WFO Huntsville Quick Event Review

Date/Time of Event:	June 6, 2005 late morning and afternoon
Forecaster(s) performing review:	Andy Kula Input from Tim Troutman Reviewed by Patrick Gatlin and Holly Allen
Type (and significance) of event:	Pulse severe hail and wind storms

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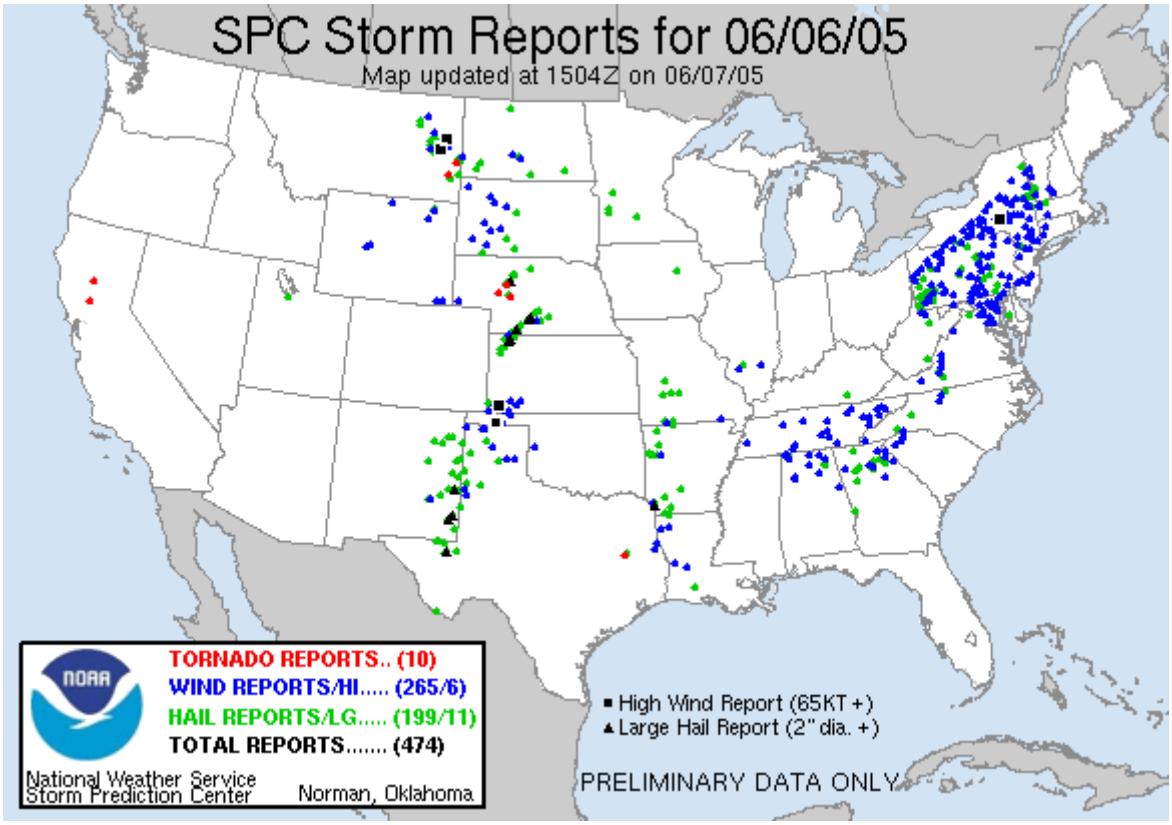
Brief **overview of event:**

As you walked in the door at 7 am, I sensed by looking at the sky and seeing moderate cumulus congestus, that the atmosphere was already quite unstable above the inversion. This event consisted of widespread coverage of numerous thunderstorms, nearly all with locally intense rain and gusty winds, with some low end severe hail and wind events. So far, one flash flood was reported. Looking at the storm report map, this event was rather widespread throughout the region, across Tennessee, Georgia and the western Carolinas.

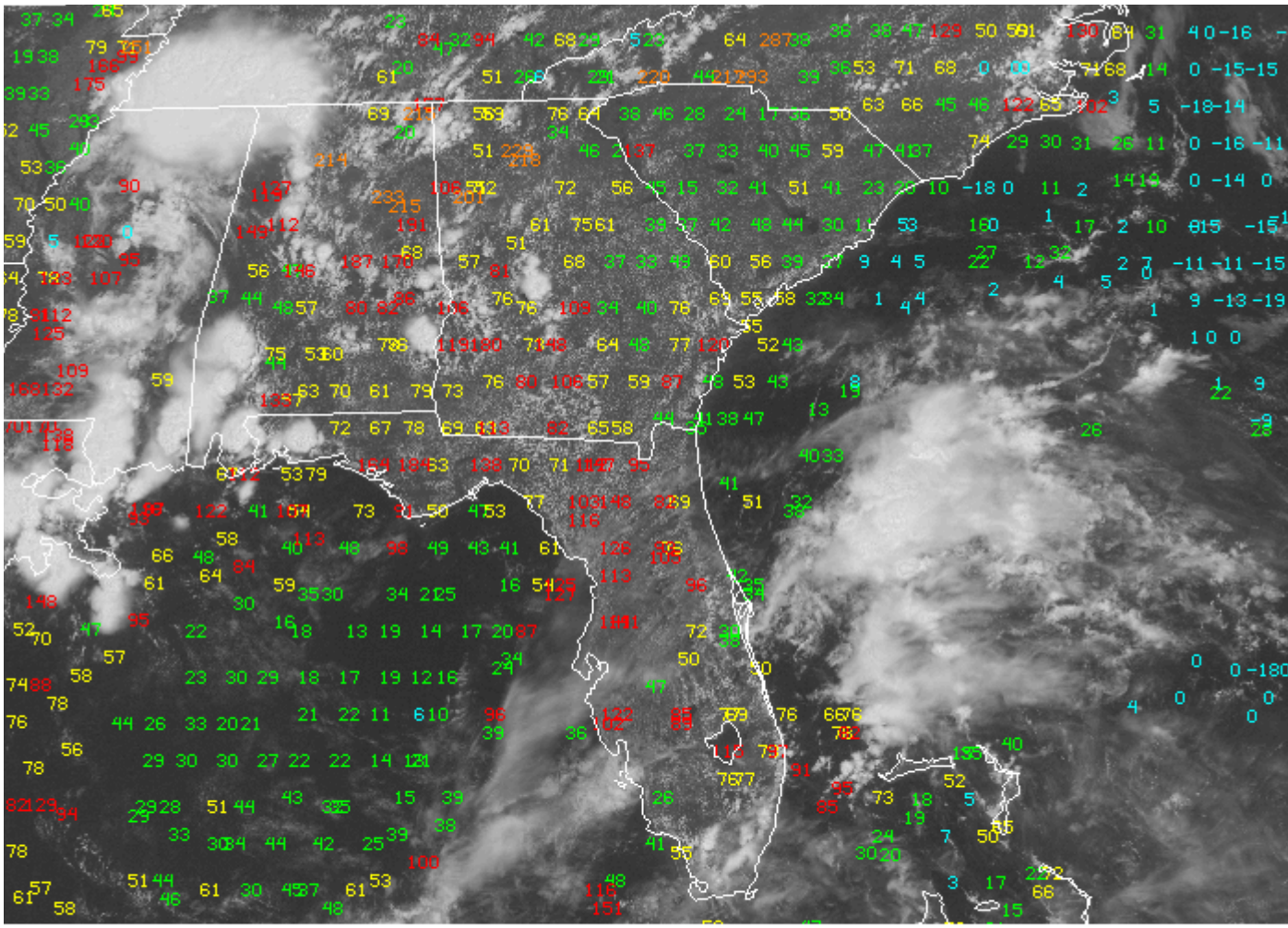
A generally weak summer synoptic pattern existed across the southeast U.S. with a large scale mid and upper level high in place off the southeast coast. This enabled widespread mT air to overspread the entire region, characterized by dew points in the lower 70s, up to 73 or 74F. Wind speeds at all levels were weak, thus the SPC placed our area in a General Thunderstorm Outlook. This was upgraded to a SLIGHT RISK during the mid afternoon once storms were underway.

