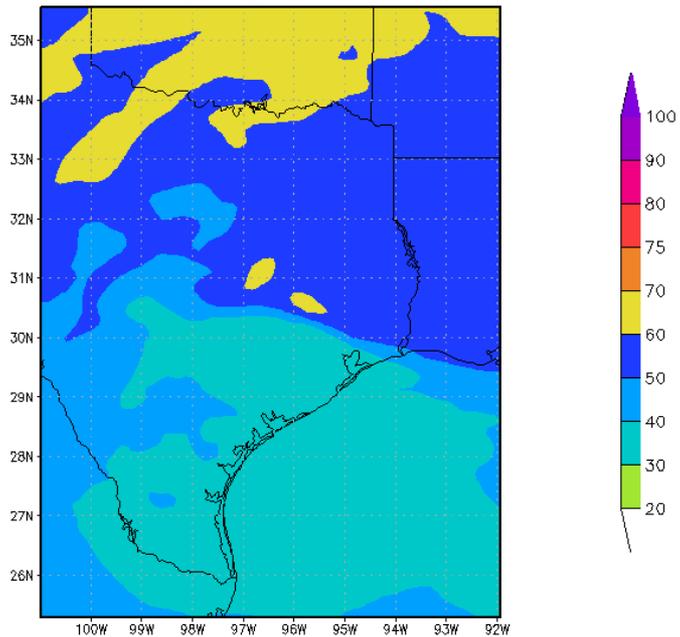


GRADS: COLA/IGES

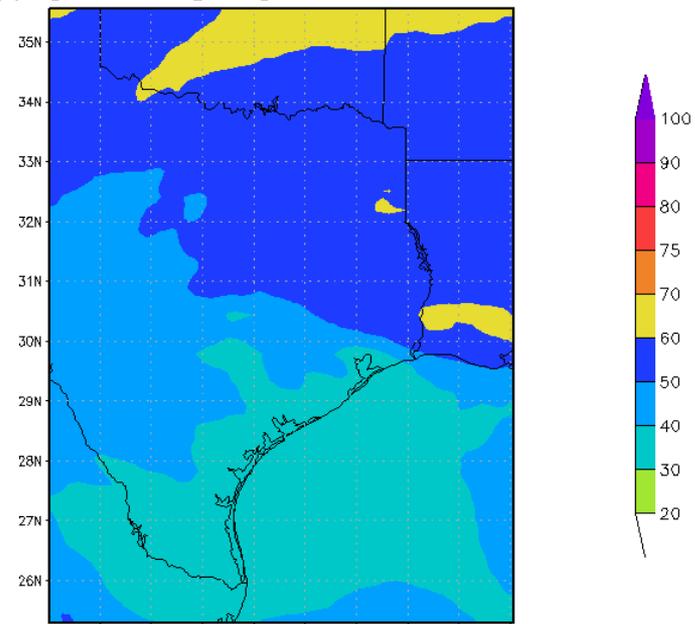


GRADS: COLA/IGES

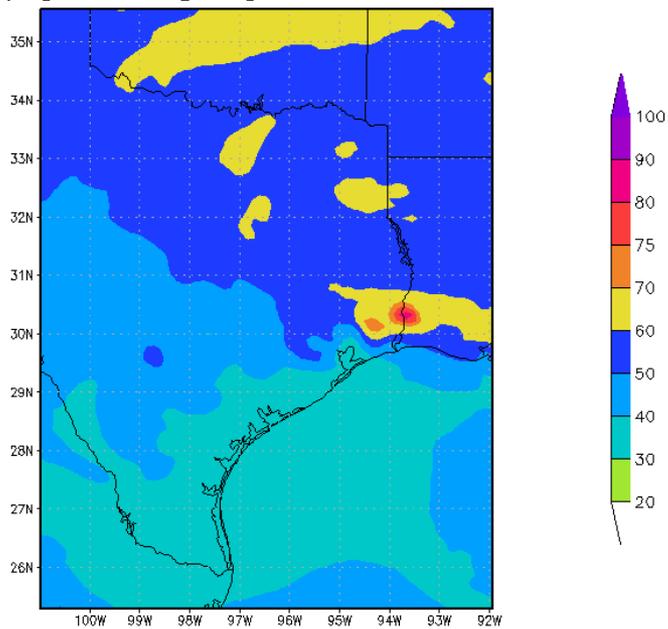
O3 [ppb] at 850 [hPa] Valid 14Z SEP 08 2013



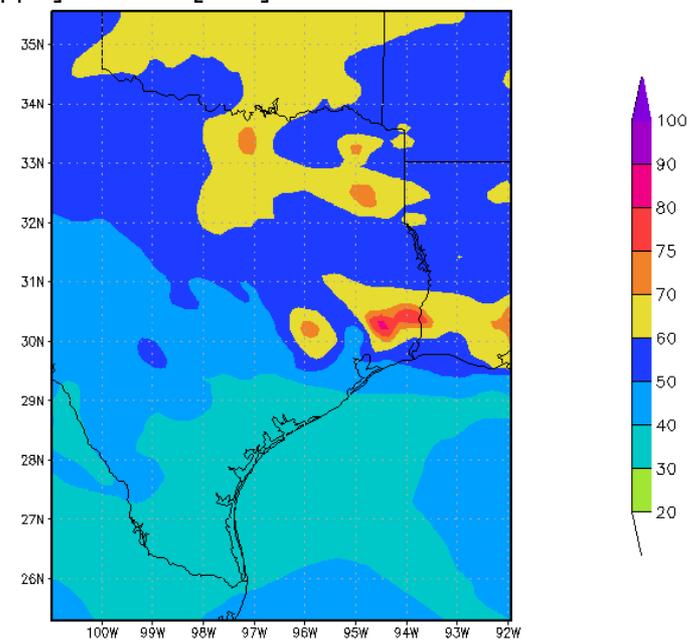
O3 [ppb] at 850 [hPa] Valid 17Z SEP 08 2013



