

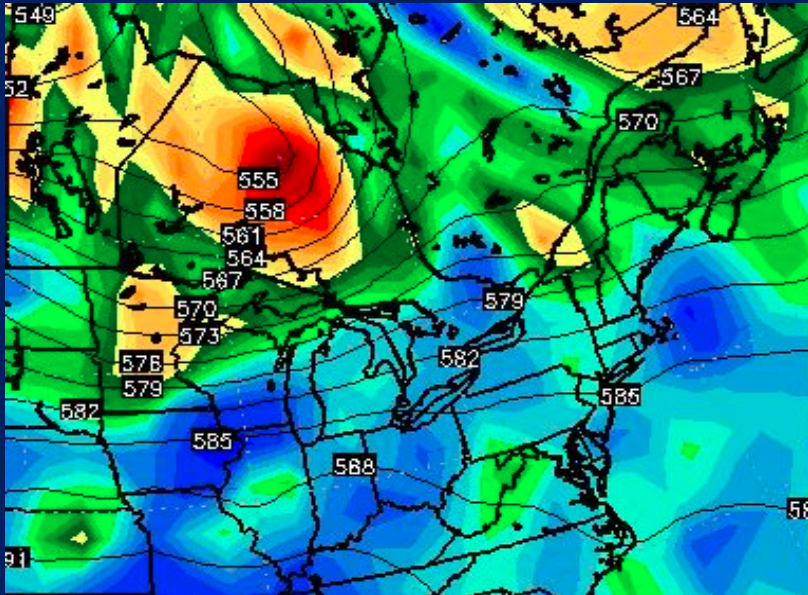
The July 19, 2015 “Non Severe” Event in Southern New England

What Happened?

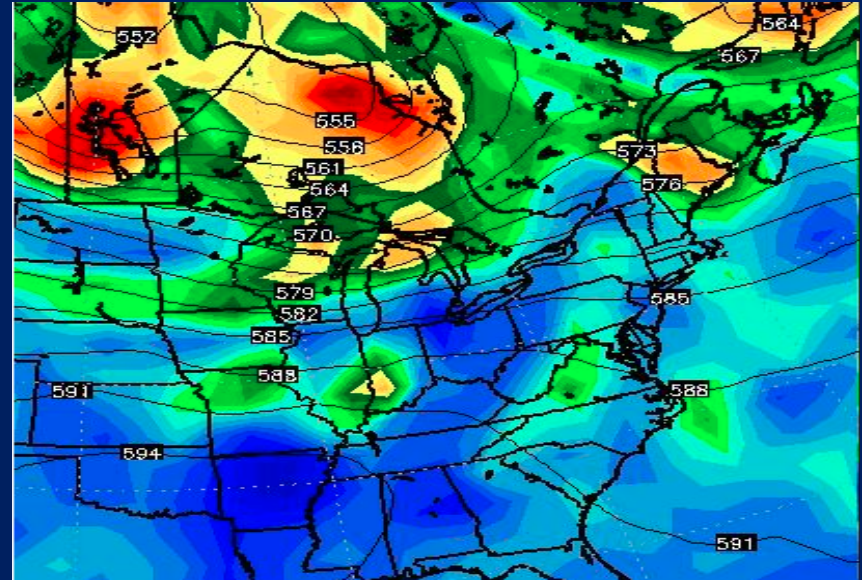
Frank Nocera
NOAA/NWS Taunton MA

500 mb Height/Vorticity (ECMWF)

