

NOAA/EPA Air Quality Forecast Guidance Feedback

2007 Air Quality Forecast Focus Group

**Bill Murphey, Georgia EPD
Nyasha Dunkley, Georgia EPD**

Overall Ozone Model Performance

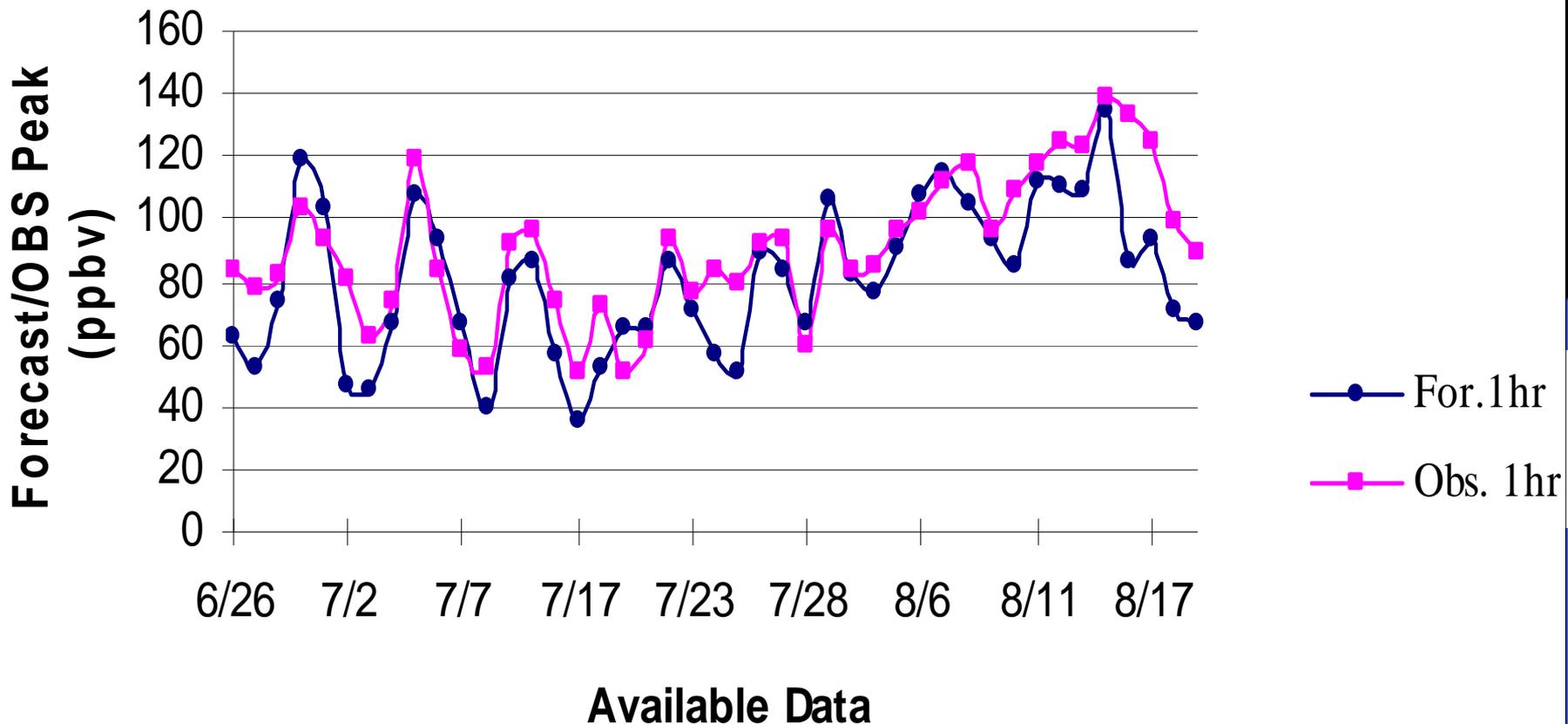
Statistical parameters for 1-hr and 8-hr averaged ozone peaks, forecasted by the NOAA air quality experimental model and observed for Metro Atlanta area during the period of June 26 – August 19, 2007

Forecast Type	Mean Forecasted Peak (ppbv)	Mean Observed Peak (ppbv)	Absolute Error	Data Points	Bias	Correlation Coefficient
1-hr. averaged Ozone peak (Exp)	80.7	90.5	13.8	43	-9.8	0.82
8-hr averaged Ozone peak (Exp)	71.4	75.5	10.7	43	-4.0	0.80