One must look to the mesoscale in this situation to locate features of interest for severe weather. Plenty of moisture and instability were available. 12Z soundings, modified for expected heating, indicated SB CAPES potentially exceeding 4000-5000 J/kg, with PWATs above 1.5 inches. GOES microburst indices Lift was required to sustain any significant storms. A mesoscale convective vorticity center (MCV) developed from convection the previous day over the Gulf Coast region of southeast Texas and Louisiana, and worked its way northeast through Mississippi. It became apparent early on the 6th that this feature would affect the Tennessee Valley during peak late morning and early afternoon heating. The system had a large mass of thunderstorms which tracked due north through Mississippi, eventually arcing and outflow boundary into western Alabama. This boundary was noted on the KGWX radar as a distinct fine line, which using the distance/speed tool, was progged by Patrick and I to reach near KMSL by 15Z. In that time, convection developed southeast along the line into far northwest Alabama, and an SWA was issued for Lauderdale County. At that time, a large cumulus field developed within one hour. In fact, the 30 minute VIS imagery showed skies going from mostly clear (except for the patch of MDT CU in northeast Alabama) to a broken CU deck. Cells broke out like a rash on the radar by 16Z with very little movement. Storm

motion with the MCV storms was generally north to northeast around 10-15KT.



The threat for microbursts was the chief concern, not necessarily hail, but the high CAPES and strong updrafts enabled some hail storms to develop. Below are some GOES microburst products from the event at various times. All three indices, WINDEX, WMSI, and Theta-E deficits were favorable for microbursts. The WMSI was actually in the highest range for severity (>65kt). Fortunately, none of that type of damage was reported.

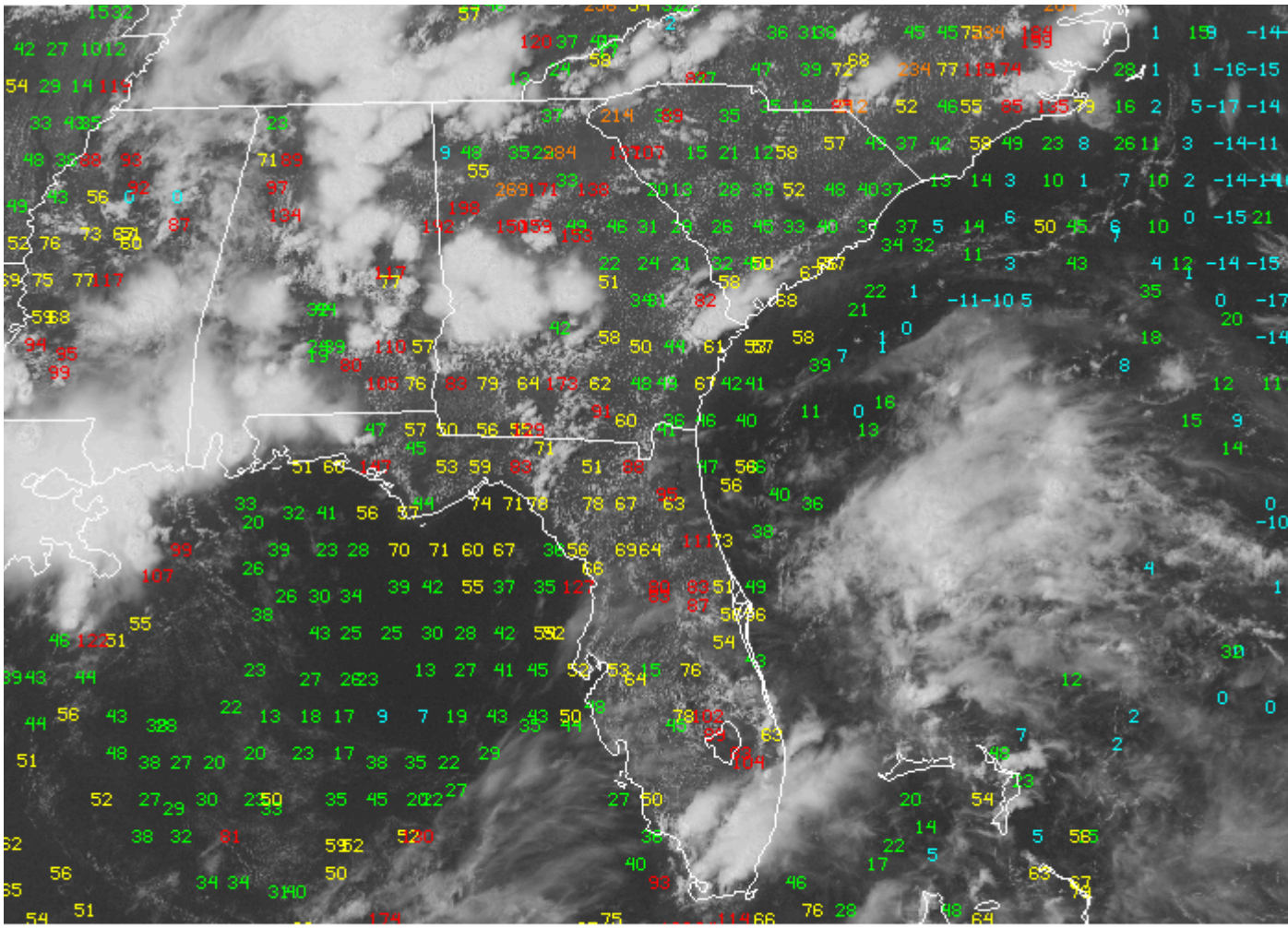


Wet Microburst Severity Index

Corresponding Wind Gust Potential (kt)

