NOAA/EPA Air Quality Forecast Guidance Feedback

2006 Air Quality Forecast Focus Group

Bill Murphey, Georgia EPD
Nyasha Dunkley, Georgia EPD

Overall Ozone Model Performance

Statistical parameters for 1-hr and 8-hr averaged ozone peaks, forecasted by the NOAA air quality models and observed for Metro Atlanta area during the period of June 21 – August 9, 2006

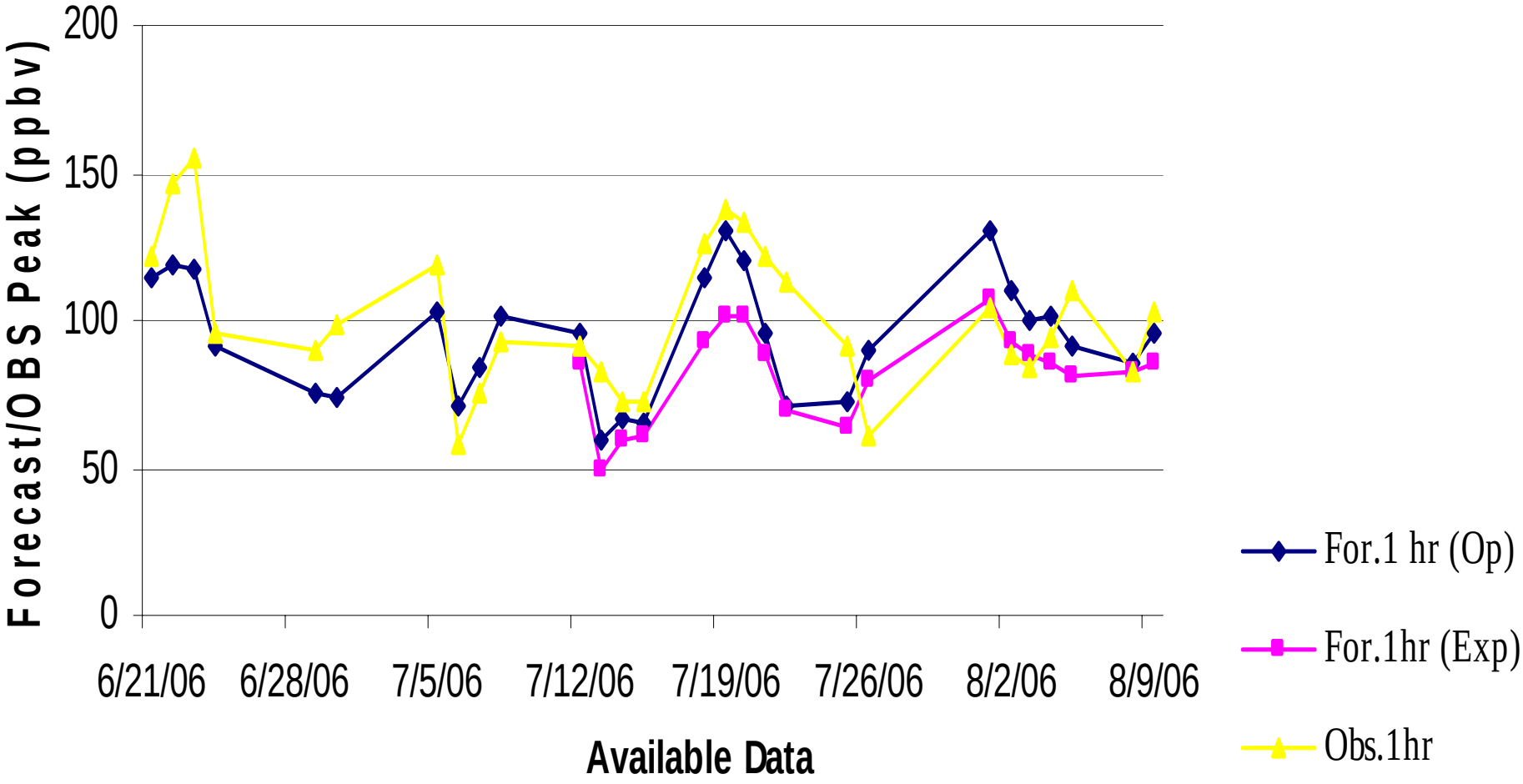
Forecast Type	Mean Forecasted Peak (ppbv)	Mean Observed Peak (ppbv)	Absolute Error	Data Points	Bias	Correlation Coefficient
1-hr. averaged Ozone peak (Exp)	82.1	98.3	19.4	18	-16.2	0.60
1-hr averaged Ozone peak (Op)	94.5	100.9	14.1	28	-6.3	0.69
8-hr averaged Ozone peak (Exp)	70.6	80.5	15.3	18	-9.9	0.62
8-hr. averaged Ozone peak (Op)	82.6	83.5	10.9	28	-0.86	0.73

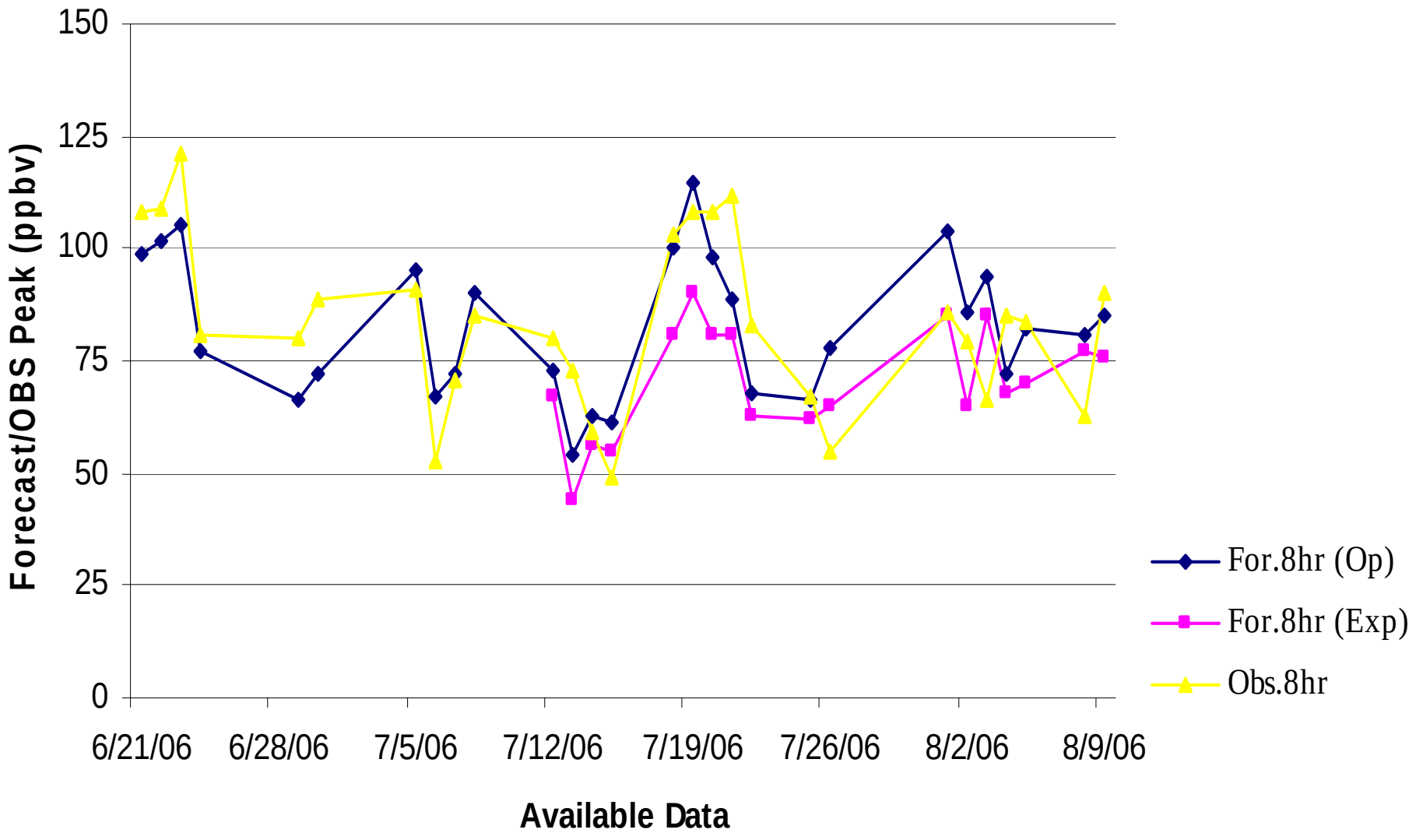
Number of categorical 8-hr ozone NOAA air quality model forecasts v. observations, according to EPA Air Quality Index (AQI), for Metropolitan Atlanta area.