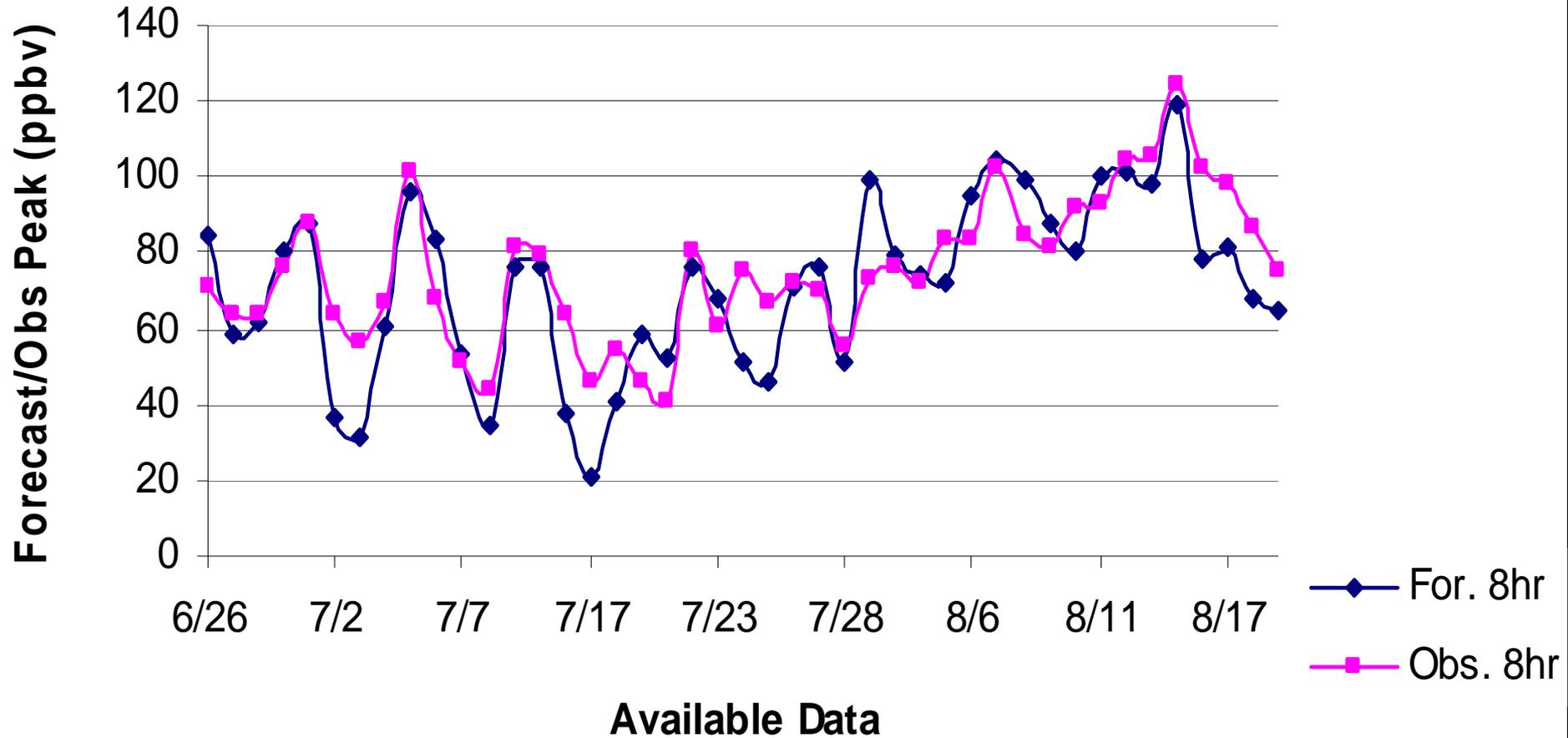
Number of categorical 8-hr ozone NOAA air quality model forecasts v. observations, according to EPA Air Quality Index (AQI), for Metropolitan Atlanta area for the period of June 26 – August 19, 2007

AQI Category	Experimental Model Forecasted AQI Category	Observed AQI Category
Good	15	13
Moderate	16	18
Unhealthy for Sensitive Groups	10	9
Unhealthy	2	3
Very Unhealthy	0	0

**FORECAST and OBS, 1-hr Average Ozone Peak Forecast vs.
Obs, Metro Atlanta, June 26th-Aug. 19th, 2007
(Available data for time period)**



**FORECAST and OBS, 8-hr Average Ozone Peak Forecast vs Obs.
Metro Atlanta, June 26th - Aug.19th, 2007
(Available data for time period)**



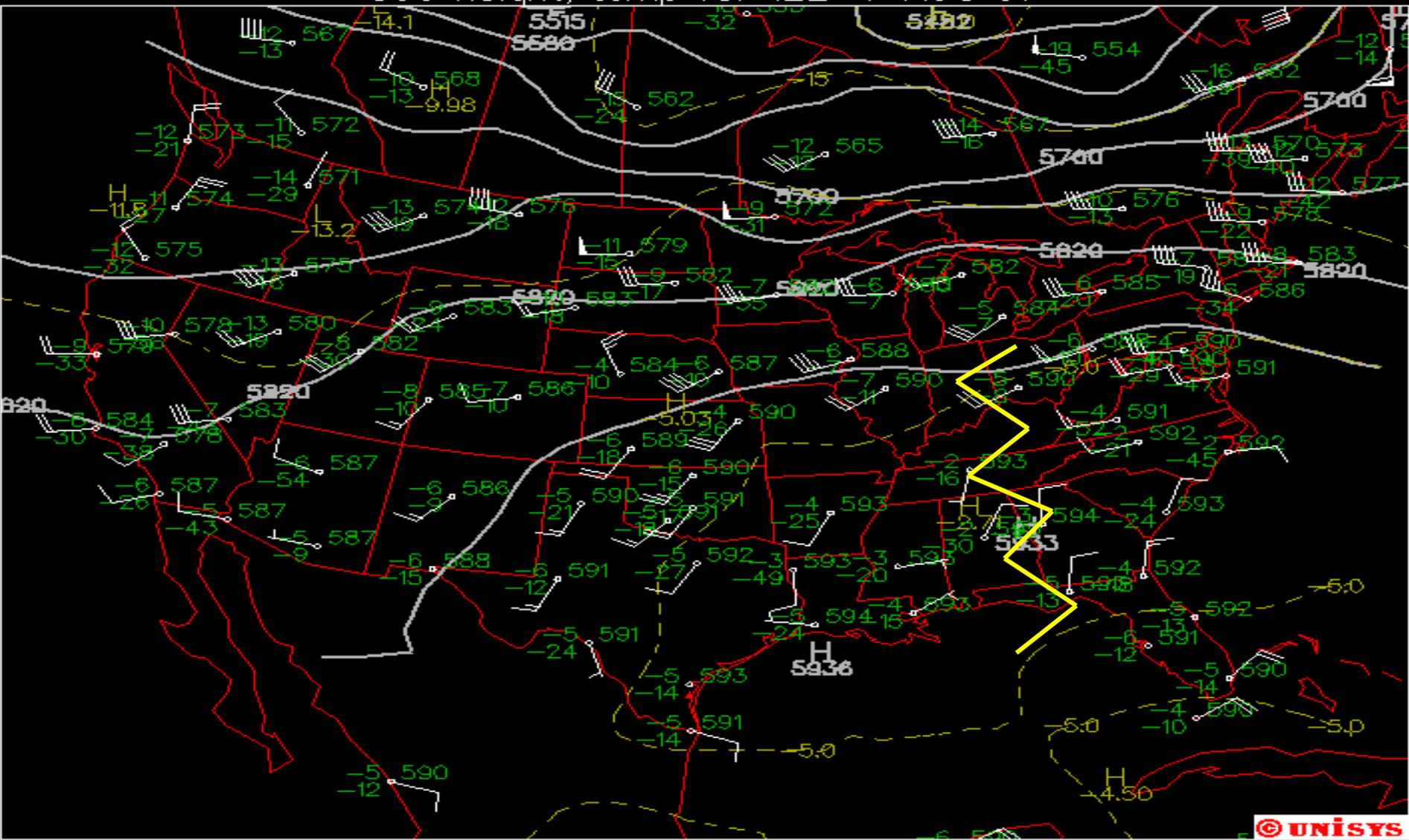
Summer “Heat Wave” Episode - *August 6th – 19th, 2007*