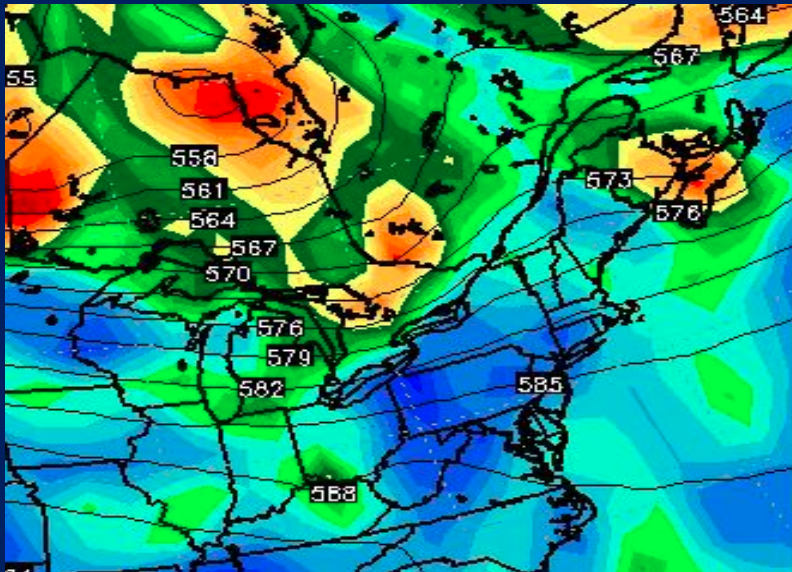
Valid at 12z on July 19th, 2015



Valid at 18z on July 19th, 2015

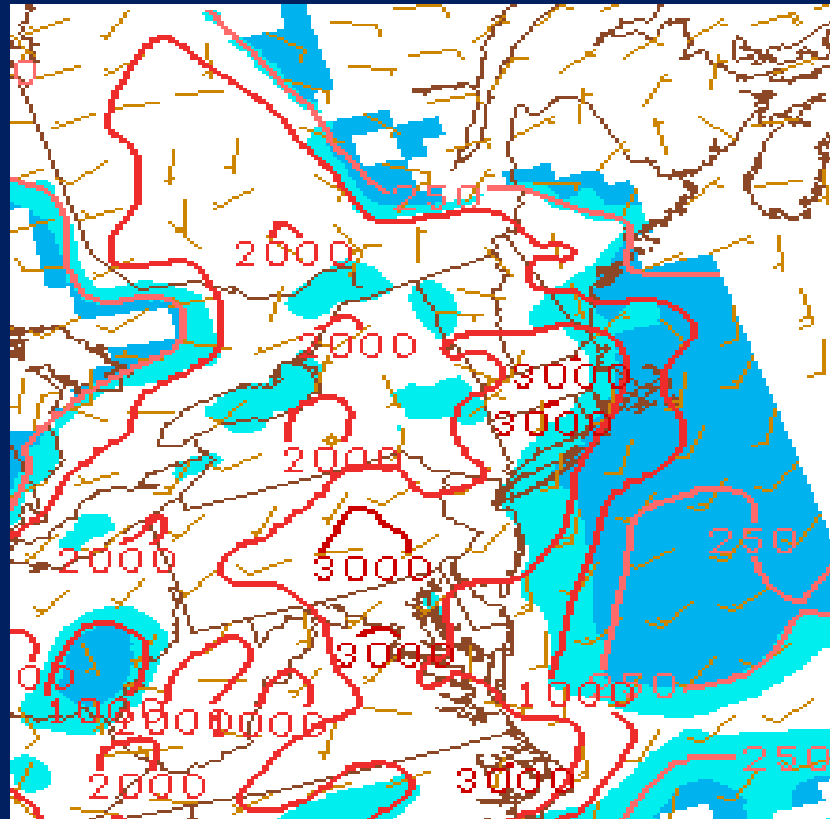


Valid at 00z on July 20th, 2015

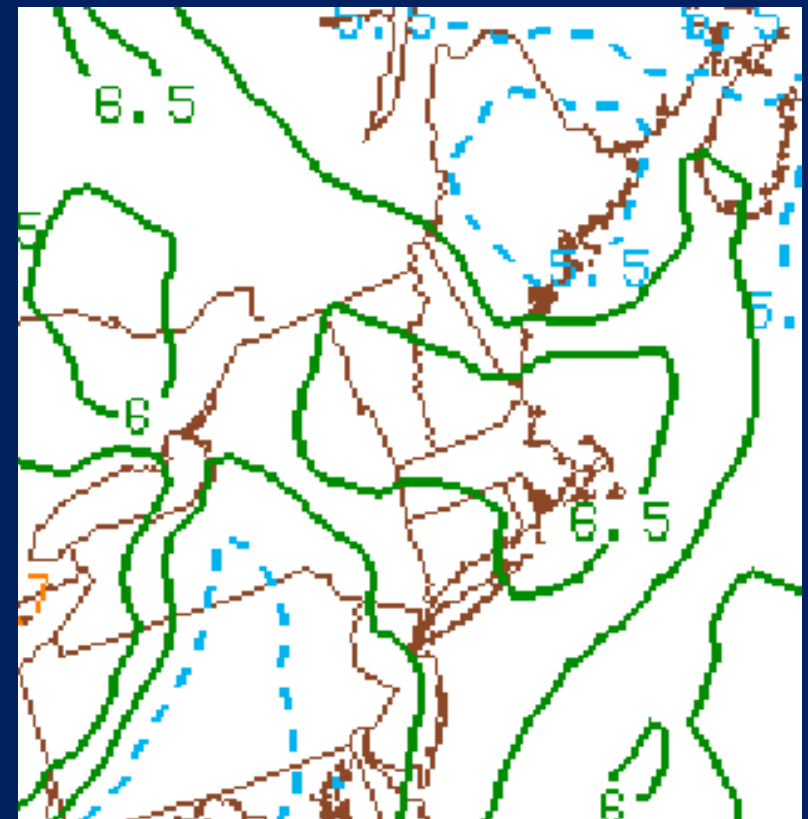


- Westerly Flow Aloft
- Subtle shortwave moving across Quebec and Northern Maine
- Minimal height falls, even in Northern New England