AQI Category	Operational Model (3x) Forecasted AQI Category (6/21/06-8/9/06)	Experimental Model (5x) Forecasted AQI Category (7/9/06-8/9/06)	Total Observed AQI Category (6/21/06-8/9/06)
Good	3	5	5 (4)
Moderate	12	10	10 (7)
Unhealthy for Sensitive Groups	11	3	7 (4)
Unhealthy	2	0	6 (3)
Very Unhealthy	0	0	0

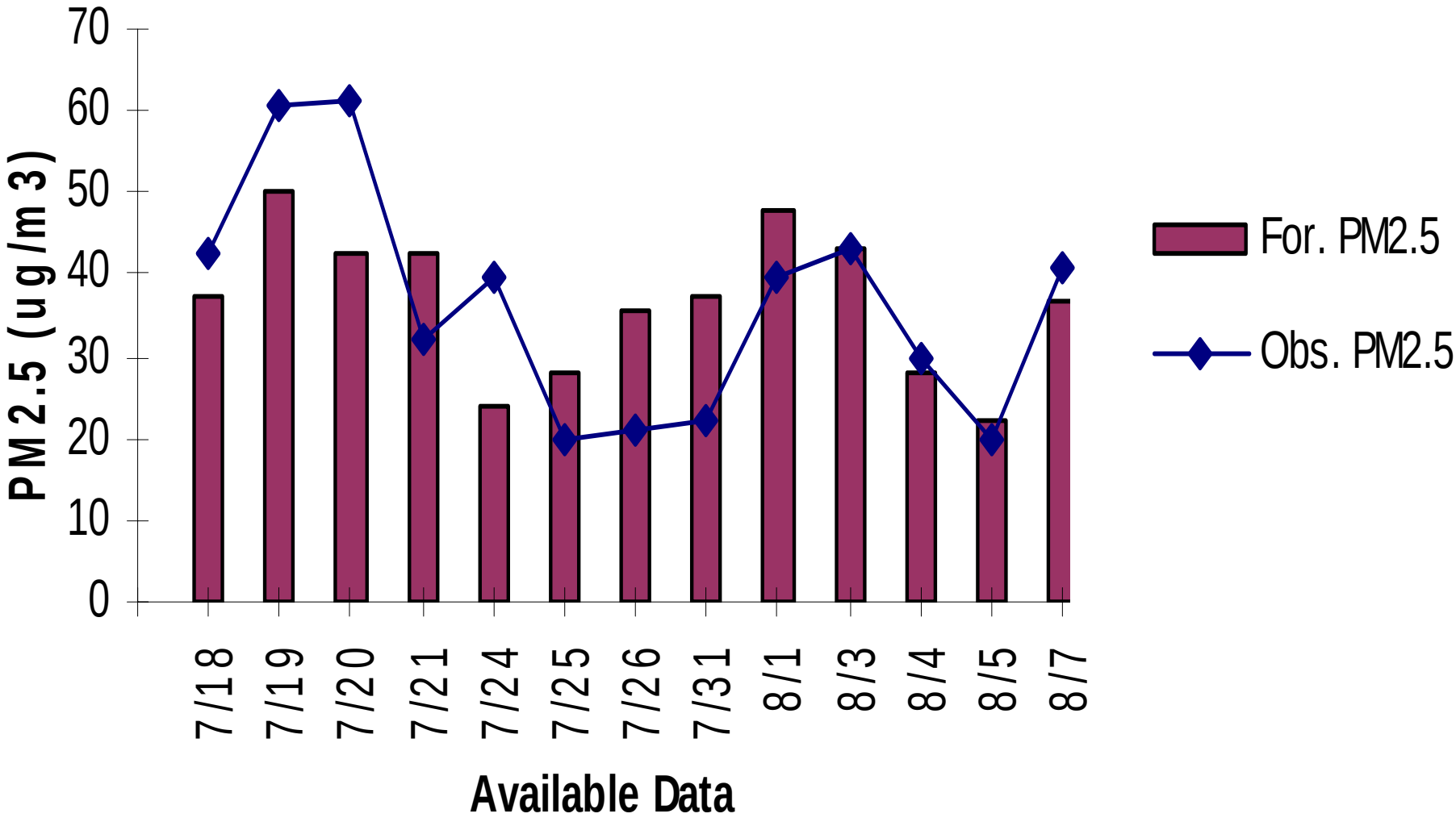
Values in parentheses show observed number just during dates of experimental model data (7/9-8/9)

FORECAST and OBS, 1-hr Average Ozone Peak Forecast vs. Obs, Metro Atlanta, June 21st - August 9th, 2006 (Available Data for Time Period)




FORECAST and OBS, 8-hr Average Ozone Peak Forecast vs. Obs., Metro Atlanta, June 21st - August 9th, 2006 (Available Data for Time Period)
Forecast/OBS Peak (ppbv)
150
125
100
75
50
25
0
6/21/06
6/28/06
7/5/06
7/12/06
7/19/06
7/26/06
8/2/06
8/9/06
Available Data
For.8hr (Op)
For.8hr (Exp)
Obs.8hr

NOAA Forecasted 1-hr Average $PM_{2.5}$ vs. Observed 1-hr Average $PM_{2.5}$ on 2D Field (Available Data)



