

The 16 July 2024 Significant Severe and Tornadoic Event across New York and New England Part II: Radar Analysis, Warnings and IDSS

Neil A. Stuart and Thomas A. Wasula

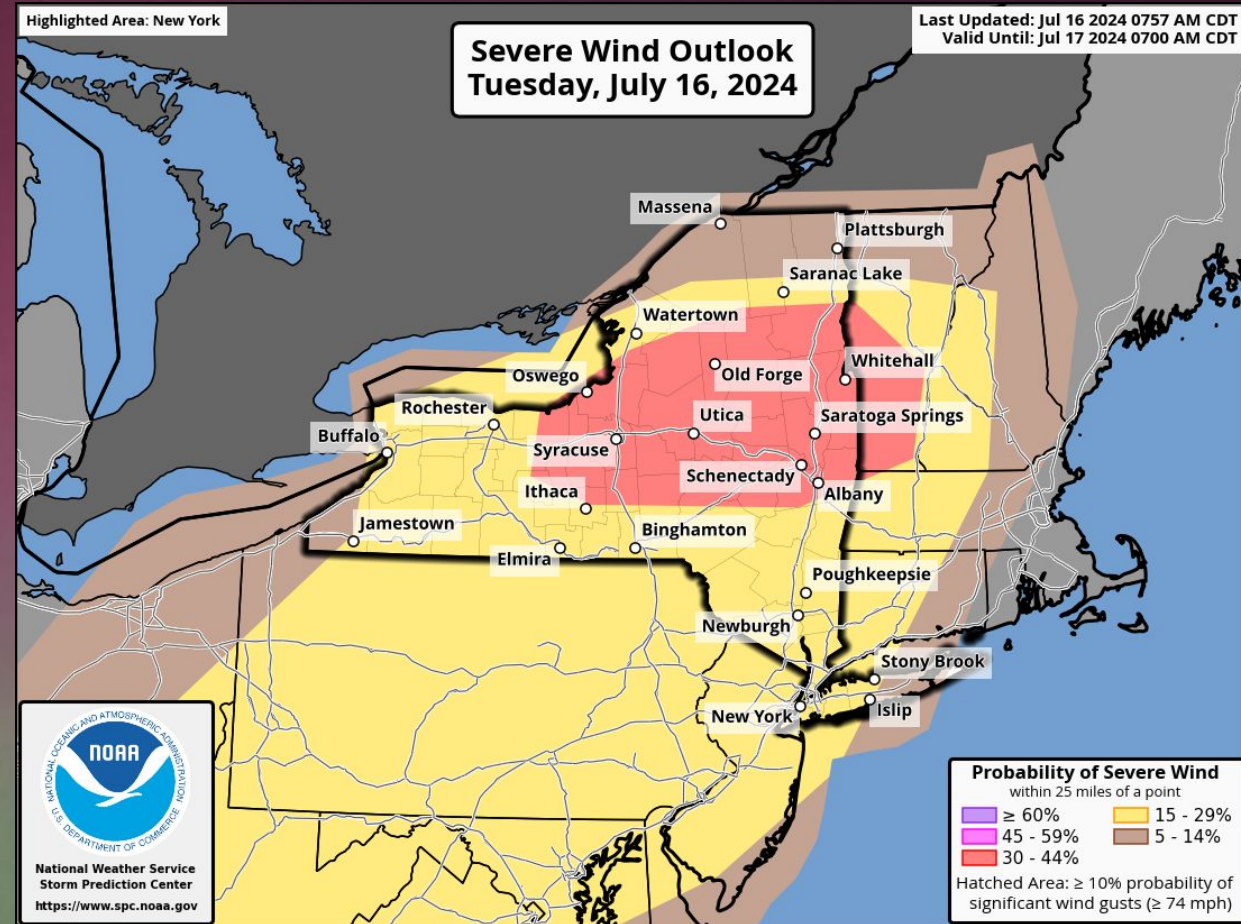
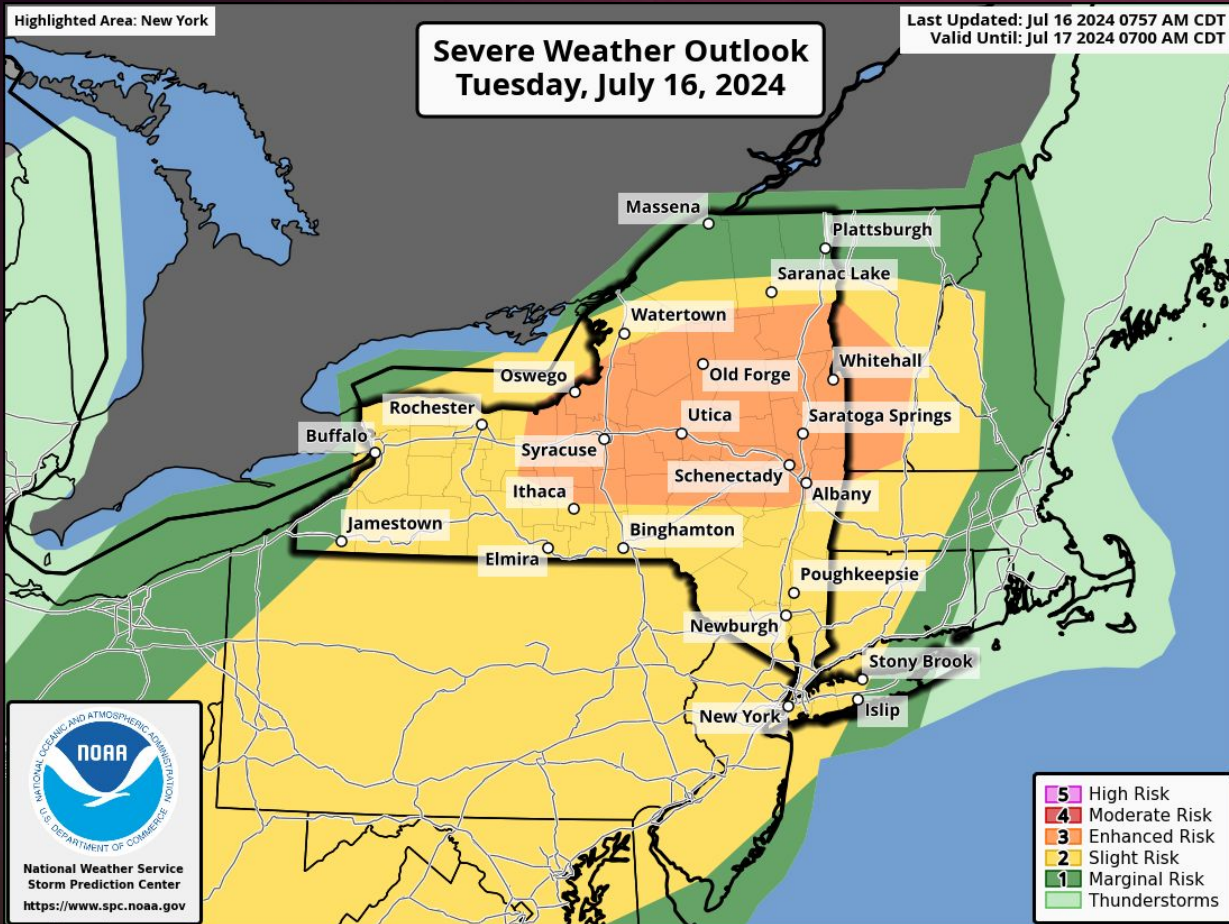
NOAA/National Weather Service, Albany NY