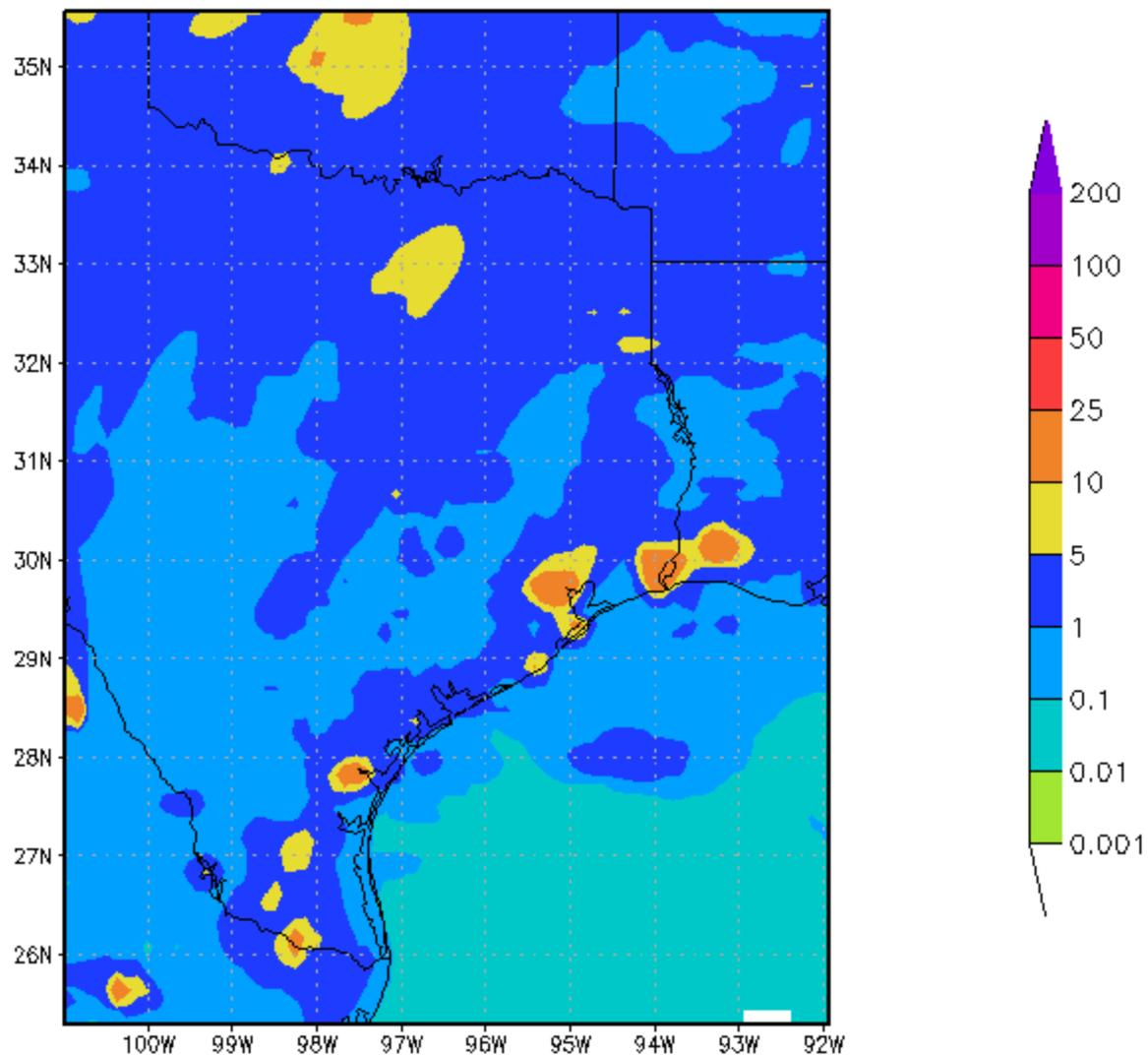
O3 [ppb] at 850 [hPa] Valid 19Z SEP 08 2013



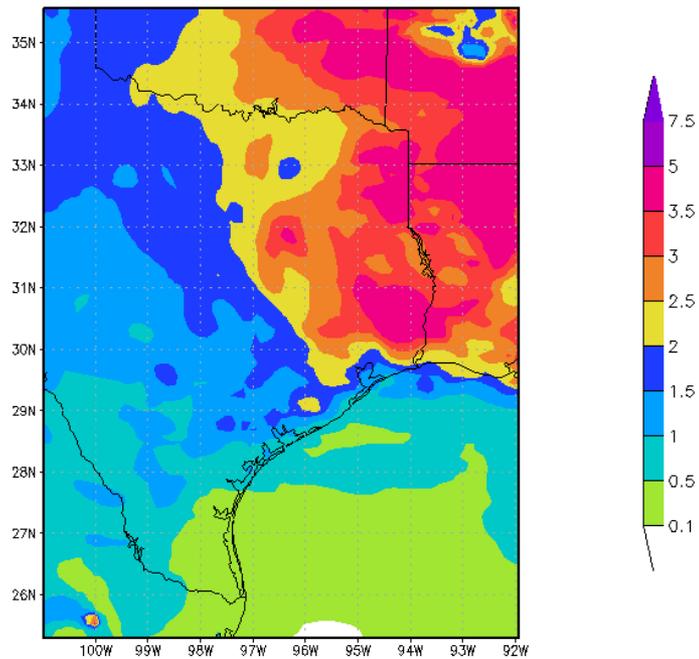
O3 [ppb] at 850 [hPa] Valid 22Z SEP 08 2013



