

# P186 A Multi-Scale Analysis of the 18 May 2017 Severe Weather Event across Eastern New York and Western New England

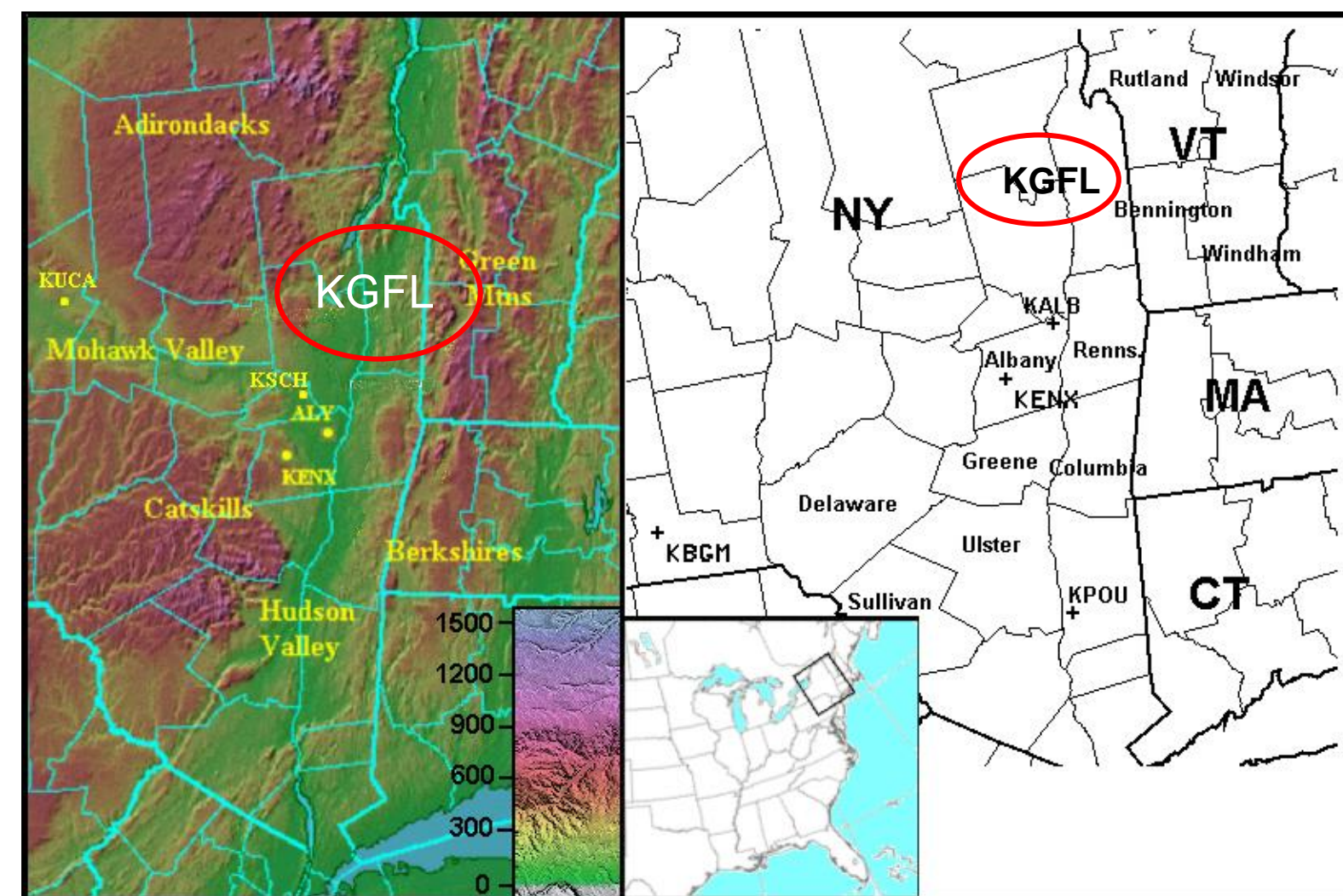
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NOAA/National Weather Service, Albany, NY