None | < 35 | 35-49 | 50-64 | > 65

GOES-12 WMSI ON 06 JUN 05 AT 17 Z

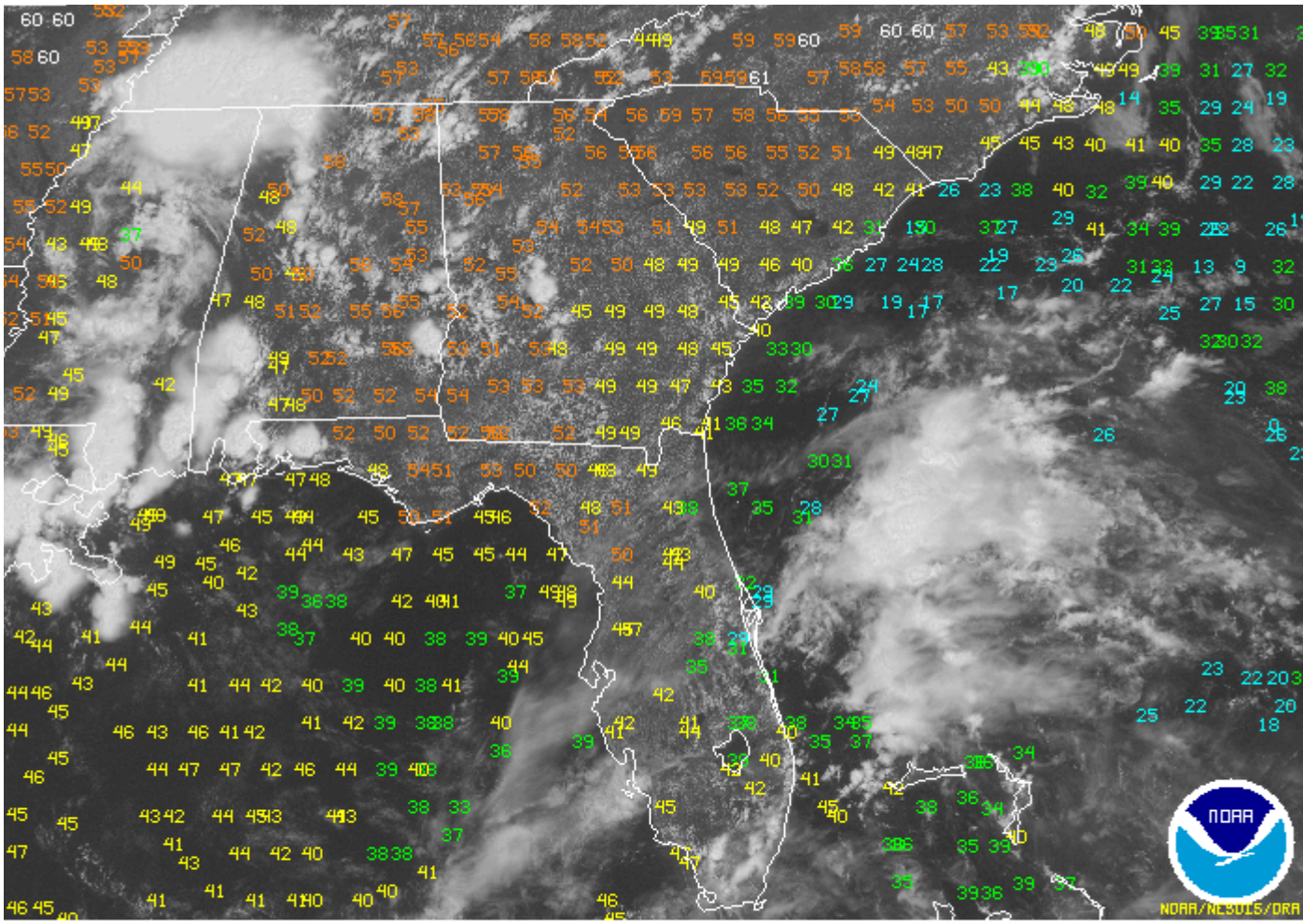


Wet Microburst Severity Index

Corresponding Wind Gust Potential (kt)