NO2 [ppb] at 1013 [hPa] Valid 14Z SEP 08 2013

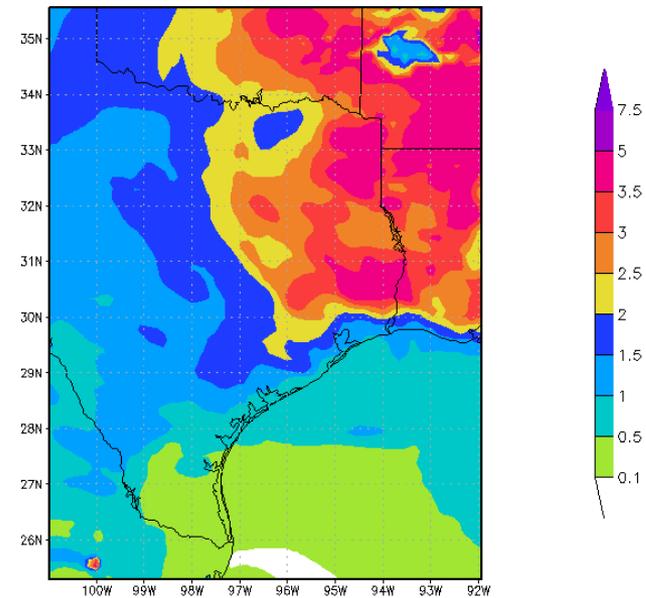


FORM [ppb] at 1013 [hPa] Valid 19Z SEP 08 2013



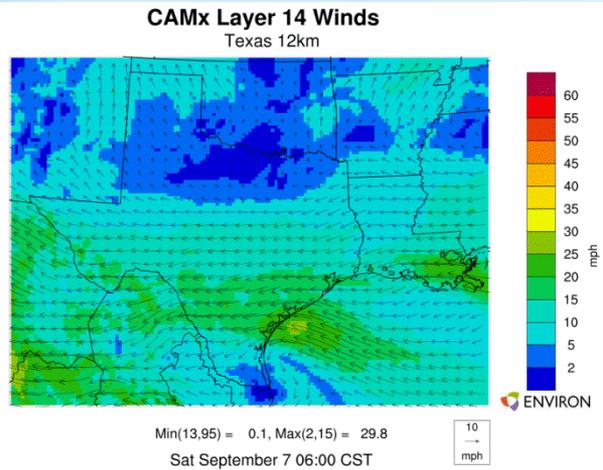
GRADS: COLA/IGES

FORM [ppb] at 1013 [hPa] Valid 22Z SEP 08 2013



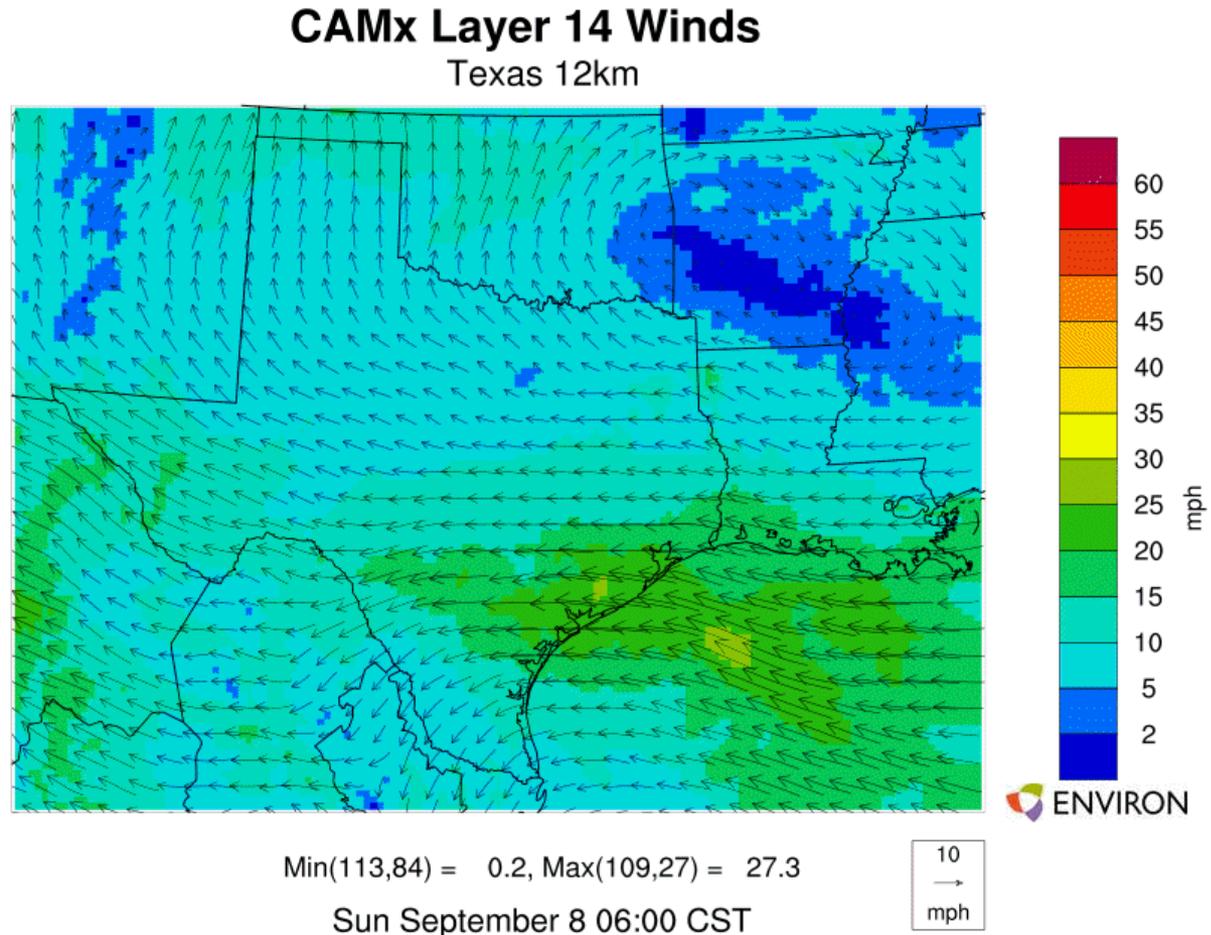
GRADS: COLA/IGES

** TCEQ: WRF Model suggests winds onshore most of the day, smog much diluted*



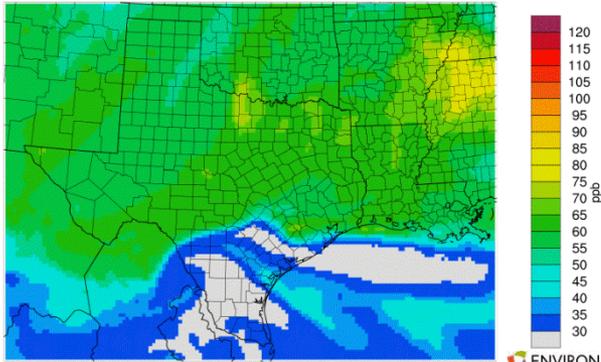
*Saturday:
Previous forecast
did not get all of
local circulation*