## Motivation

- The Albany forecast area had one of its biggest severe weather events of the season with over 40 severe weather reports (mostly wind damage) with a macroburst near the Glens Falls area (northern Queensbury to Kingsbury)
- Key question:** What caused all the severe weather and how did some of the high resolution guidance (HREFs) perform?
- CSTAR VI (2016-2019) continues looking at various severe weather topics (Forecast and model diagnostics on severe convection in complex terrain) using NYS Mesonet data, expanding severe (1" hail local study) and tornado guidance as well as new advances with dual pol radar data ( $Z_{DR}$  arches, and  $K_{DP}$  columns/spikes)

CSTAR Grant #: NA16NWS4680005

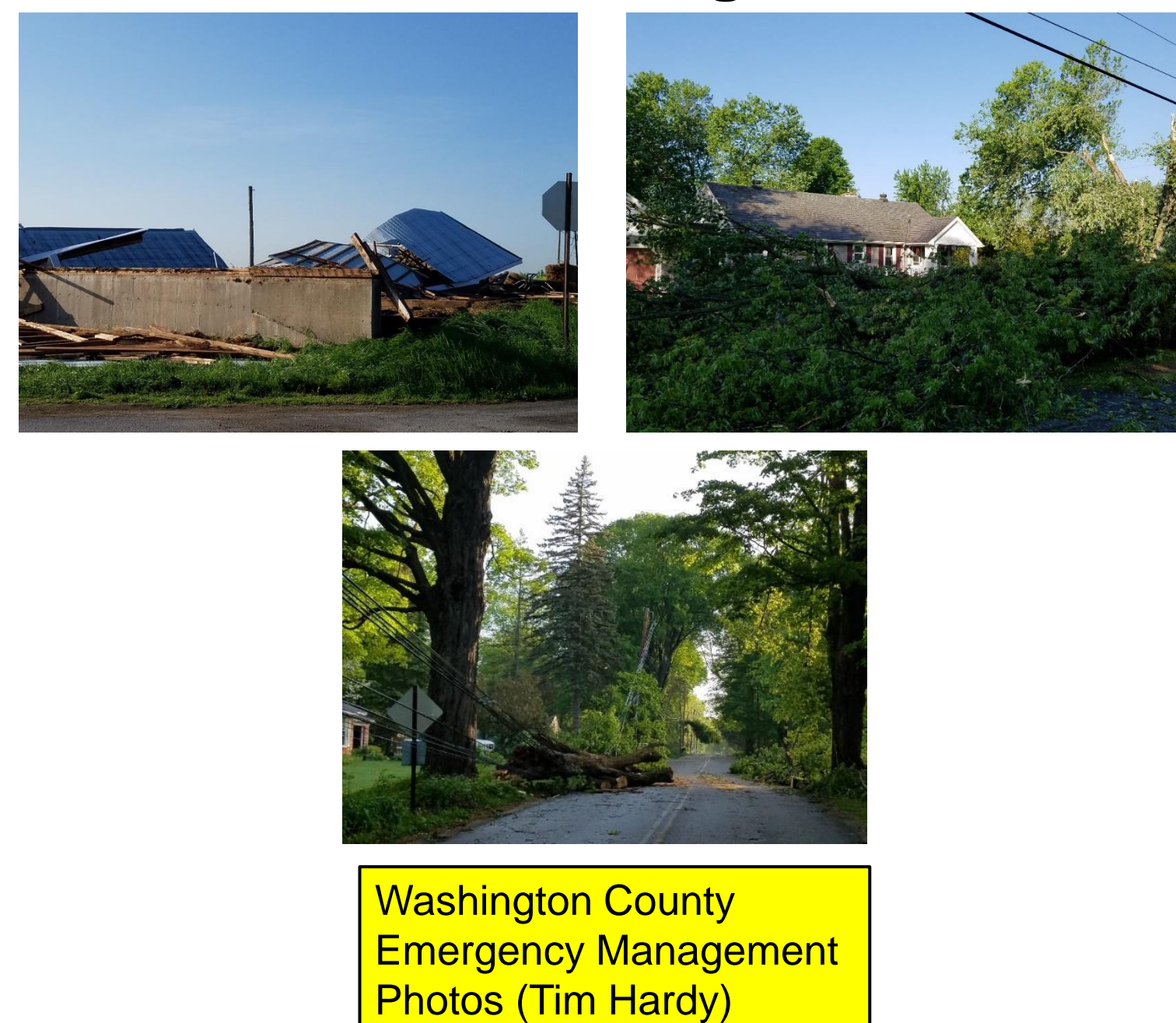
## NWS at Albany Forecast Area



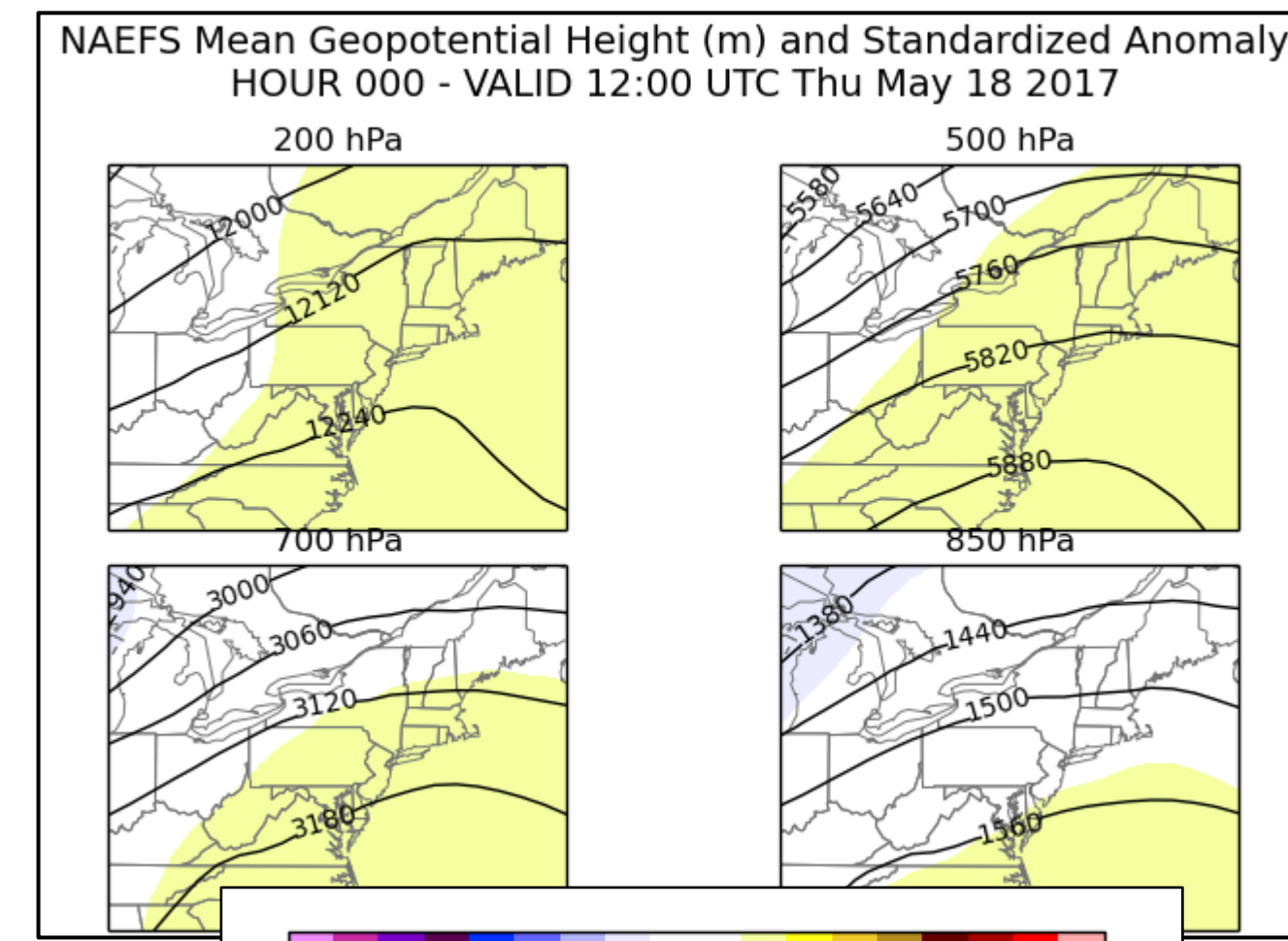
## Macroburst near KGFL

- Maximum Estimate Wind Speed:** 90 mph
- Estimate Time:** 730-740 pm (2330-2340 UTC)
- NYS Mesonet site in Glen Falls measured a wind gust of 59 Knots (68 mph)
- Path Length** 3 miles, and **path width** 1.5 miles extending damaged and a barn destroyed from Queensbury in Warren Co. to northern Washington Co.
- Extensive tree damage, a few roofs damaged, and a barn was destroyed