MLCAPE

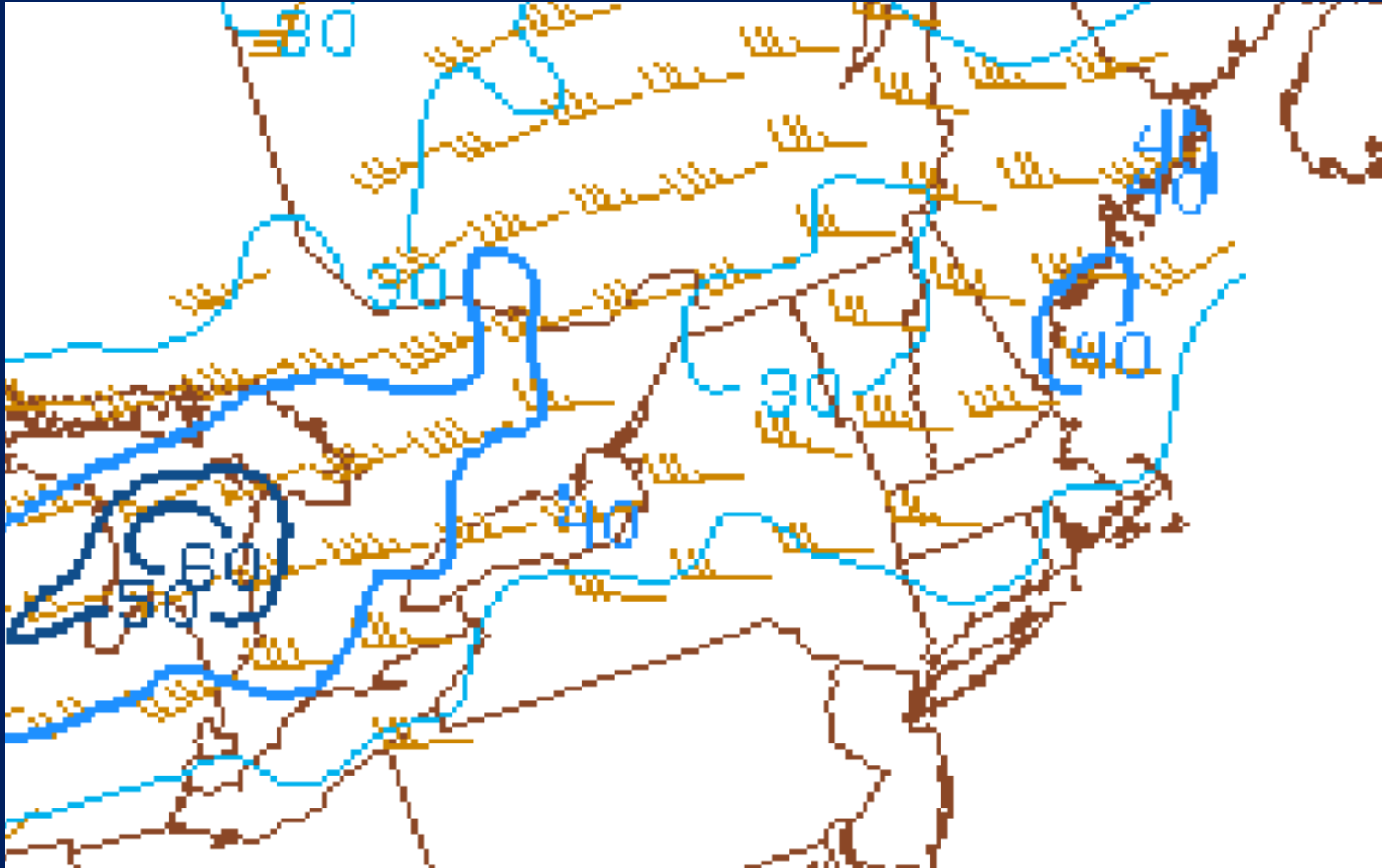


Mid Level Lapse Rates



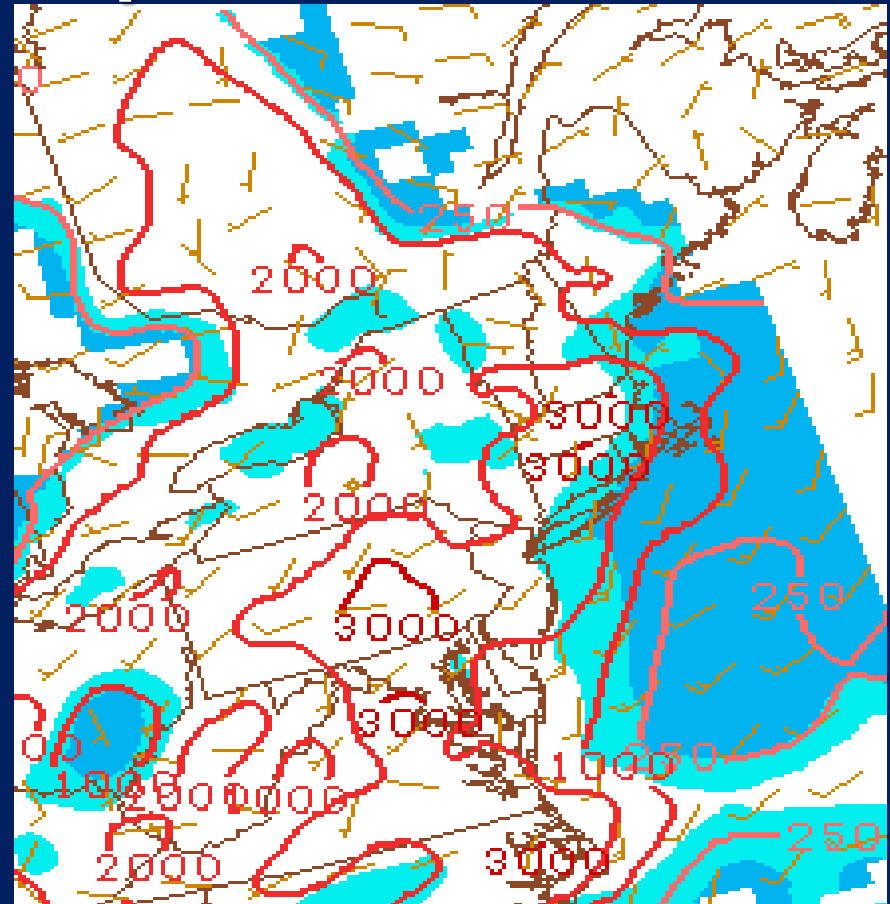
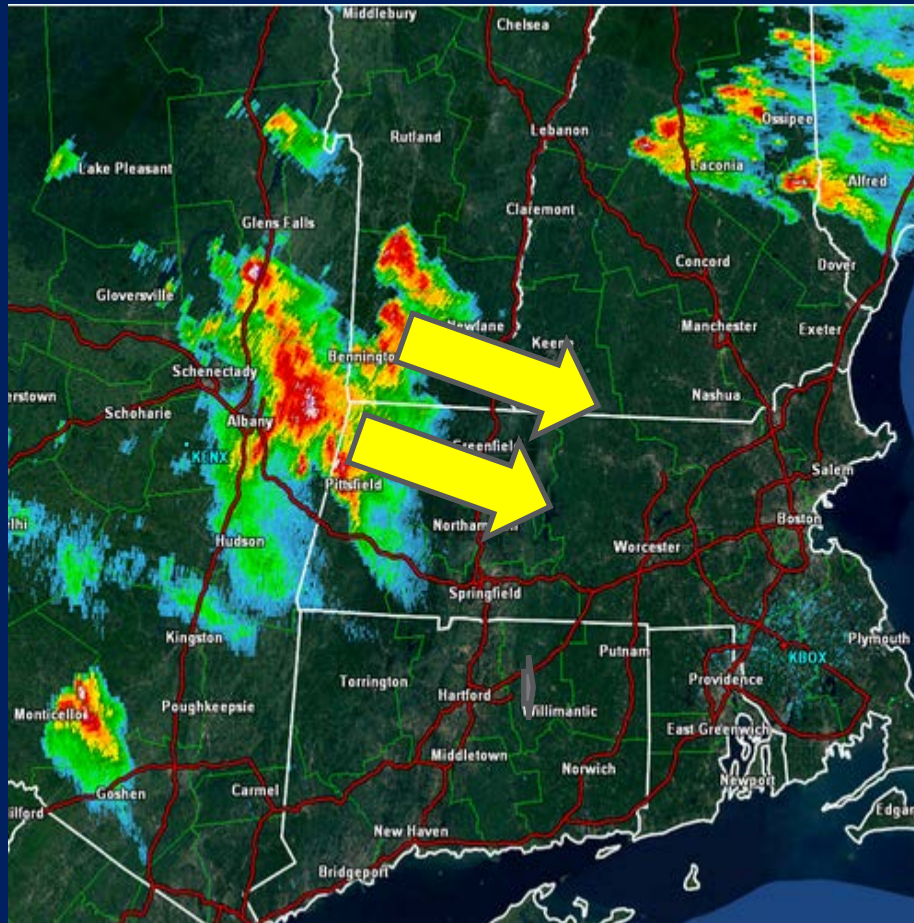
- Valid 20z
- Remnant EML- Mid Level Lapse Rates $> 6.5\text{C/KM}$
- MLCAPE $> 3000\text{ J/kg}$ in southern New England