*Forecast for Sunday depends on synoptics
probably more credible*



Ozone

Best Case: CAMx Layer 14



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

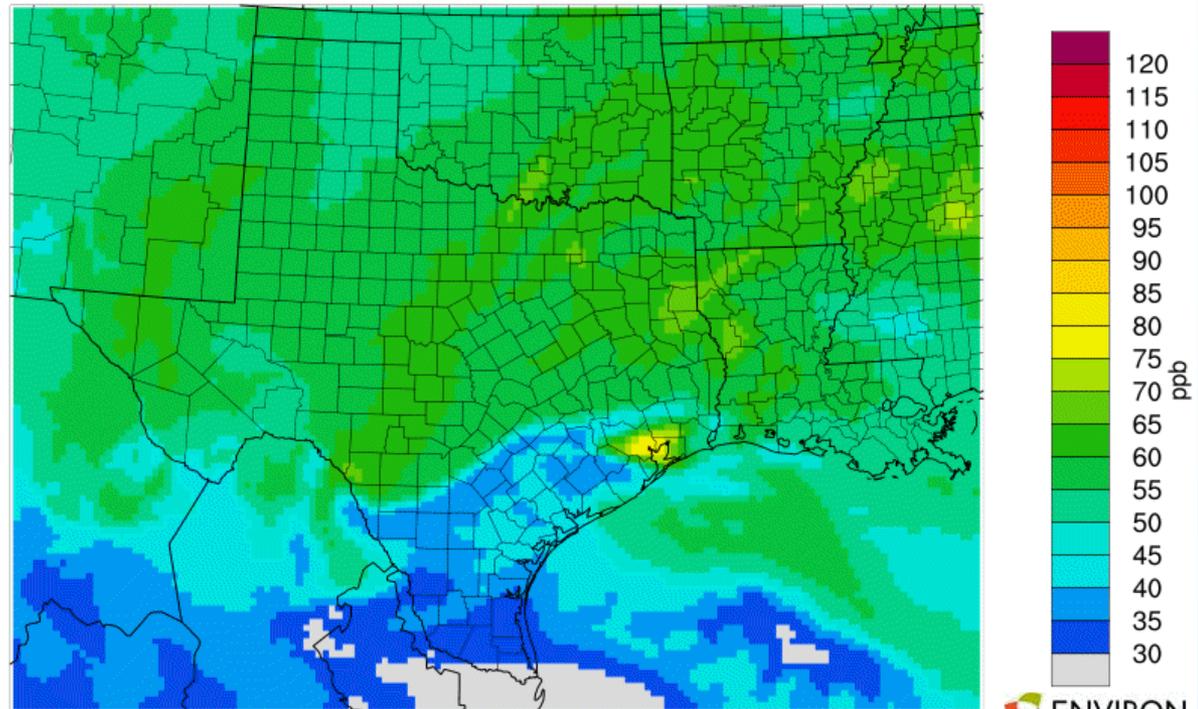
Sat September 7 06:00 CST

*Ozone affected by
strong push from Gulf
towards NW*

* *TCEQ for
Saturday*

Ozone

Best Case: CAMx Layer 14



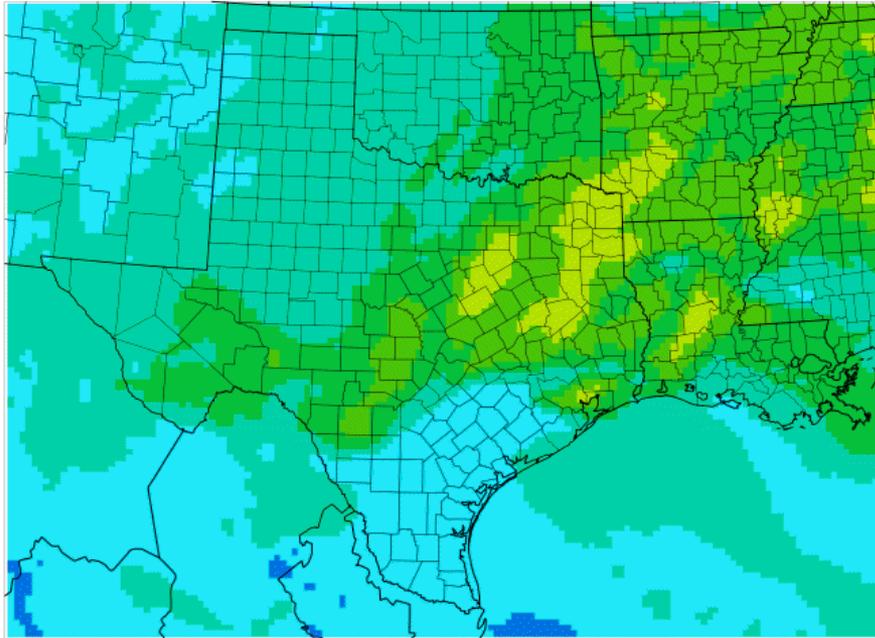
Min(85,3) = 26.2, Max(98,42) = 80.6

Sun September 8 06:00 CST

* *TCEQ: strong winds dilute NO₂ and HCHO also*

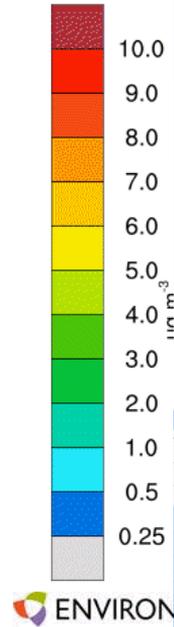
Formaldehyde

Best Case: CAMx Layer 14



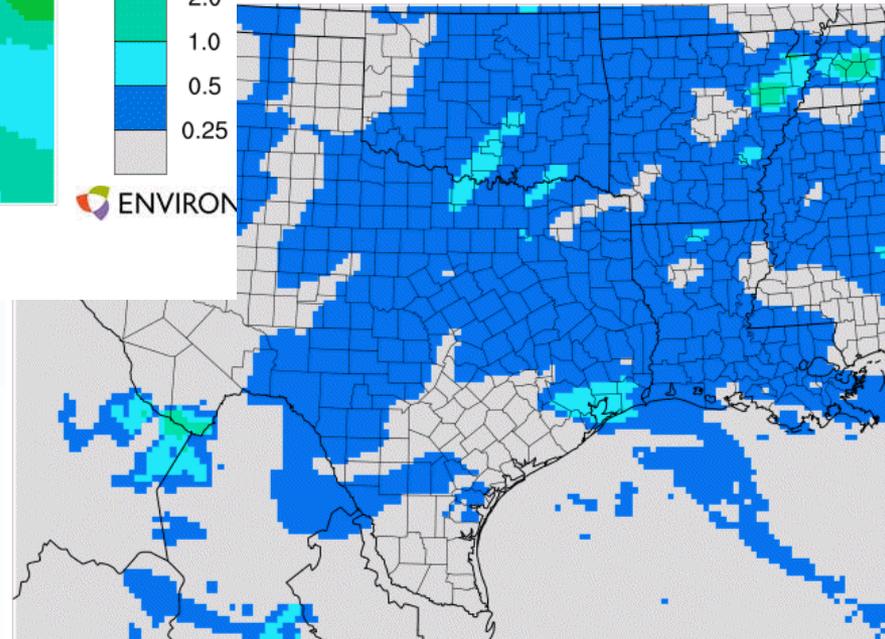
Min(54,2) = 0.4, Max(100,72) = 4.8

Sun September 8 06:00 CST



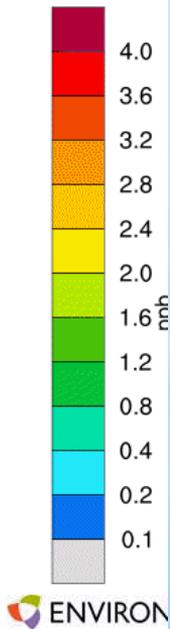
NO₂

Best Case: CAMx Layer 14



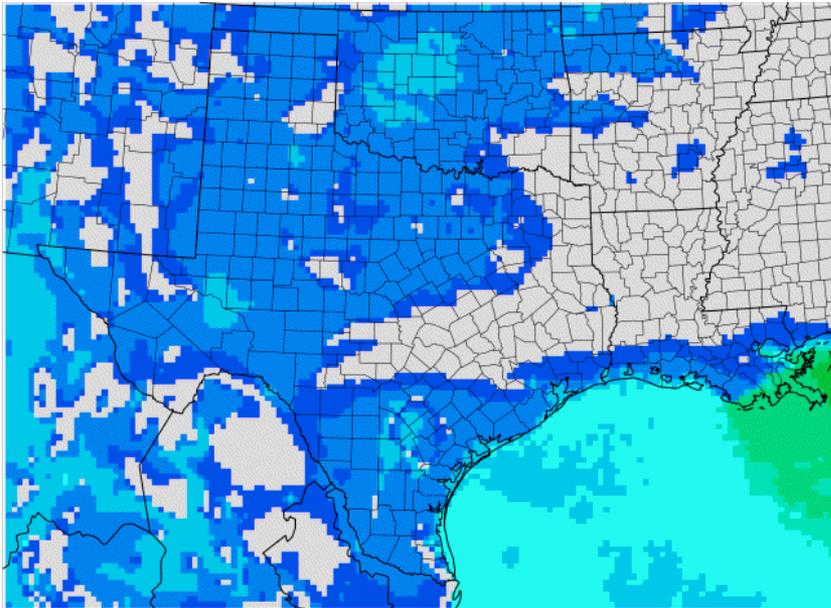