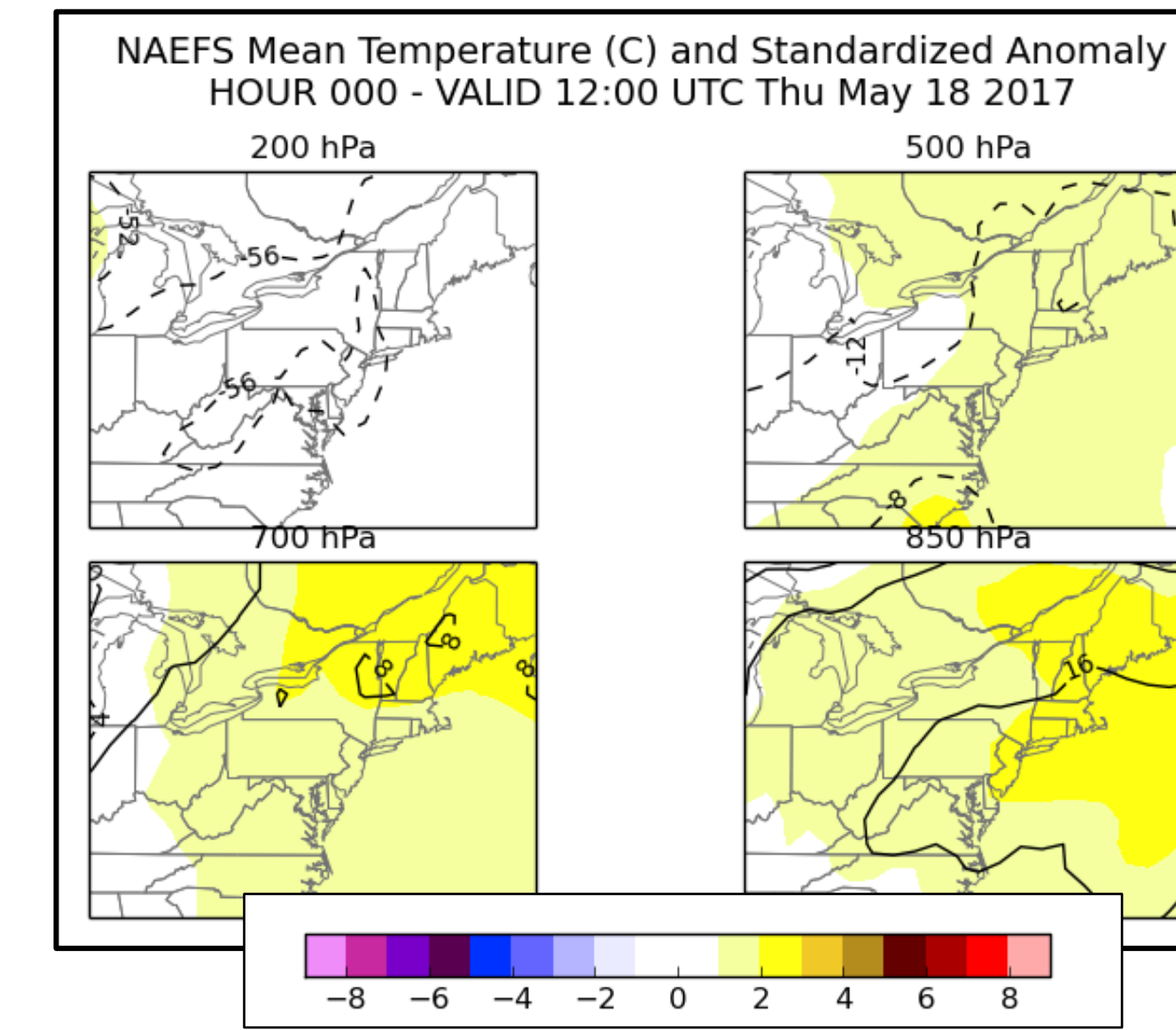
## Macroburst Damage Photos



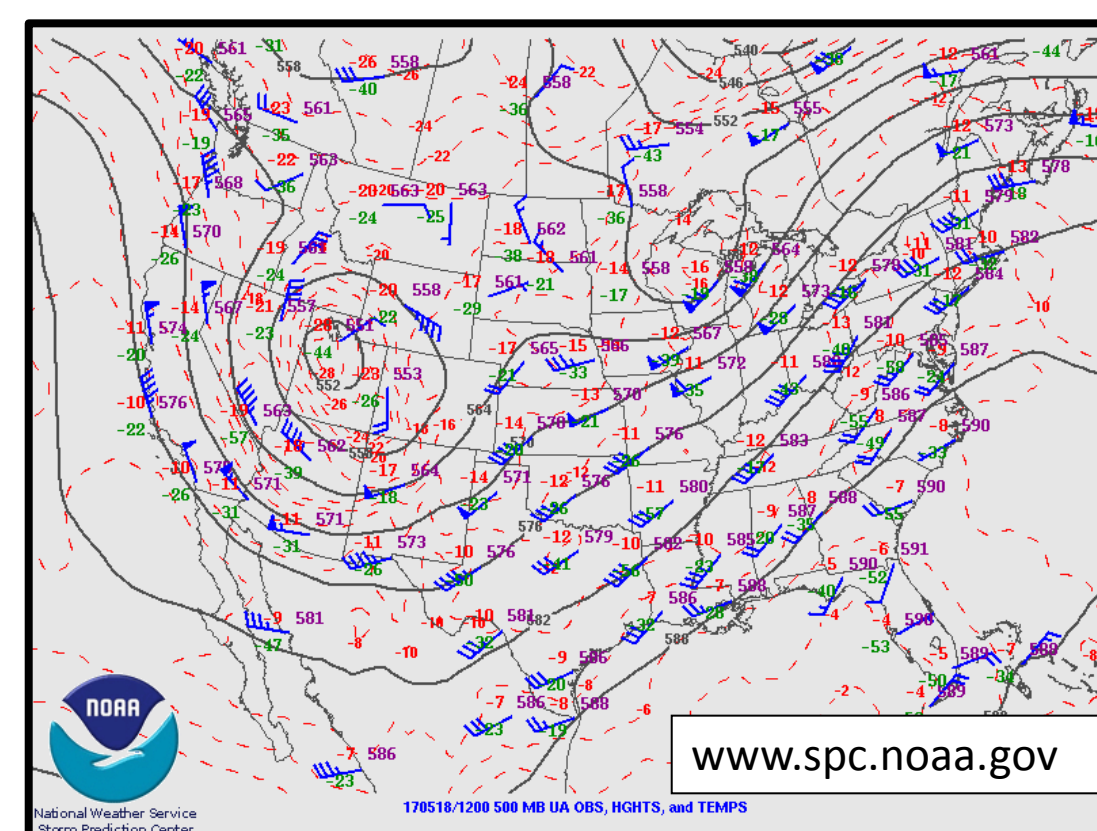
## 1200 UTC 18 May 2017 Synoptic Overview



Ensemble Situational Awareness Table (Alcott, Kahler, Graham and Grumm) <http://ssd.wr.noaa.gov/satable/>