Case Study

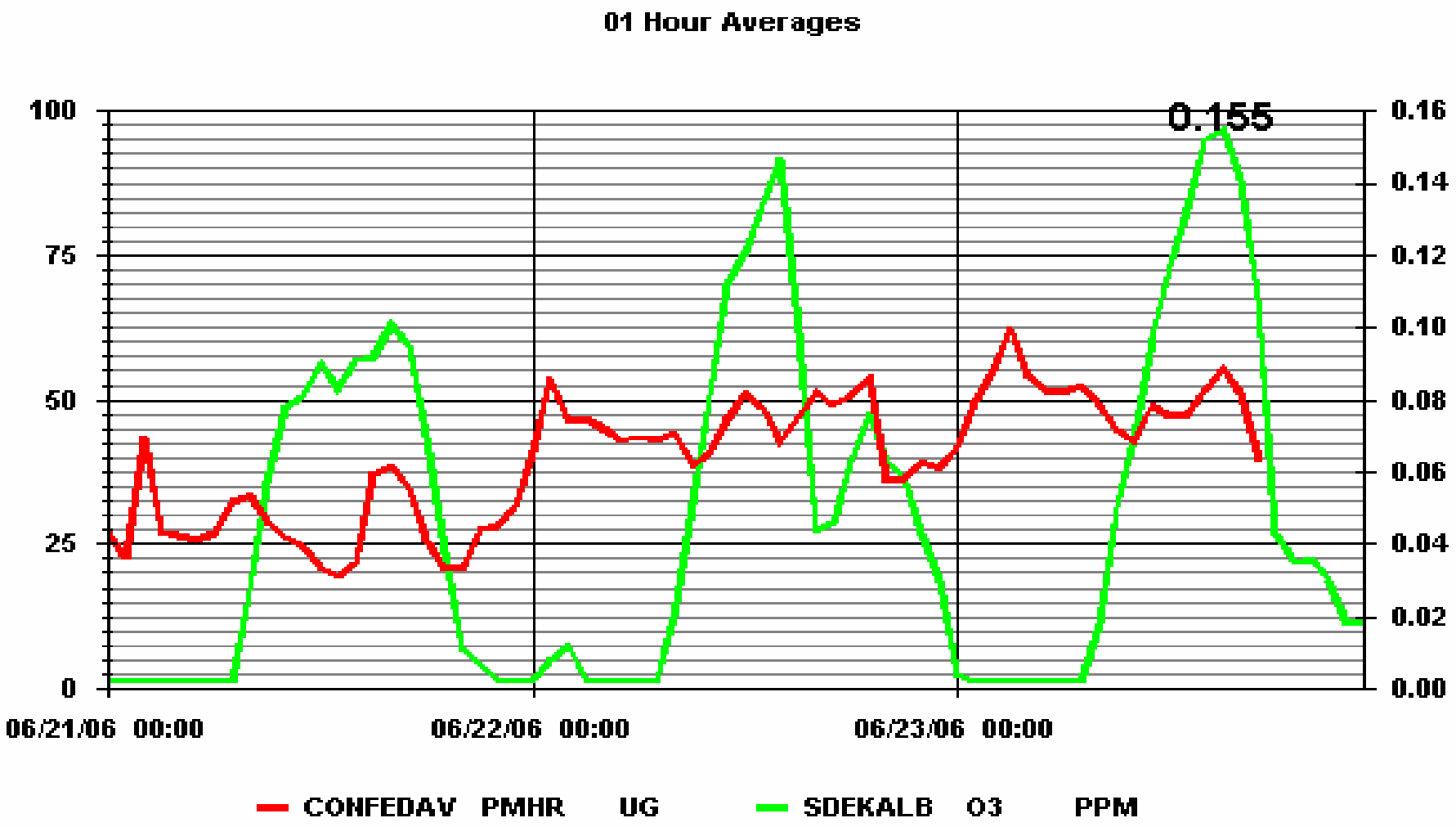
- Atlanta Ozone Episode (June 21,22,23)
- Strong Mid-Atlantic ridging
- Down-slope wind enhanced subsidence (warming, drying, increasing stability, and clearing)
- RUC2/MAPS analysis showed dry stable pocket over north GA.

Atlanta Ozone Episode June 21-23, 2006

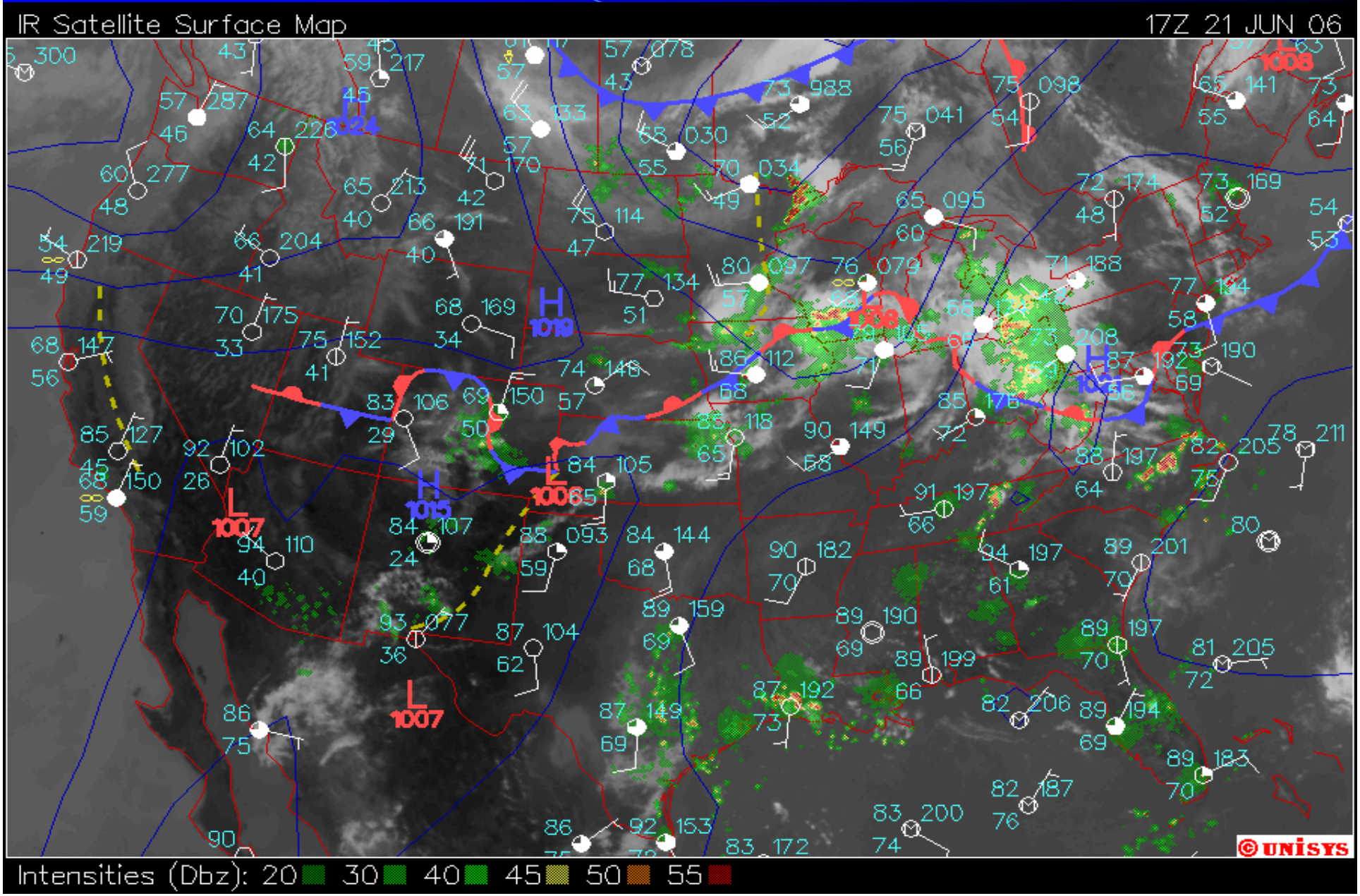
	Model Forecast 1hr.	*Observed 1hr.*	*Model Forecast 8hr.*	*Observed 8hr.*
June 21	**114**	**122**	**99**	**108**
June 22	**119**	**147**	**102**	**109**
June 23	**118**	**155**	**105**	**121**