Prevailing Synoptic Pattern:

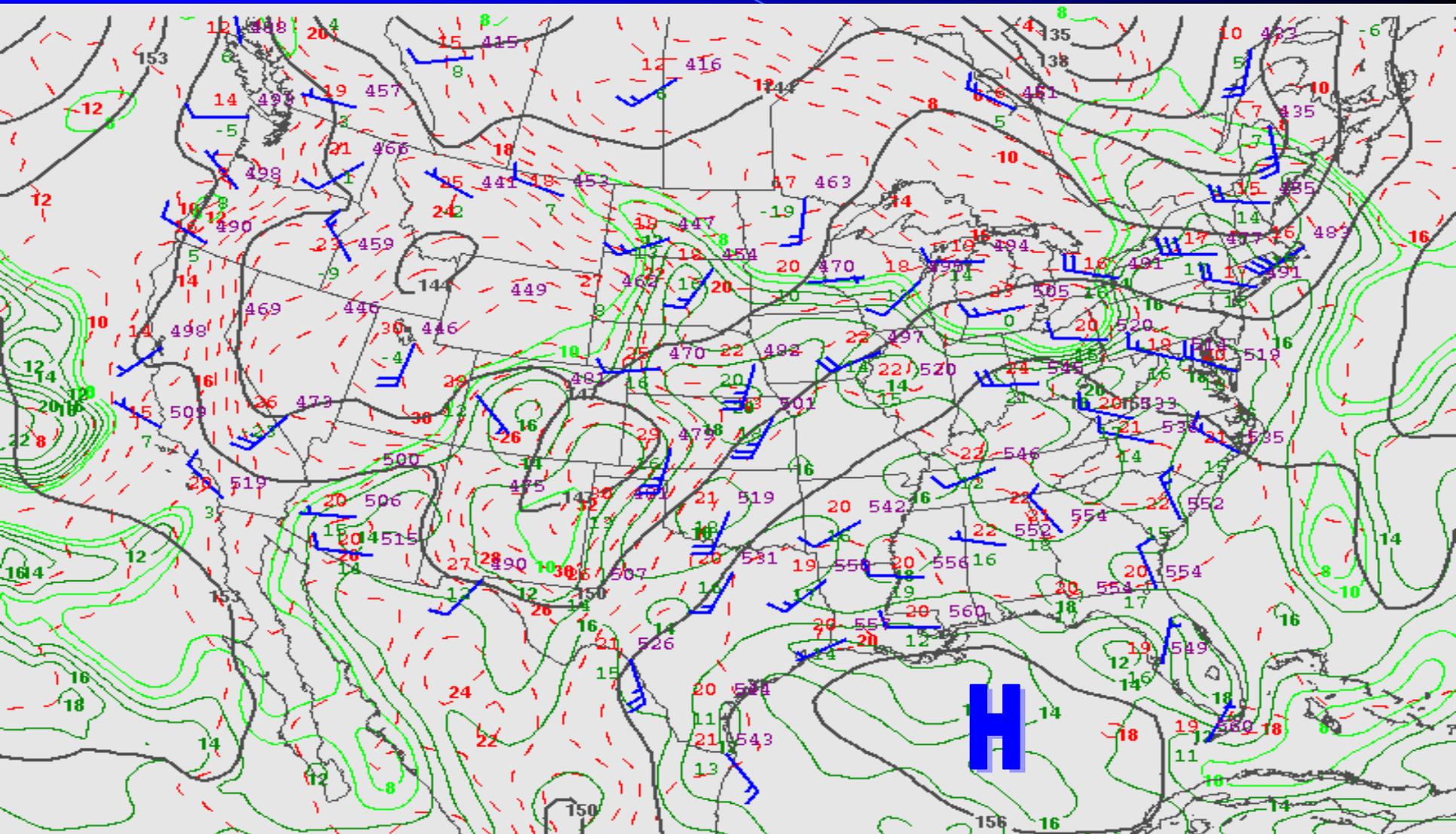
- Strong upper level ridge over southern US with midlevel Gulf ridge over the southeast
- Position of Gulf Surface High relative to upper ridge axis determined if there would be moist return flow from the Gulf (lower ozone values), or the Gulf would be cutoff, giving north GA more of a dry NW downslope flow (higher ozone values)
- Elevated residual ozone along with dry, stable conditions aided in multiple orange and red AQI events