None | < 35 | 35-49 | 50-64 | > 65

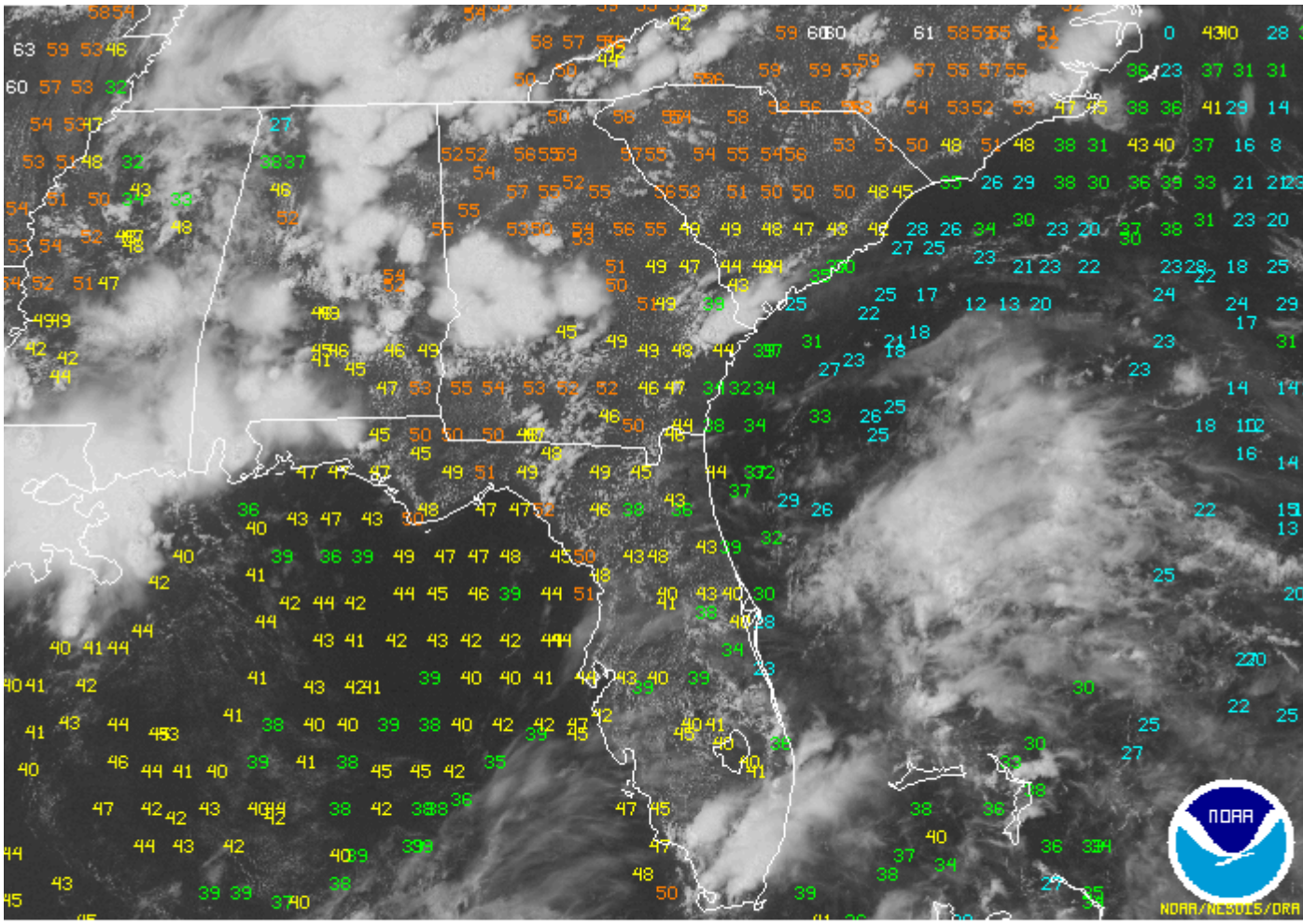
GOES-12 WMSI ON 06 JUN 05 AT 19 Z



Maximum Potential Convective Wind Gusts (KT) – WINDEX

< 30 KT *>= 30 KT* *>= 40 KT* *>= 50 KT* *>= 60 KT* *>= 70 KT* *>=80 KT*

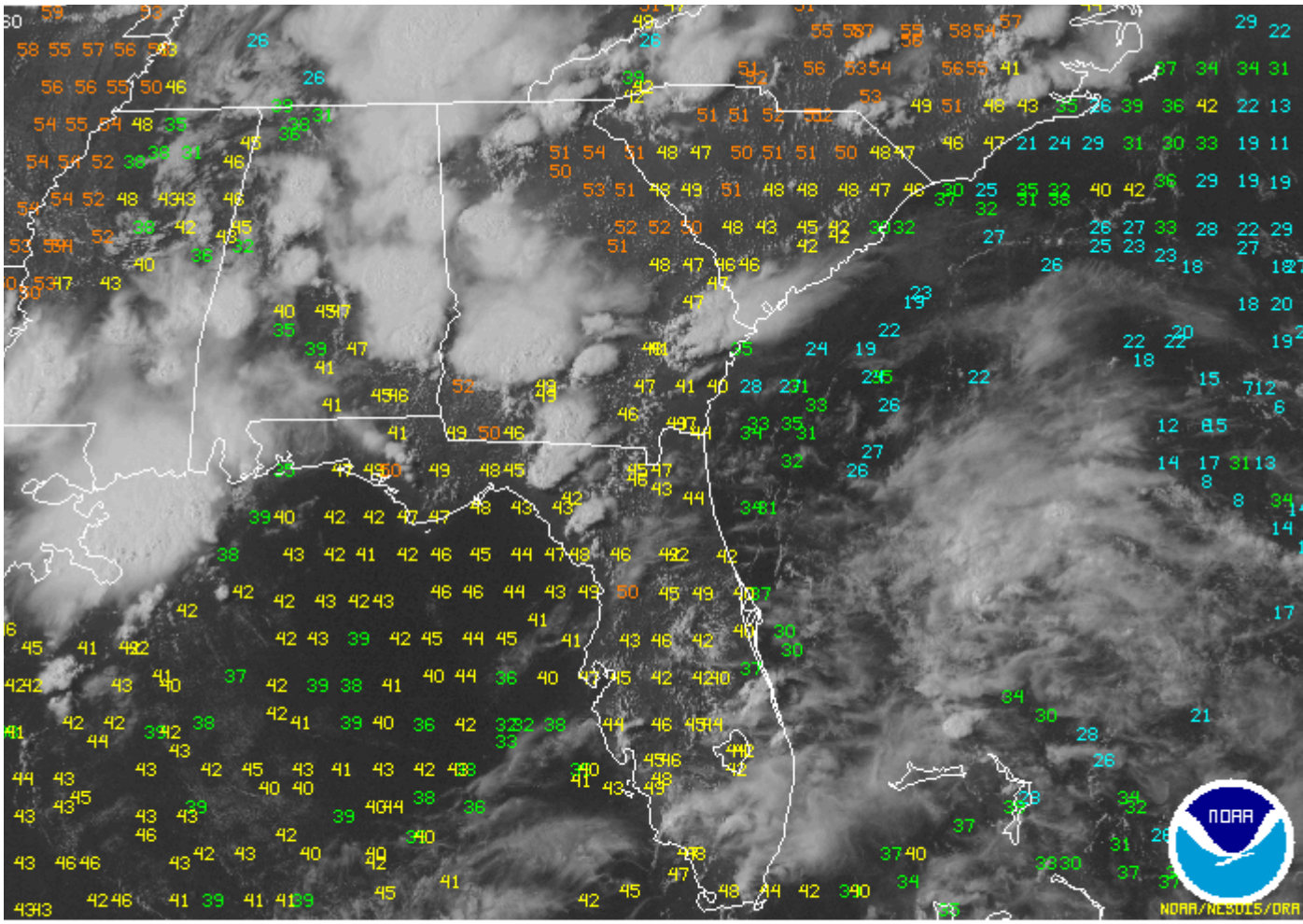
MICROBURST RISK SAT IMAGE FROM 16:45UTC ON 6 JUN 05 G12I/B=1/02.00KM



Maximum Potential Convective Wind Gusts (KT) – WINDEX

< 30 KT | >= 30 KT | >= 40 KT | >= 50 KT | >= 60 KT | >= 70 KT | >=80 KT

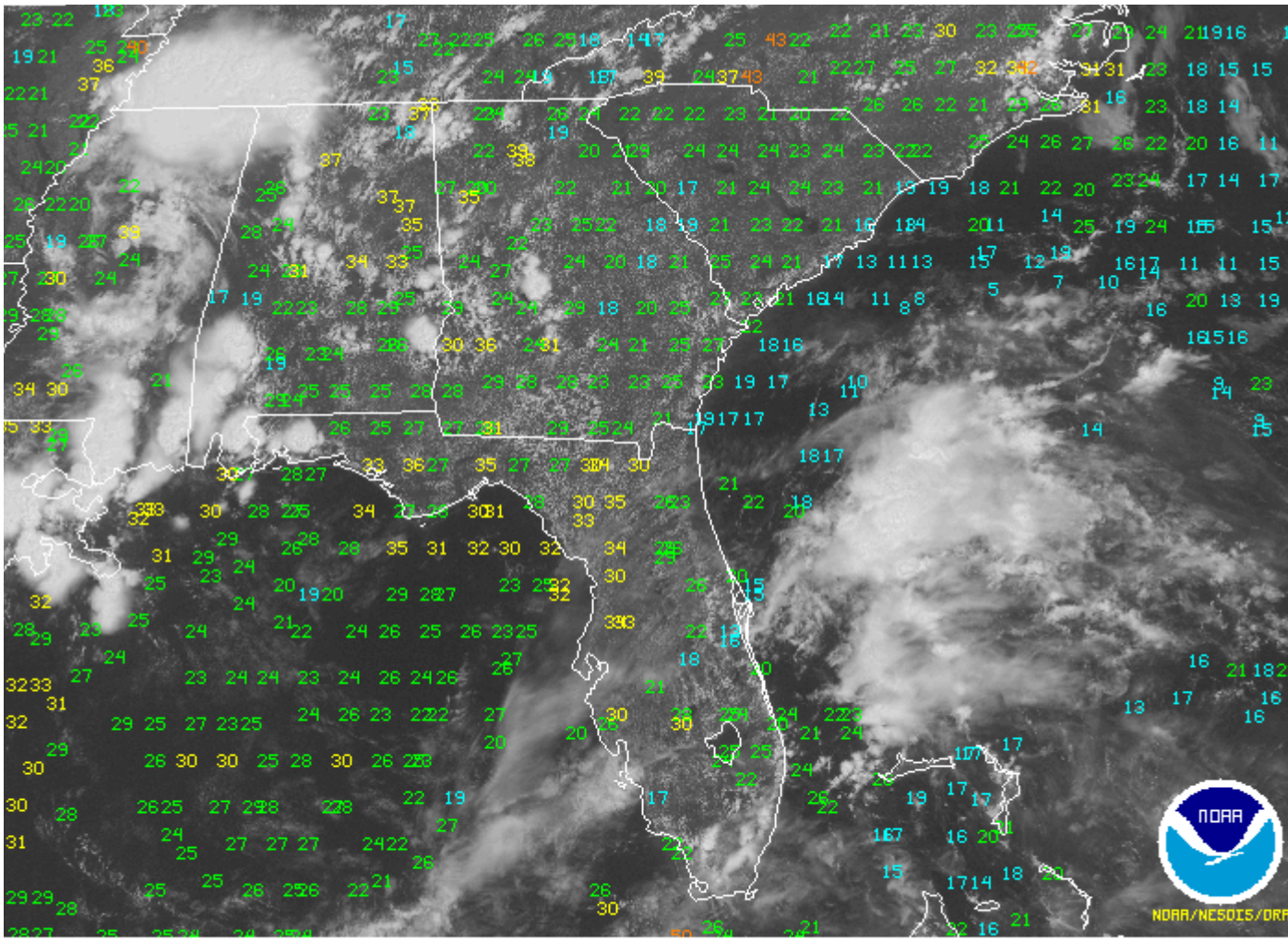
MICROBURST RISK SAT IMAGE FROM 19:15UTC ON 6 JUN 05 G12I/B=1/02.00KM