Northeast Regional Operational Workshop XXV

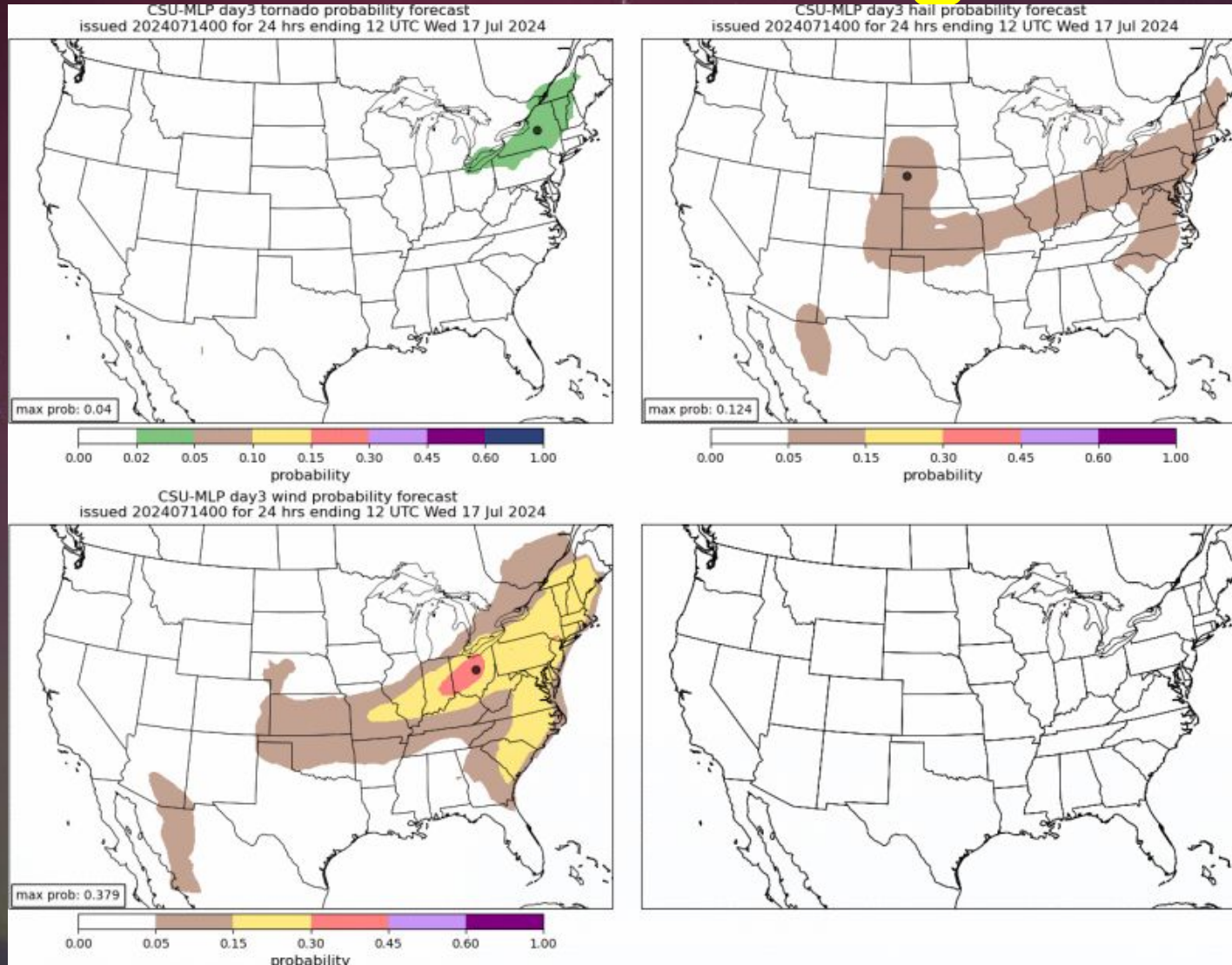
13-15 November 2024



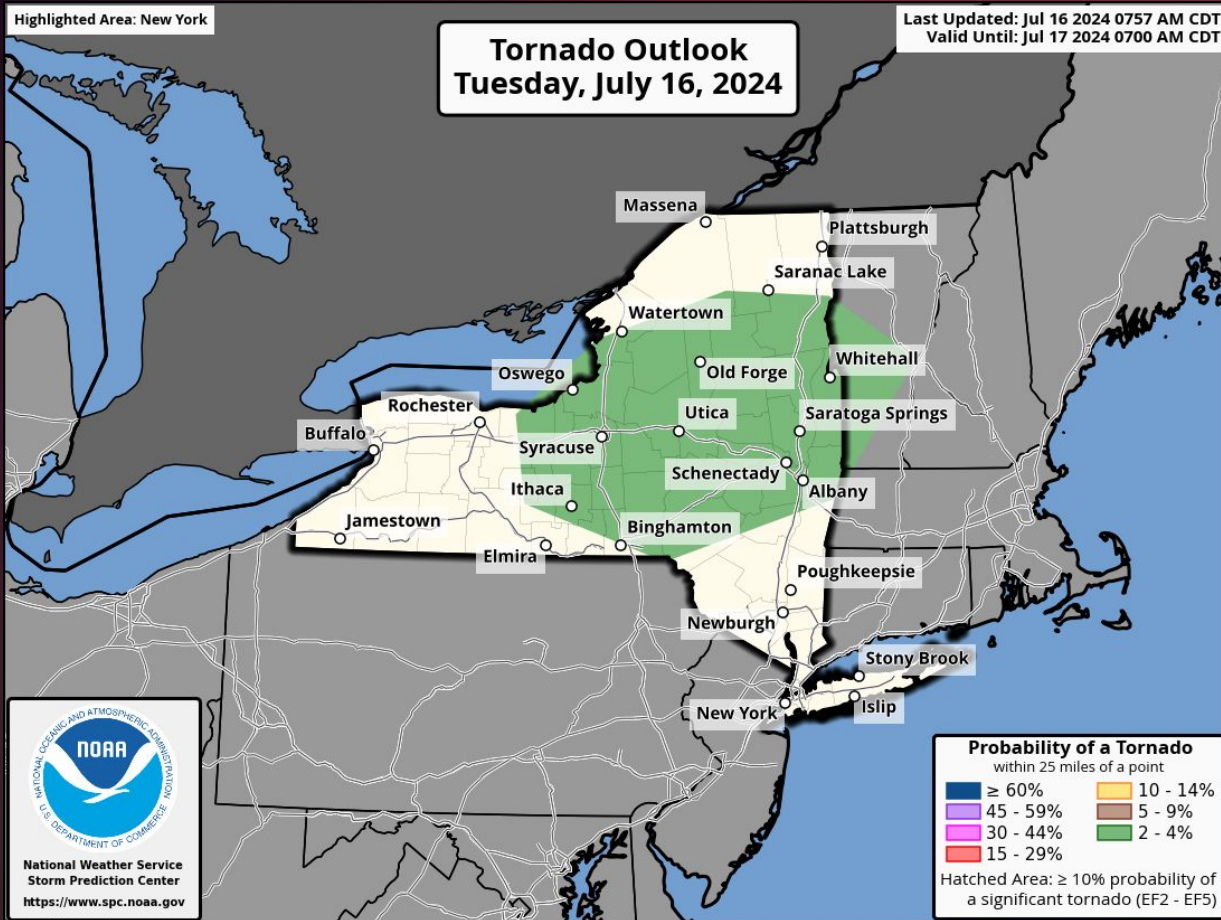
Let's review where we left off - Severe Weather Outlooks



Let's review where we left off - CSU Machine Learning Predictions



Let's review where we left off - Severe Weather Outlooks



Severe Thunderstorm Watch

Valid Until
9:00 PM EDT Tuesday
July 16, 2024

Threat Information

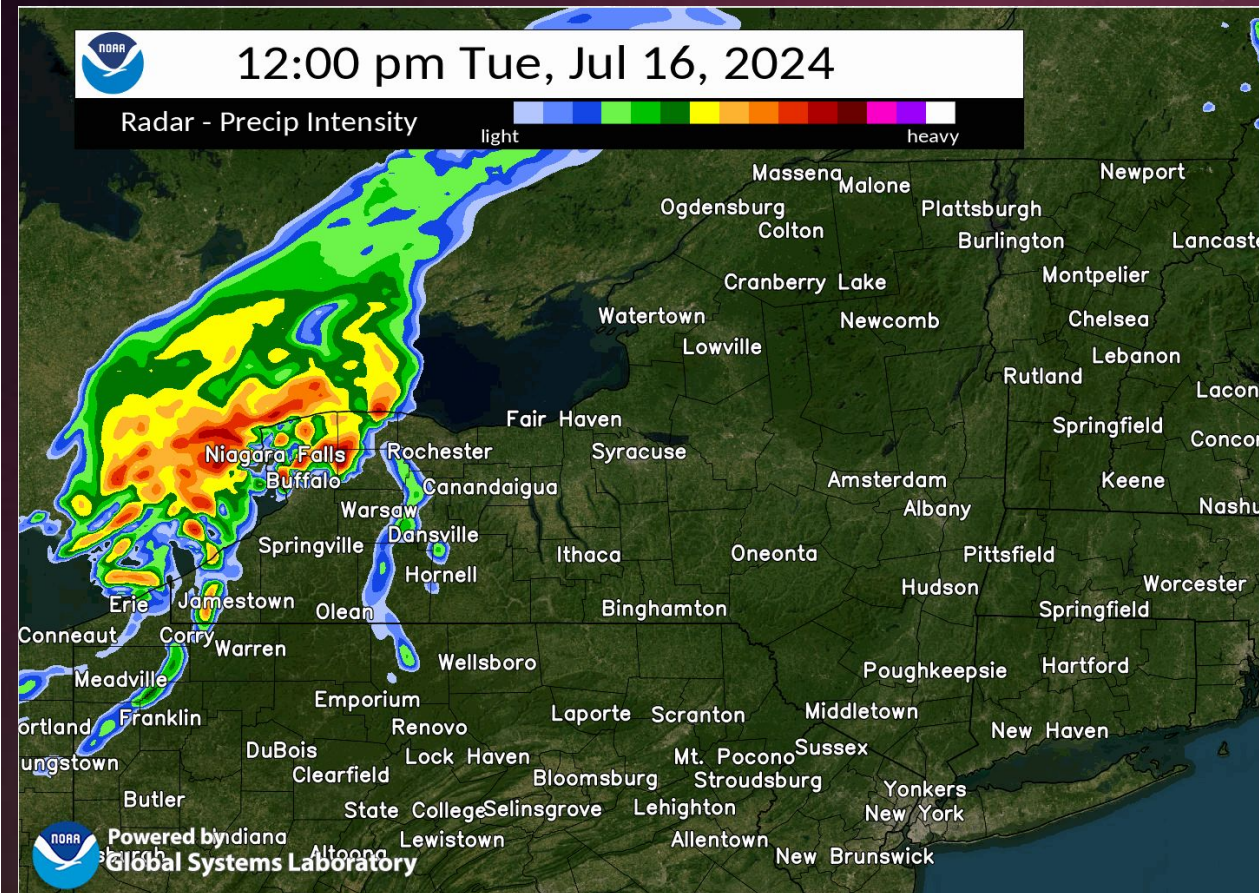
- TORNADOES**
A Couple Tornadoes Possible
- HAIL**
Isolated Hail Up To Ping Pong Size Possible
- WIND**
Scattered Gusts Up To 75 MPH Likely