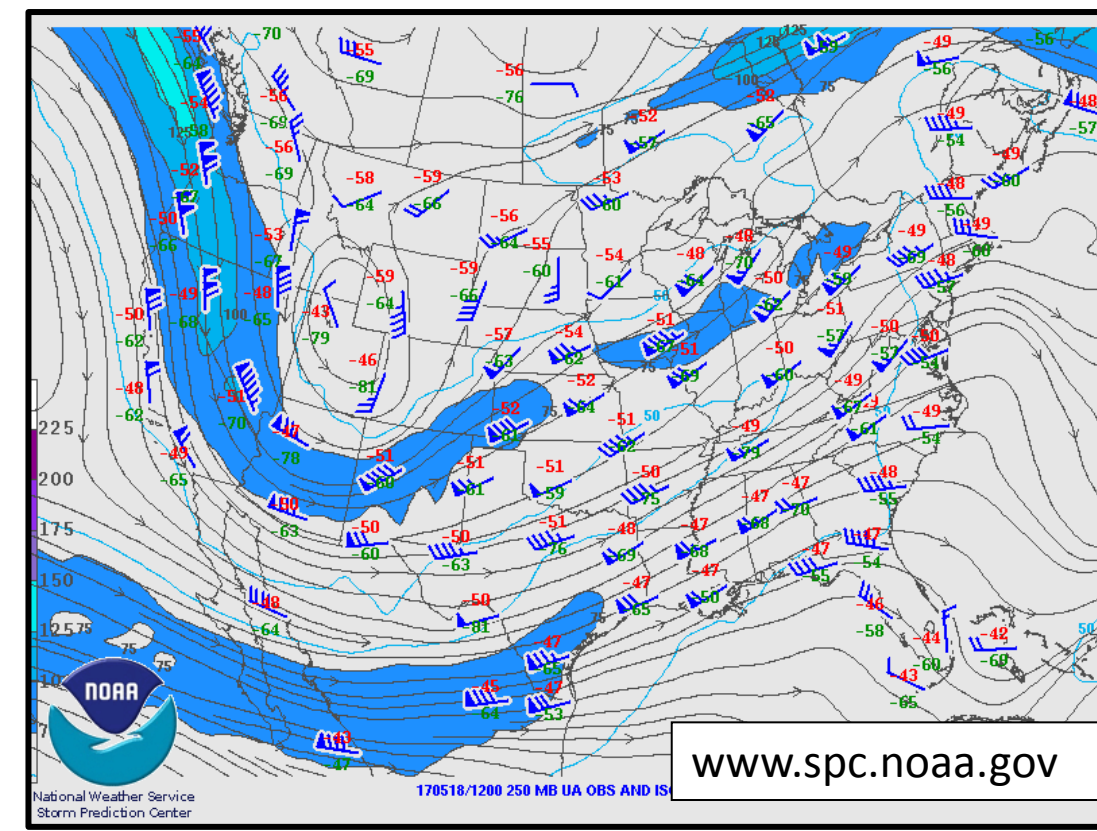


## 1200 UTC 500 hPa Heights, Winds & Temps

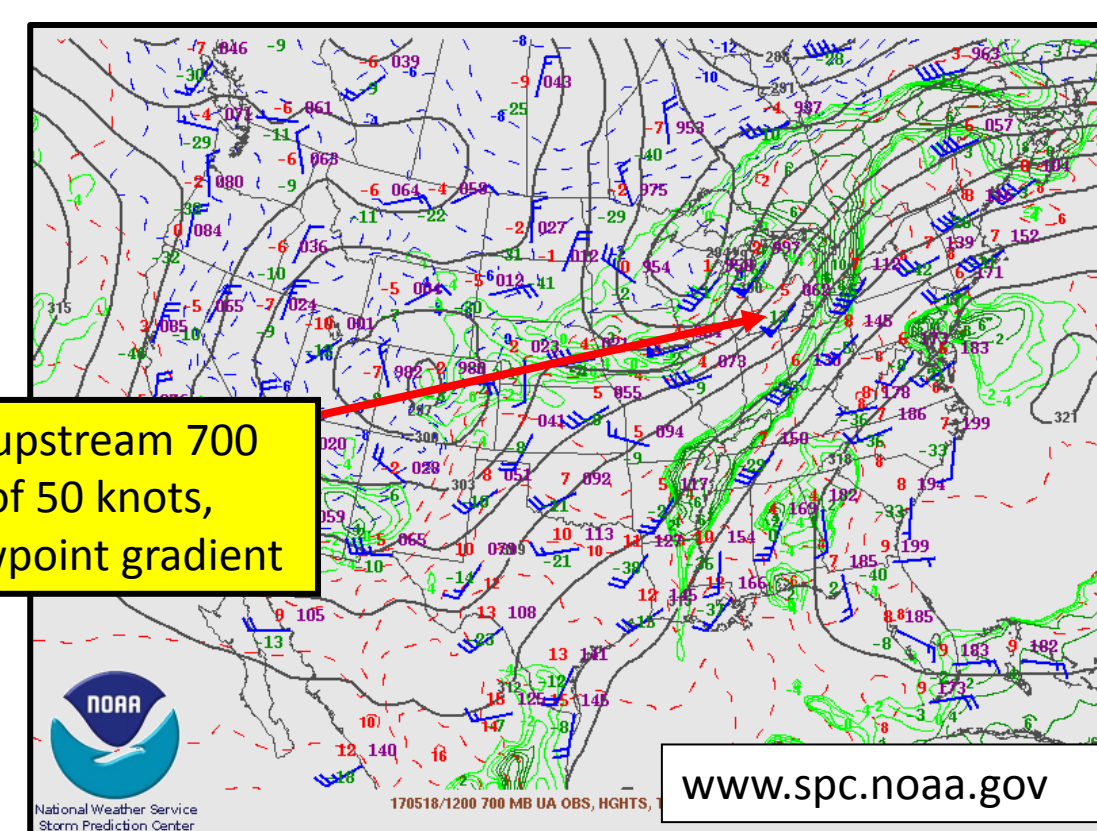


500 hPa short-wave trough approaches the Northeast from the western Great Lakes Region. 500 hPa ridge over East Coast.