Min(86,2) = 0.0, Max(128,94) = 0.8

Sun September 8 06:00 CST



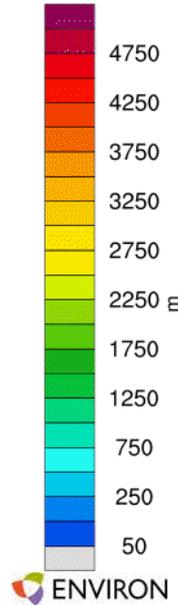
PBL Height

Texas 12km



Min(14,108) = 15.8, Max(148,41) = 1322.0

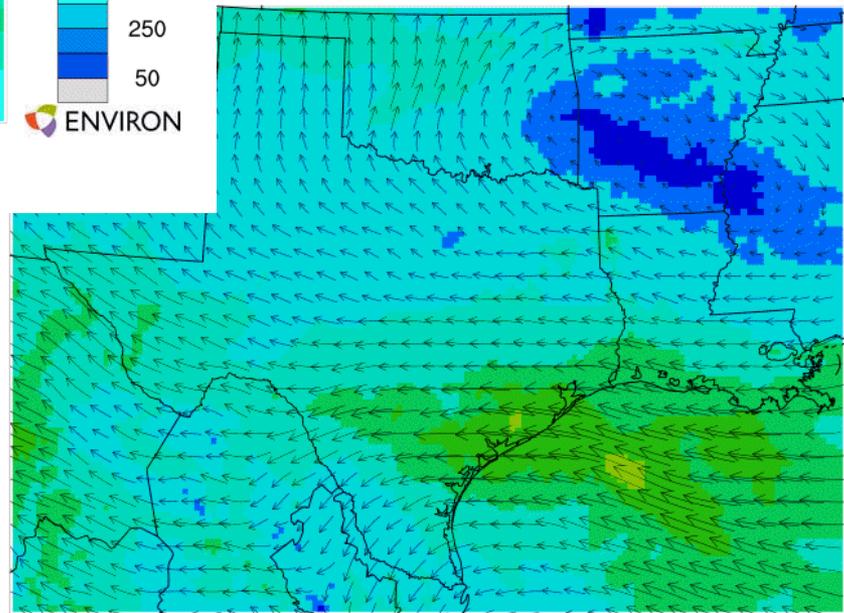
Sun September 8 06:00 CST



Very low PBL heights
for this season

CAMx Layer 14 Winds

Texas 12km

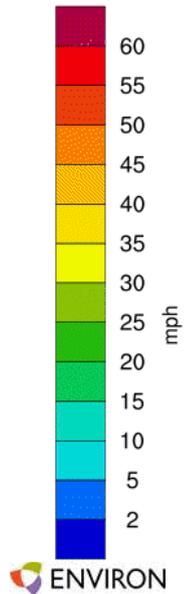


Min(113,84) = 0.2, Max(109,27) = 27.3

Sun September 8 06:00 CST

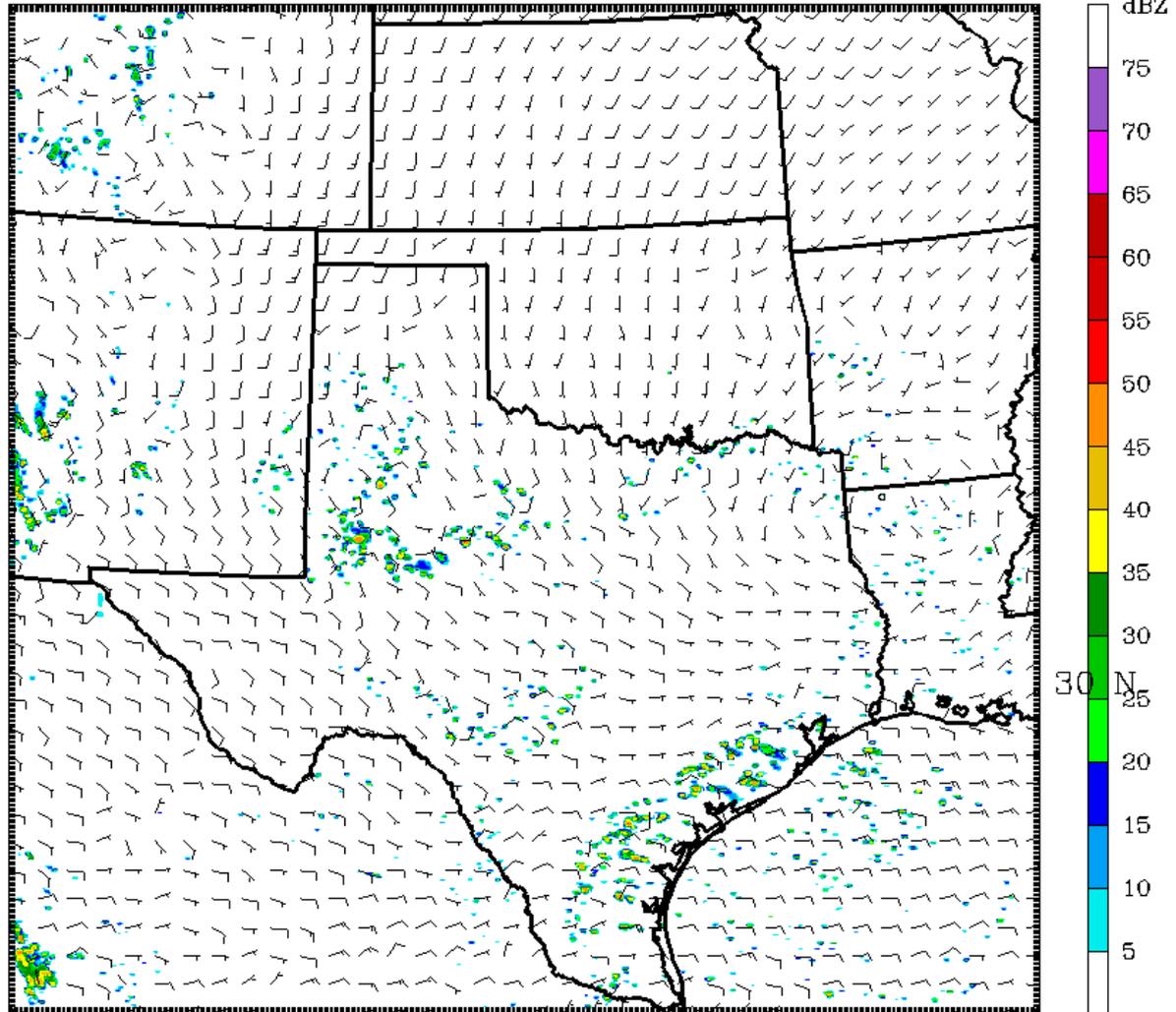


Lower PBL with strong
ventilation by onshore
winds



* **Texas Tech WRF Model for 3 days suggests stronger ventilation, no smog**

WRF 3-KM
Fcst: 14 h
Near Surface Reflectivity (dbZ)
Wind at 10m (full barb = 10kts)
Init: 06 UTC Sat 07 Sep 13
Valid: 20 UTC Sat 07 Sep 13 (15 CDT Sat 07 Sep 13)