Potential Exposure

Population: 2,193,751
Schools: 794
Hospitals: 49



Situational Awareness – CAM simulated radar reflectivity

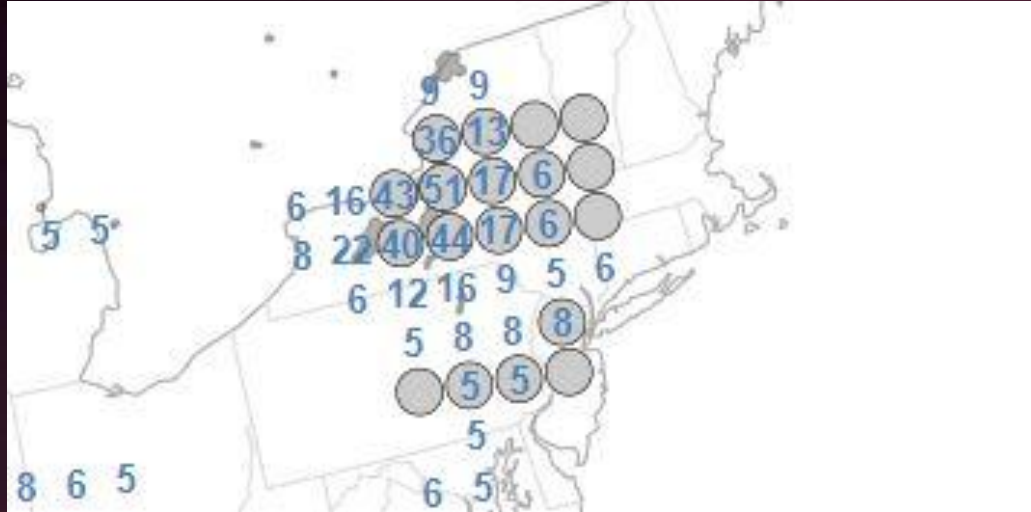


HRRR

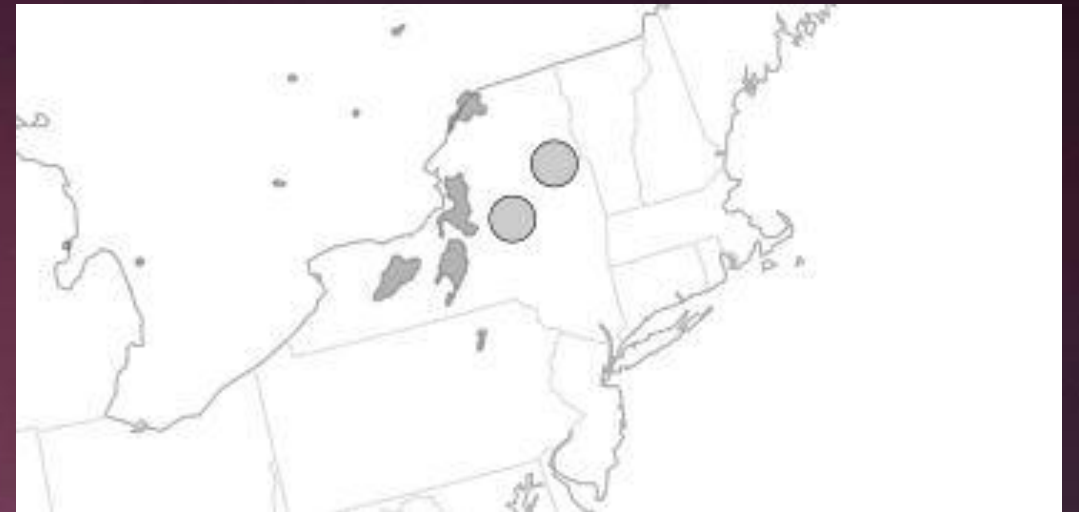


NAM Nest

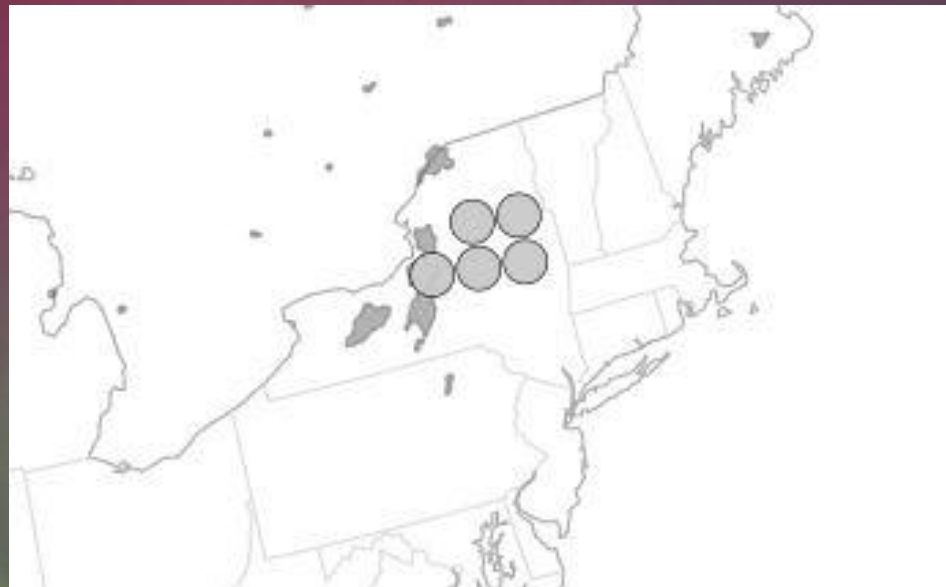
NCAR Neural Network HRRR based guidance – Initialized 06Z 16 July



Probability for any
severe within 40
Km 18Z-22Z



Probability for significant
severe within 40 Km
18Z-22Z

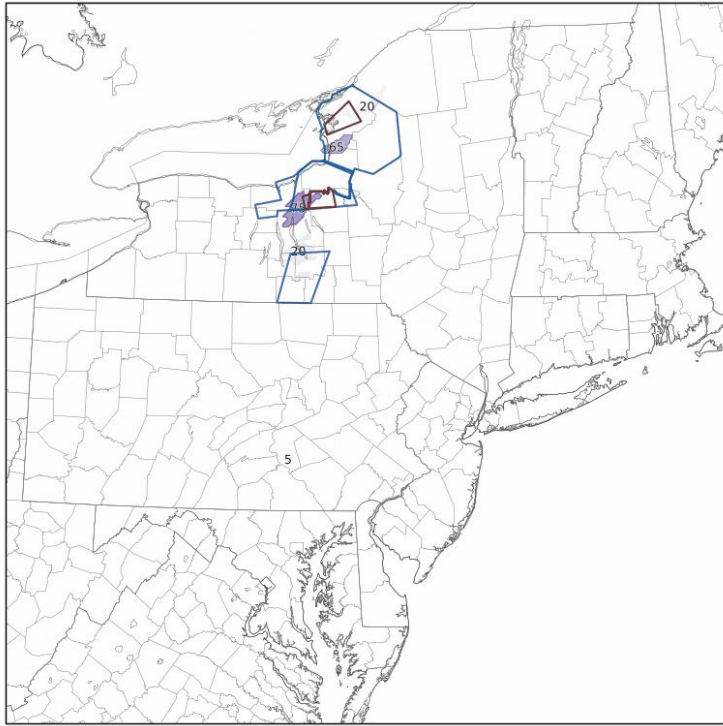


Probability for tornadoes within 40 Km 18Z-22Z

(WoFS) Machine Learning Guidance

ML 30-min Probability of At Least One Severe Weather Report

Init: 2024-07-16, 1800 UTC
Valid: 2024-07-16, 1830 UTC

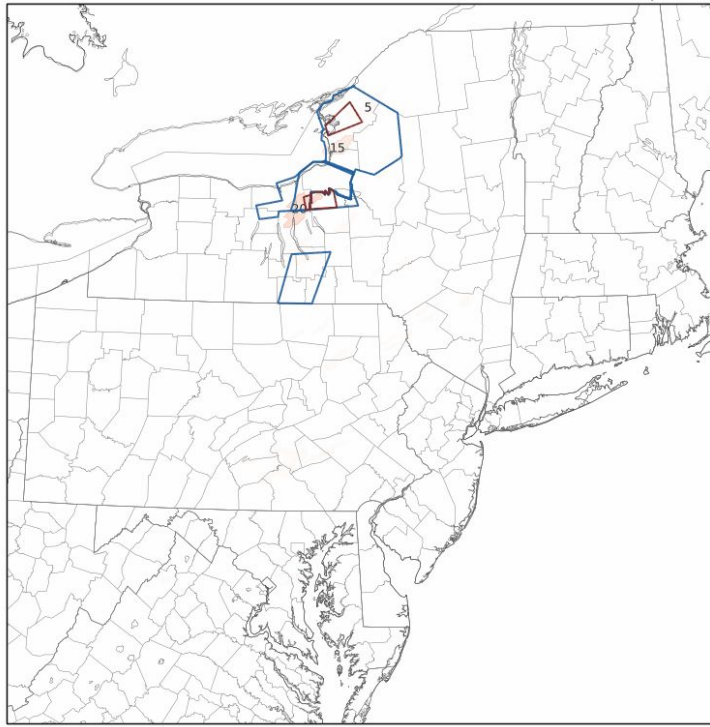


Probability for at least one severe report 18Z-22Z

Probability for at least one tornado report 18Z-22Z

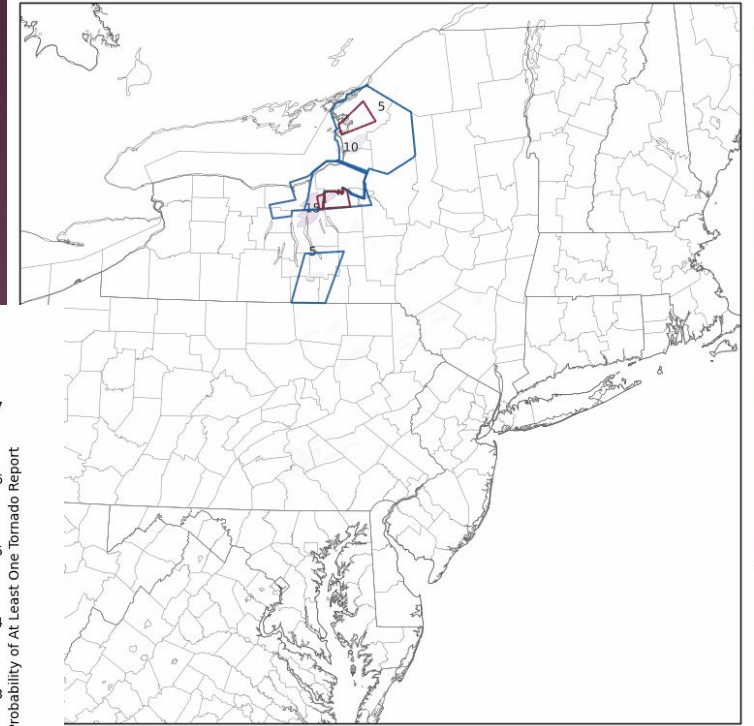
ML 30-min Probability of At Least One Tornado Report