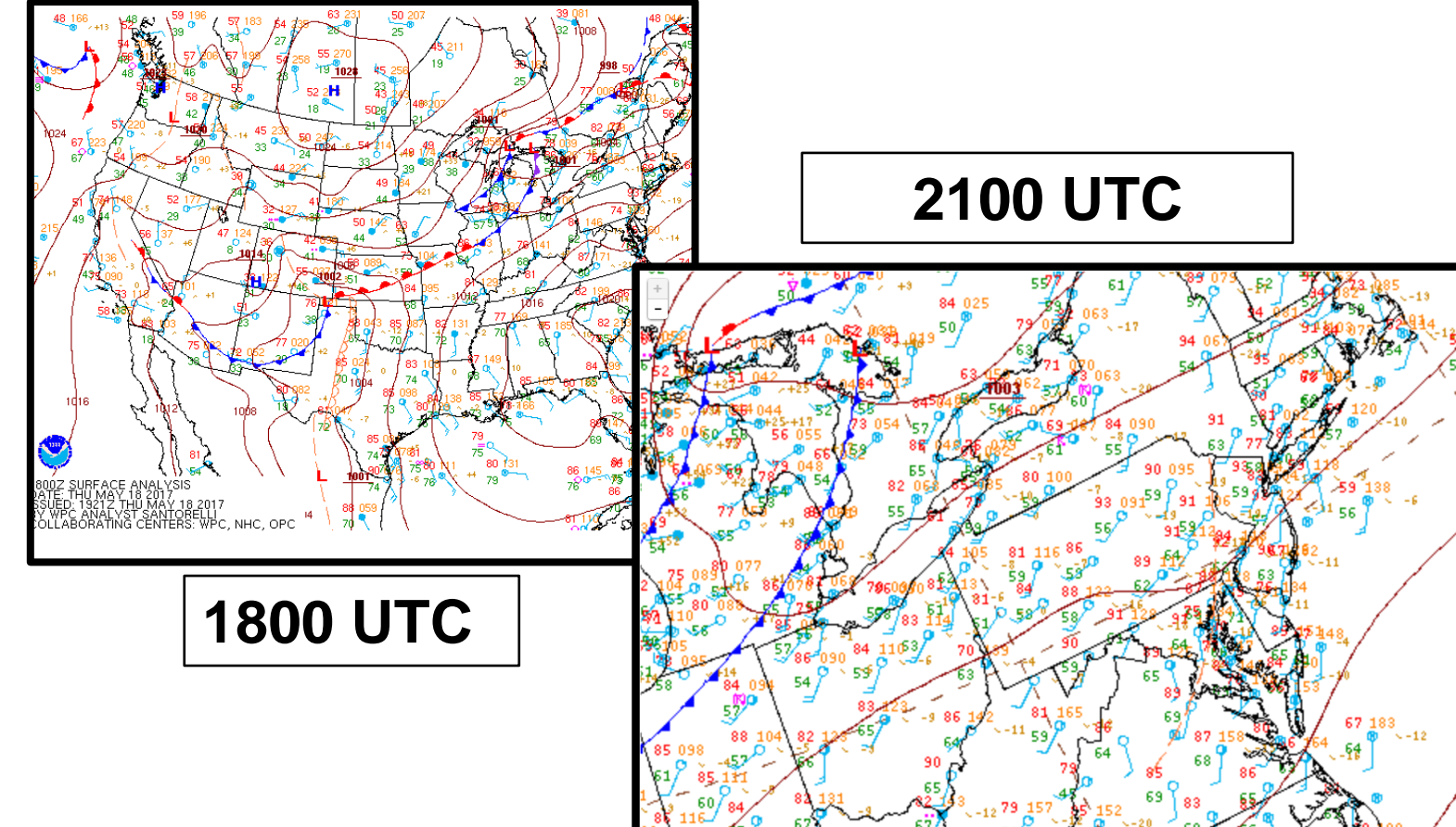
## 1200 UTC 250 hPa Upper Air Obs, Streamlines & Isotachs