**Forecasted values from NOAA Operational (3x) ozone model*

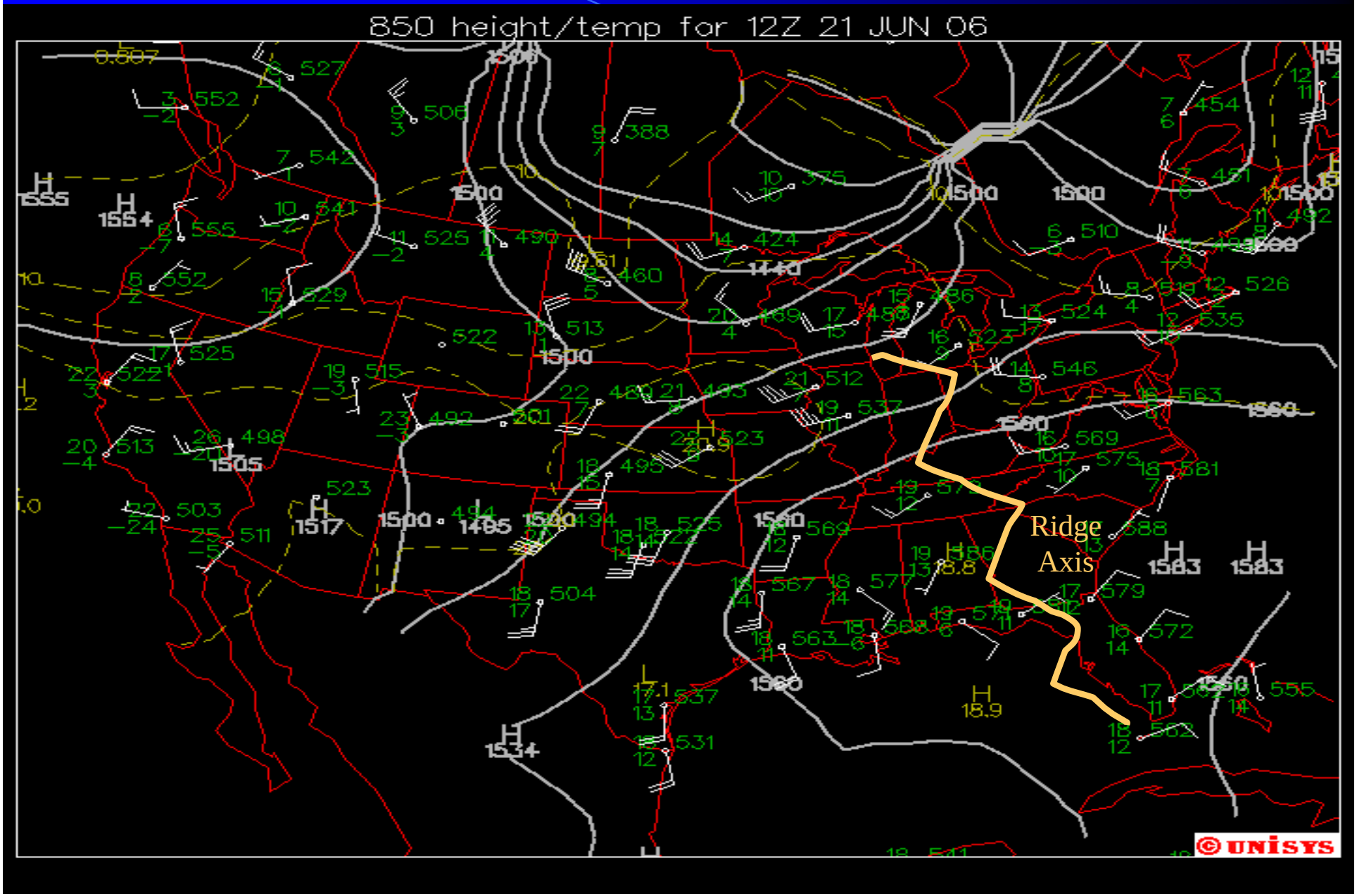
South Dekalb O_3 and Confederate Ave. $PM_{2.5}$



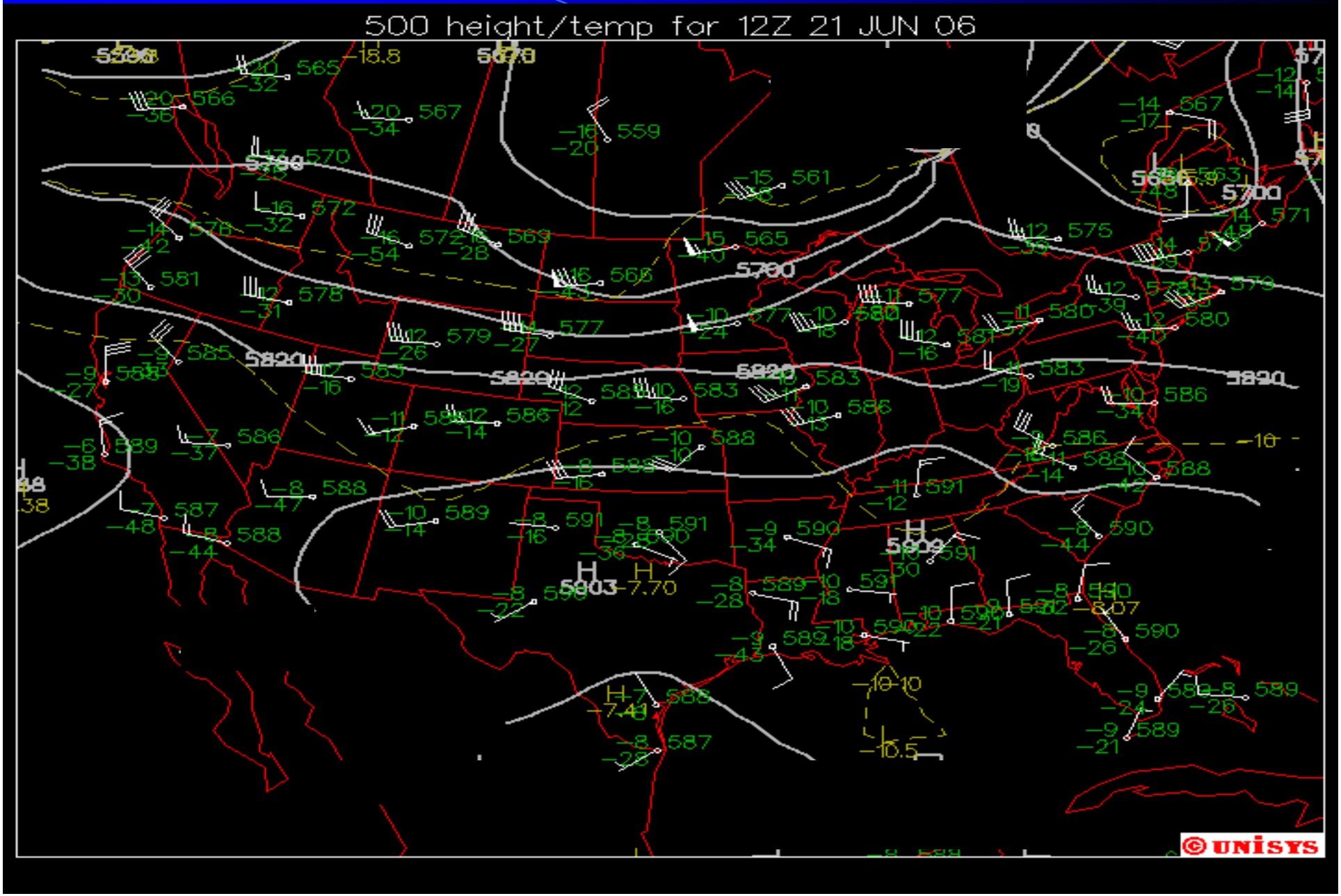
Surface Map (21JUN17Z)