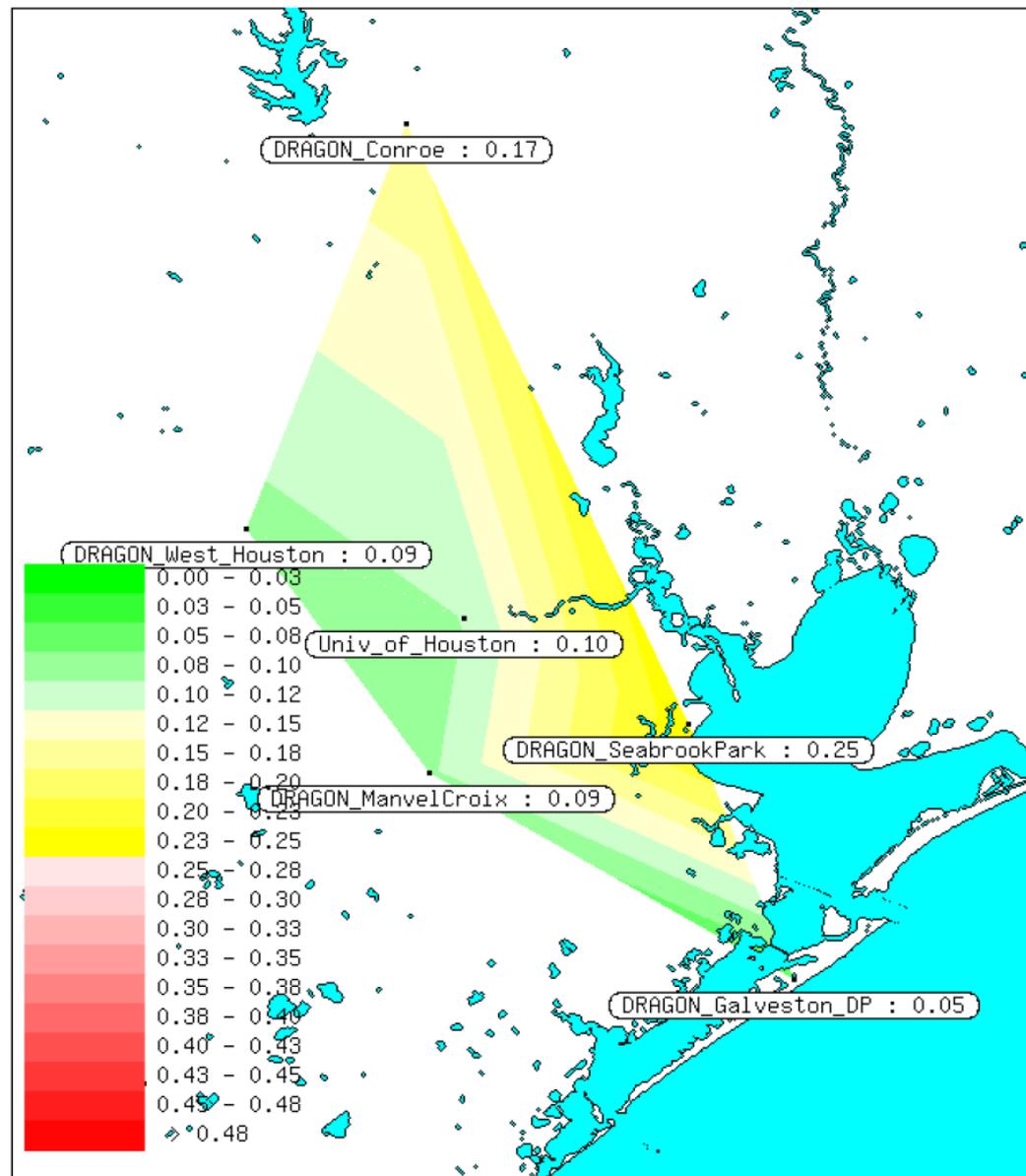


* **Saturday
, Sunday,
Monday**

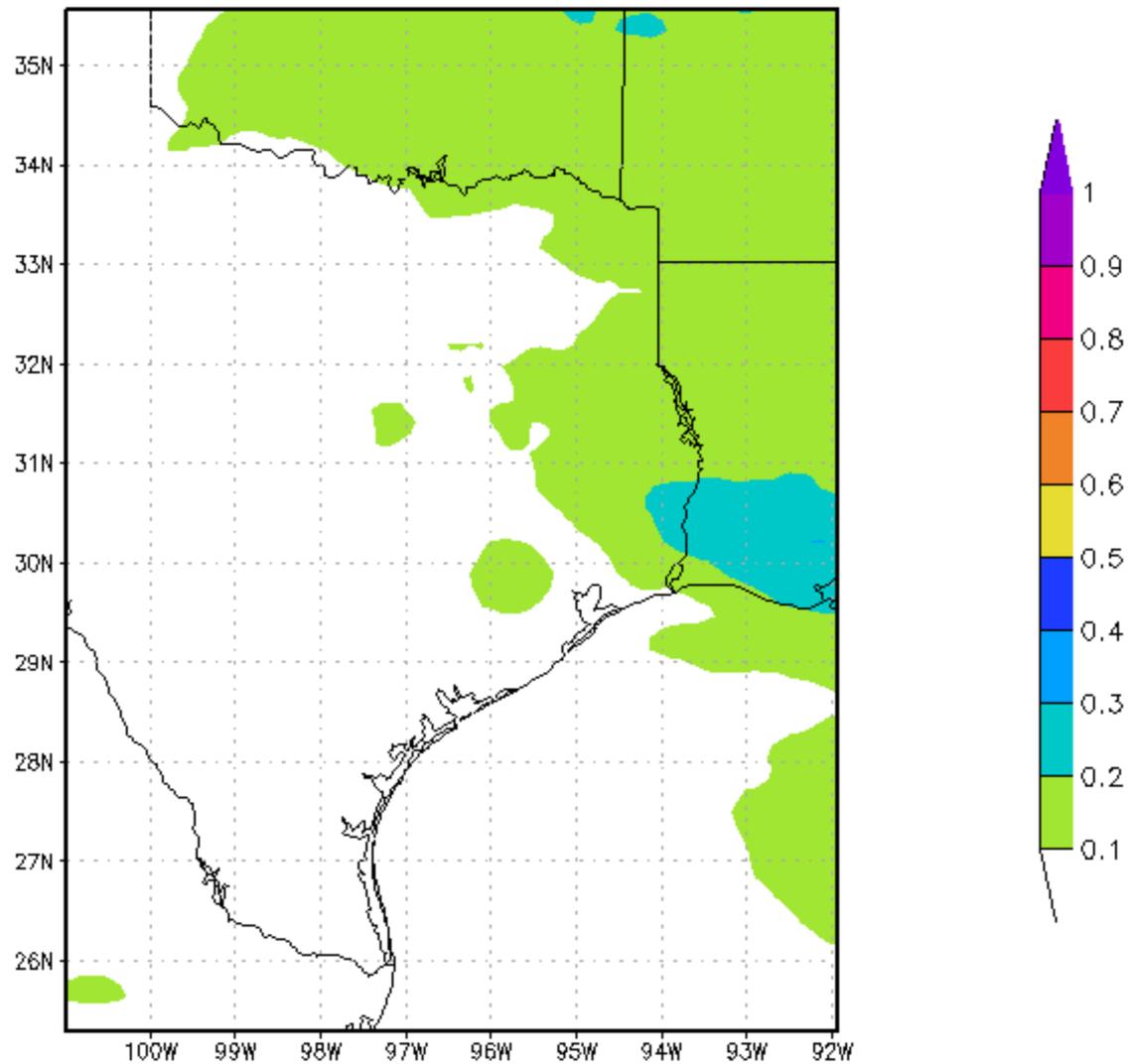
* **Each at
2CDT**

(N 30.5000, W 96.0000)