Init: 2024-07-16, 1800 UTC
Valid: 2024-07-16, 1830 UTC



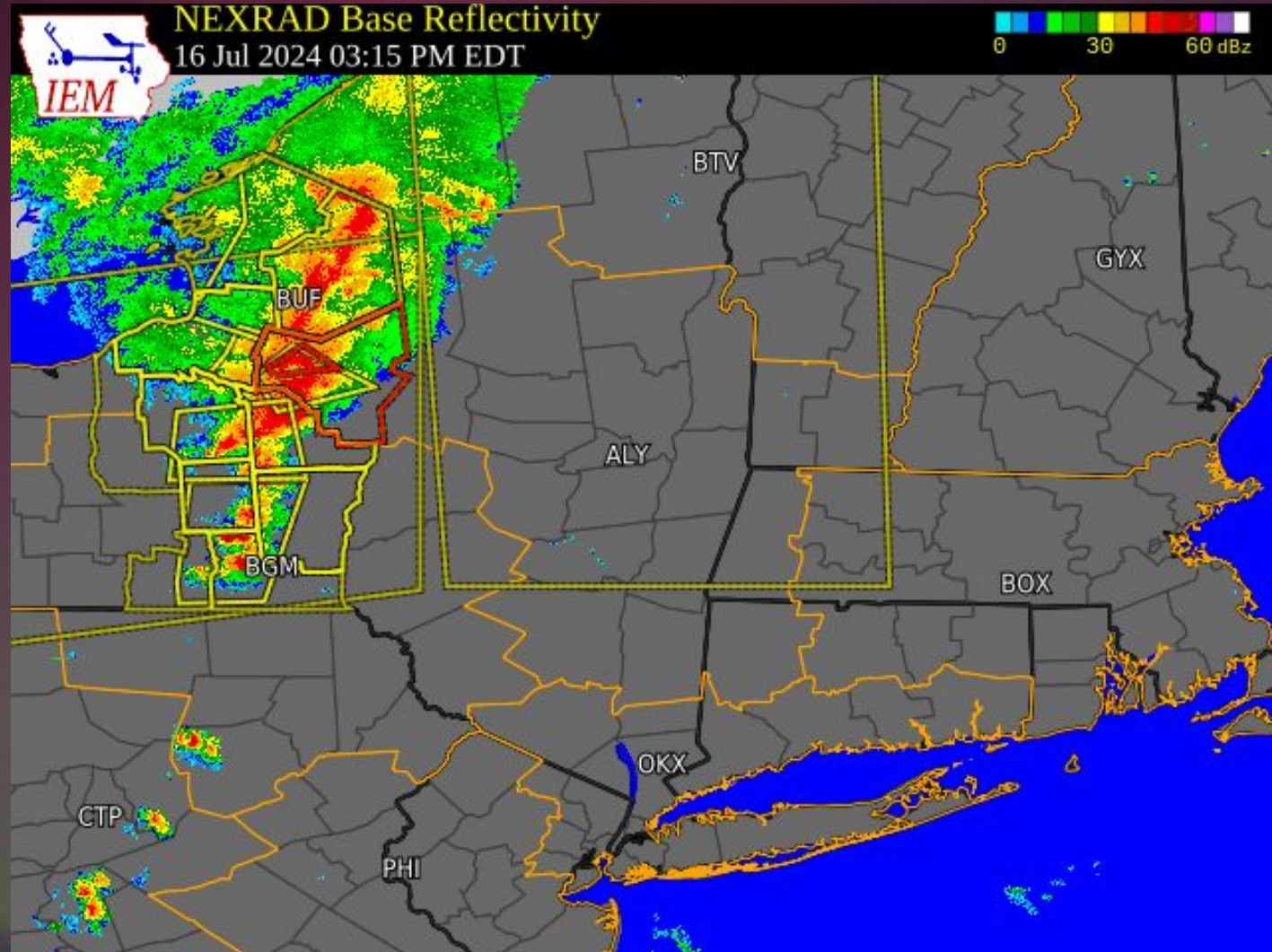
ML 30-min Probability of At One Sig. Severe Weather Report

Init: 2024-07-16, 1800 UTC
Valid: 2024-07-16, 1830 UTC

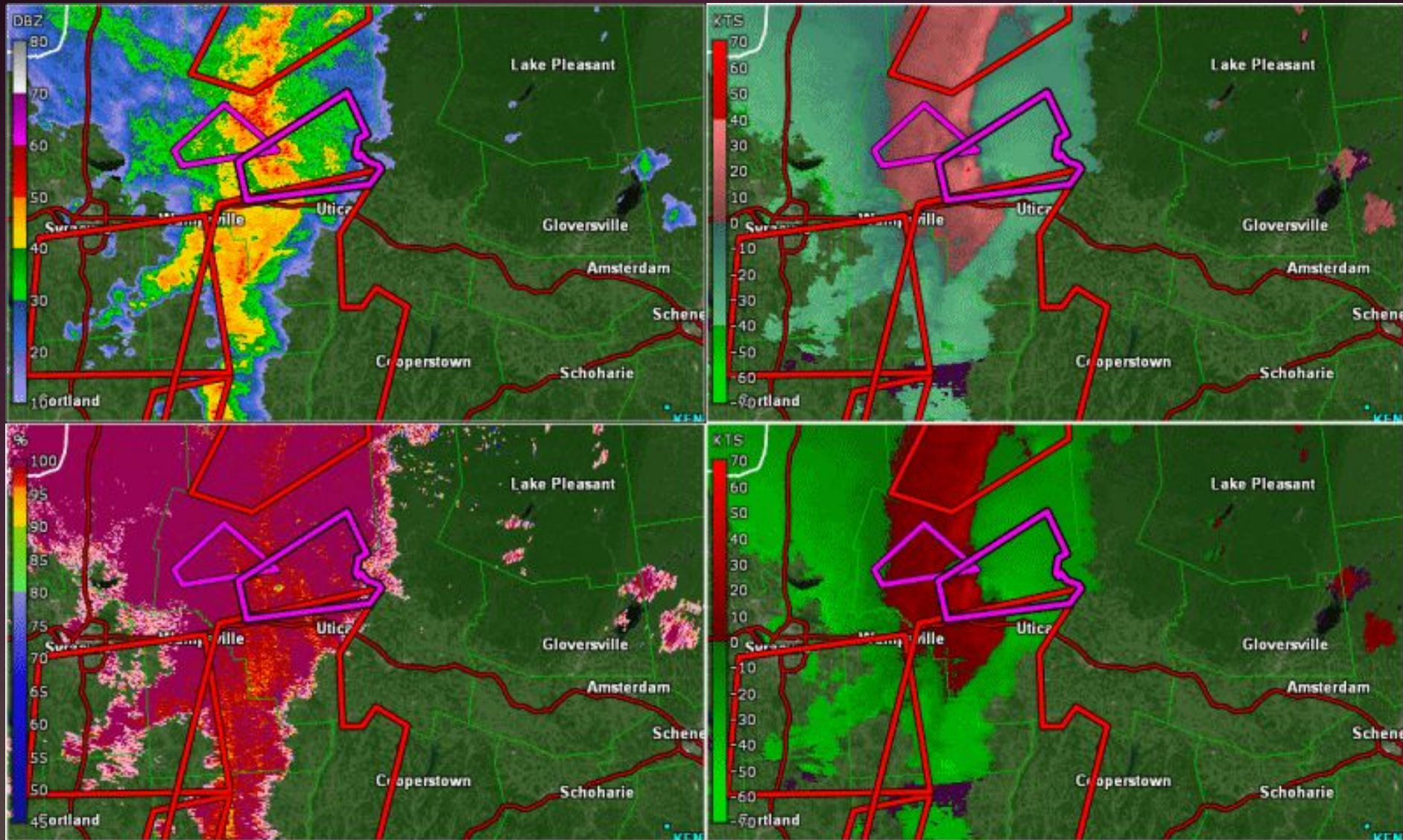


Probability for at least one significant severe report 18Z-22Z

Overview of Entire Event – Radar reflectivity

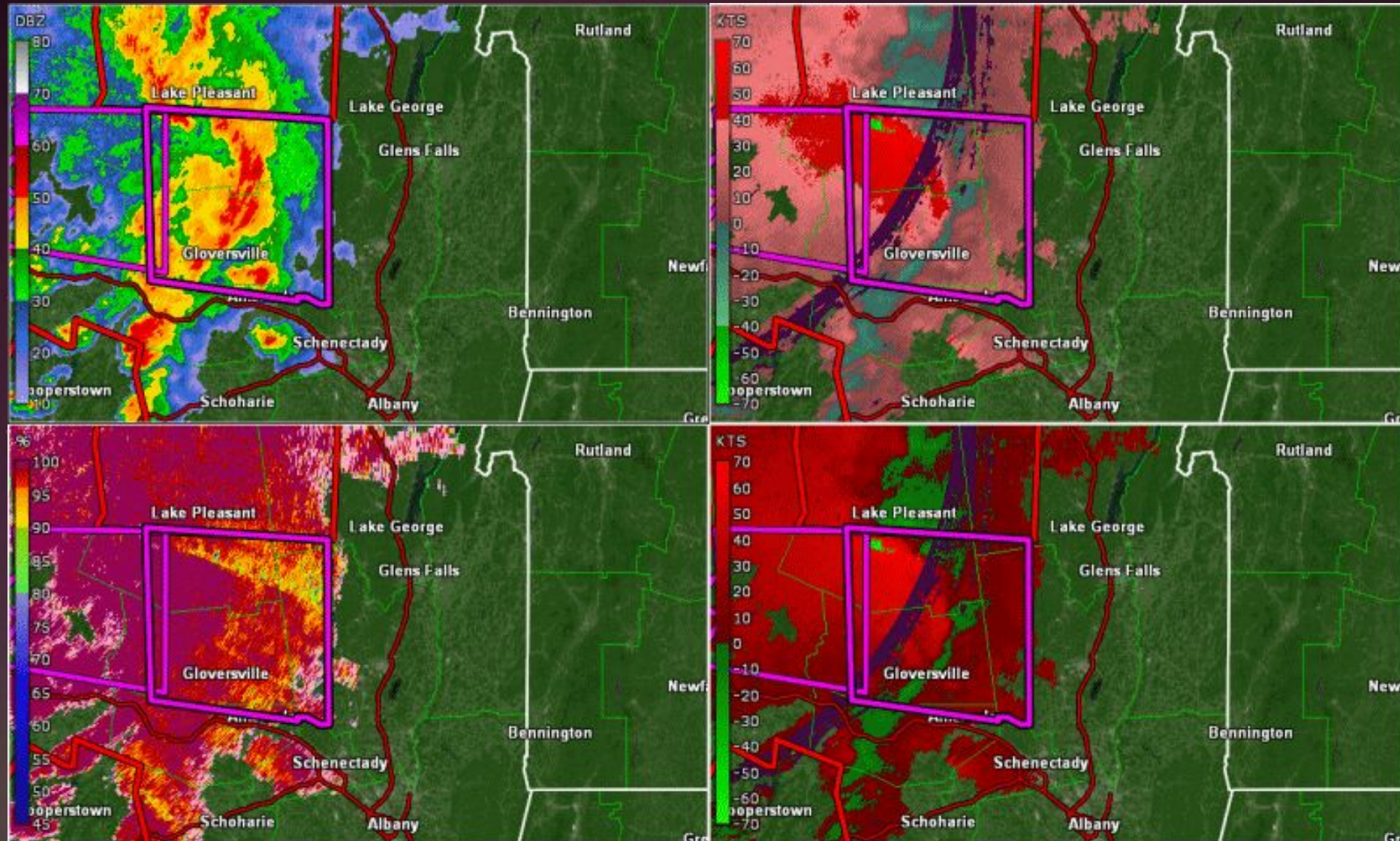


Line with history of damaging winds and a TDS near Rome, NY



Line with enhanced rear inflow jets enters NWS Albany NY CWA – Decision to message considerable damage potential, triggering WEA, also possible tornado tag