0 to 6 km Shear: 20z



- 30-35 knots
- Plenty, considering MLCAPE over 3000 J/KG

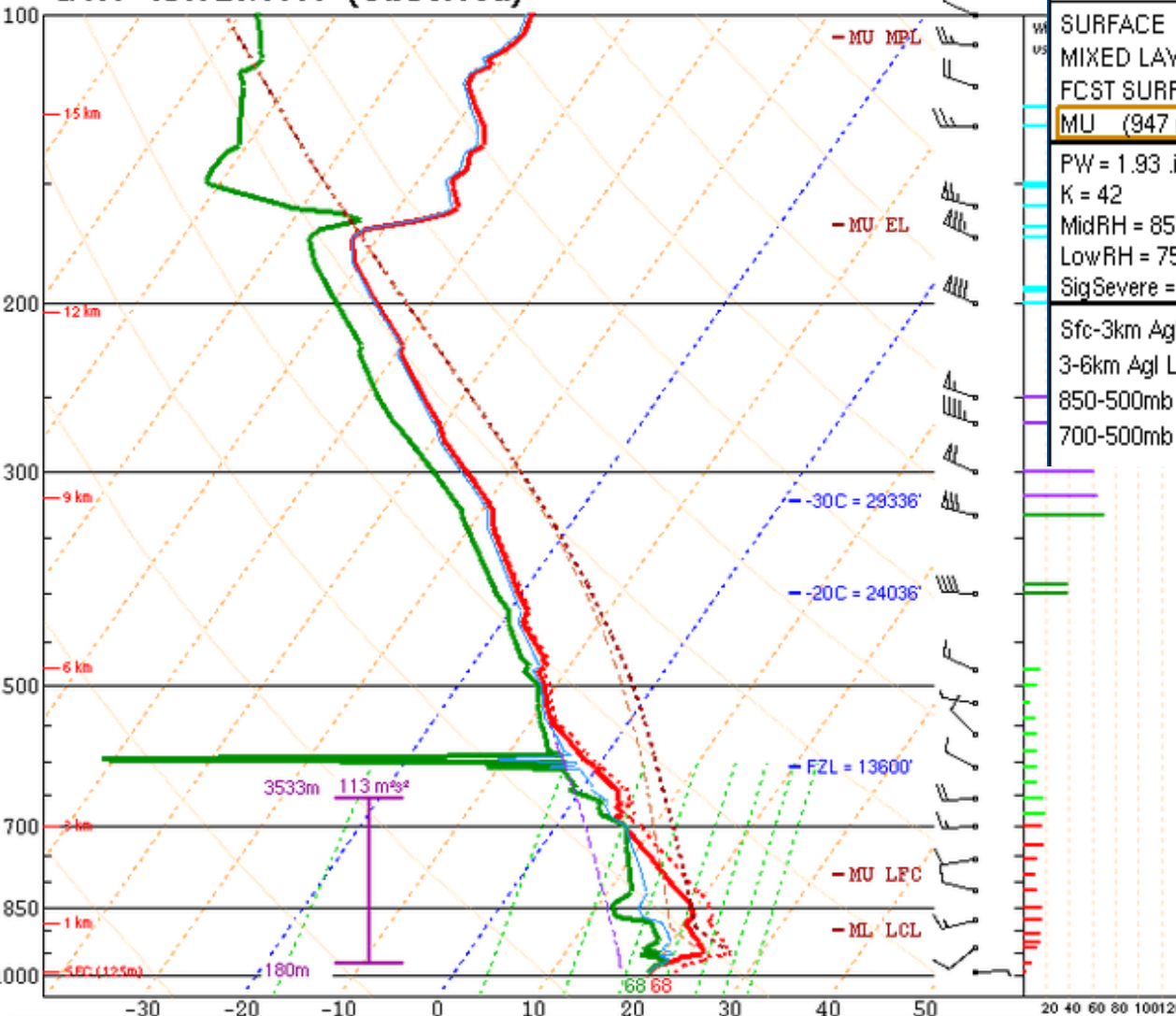
Radar and MLCAPE: 2230Z



- Severe Thunderstorms moving ESE at 25 mph
- Significant Wind/Hail Damage occurred in Eastern NY
- Should storms strengthen as they move into an environment with over 3000 MLCAPE?