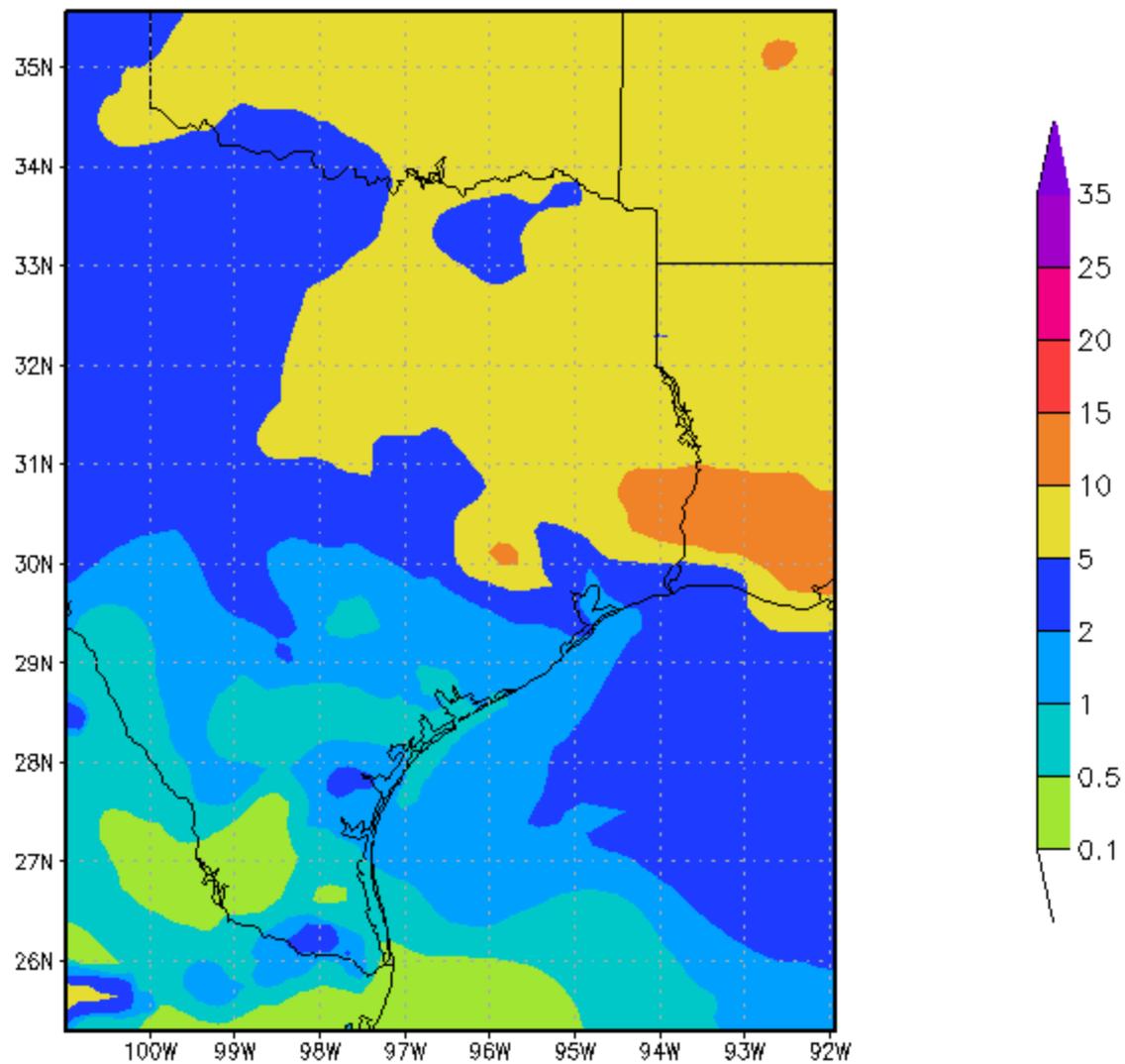
(N 30.5000, W 94.5000)



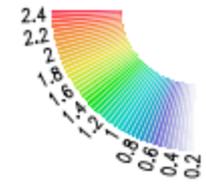
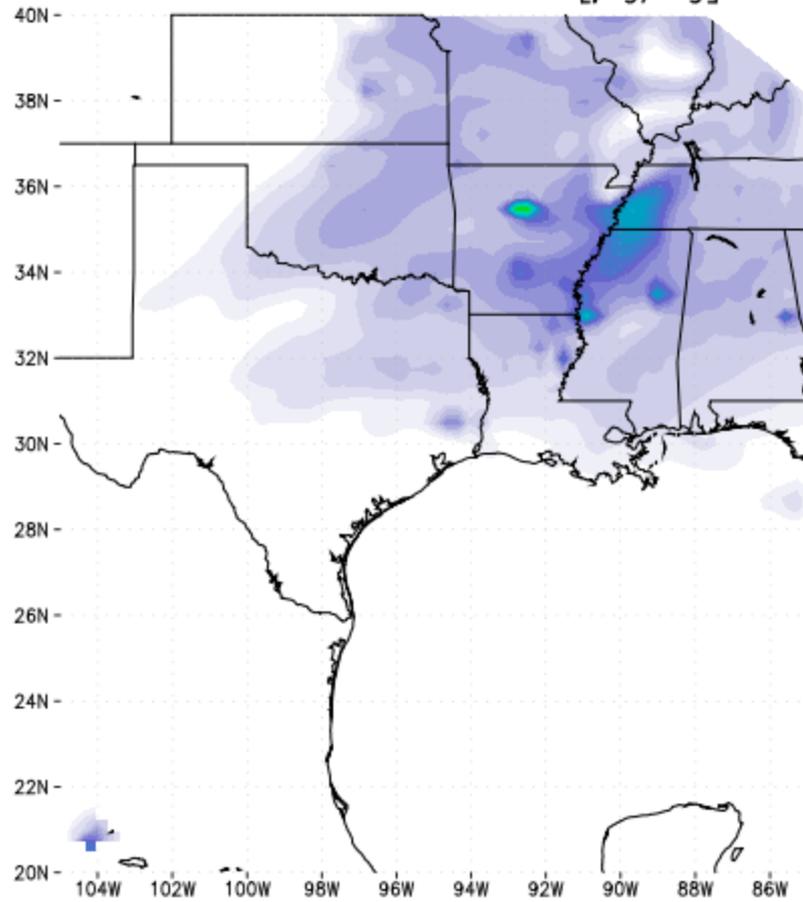
(dev) aot 37H VALID 19Z 08 SEP2013 [dimensionless]



(dev) sfc pm25 40H VALID 22Z 08 SEP2013 [$\mu\text{g}/\text{m}^3$]



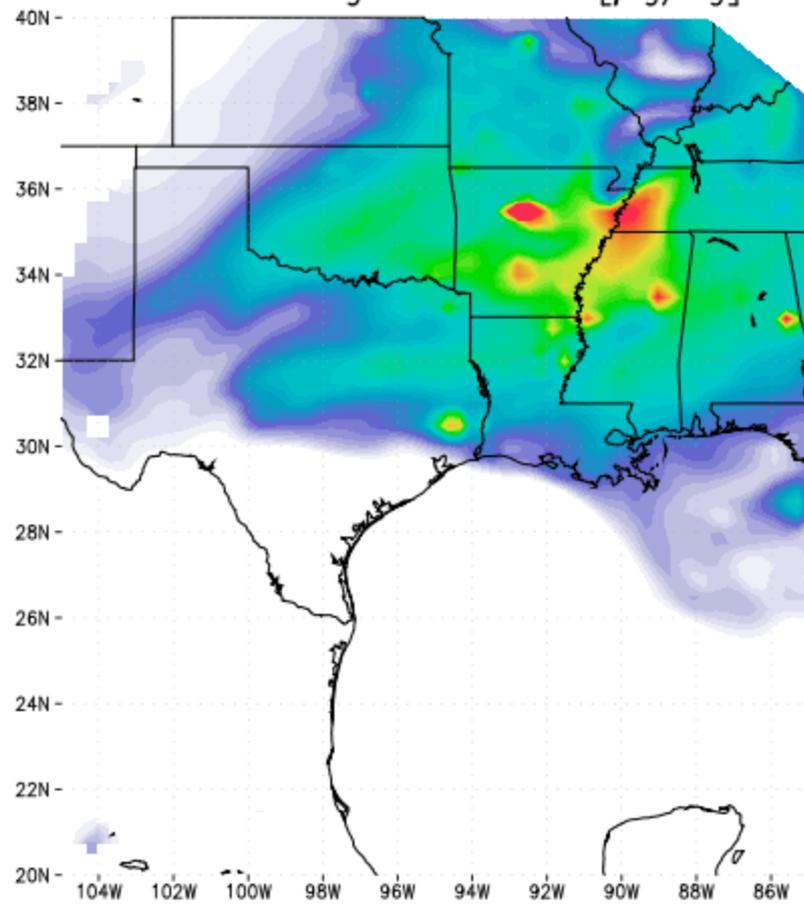
NASA/GMAO - GEOS-5 Forecast Initialized on 06z 2013-09-07
850 hPa Black Carbon [$\mu\text{g}/\text{kg}$]



