WFO Huntsville Quick Event Review

Date/Time of Event:	February 1, 2004 - 00Z to 12Z
Forecaster(s) performing review:	Priscilla Bridenstine
Type (and significance) of event:	Non-rain event

Brief **overview of event:**

Forecast challenge for this event was timing the rainfall into the Huntsville County Warning Area. At the surface, a wedge was present across the spine of the Appalachians as a surface high pressure center settled across the Ontario/Quebec border. Easterly flow dominated the forecast area on Sunday with dewpoint temperatures in the mid-teens throughout the day. Muscle Shoals reported dewpoint temperatures in the 20-30 degree range, which appeared to be erroneous. The upper ridge shifted to the east of the forecast area as an upper level trough kicked out over the Plains States.

Visible satellite imagery indicated high clouds moving north into the County Warning Area by 18Z. Lower ceilings of around 3000 feet had advanced as far north as southern Alabama, along a line from KMEI to KMGM by 18Z, and were continuing to move north. Viewing the 6-hour forecast from the 12Z ETA, this stratus deck lined up well with the lowest condensation pressure deficits and strongest isentropic lift on the 300K Theta surface. The GFS and NGM also initialized this low cloud deck well at 18Z.

Regarding the forecast from the 12Z models:

The ETA model forecast QPF to develop across northwest Alabama at 06Z and overspread the entire area by 12Z. This correlated well with the1000-500MB RH fields forecasted by 06Z. The model soundings indicated rapid saturation between 00Z and 06Z with only the lowest 1000 foot layer remaining relatively dry. The entire column was forecast to saturate by 12Z. The time height sections gradually forecast high level moisture to move in at 18Z, then saturate down to the surface by 06Z. The model soundings and time height sections lined up well with 18Z surface obs and satellite imagery, showing high clouds streaming into the forecast area.

Looking at the 300K Theta surfaces forecast by the 12Z ETA, condensation pressure deficits and strong isentropic lift lined up well with current conditions at 18Z, as mentioned previously.

Isentropic lift was forecast to commence across the forecast area by 06Z with condensation pressure deficits lower than 10MB by that time.

The remaining 12Z models (GFS and NGM) were consistent with the forecast shown by the ETA model, regarding the timing of the isentropic lift and return of low-level moisture.

The afternoon forecast issued at 2152Z on February 1st indicated rain likely by midnight across the entire forecast area. This was based on model trends of rapid low-level moisture return and significant isentropic lift occurring ahead of the system entering the Plains States. In the past, the models have been slow with breaking rainfall out in isentropic lift regimes. This was taken into account with this forecast package and it was felt that rainfall would begin by late evening (10:00 to midnight timeframe). In addition to the model mass fields and QPF, model guidance ranged from 63 POPs off the GFS MOS to 91 POP from the ETA MOS. It was felt, given the dynamics in place, low level moisture return and enormously high POPS from the guidance, that rain was likely by midnight.

Thing(s) that went well (and why):

Intense analysis of the 12Z data from all three models (ETA, GFS and NGM) indicated that moisture and dynamics would be in place by 06Z to produce QPF across the forecast area. Given the trend for models to be slower and less widespread with QPF in isentropic regimes, it was felt that rainfall by midnight was extremely likely across the majority of the County Warning Area.

The concern regarding precipitation development was the tremendously low surface dewpoints in place across the area. It was felt that these dewpoints would rapidly increase during the evening hours as moisture continued to stream north. However, confidence was not extremely high on this occurring and this fact was mentioned in the afternoon AFD and in briefing the next shift.

Thing(s) that didn't go so well (and why):

Measurable rainfall did not occur at any of the surface observing sites from 00Z-12Z. Muscle Shoals reported a trace of rainfall, between 1053 and 1153Z. All other stations reported zero rainfall during the 12 hour period.

Although no data was available after 00Z on February 2nd, it is believed that the low-level moisture did not get as far north as expected. Metar reports from KHSV indicated surface temperatures of 46 degrees with a dewpoint temperature of 19 degrees. By 12Z, the temperature recorded was 45 degrees while dewpoints had increased to 30 degrees. This indicated that low-level moisture had still not made it to the majority of the forecast area.