July 20th 00z Sounding from GYX

GYX 150720/0000 (Observed)



PARCEL	CAPE	CINH	LCL	LI	LFC	EL
SURFACE	349	-399	26m	-3	3837m	27850'
MIXED LAYER	1586	-127	853m	-7	2369m	42431'
FCST SURFACE	2916	-4	1514m	-9	1756m	44124'
MU (947 mb)	2326	-57	945m	-8	2009m	43619'

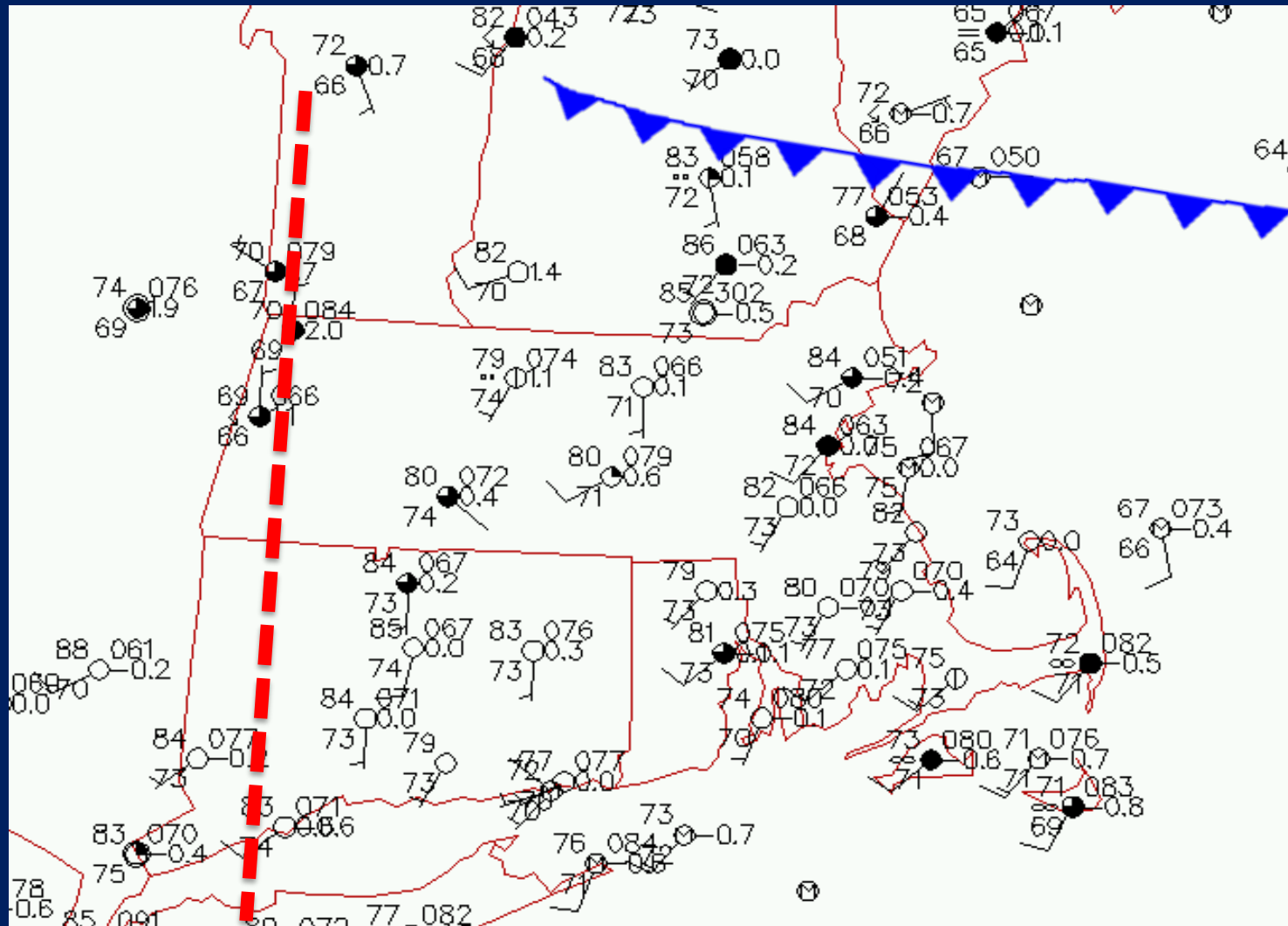
PW = 1.93 in 3CAPE = 26 J/kg WBZ = 12842' WNDG = 0.0
 K = 42 DCAPE = 891 J/kg FZL = 13600' ESP = 0.0
 MidRH = 85% DownT = 63 F ConvT = 91 F MMP = 0.52
 LowRH = 75% MeanW = 15.1 g/kg MaxT = 90F NCAPE = 0.21
 SigSevere = 16359 m3/s3

Supercell = 4.1
Left Supercell = -1.2
STP (eff layer) = 0.0
STP (fix layer) = 0.0
Sig Hail = 0.6

Sfc-3km Agl Lapse Rate = 4.7 C/km
 3-6km Agl Lapse Rate = 6.9 C/km
 850-500mb Lapse Rate = 7.4 C/km
 700-500mb Lapse Rate = 7.2 C/km

- Classic Remnant EML with 700 to 500 MB Lapse Rate of 7.2C/KM
- EML shows capping inversion away from significant forcing