Predominant Upper Air Feature

500 height/temp for 12Z 7 AUG 07

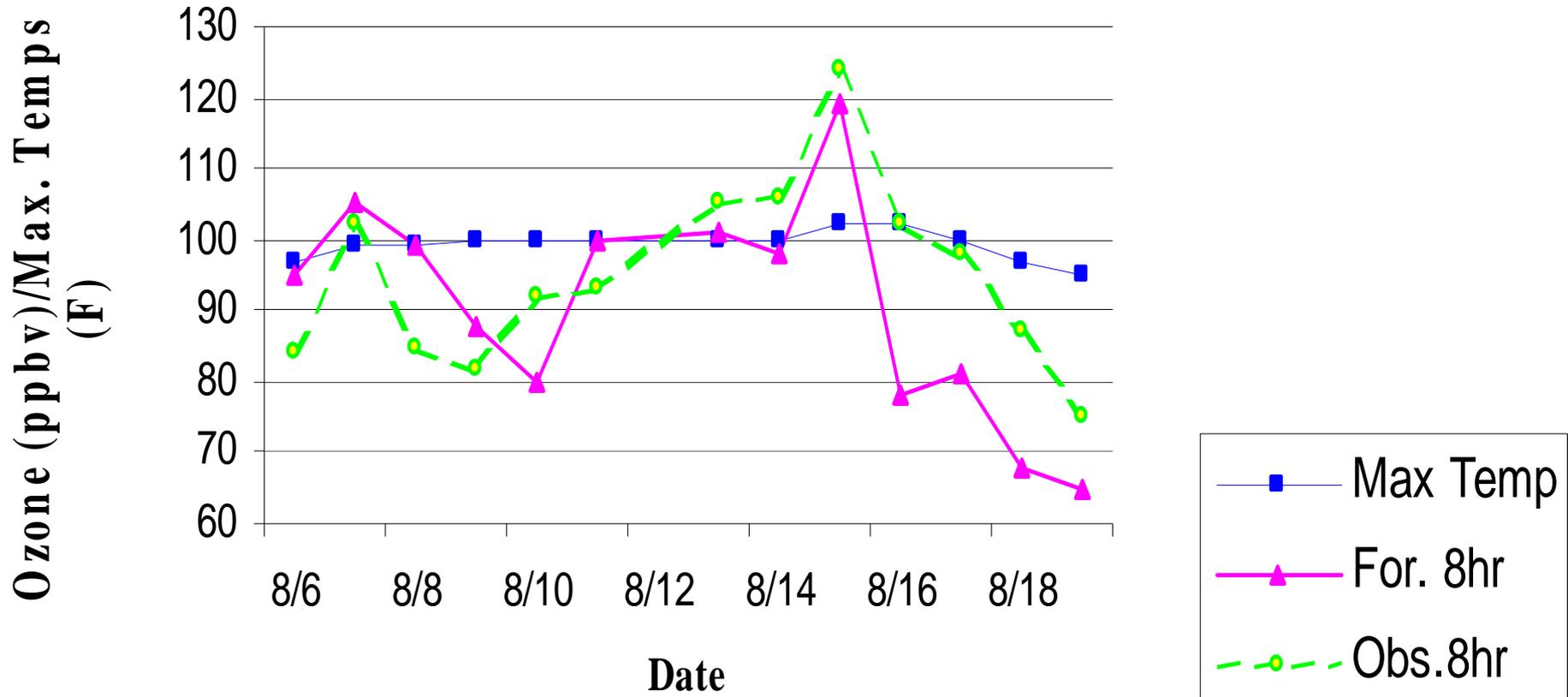


Persistent 850mb Gulf Ridge



070807/0000 850 MB UA OBS, HGHTS, TEMPS, Td>=8

NOAA Forecasted and Observed 8-hr. values with Maximum Temperatures for Aug. 6th - Aug. 19th

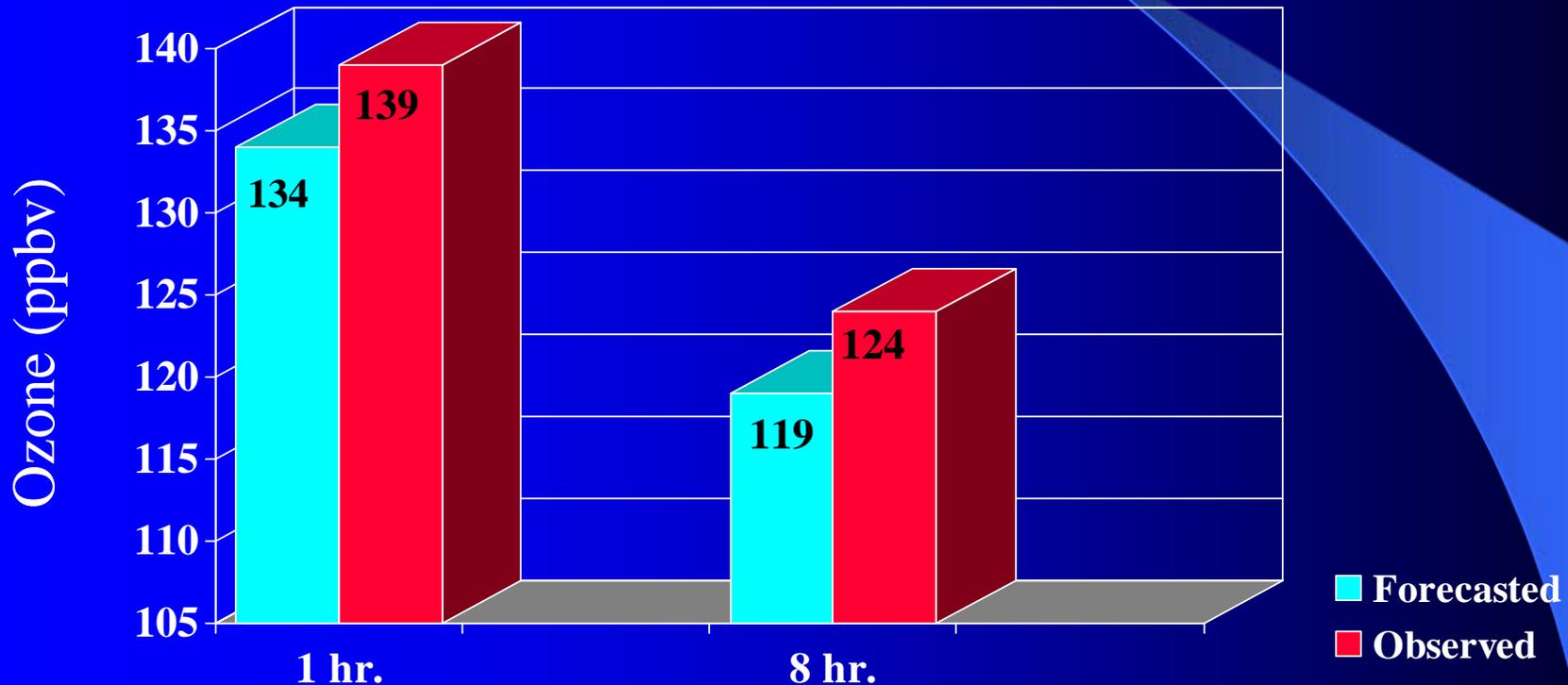


**Peak 8-hr ozone corresponded with record-breaking max temp*

Maximum O₃ Day – August 15th, 2007

- Surface and upper ridge axis aligned directly over north GA closing GOMEX providing dry, subsident conditions
- Boundary layer depth limited, with 850mb temps between 22 and 24°C (strong inversion)
- Drier air on the 15th was caused by surface High over New England funneling drier air down the eastern slopes of the southern Apps