Looking back at the 12Z model forecasts, each model (GFS, ETA and NGM) overestimated surface dewpoint temperatures at 18Z. The following table shows the difference between the surface dewpoint temperature observations vs the 12Z model forecast, valid at 1800 UTC.

	OBS AT 1800	ETA FCST	NGM FCST	GFS FCST
TUPELO	22	33	29	35
HUNTSVILLE	14	20	21	27
GADSDEN	16	18	18	22
ROME, GA	10	14	14	23

Analysis of the surface observations versus model forecasts may have led to the realization that models were over- forecasting moisture return into the area. This may have led to reducing POPs to the chance category for the overnight period instead of the 70 POPs which were advertised.

Specific weakness of a model, computer algorithm, office system or procedure that needs to be addressed:

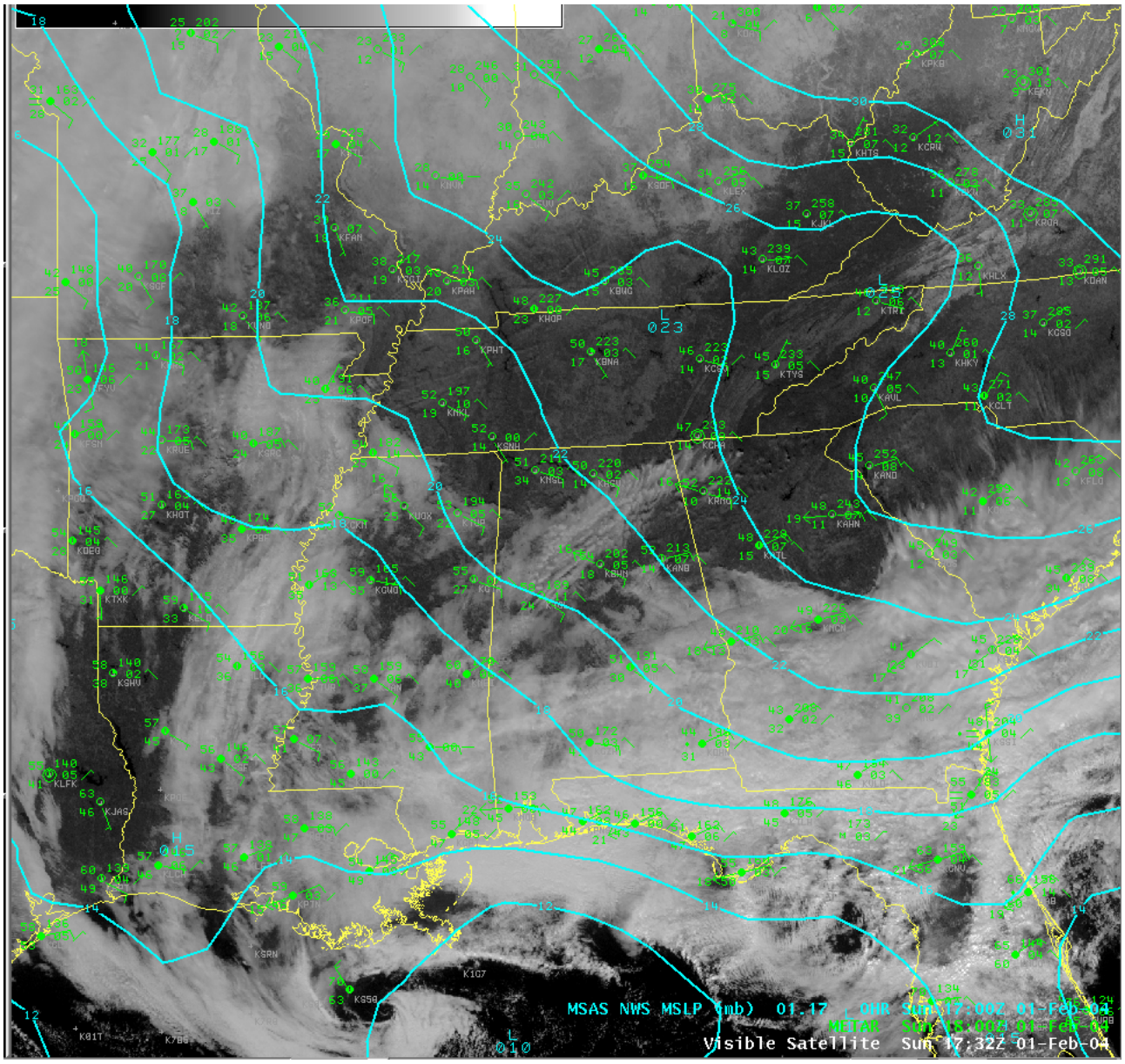
Given the models history of being notoriously slow on moving overrunning precipitation into the forecast area, it was felt that this would again be the case. Instead, the models moved QPF in too fast with no rainfall occurring during the forecast period. As has been stated before, forecasters should not accept model output at face value. Rather, model forecasts should be compared against current observations as a rough Afirst-guess@ on what may eventually evolve. Likewise, forecasters need to be especially cognizant of getting lulled into model biases.