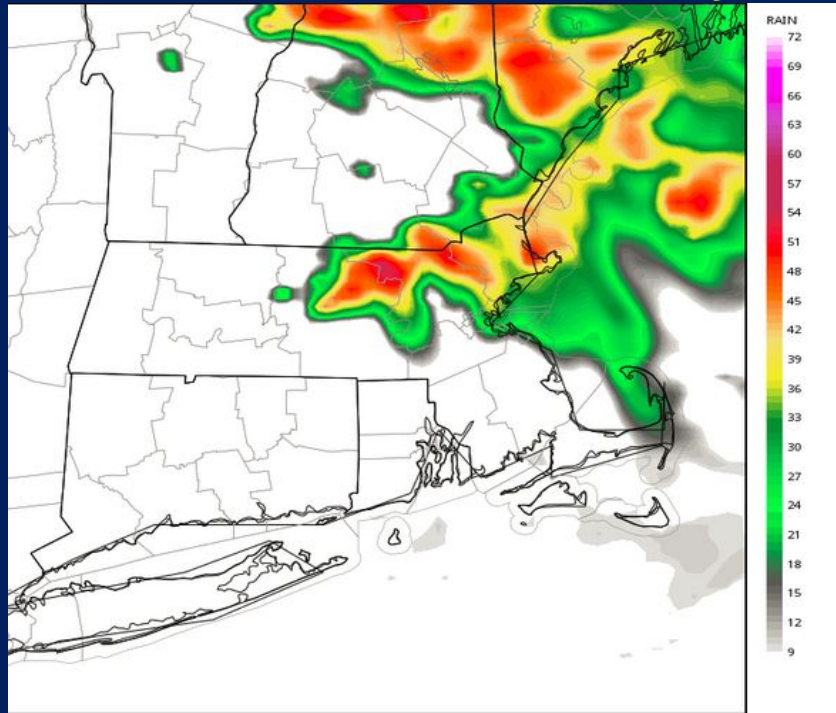
Surface Analysis: 00z July 19th



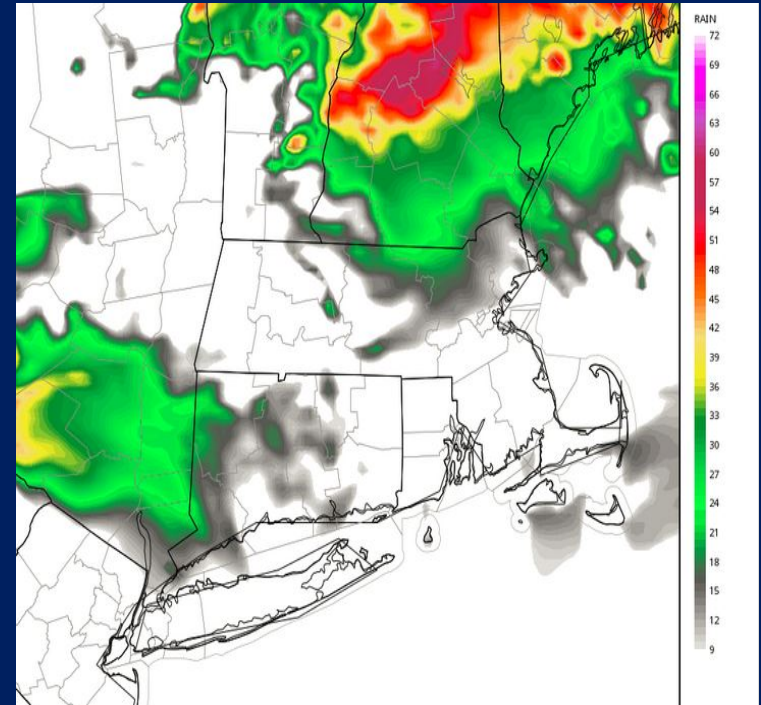
- Forcing from boundaries is north and west of region
- Not much in MA/CT/RI