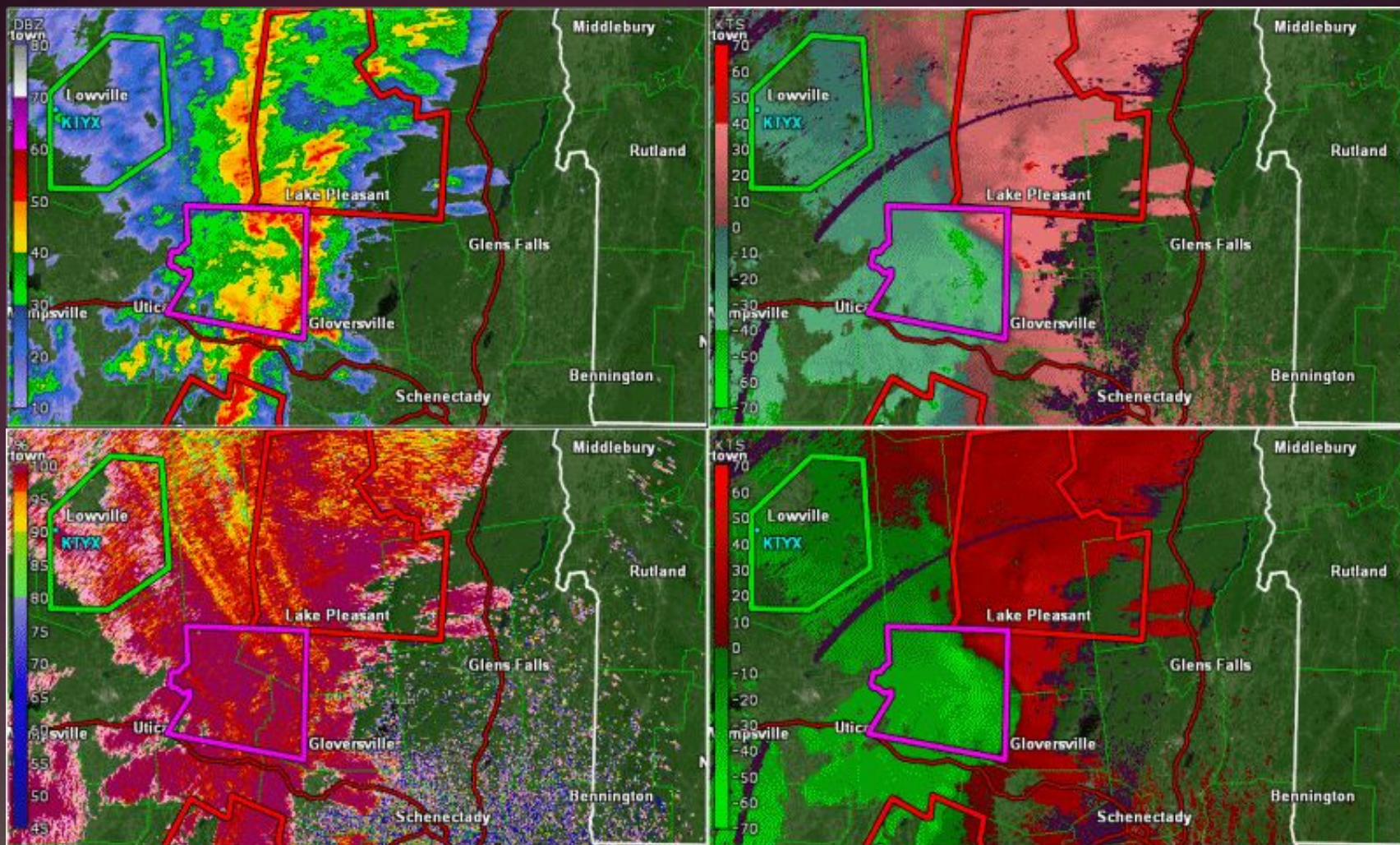
data



- Rotation that produced TDS broad and weaker but northern “Comma Head” and potential spin up tornado prompts Tornado Warning
- Decision also made that Severe Thunderstorm Warnings for the line would have considerable tags, triggering WEA until radar data indicates weakening

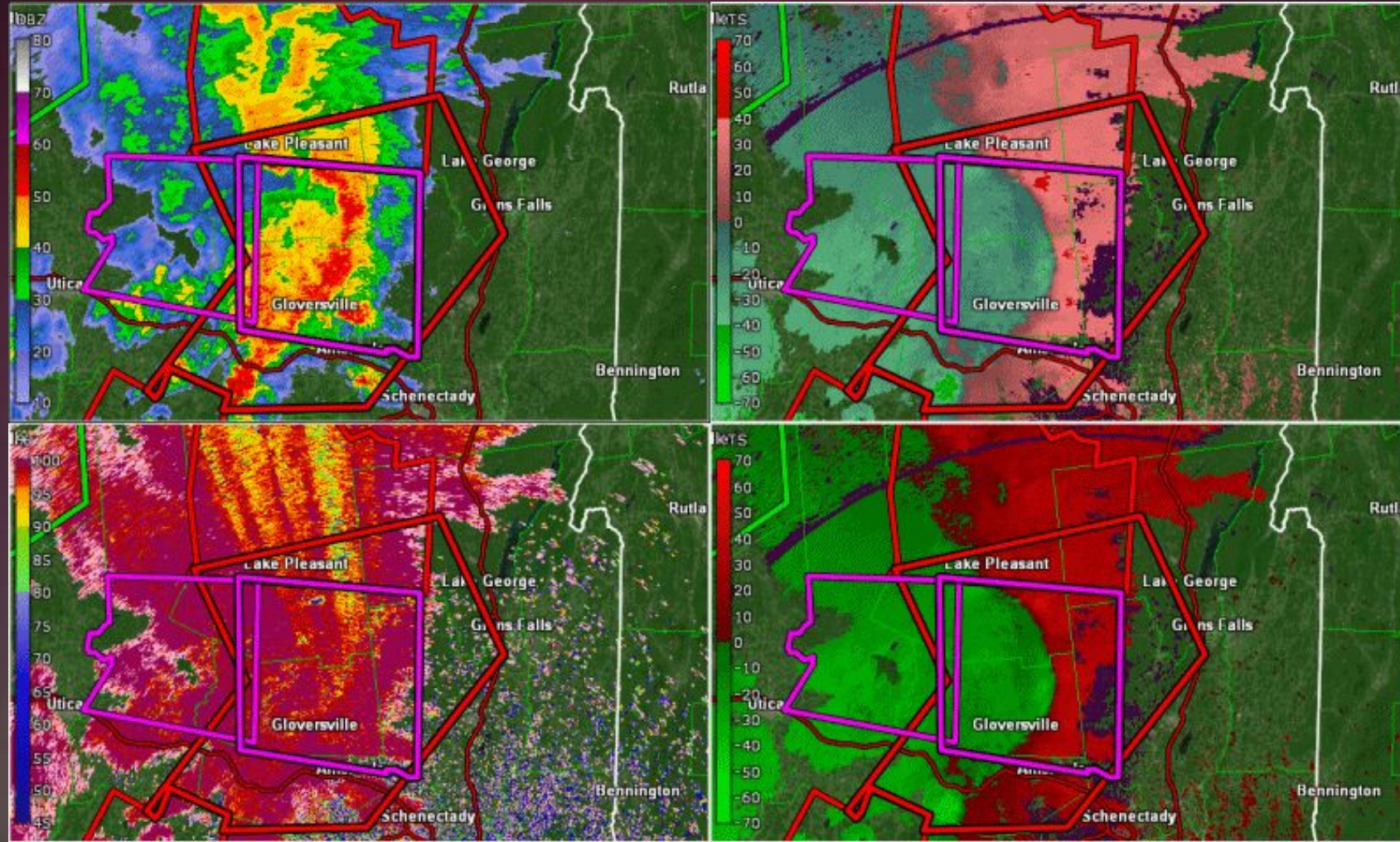


First KENX TDS



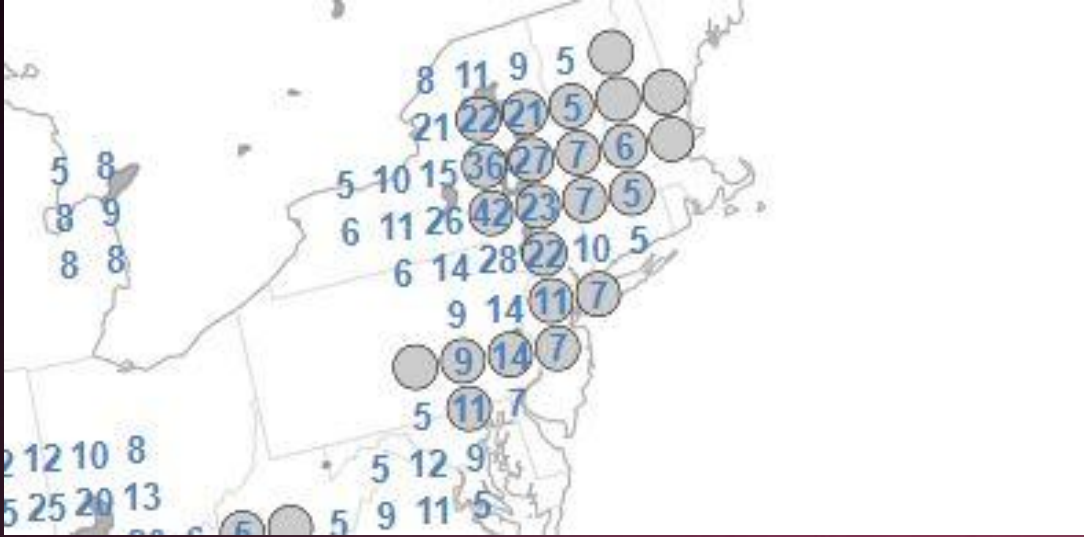
- Meanwhile, the rest of the line was producing straight-line winds 60-90 mph
- Warning strategy was to warn the severe line, try to focus on the bowing segments and rotations in northern “Comma Heads” for Tornado Warnings