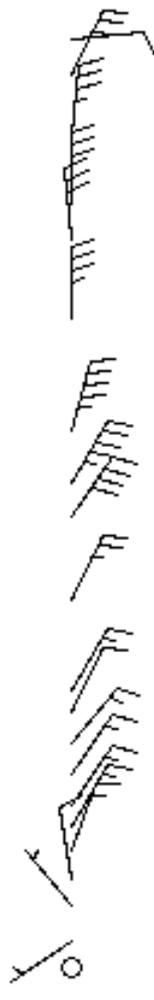
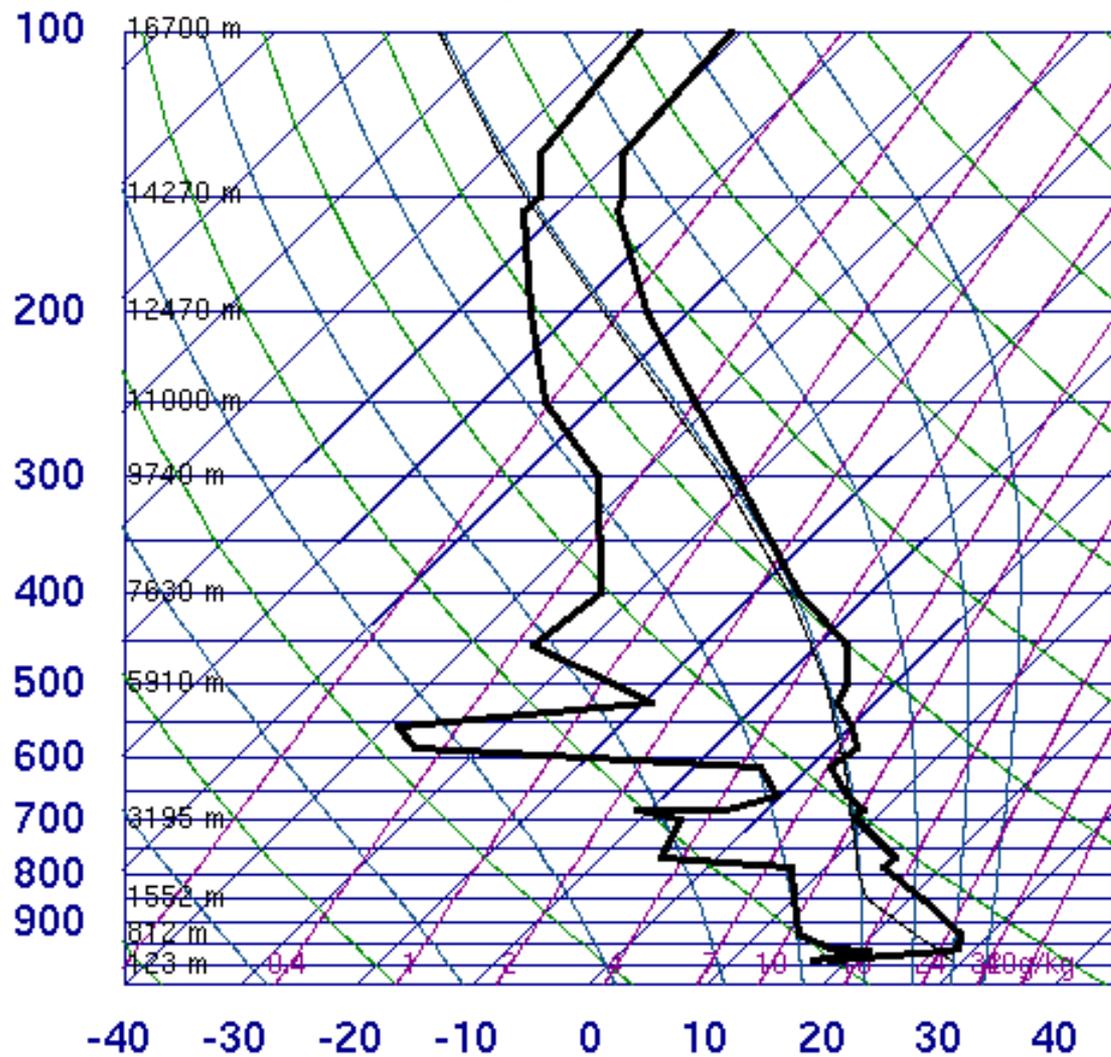
NOAA Model performance – August 15th, 2007