Potential Red Flag

ARW Valid at 8 PM on July 19th

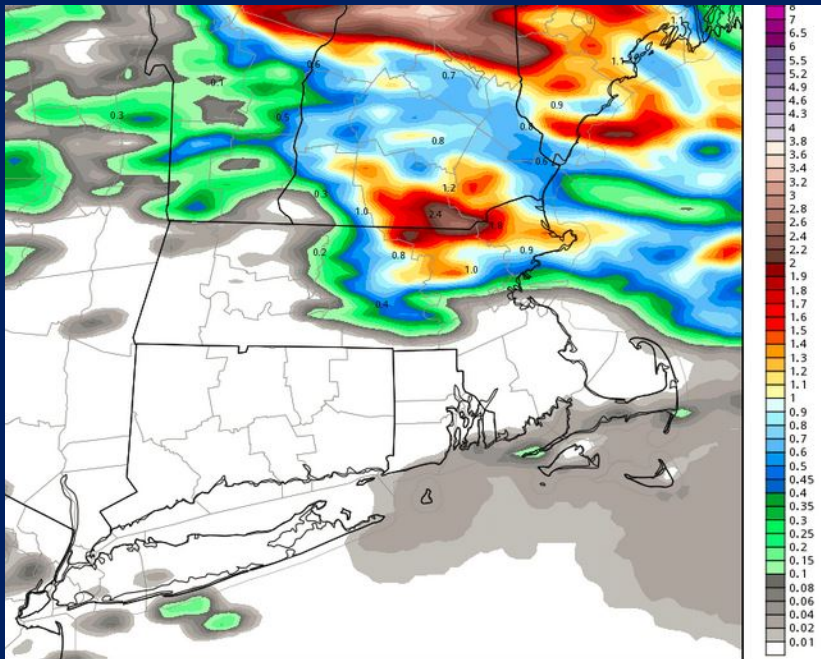


NMM Valid at 8 PM on July 19th

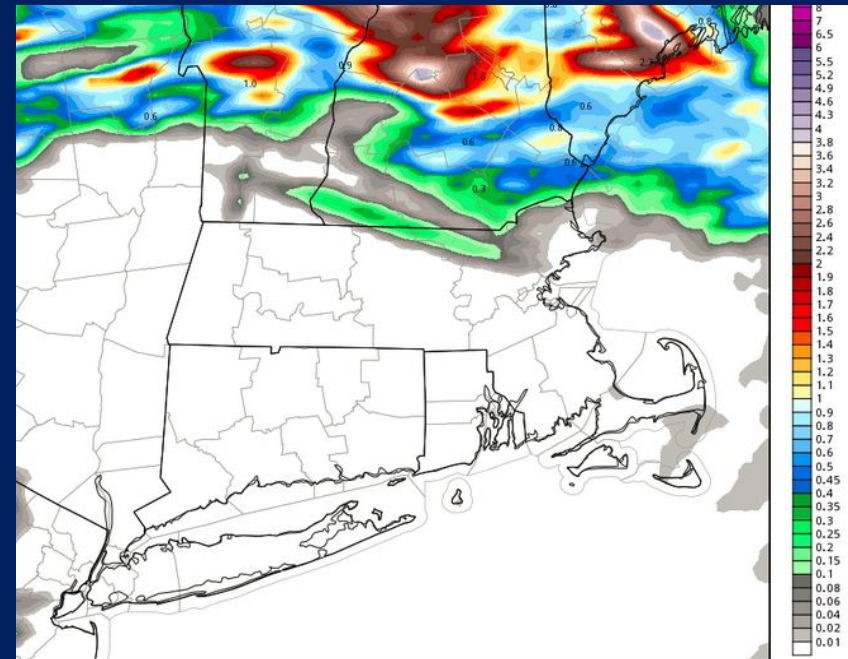


- ARW and NMM disagree on southward extend of thunderstorms
 - ARW brings storms into Northern MA, while NMM keeps them in NH and ME

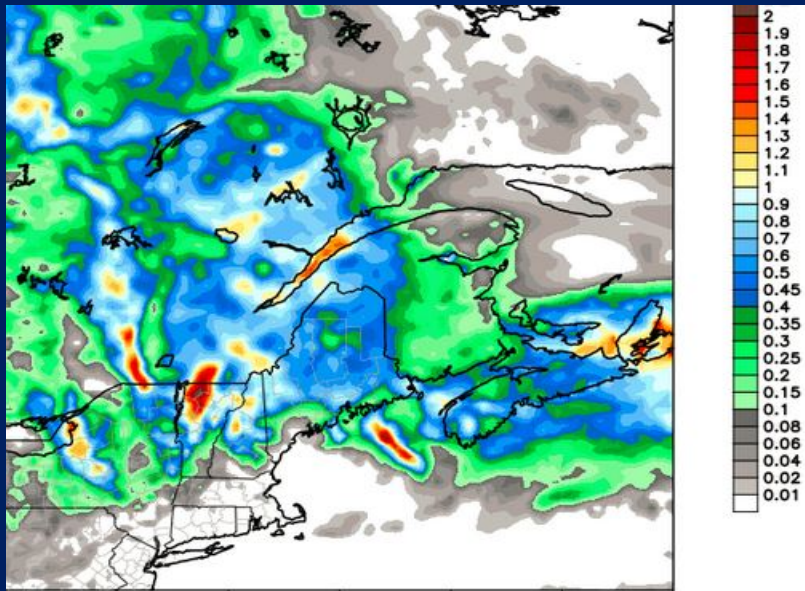
ARW Total QPF



NMM Total QPF



ECMWF Total QPF



- All had significant QPF in Northern New England
- Some brought QPF into MA, others kept it north.

Actions Taken: 12-36 Hours Before Event

- **Coordinated with SPC, GYX and ALY on Day1 Outlook**
 - **Included Slight Risk north of MA Turnpike**
- **Forecast mentioned isolated severe thunderstorms north of MA Turnpike by early evening on July 19th.**
- **Email sent to Emergency Managers mentioning potential for “high end” severe weather for portions of the region.**
 - **Mentioned the uncertainty as to whether or not isolated activity would merge into an MCS, bringing the potential for pockets of significant wind damage**