Continuing to warn on the “comma heads” for enhanced wind damage and intermittent potential tornado spin-ups



Second TDS

NCAR Neural Network HRRR based guidance – Initialized 06Z 16 July



Probability for any severe within 40 Km 20Z-24Z

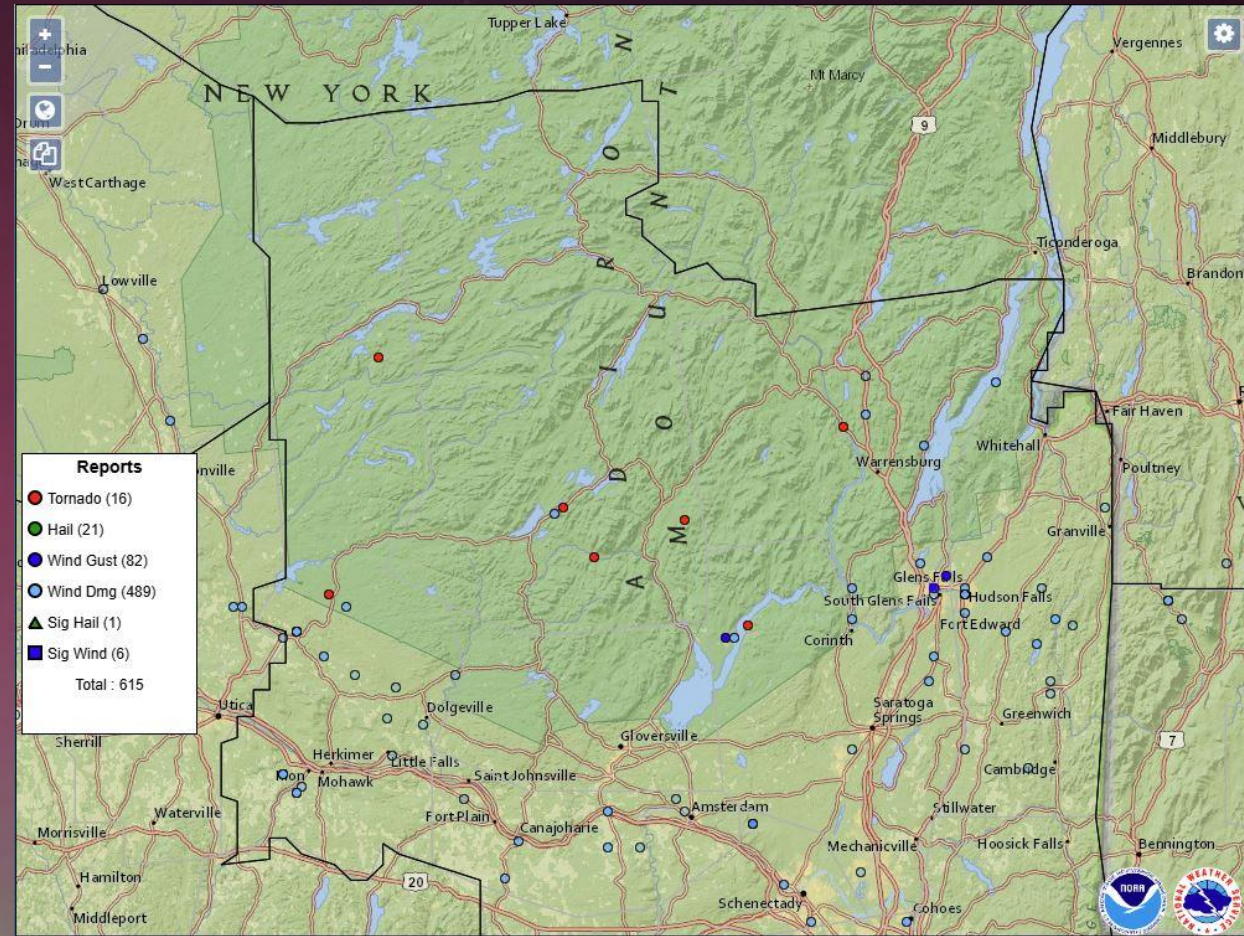
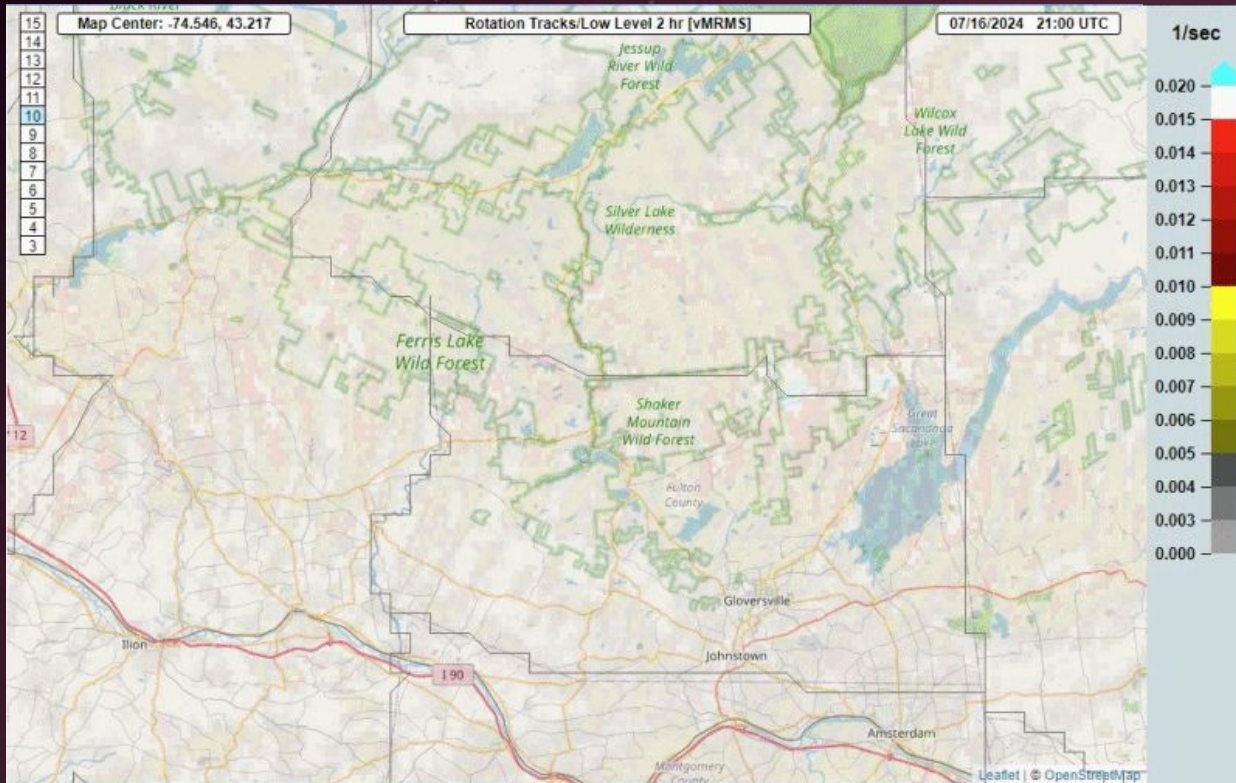