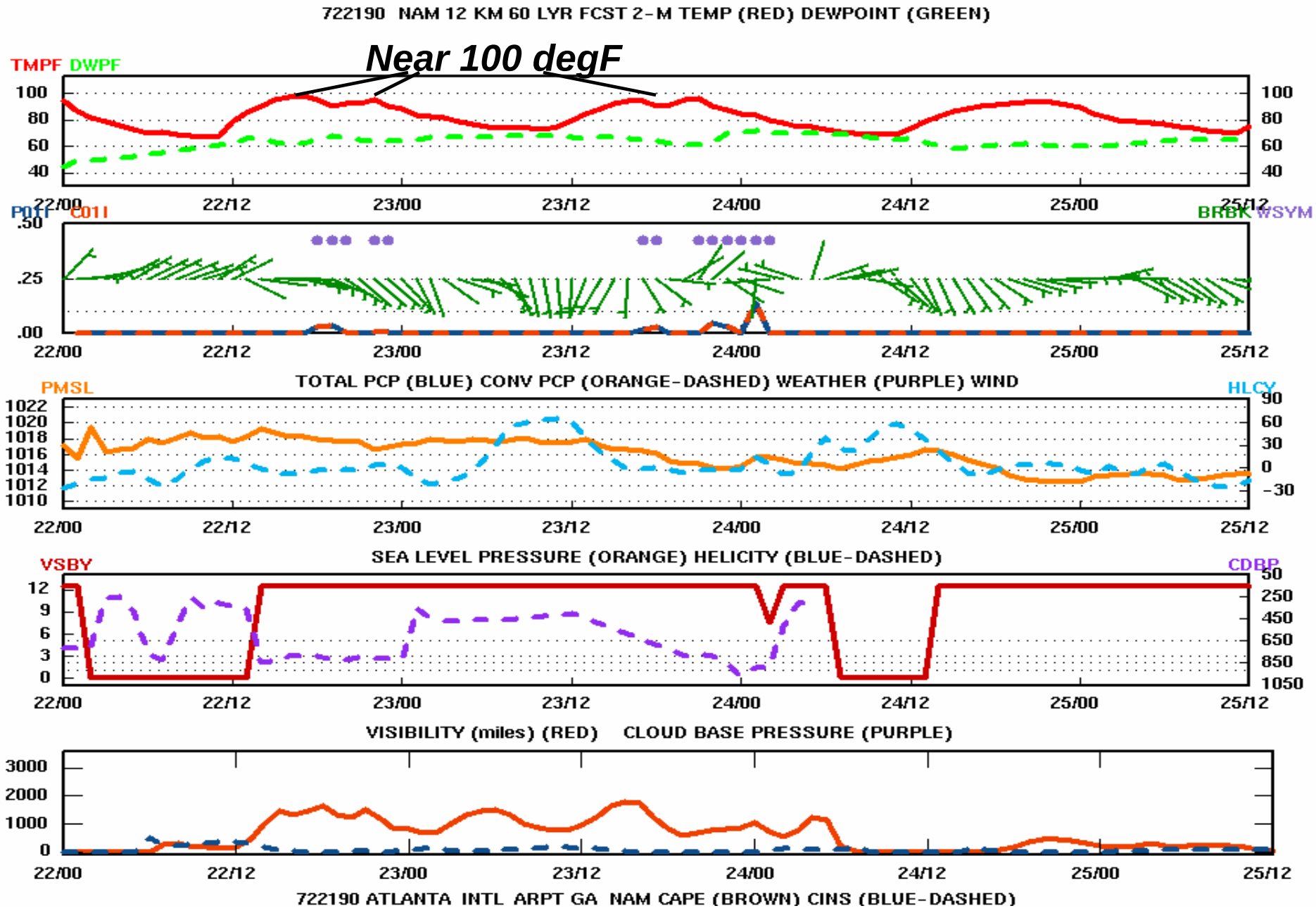
Upper Air - 850 mb (21JUN12Z)



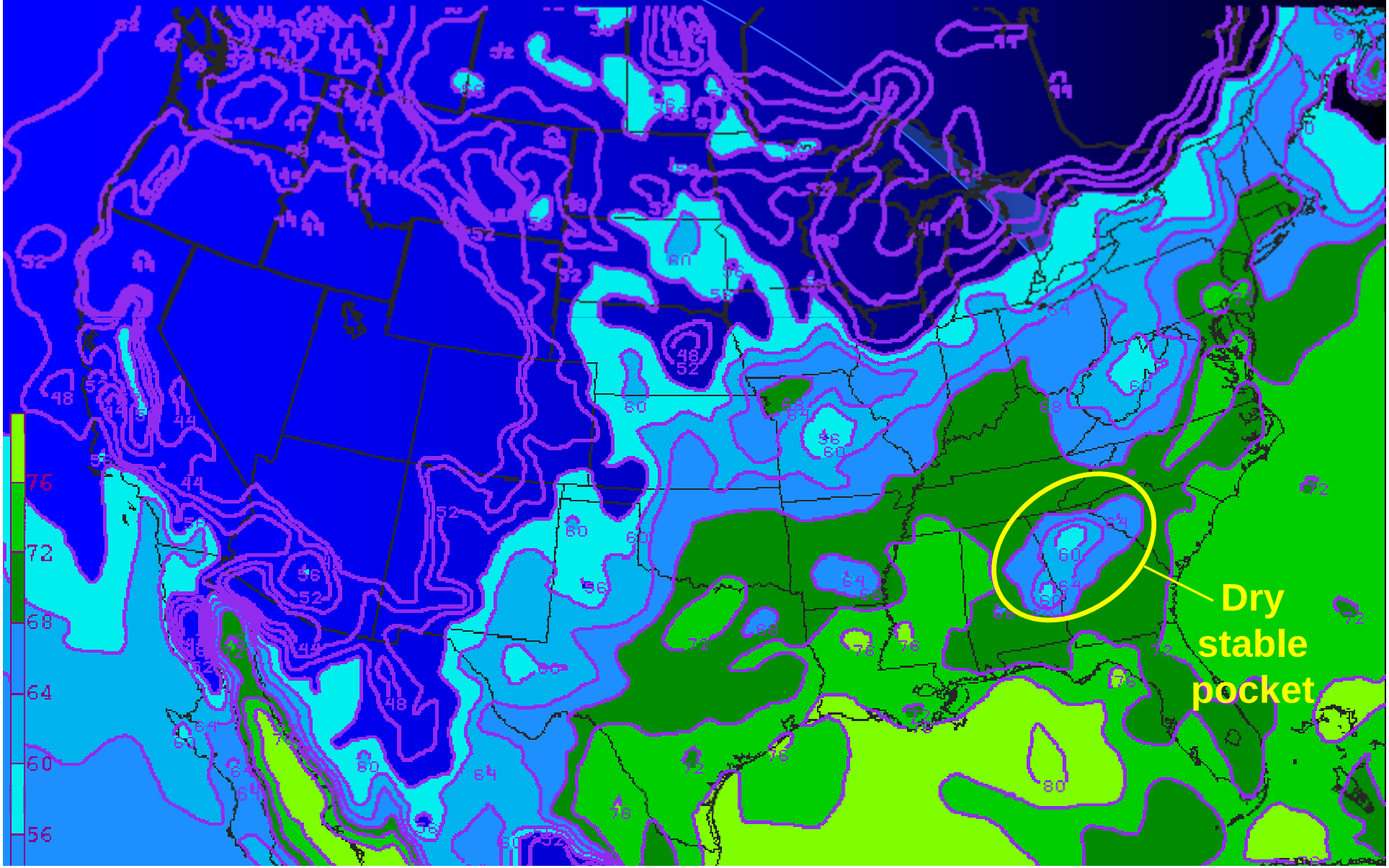
Upper Air - 500 mb (21JUN12Z)