Maximum Potential Convective Wind Gusts (KT) – WINDEX

< 30 KT | >= 30 KT | >= 40 KT | >= 50 KT | >= 60 KT | >= 70 KT | >=80 KT

MICROBURST RISK SAT IMAGE FROM 20:45UTC ON 6 JUN 05 G12I/B=1/02.00KM

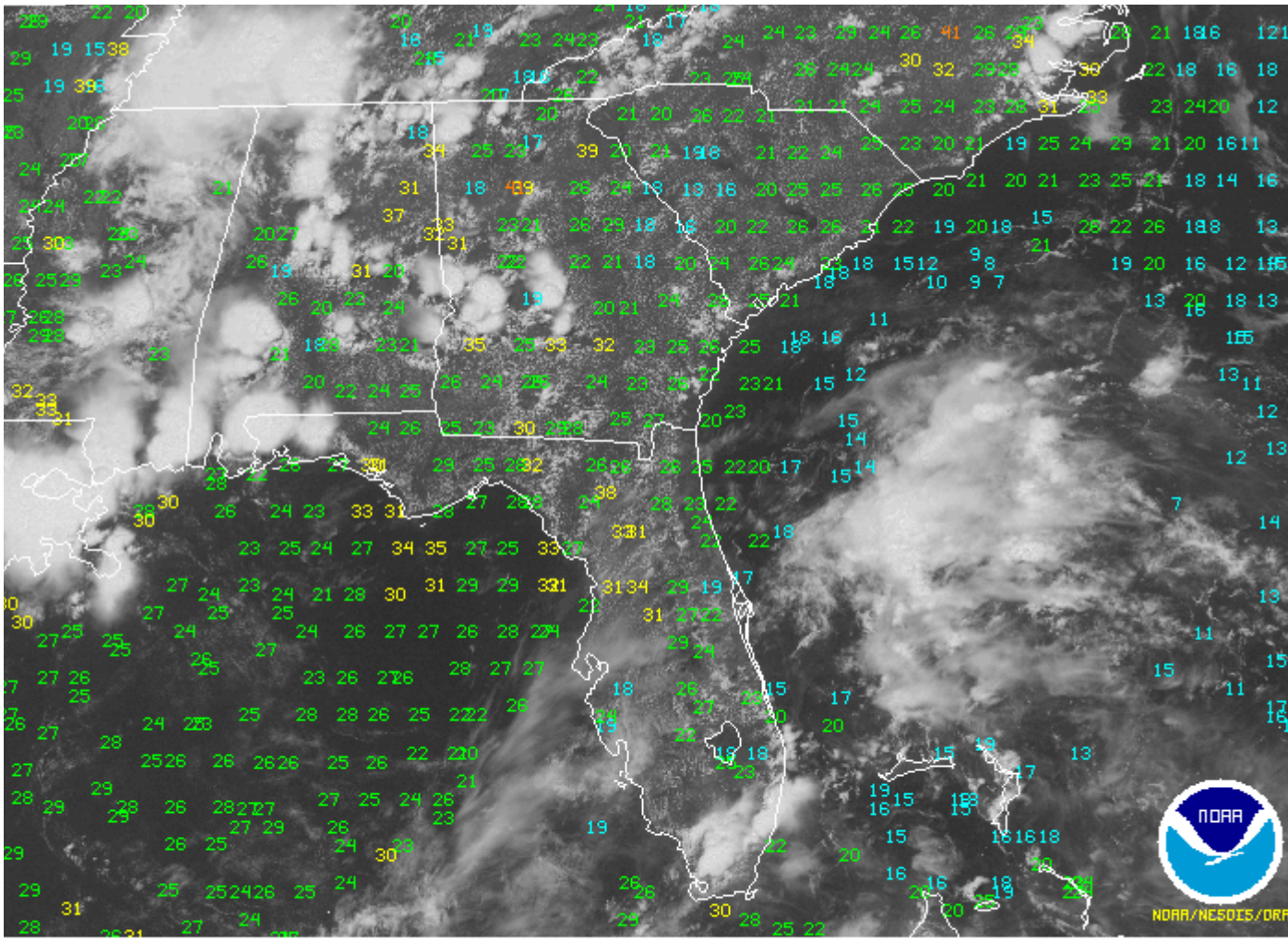


Maximum Theta-e (K) – Surface to 300mb / MDPI

[Theta-e Deficit of 30K = MDPI of 1]

< 20 (MDPI<0.7)	>= 20 (MDPI<1.0)	>= 30 (MDPI>1.0)	>= 40 (MDPI>1.3)

MICROBURST RISK SAT IMAGE FROM 16:45UTC ON 6 JUN 05 G12I7B=1/02.00KM

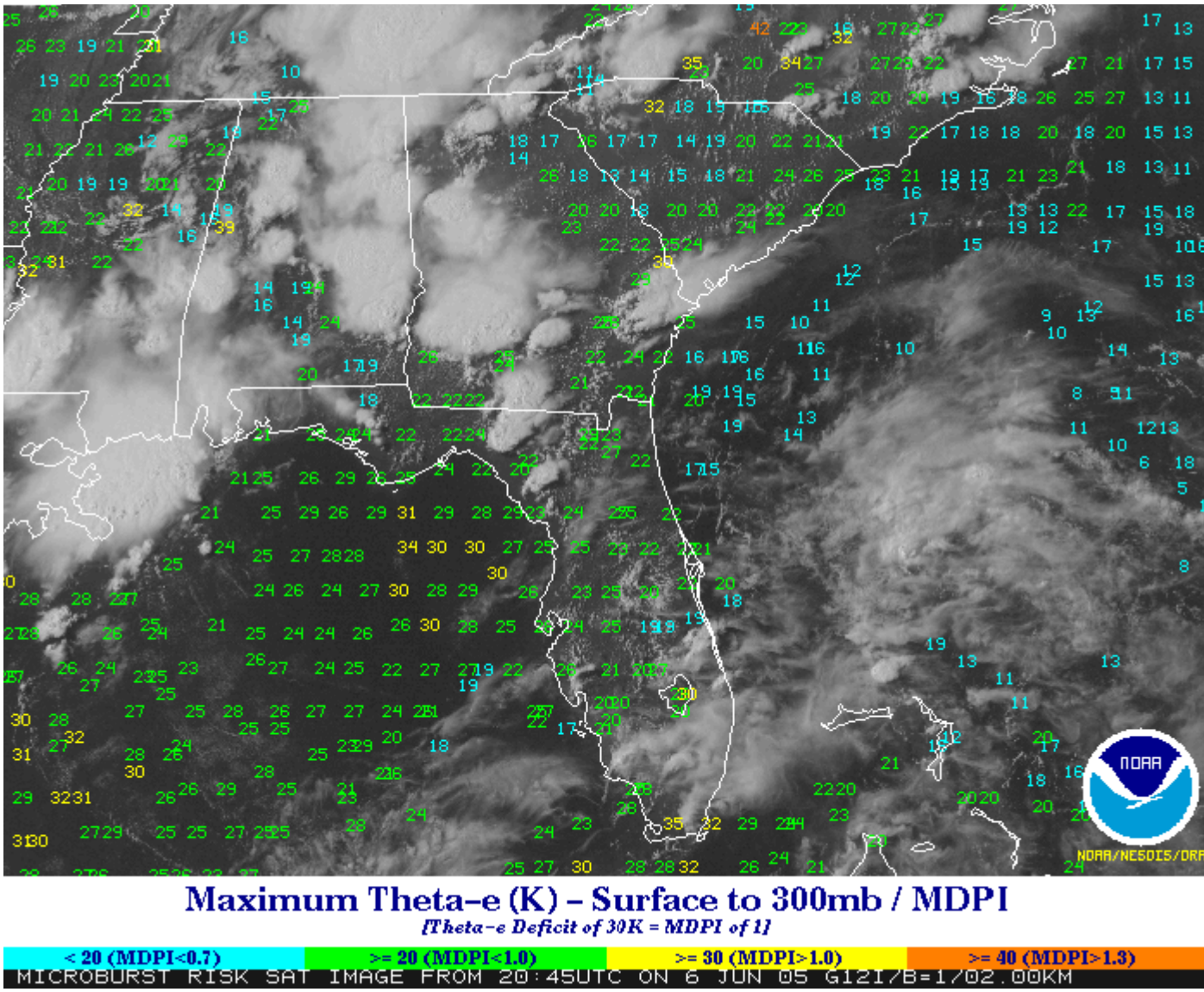


Maximum Theta-e (K) – Surface to 300mb / MDPI

[Theta-e Deficit of 30K = MDPI of 1]