Probability for significant severe within 40 Km 20Z-24Z



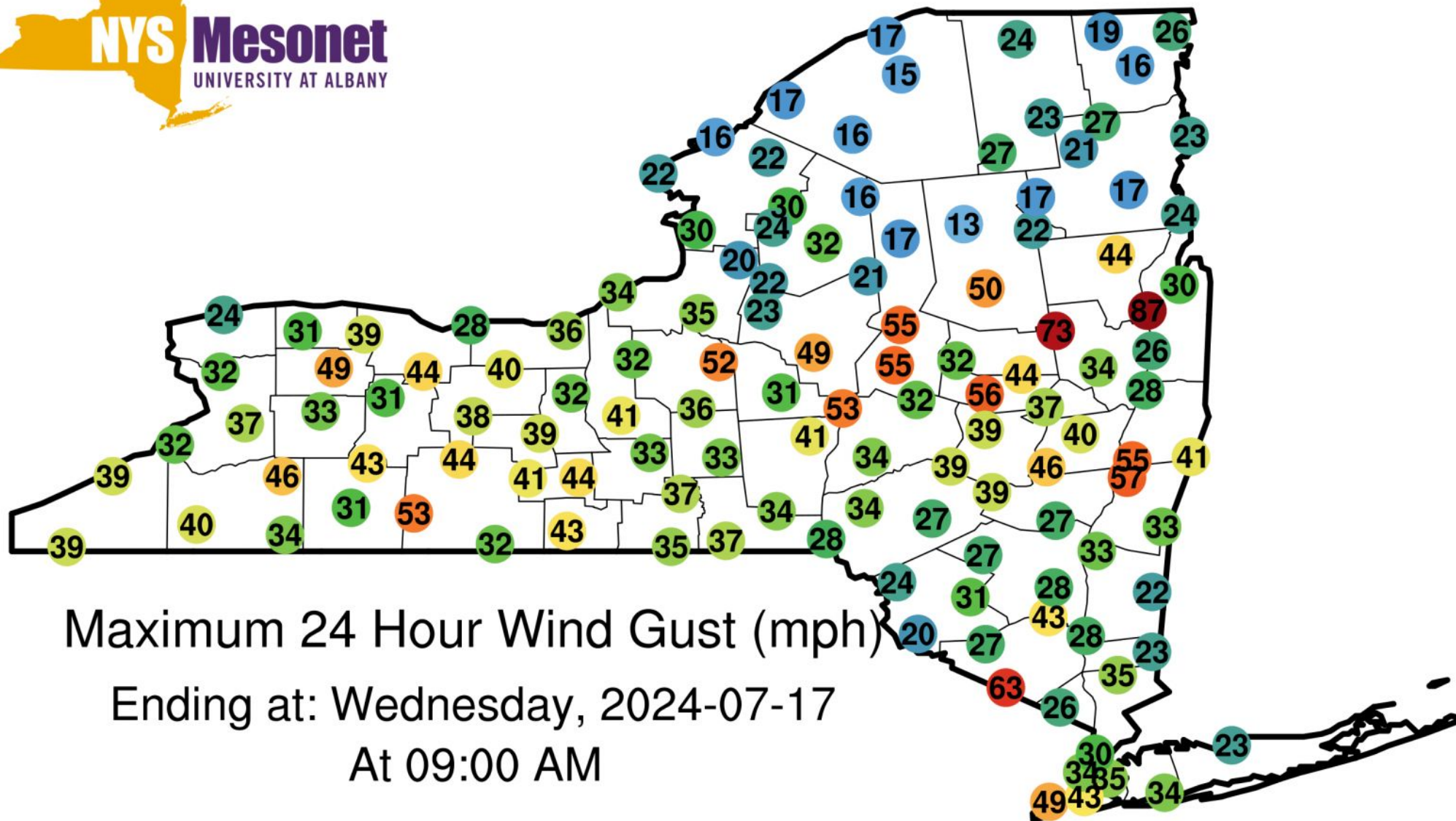
Probability for tornadoes within 40 Km 20Z-24Z

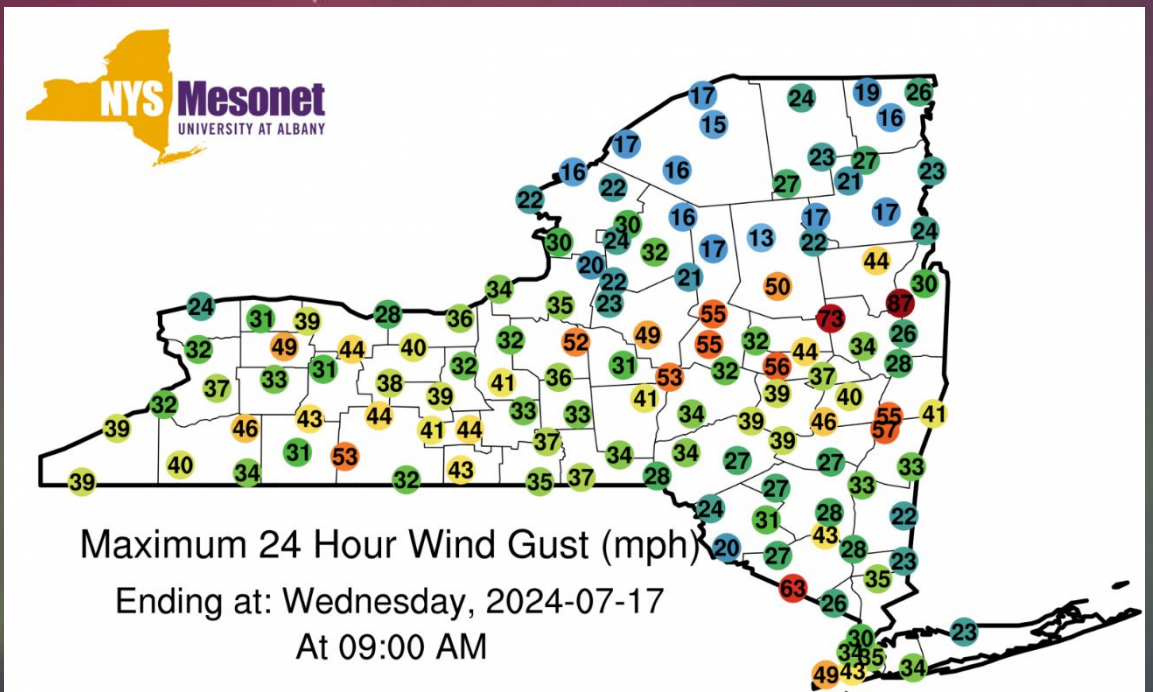
MRMS Rotational Tracks monitored in real-time



Tornadoes occurred where shear was $\geq 0.015/\text{sec}$ but also isolated spots where shear was between $0.10/\text{sec}$ and $0.15/\text{sec}$

Monitoring NY State Mesonet data





Pre-event messaging

NWS Albany @NWSAlbany

Another round of showers and thunderstorms is expected this afternoon and early evening, with some storms becoming severe. Primary threats are damaging winds and heavy rainfall. Otherwise, another hot and humid day is in store. #nywx #vtwx #mawx #ctwx

5:21 AM · Jul 16, 2024 · 2,757 Views

View post engagements

1 9 17

Post your reply Reply

Mighty Muffins @Mighty_Muffins · Jul 16
Busy day in storm for you guys. Good luck today. I'll be out there probably WNW of Albany today so as usual, if I see anything, I'll report it in. :)

115

NWS Albany @NWSAlbany

There is now an enhanced risk of severe weather in portions of Eastern NY and western New England for today. The main threat from thunderstorms will be damaging wind gusts, but there is also a threat of an isolated tornado, from Albany and points north. #nywx #mawx #vtwx #ctwx

10:06 AM · Jul 16, 2024 · 7,962 Views

View post engagements

2 43 89 2

Post your reply Reply

Mighty Muffins @Mighty_Muffins · Jul 16
Absolutely chase day today

1 114



Automated Watches and Warnings in English and Spanish

NWS Albany @NWSAlbany · Jul 16
Vigilancia de Tormenta Severa ha sido emitida para partes de Massachusetts, New York y Vermont hasta las 9 PM EDT

Vigilancia de Tormenta Severa

Vigente hasta 9:00 PM EDT Tuesday 16 de July

Información de Amenazas

- TORNADOS**
Varios tornados posibles
- GRANIZO**
Grano aislado de hasta pelotas de pingpong posible
- VIENTO**
Ráfagas dispersas de hasta 75 MPH Probables

Potencial de Exposición

Population: 2,193,751
Escuelas: 794
Hospitales: 49

ALT

NWS Albany @NWSAlbany · Jul 16
Aviso de Tormenta Severa incluye Ilion NY, Herkimer NY, Little Falls NY hasta las 4:15 PM EDT. ¡Esta tormenta contiene ráfagas de vientos de 70 MPH!

Aviso de Tormenta Severa

Vigente hasta 4:15 PM EDT Tuesday 16 de July

Información de Amenaza

- VIENTO**
hasta 70 MPH
- GRANIZO**
Tamaño posible de una pequeña canica

*** Un tornado también es posible ***

Potencial de Exposición

Population: 51,623
Escuelas: 26
Hospitales: 1

NWS Albany @NWSAlbany · Jul 16
Aviso de Tornado incluye Gloversville NY, Johnstown NY, Broadalbin NY hasta las 5:00 PM EDT

Aviso de Tornado

Vigente hasta 5:00 PM EDT Tuesday 16 de July

Información de Amenaza

- TORNADO**
Radar indica
- GRANIZO**
Tamaño posible de una pequeña canica

Potencial de Exposición

Population: 67,503
Escuelas: 30
Hospitales: 2

NWS Albany @NWSAlbany · Jul 16
A severe thunderstorm watch has been issued for parts of Massachusetts, New York and Vermont until 9 PM EDT

Severe Thunderstorm Watch

Valid Until 9:00 PM EDT Tuesday July 16, 2024

Threat Information

- TORNADOES**
A Couple Tornadoes Possible
- HAIL**
Isolated Hail Up To Ping Pong Size Possible
- WIND**
Scattered Gusts Up To 75 MPH Likely

Potential Exposure

Population: 2,193,751
Schools: 794
Hospitales: 49

ALT

NWS Albany @NWSAlbany · Jul 16
Severe Thunderstorm Warning including Ilión NY, Herkimer NY and Little Falls NY until 4:15 PM EDT. This storm will contain wind gusts to 70 MPH!

Severe Thunderstorm Warning

Valid Until 4:15 PM EDT Tuesday July 16, 2024

Threat Information

- WIND**
Up to 70 MPH
- HAIL**
Pea Sized Possible

*** A tornado is also possible ***

Potential Exposure

Population: 51,623
Schools: 26
Hospitales: 1

NWS Albany @NWSAlbany · Jul 16
Tornado Warning including Gloversville NY, Johnstown NY and Broadalbin NY until 5:00 PM EDT

Tornado Warning

Valid Until 5:00 PM EDT Tuesday July 16, 2024

Threat Information

- TORNADO**
Radar Indicated
- HAIL**
Pea Sized Possible


Potential Exposure


Population: 67,503
Schools: 30
Hospitales: 2

Could ask the question about colors and graphic icons – consistent and understood by greatest number of people?




Radar loops and urgent messaging to motivate people to take shelter

 **NWS Albany** @NWSAlbany · Jul 16
[2:30 PM] - The radar is quiet across eastern NY and western New England at the moment, but we are closely monitoring severe thunderstorms ongoing across central NY. This activity will make its way into the region over the next several hours. #nywx



1 6 24 2.4K

 **NWS Albany** @NWSAlbany · Jul 16
Severe thunderstorms continue to move eastward across the area. We have received several reports of wind damage and measured wind gusts over 70 mph. Please move to a safe interior place as these storms approach.