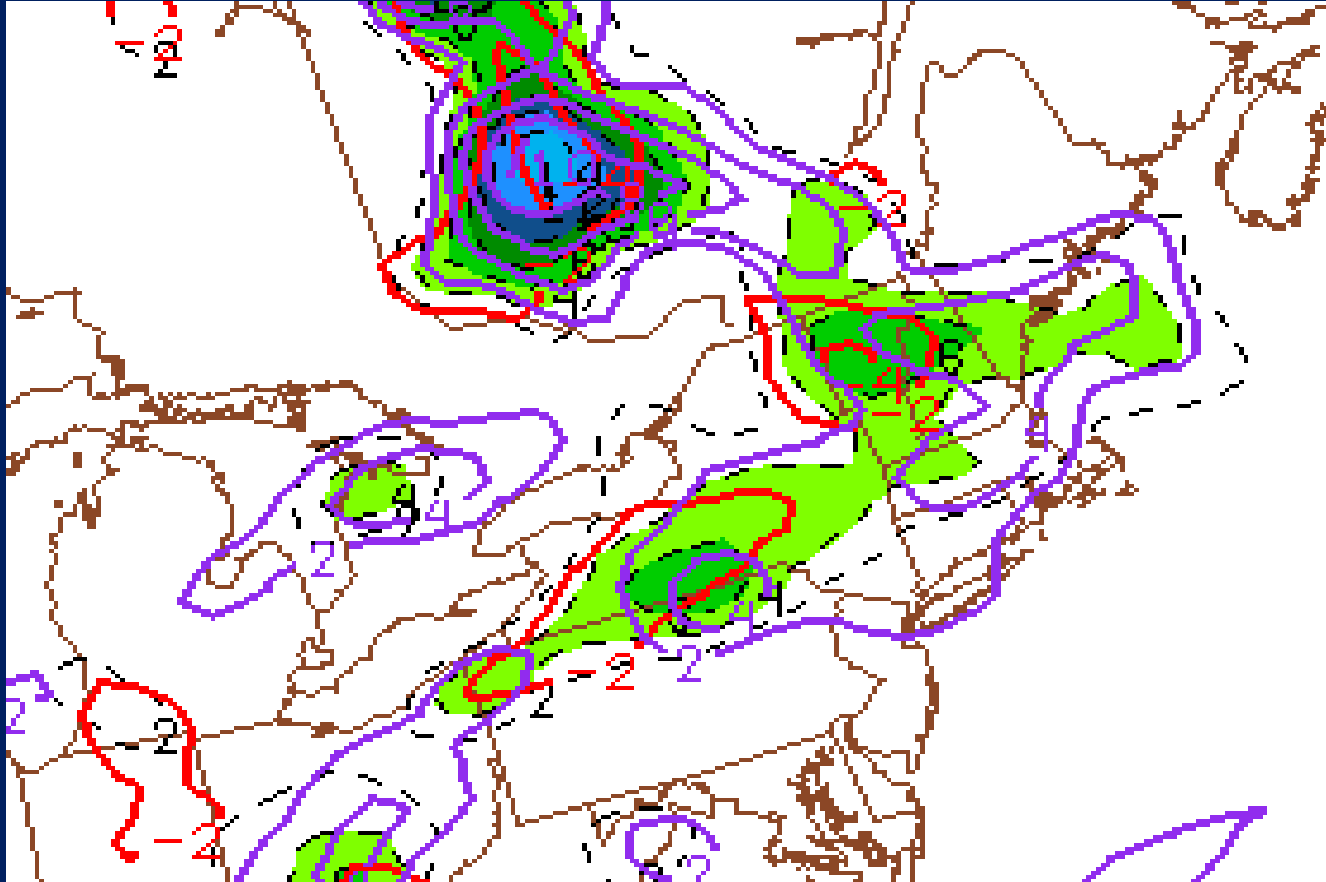
Actions Taken: <12 Hours Before Event

- SPC upgraded northern MA to an Enhanced Risk, with slight risk farther south with 13z update
- Severe Thunderstorm Watch Issued that afternoon to the North of Massachusetts Turnpike
 - Expanded into Northern CT based on storms to our west
- Flash Flood Watch issued by early that evening, based on flooding and slow moving storms to our north and west



850 mb Convergence and 250 mb Divergence

Shaded Values Indicate Positive Differential



- Most of lift stays to the north and west of southern New England
- Surface convergence north of region and pre-frontal trough west
- EML reduces convection away from forcing because of mid level CAP

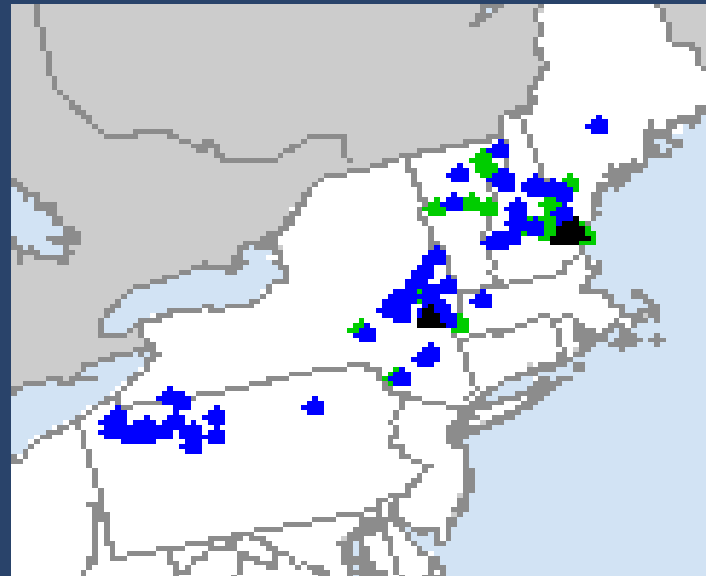
Storms Weaken: Limited Forcing Despite Higher CAPE



The Event Did Not Materialize

- Bulk of severe weather occurred between 3 and 9 pm
- Only 1 report of severe weather was received
 - Tree/large branches downed in NW MA
 - Rest of the region did not even see any rain
- “High impact” severe weather stayed our north and west
 - Baseball sized hail and significant wind damage

- High Wind Report (65KT +)
- ▲ Large Hail Report (2" dia. +)



Lessons Learned

- **Remnant EML with steep mid level lapse rates and high CAPE does not always result in significant severe weather**
 - **Low level forcing and upper level divergence were lacking in southern New England**
 - **“Red Flags” in some model QPF fields**
 - **Shortwaves tend to be more subtle in EML situations with westerly flow aloft**
 - **Forecasters were concerned activity may end up further south than model depictions with push of cool outflow.**

Lessons Learned

- **Event “over performed” in Eastern NY and central New England**
 - Baseball sized hail despite WBZ around 14K feet
 - Significant wind damage
- **High CAPE with an EML in place can produce very large hail despite high freezing levels**
- **Look at 250 MB divergence and 850 convergence, especially when model QPF fields are showing red flags**
- **EML’s are often high end severe or nothing at all**
 - Something we can convey in briefings to EMs.

Comparison with Severe Weather Reports