< 20 (MDPI<0.7)	>= 20 (MDPI<1.0)	>= 30 (MDPI>1.0)	>= 40 (MDPI>1.3)

MICROBURST RISK SAT IMAGE FROM 17:45UTC ON 6 JUN 05 G12I7B=1/02.00KM



Radar signatures

Outflow dominant storms were the primary storm mode, which generated numerous outflow boundary collisions and storm mergers. The storms associated directly with the MCV were a variation of a linear squall line, but had embedded stronger updrafts which produced hail after storm mergers. The most notable here was the storm impacted the Shoals, producing up to quarter sized hail. MARC signatures were weak, making SVR warnings very difficult. The Donavon technique was very helping at identifying cells with potential hail cores developing above the rather high (14000+) freezing level. VILs reached 55 to 60 briefly (below the normal VIL of the day rule). Storms produced strong winds at times, including a 42KT gust at KMSL.

The "random" cells east of the MCV likely obtained lift from pure heating in the low

levels, pushing parcels quickly to the rather low LFC heights. PVA from the approaching MCV likely aided general lift. However, there was a distinct terrain factor which developed storms on either side of the Tennessee River, likely from differential heating. Eventually, these storms developed outflow boundaries which collided along the U.S. 72 highway corridor from west of Scottsboro to east of Bridgeport. When this collision occurred, 65-70dbz cores developed rapidly above the freezing level, promoting the issuance of a SVR. Again, the Donavon technique along with a few hits of LRM3 above 57dbZ all aided the warning process. I don't know what it is about DeKalb County, but they again had one of the best "radar" storms of the day when rotation developed in the mid levels. Another storm merger and a nickel sized hail report in Geraldine prompted an extension to a SVR.

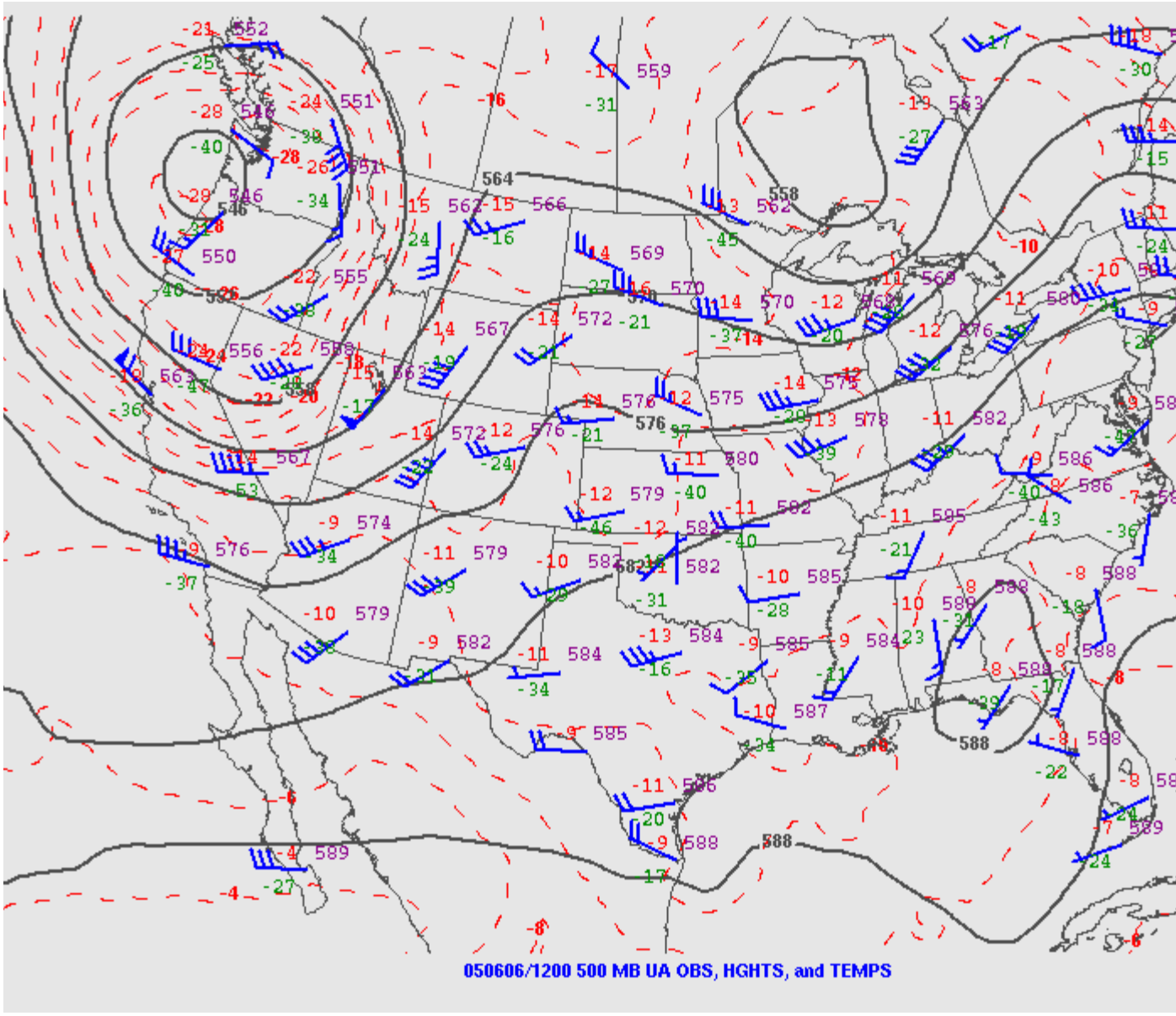
The storms that impacted the Huntsville metro came from nearly all directions. A pulse storm remained stationary over northwest Madison County with a strong core, while storms over the mountains to the east developed a divergent base velocity signature and outflow in northeast Madison County which collided with the storm approaching Meridianville. This along with another storm in Morgan county, a part of the linear convection, all merged over Madison county. Trees were reported down in the Harvest area, and a 30+ gust was reported at KHSV. Very interesting cloud features were observed from the WFO, with a northwest to southwest moving shelf cloud, followed by a dark rain mass moving in from the southwest a few minutes later, followed by intense rainfall. The merging cells and intense rain rates prompted the issuance of a timely FFW, verified by a flooded road in Meridianville.