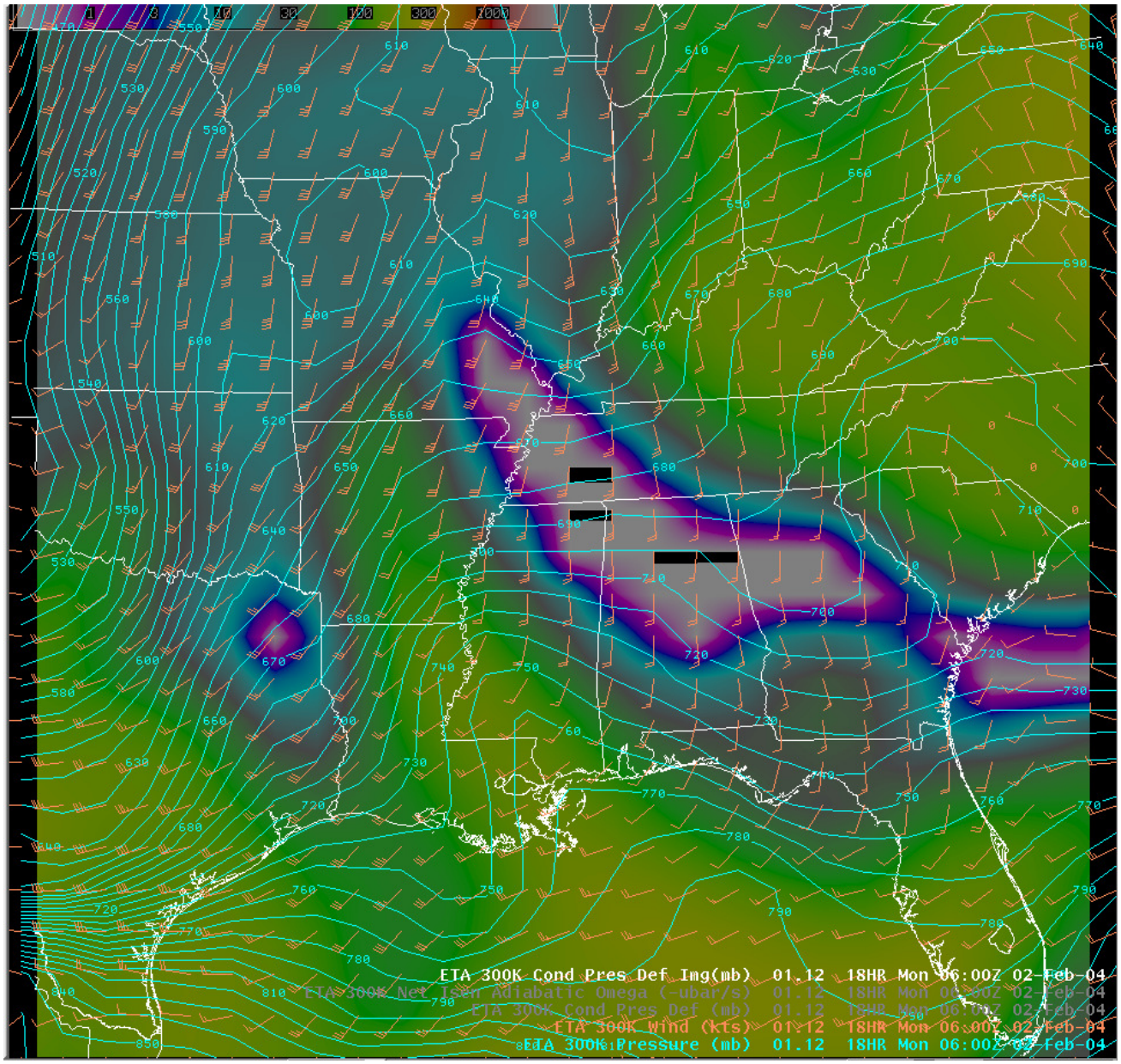
Other lessons we can apply to future events:

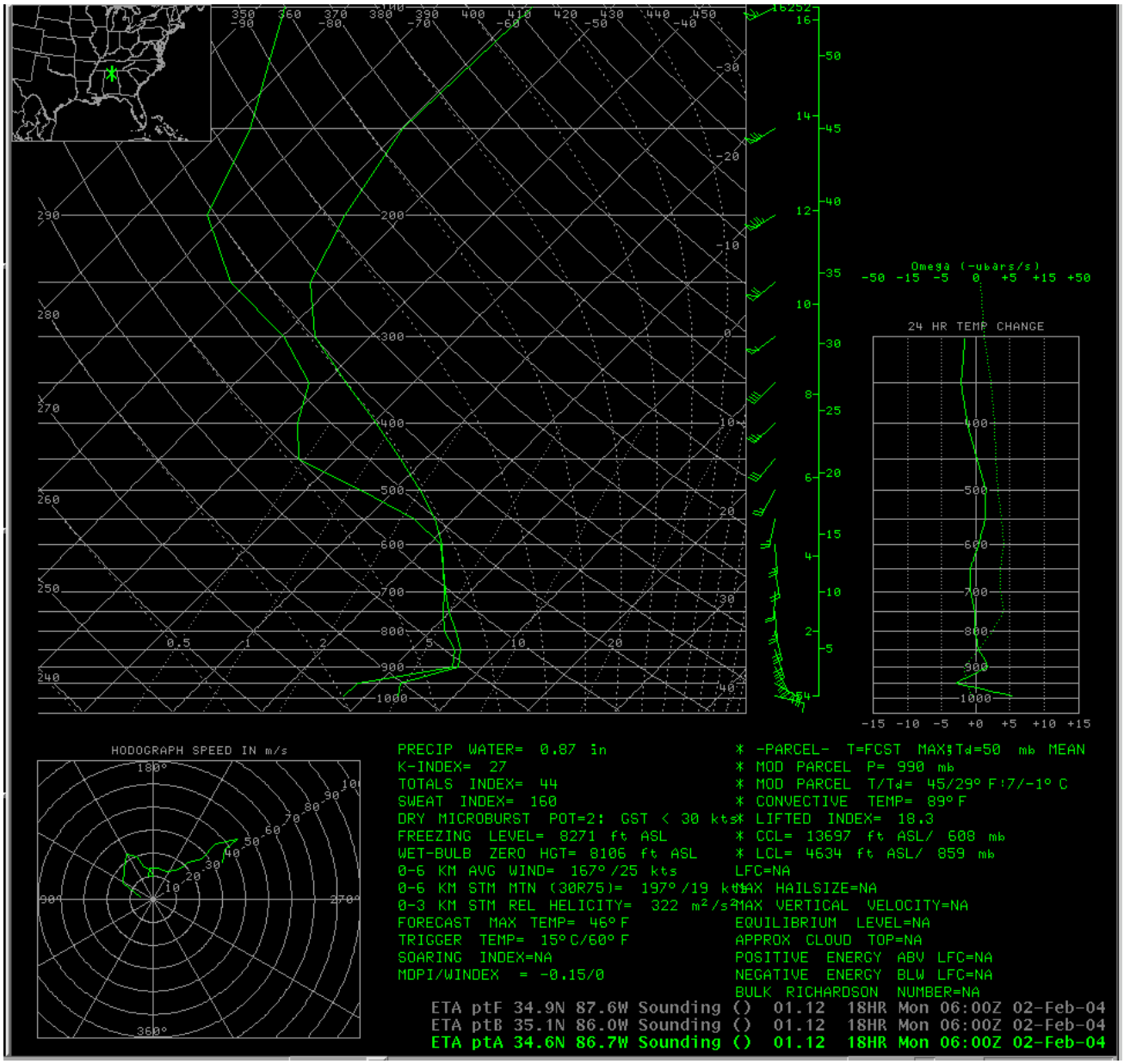
As stated earlier, intense analysis of current observations may help. Forecasters should not be lulled into either model output or model biases.