1 11 23 3.9K

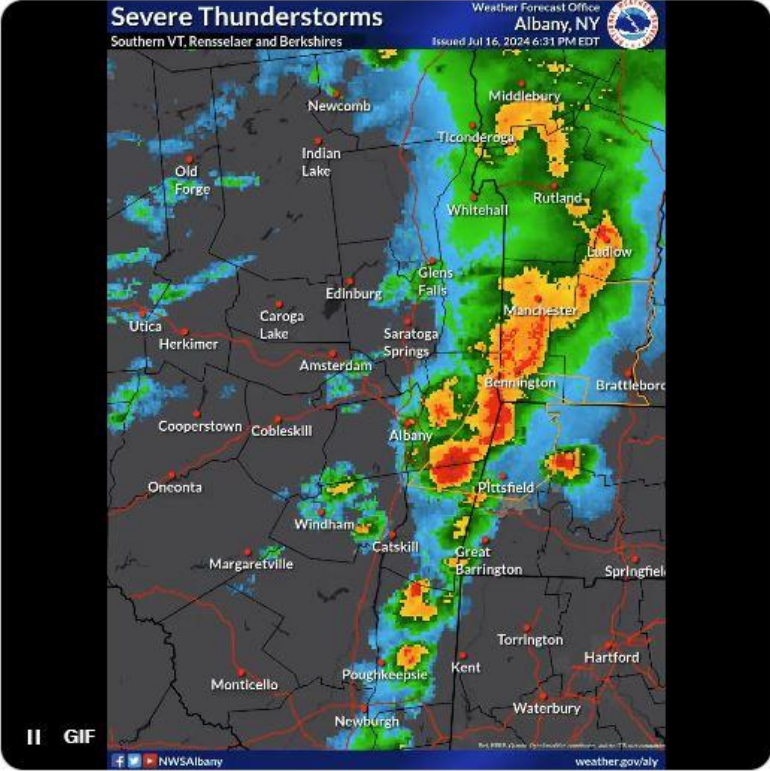
Highlighted some of the severe weather and damage history



Radar loops, videos of damage occurring and urgent messaging to motivate people to take shelter

NWS Albany @NWSAlbany · Jul 16

Severe thunderstorms exiting Rensselaer, and tracking through southern VT and the Berkshires. Winds reported over 60 mph with trees down. Seek safe shelter until the storms pass.



5 3 11 1.7K

NWS Albany @NWSAlbany · Jul 16


Dangerous storms moving through and into Lake George and Saratoga Region with a history of wind damage and a possible brief tornado. The wind gusted to 73 MPH at the Edinburg NY Mesonet site and blew over the shed. Seek safe shelter until the storms pass.



12 40 3.5K

NWS Albany @NWSAlbany · Jul 16

Dangerous storms moving through and into southern Vermont with a history of wind damage and a possible brief tornado. Edinburg NY Mesonet site had 73 mph. Glens Falls NY Mesonet site had 87 mph and some trees were blown over nearby. Seek safe shelter until the storms pass.



6 10 44 4.5K



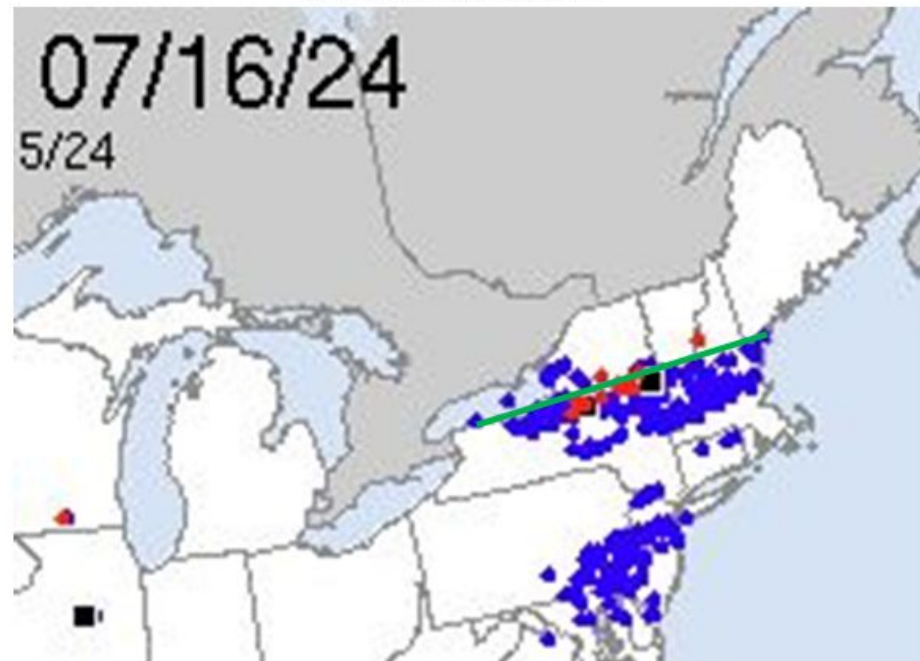
Thanks to the NY Mesonet - Visuals of actual wind damage to urge people to seek shelter

Was this a derecho?

Derecho – 400 miles KSYR-KACK - 60-80 miles wide



Not a Derecho – 450+ miles KROC to KPWM
– 60-80 miles wide



How strong are derecho winds?

By definition, a derecho must include wind gusts of at least 58 mph (50 knots or 93 km/h) or greater along most of its length. While derecho winds typically are less than 100 mph, gusts as high as 130 mph have been recorded --- equivalent to those with strong EF2 tornadoes.

What are the dimensions of a derecho?

A derecho wind damage swath must extend either continuously or intermittently more than 400 miles (about 650 km) with a width of at least 60 miles (about 100 km). This criterion is used to eliminate more common, shorter-lived, and generally less-organized wind-producing convective systems.

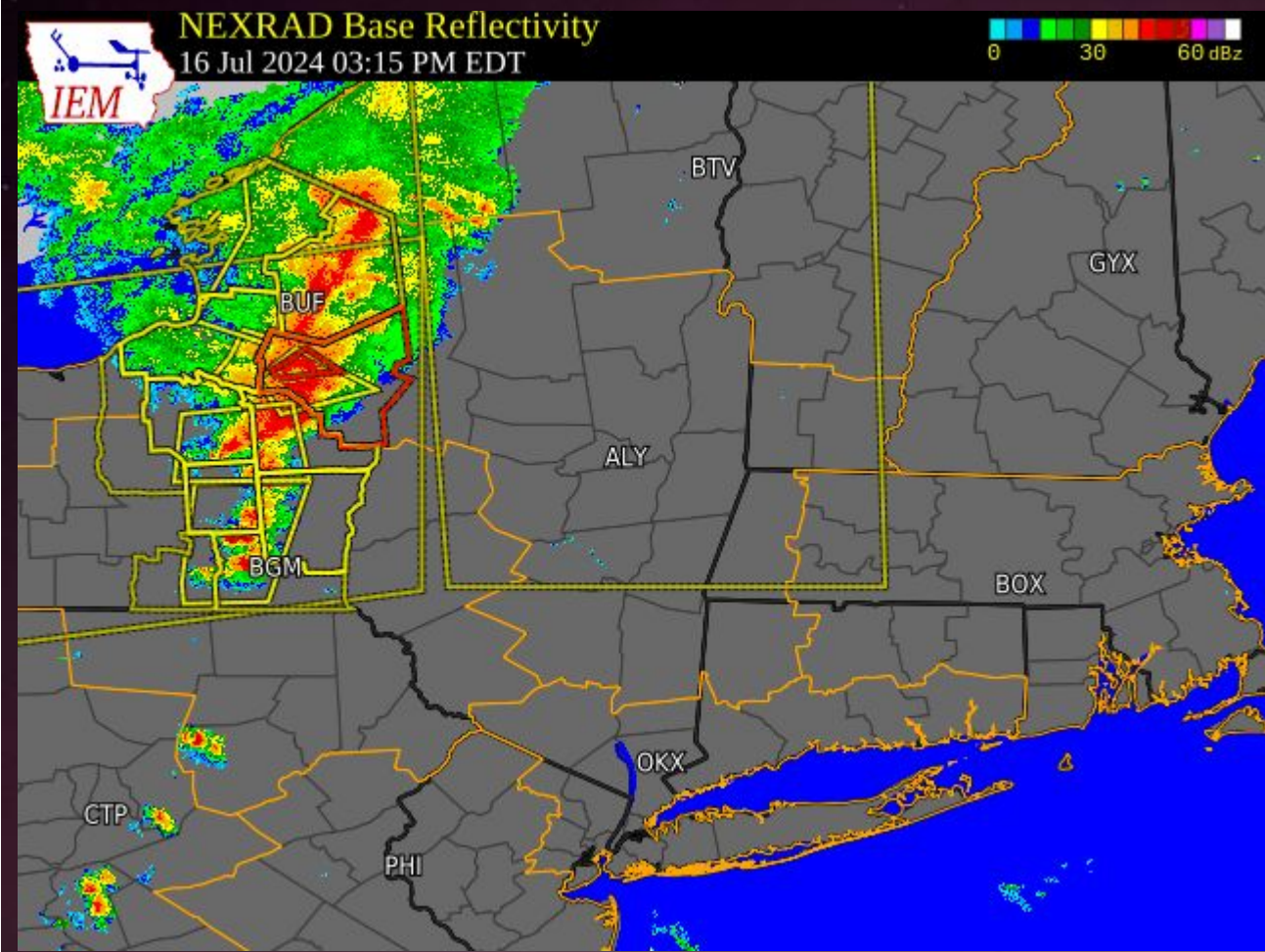
Still being evaluated whether to name as a derecho or not

Summary

- Guidance showed multiple run to run consistency for a severe mesoscale convective complex/system to track through NY and western New England
- Machine learning/Neural Network based guidance provided valuable near-term predictions of the evolution/characteristics of the severe convection
- Development, evolution and severe weather reports upstream in western and central NY aided in situational awareness to identify radar signatures and resultant observed severe weather
- Rear inflow jets of 60-90 KT observed on radar data as well as TDS, prompted high confidence “considerable” tags triggering WEAs

Summary

- Tornado warnings covered northern comma head signatures because very brief, small spin-ups were being observed in different regions of the comma heads that were verified as tornadoes after storm surveys
- Winds of 73 mph and 87 mph observed in the NY Mesonet and extensive and widespread wind damage observed across a very large area of NY and New England
- Social media frequently updated with radar data, pictures and videos of damage to emphasize urgency and seriousness of the situation
- Need social science to help determine what colors, formats and language that would reach the most people



Thank you for your time!

Questions?