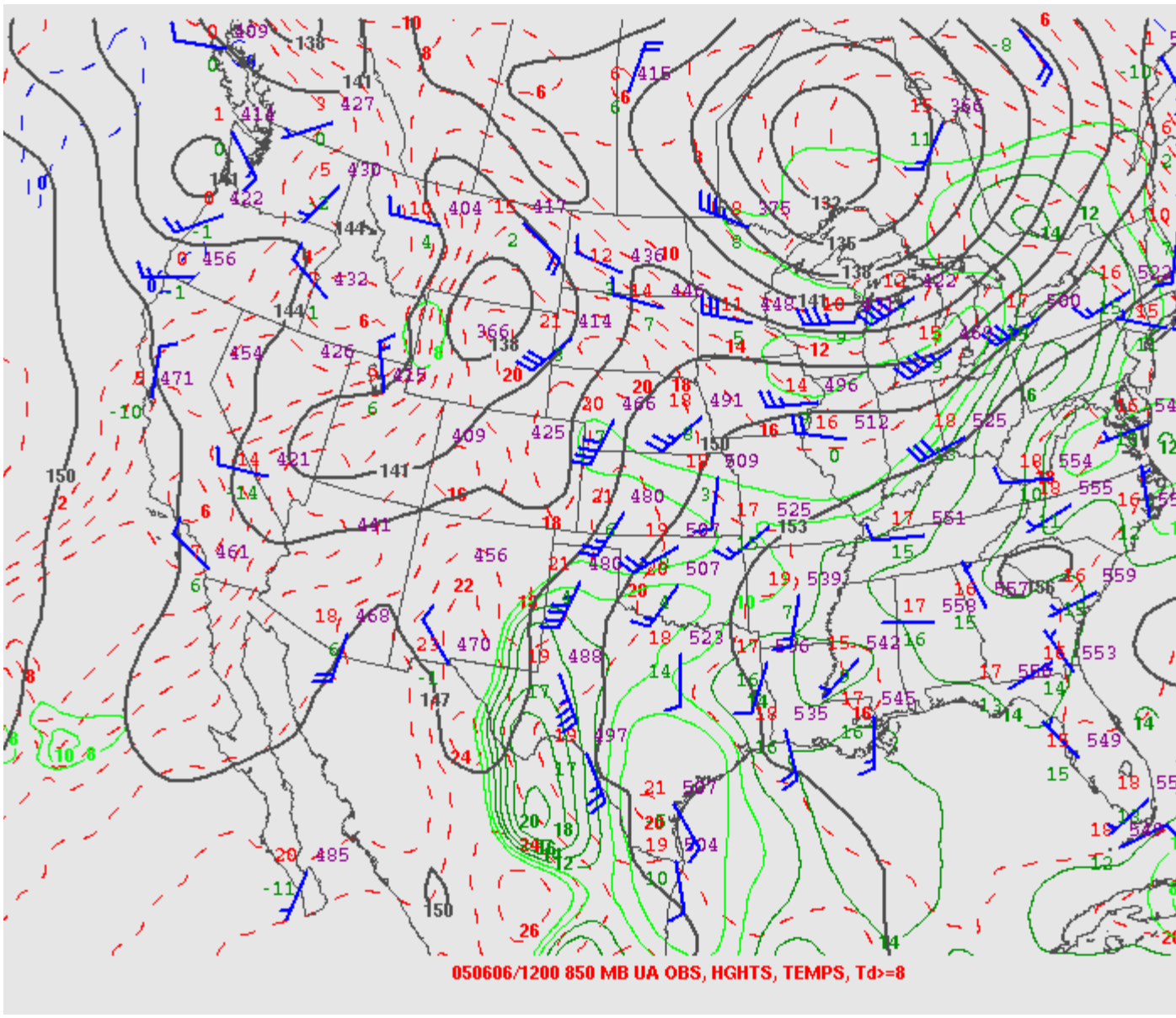
A lot can be told by looking at a meteogram, so the one for UAH is attached. Note the 4-5 inch/hr rain rate for a brief time. I believe it! Also of note are the pressure fall and jump during and after the storms.

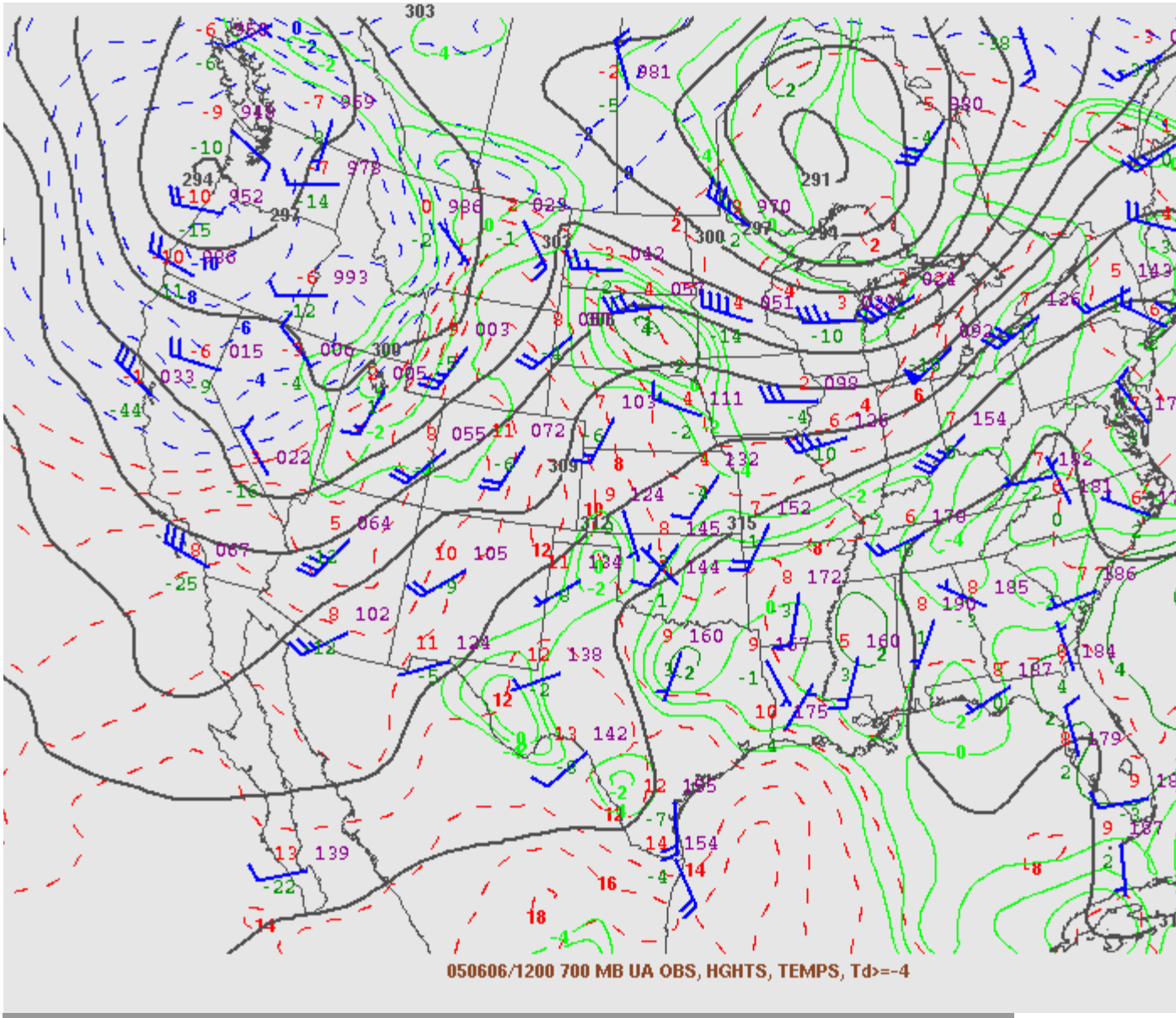
Amateur radio

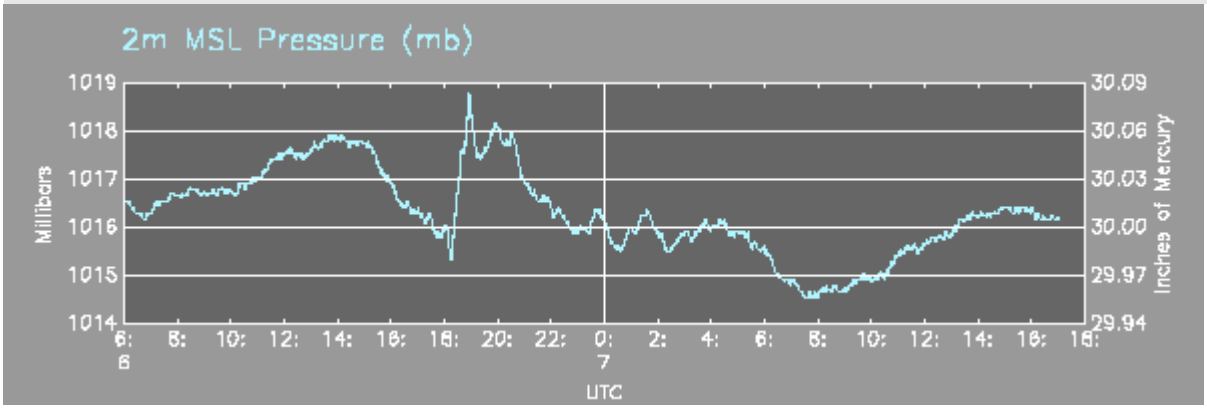
Thanks to Paul Meyer who was called in when rotation developed within the DeKalb County storm. In the future, I'd rather see us be more proactive and bring these folks in sooner to receive reports from the field.