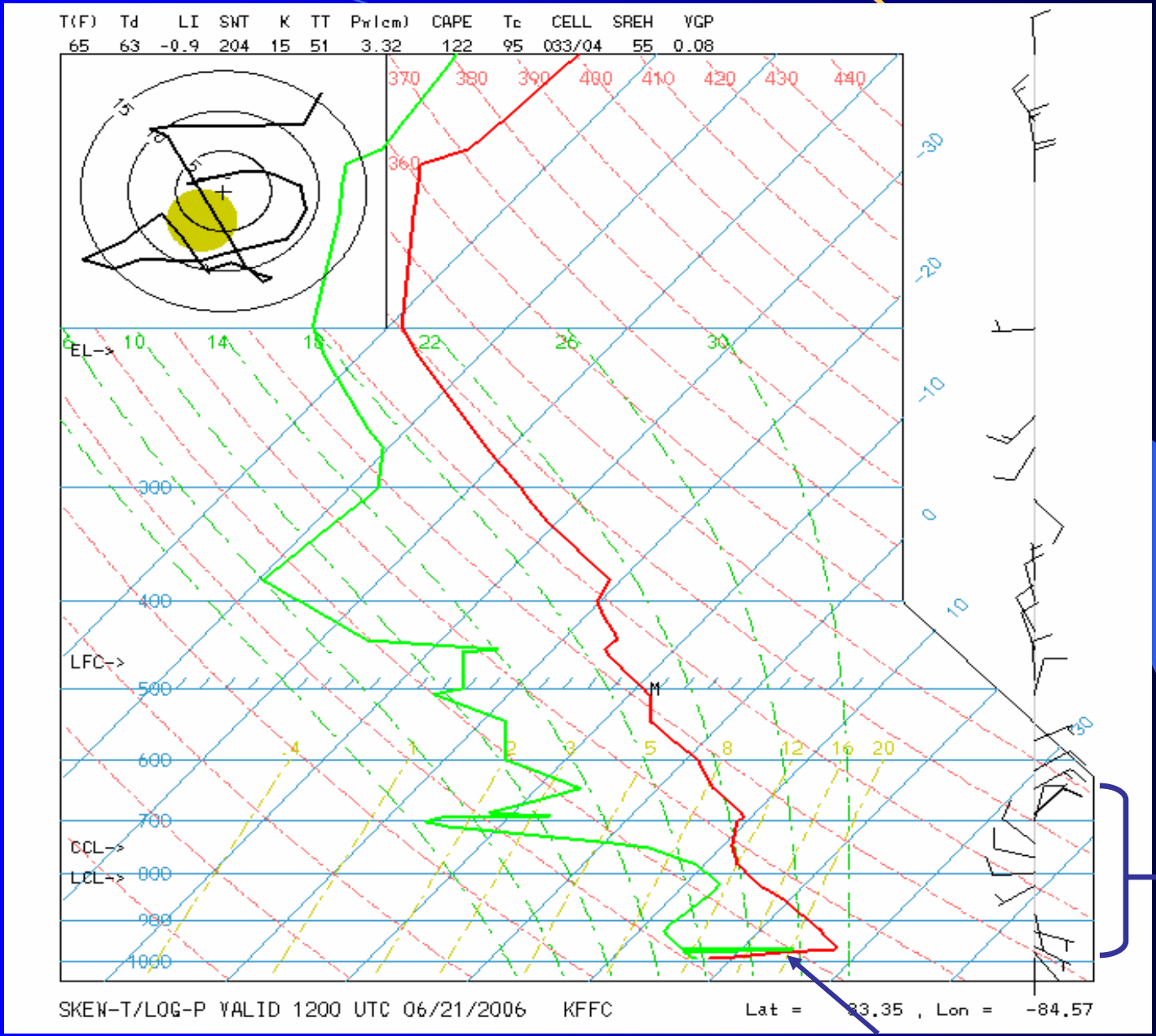
NAM Meteogram



RUC2 ANALYSIS (21JUN16Z)



FFC 12Z Rawinsonde (6/21/06)