Valid: Sun 18z 2013-09-08 ($\tau = 36$)

NASA/GMAO - GEOS-5 Forecast Initialized on 06z 2013-09-07

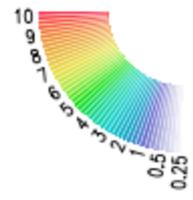
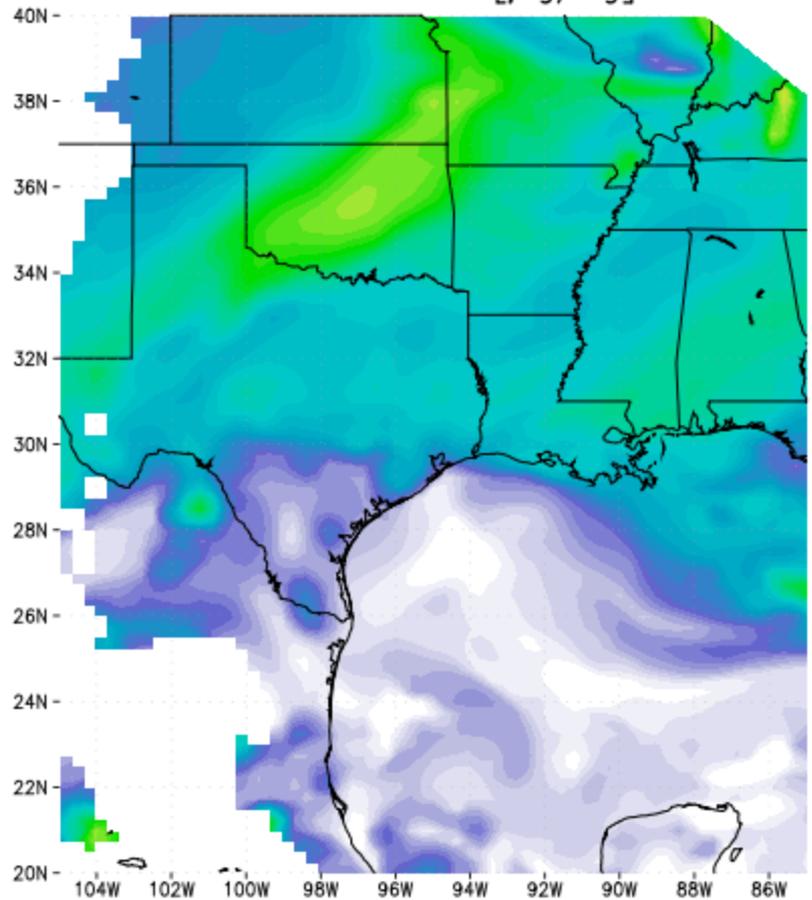
850 hPa Organic Carbon [$\mu\text{g}/\text{kg}$]



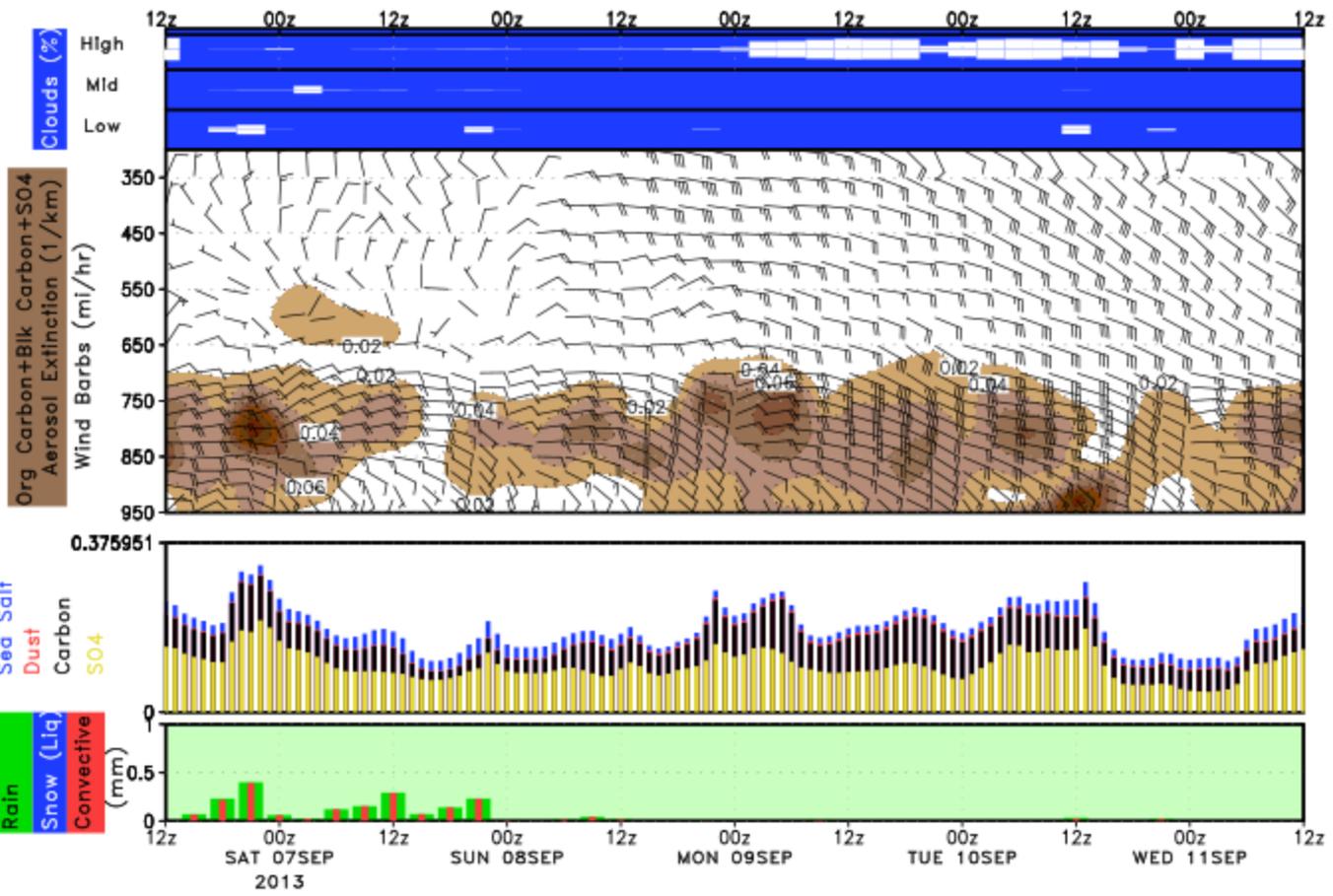
Valid: Sun 18z 2013-09-08 ($\tau = 36$)

NASA/GMAO - GEOS-5 Forecast Initialized on 06z 2013-09-07

850 hPa S04 [$\mu\text{g}/\text{kg}$]



Valid: Sun 18z 2013-09-08 ($\tau = 36$)



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