**NOAA model forecast was within correct AQI category*

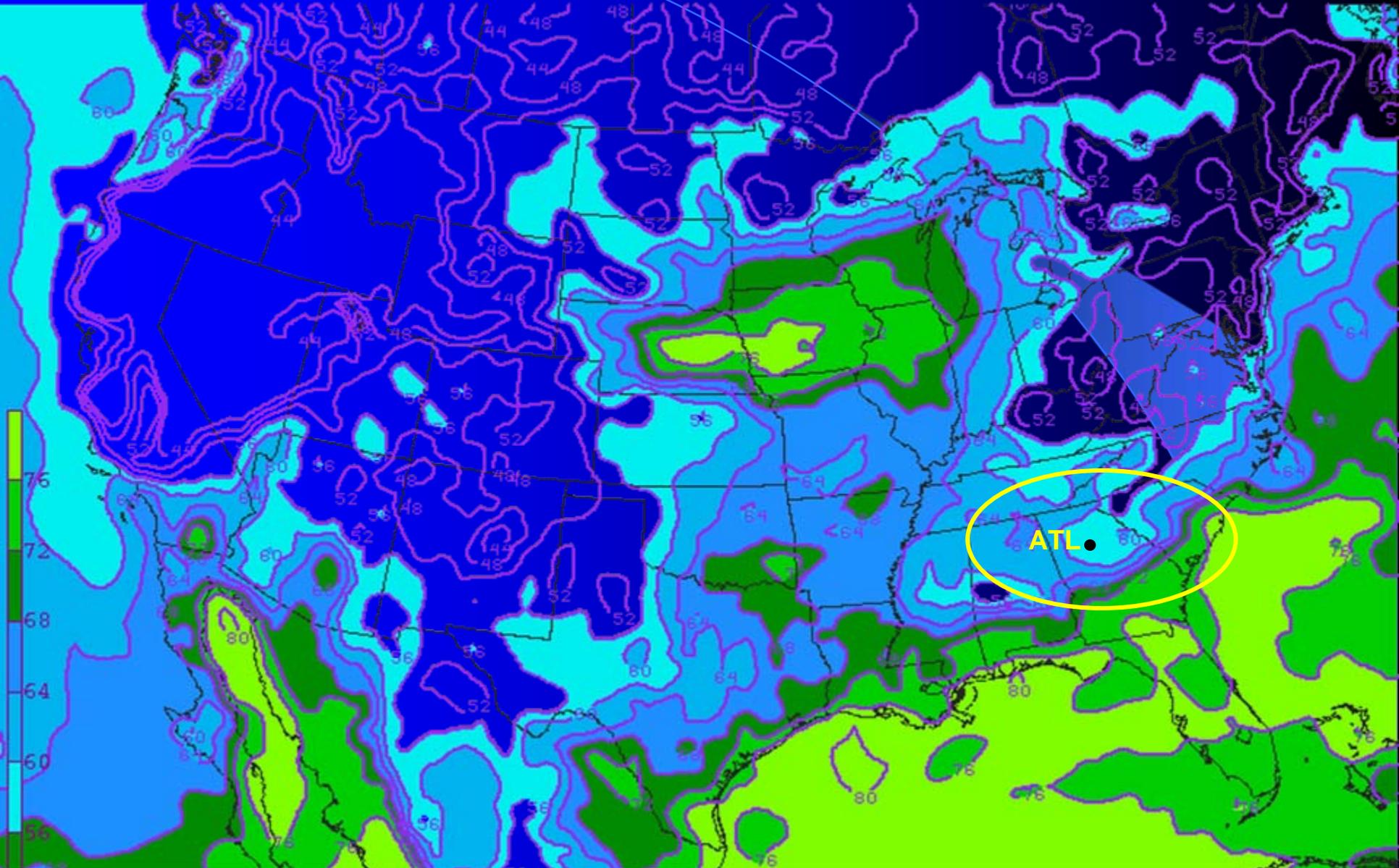
12Z FFC Sounding – 15Aug07

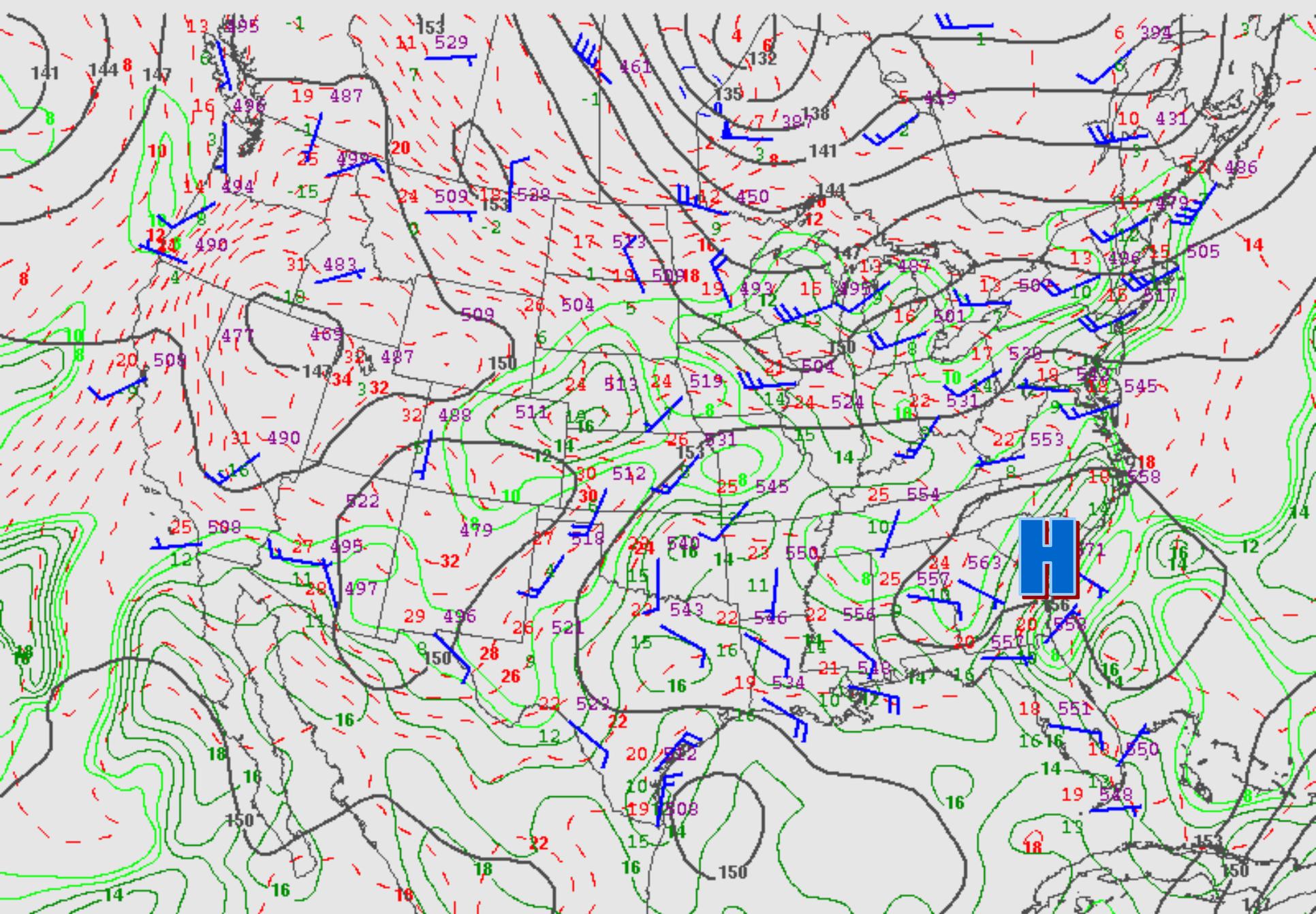
72215 FFC Peachtree City



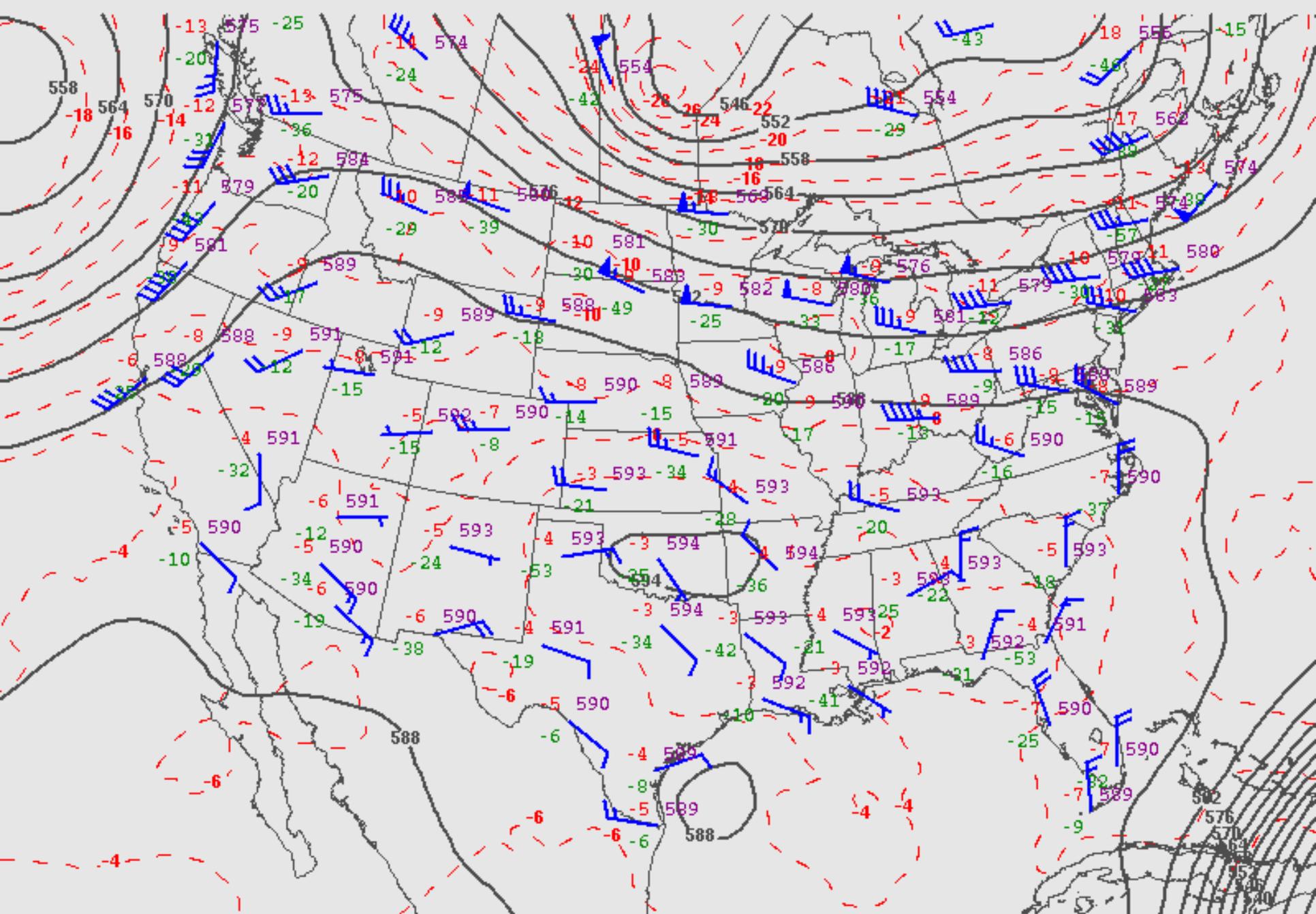
SLAT	33.35
SLOE	-84.57
SELV	255.0
SHOW	4.39
LIFT	1.87
LFTV	1.25
SWET	138.9
KINX	20.10
CTOT	14.10
VTOT	25.10
TOTL	39.20
CAPE	17.10
CAPV	44.11
CINS	-278.
CINV	-201.
EQLV	601.6
EQTV	589.5
LFCT	660.5
LFCV	717.7
BRCH	1.31
BRCV	3.38
LCLT	288.2
LCLP	837.7
MLTH	303.2
MLMR	13.17
THCK	5787.
PWAT	31.26