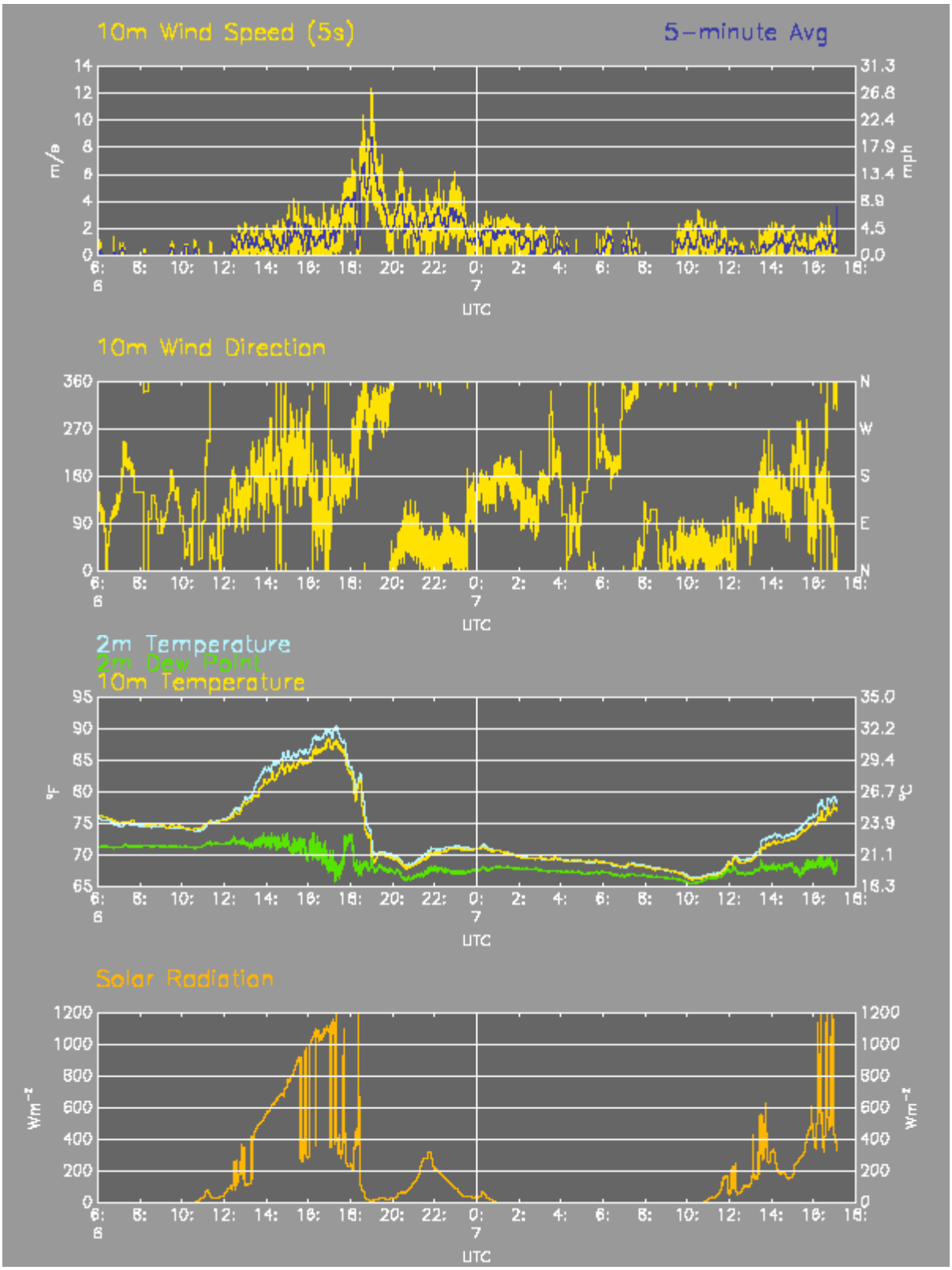
Attachments

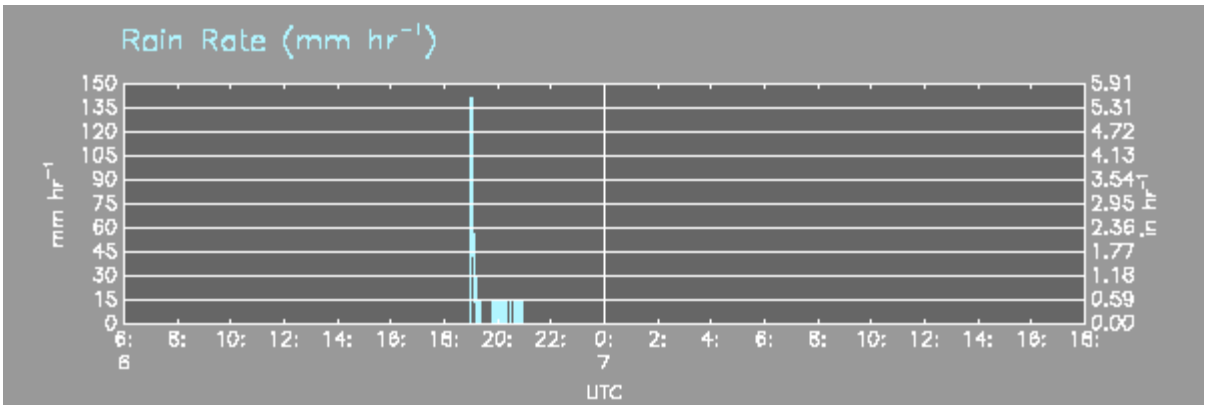

050606/1200 500 MB UA OBS, HGHTS, and TEMPS


050606/1200 850 MB UA OBS, HGHTS, TEMPS, Td>=8


050606/1200 700 MB UA OBS, HGHTS, TEMPS, Td>=-4


2m MSL Pressure (mb)
Millibars
Inches of Mercury
1019
1018
1017
1016
1015
1014
30.09
30.06
30.03
30.00
29.97
29.94
6: 8
8:
10:
12:
14:
16:
18:
20:
22:
0: 7
2:
4:
6:
8:
10:
12:
14:
16:
18:
UTC


10m Wind Speed (5s)
5-minute Avg
m/s
mph
UTC
10m Wind Direction
N
W
S
E
N
UTC
2m Temperature
2m Dew Point
10m Temperature
°F
°C
UTC
Solar Radiation
Wm⁻²
Wm⁻²
UTC



Other lessons we can apply to future events:

Remember to carefully track MCVs via satellite imagery. We successfully did it in this case. Perhaps the severe threat was underplayed, but it was difficult to judge the actual strength of the storm threat with such a weak wind field. All in all, the situation awareness was pretty good.