Additional Material (Attached):

18Z Surface and Satellite Imagery
12Z ETA forecast, valid 06Z February 2nd of 300K Theta Surface
12Z ETA forecast, valid 06Z February 2nd of Huntsville model sounding


MSAS NWS MSLP (mb) 01.17 _ 0HR Sun 17:00Z 01-Feb-04
METAR Stn ID 00Z 01-Feb-04
Visible Satellite Sun 17:32Z 01-Feb-04


ETA 300K Cond Pres Def Img(mb) 01.12 18HR Mon 06:00Z 02-Feb-04
ETA 300K Net Isen Adiabatic Omega (-ubar/s) 01.12 18HR Mon 06:00Z 02-Feb-04
ETA 300K Cond Pres Def (mb) 01.12 18HR Mon 06:00Z 02-Feb-04
ETA 300K Wind (kts) 01.12 18HR Mon 06:00Z 02-Feb-04
ETA 300K Pressure (mb) 01.12 18HR Mon 06:00Z 02-Feb-04


Omega (-ubars/s)
-50 -15 -5 0 +5 +15 +50
24 HR TEMP CHANGE
-15 -10 -5 +0 +5 +10 +15
HODOGRAPH SPEED IN m/s
PRECIP WATER= 0.87 in
K-INDEX= 27
TOTALS INDEX= 44
SWEAT INDEX= 160
DRY MICROBURST POT=2: GST < 30 kts
FREEZING LEVEL= 8271 ft ASL
WET-BULB ZERO HGT= 8106 ft ASL
0-6 KM AVG WIND= 167°/25 kts
0-6 KM STM MTN (30R75)= 197°/19 kts
0-3 KM STM REL HELICITY= 322 m²/s²
FORECAST MAX TEMP= 46° F
TRIGGER TEMP= 15° C/60° F
SOARING INDEX=NA
MDPI/WINDEX = -0.15/0
* -PARCEL- T=FCST MAX Td=50 mb MEAN
* MOD PARCEL P= 990 mb
* MOD PARCEL T/Td= 45/29° F 7/-1° C
* CONVECTIVE TEMP= 89° F
* LIFTED INDEX= 18.3
* CCL= 13697 ft ASL/ 608 mb
* LCL= 4634 ft ASL/ 859 mb
LFC=NA
MAX HAILSIZE=NA
MAX VERTICAL VELOCITY=NA
EQUILIBRIUM LEVEL=NA
APPROX CLOUD TOP=NA
POSITIVE ENERGY ABV LFC=NA
NEGATIVE ENERGY BLW LFC=NA
BULK RICHARDSON NUMBER=NA
ETA ptF 34.9N 87.6W Sounding () 01.12 18HR Mon 06:00Z 02-Feb-04
ETA ptB 35.1N 86.0W Sounding () 01.12 18HR Mon 06:00Z 02-Feb-04
ETA ptA 34.6N 86.7W Sounding () 01.12 18HR Mon 06:00Z 02-Feb-04