RUC Analysis – 20z 15Aug



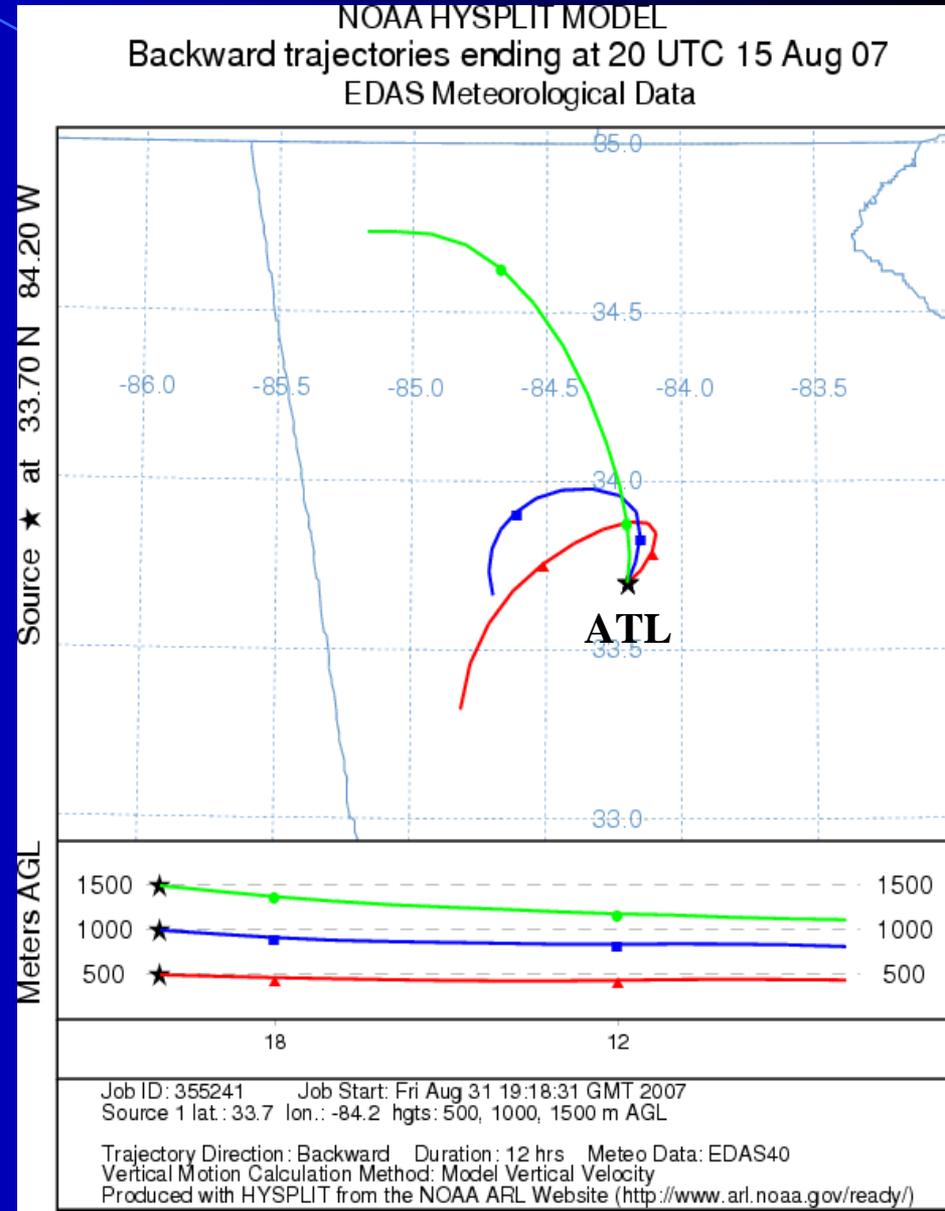
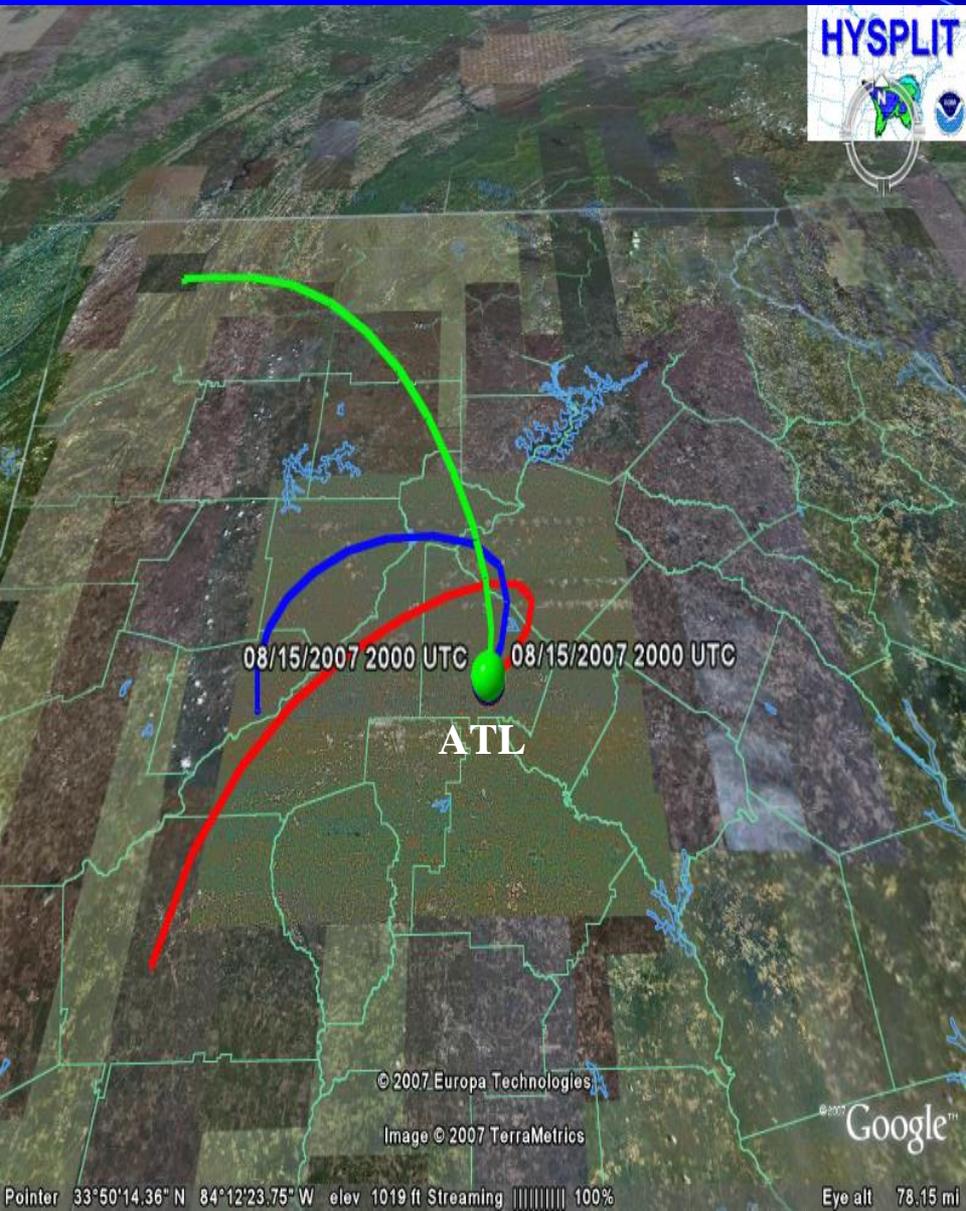


070816/0000 850 MB UA OBS, HGHTS, TEMPS, Td>=8



070816/0000 500 MB UA OBS, HGHTS, and TEMPS

12 hr. Backward Trajectory – 15Aug07



Summary

- Experimental model agreed well with observed 8hr avg for period of study. Greater error observed during days with afternoon convection (after 8/15), possibly due to meteorological uncertainty.
- Observed peak in ozone corresponded with max temp. Surface thermal trough was noted on 8/9 during heat wave episode.
- Residual ozone observed at Ft Mtn on 8/14 and 8/15. Trajectory analysis showed 850mb transport from North Georgia mountains.
- Surface and mid-level ridge axis alignment is important in controlling flow from GOMEX.