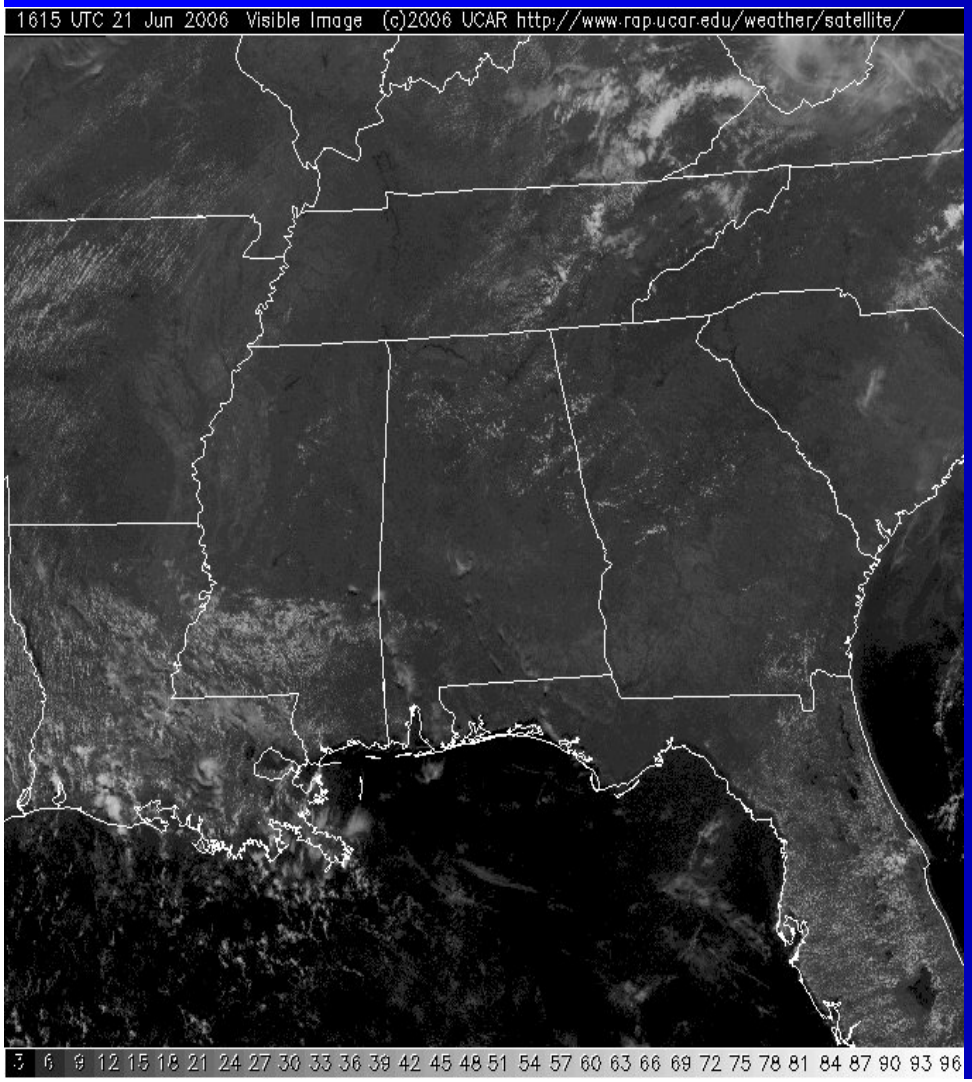


Veering of the winds with height

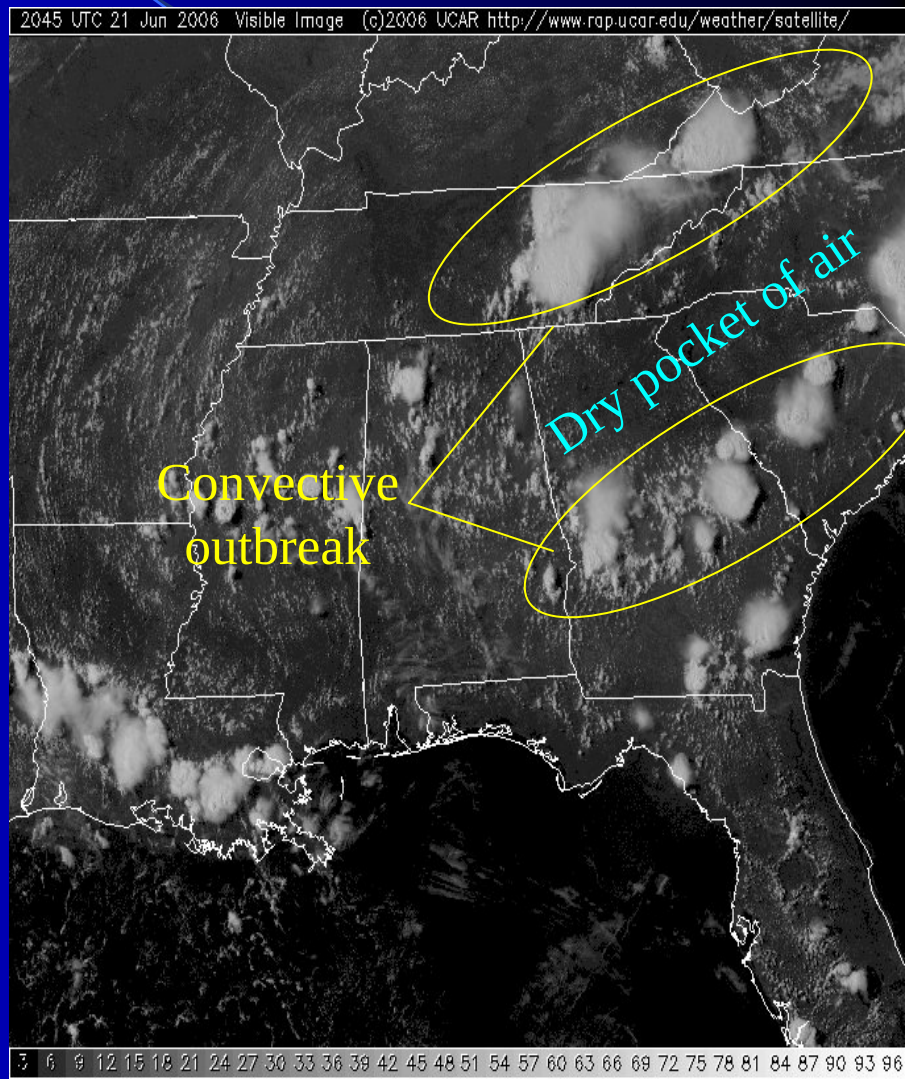
Strong surface inversion

Visible Imagery – June 21st

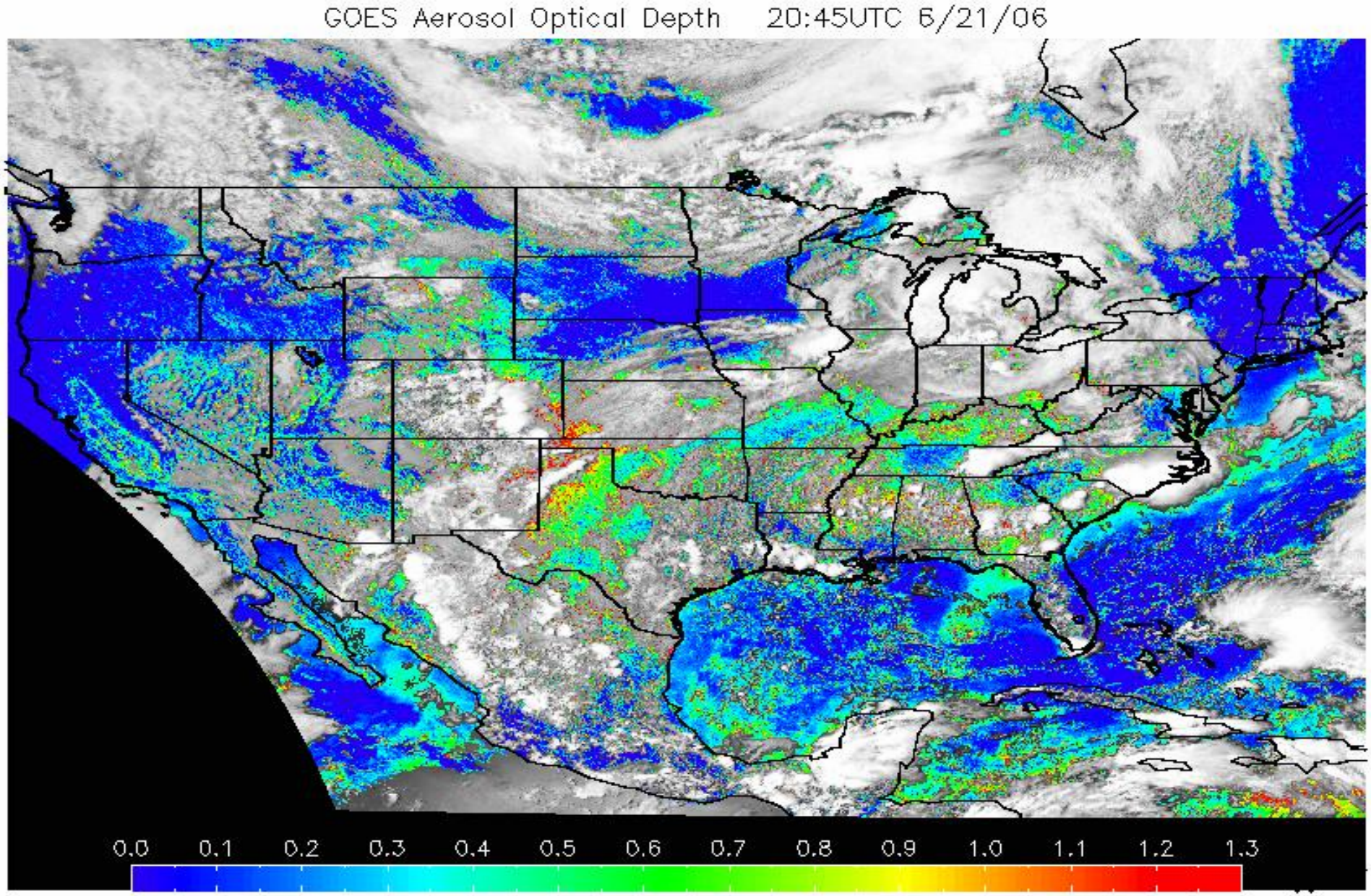
1615z

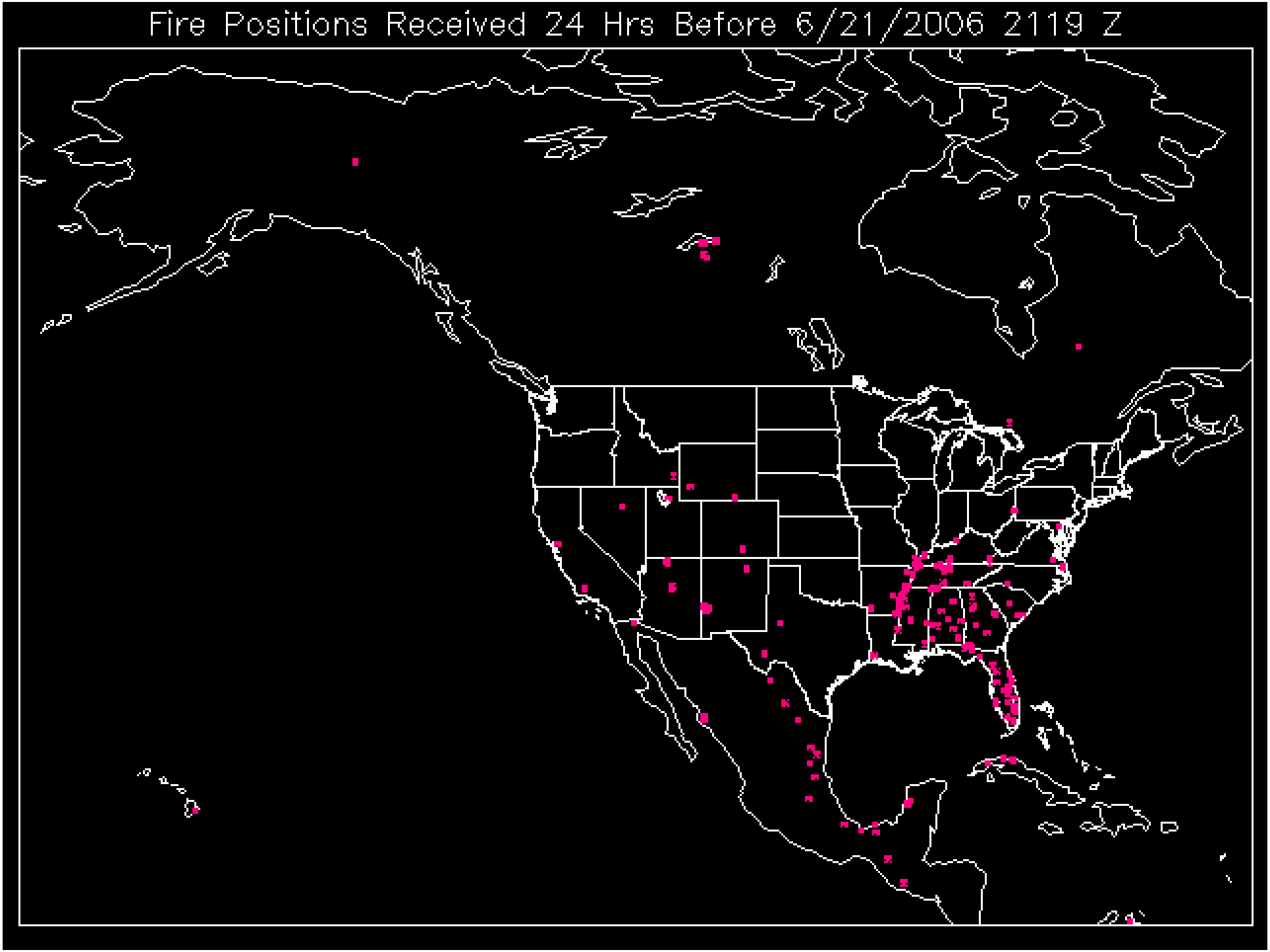


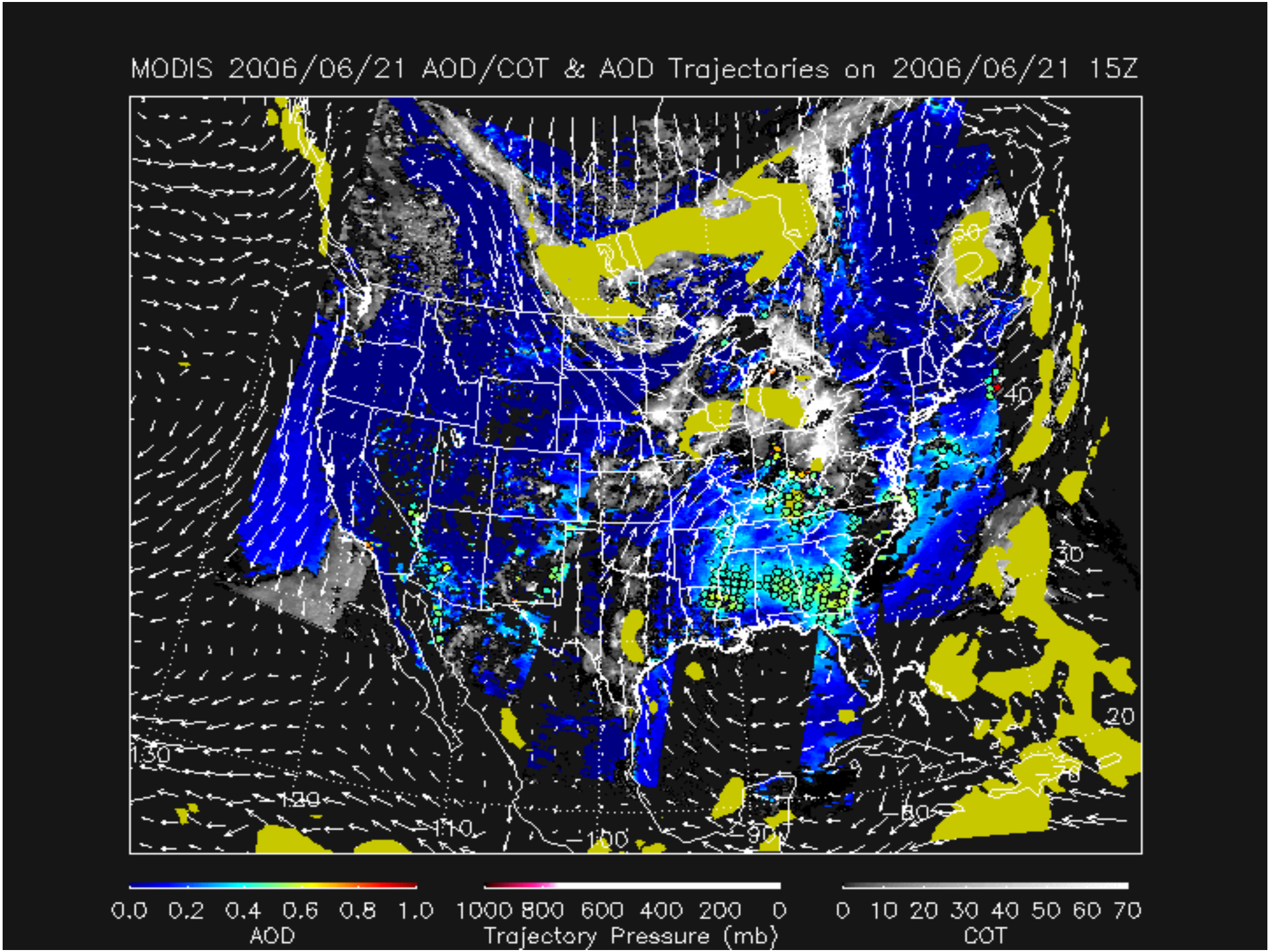
2045z



GOES Aerosol Optical Depth – 21June2045z




Fire Positions Received 24 Hrs Before 6/21/2006 2119 Z


MODIS 2006/06/21 AOD/COT & AOD Trajectories on 2006/06/21 15Z
0.0 0.2 0.4 0.6 0.8 1.0
AOD
1000 800 600 400 200 0
Trajectory Pressure (mb)
0 10 20 30 40 50 60 70
COT

Summary

1. NOAA Experimental Model (5x) under predicted both 1-hr and 8-hr ozone peak values.
2. NOAA Operational Model (3x) performed fairly well with 8-hr ozone peak forecasts, though it tended to under predict high ozone episodes (ex. June 21-23)
3. $PM_{2.5}$ model showed improvement in the month of August for 1-hr averaged $PM_{2.5}$ values.
4. GFS had convective feedback problems.
5. NAM 850mb temps better than GFS on case study.
6. RUC2/MAPS handled low-level RH well for north GA for case study.