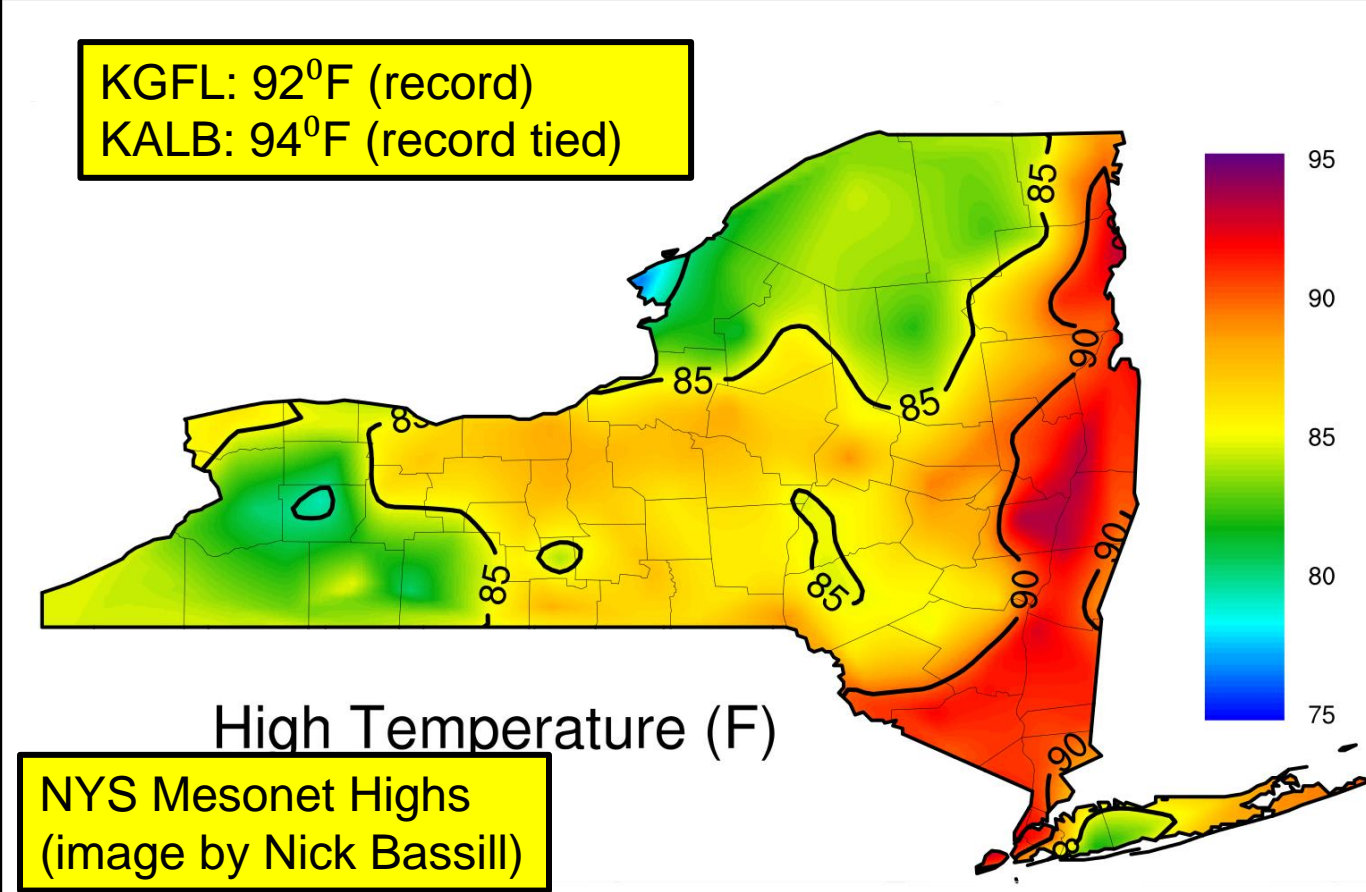
## 1200 UTC 700 hPa Heights, Winds, Temps & Td's



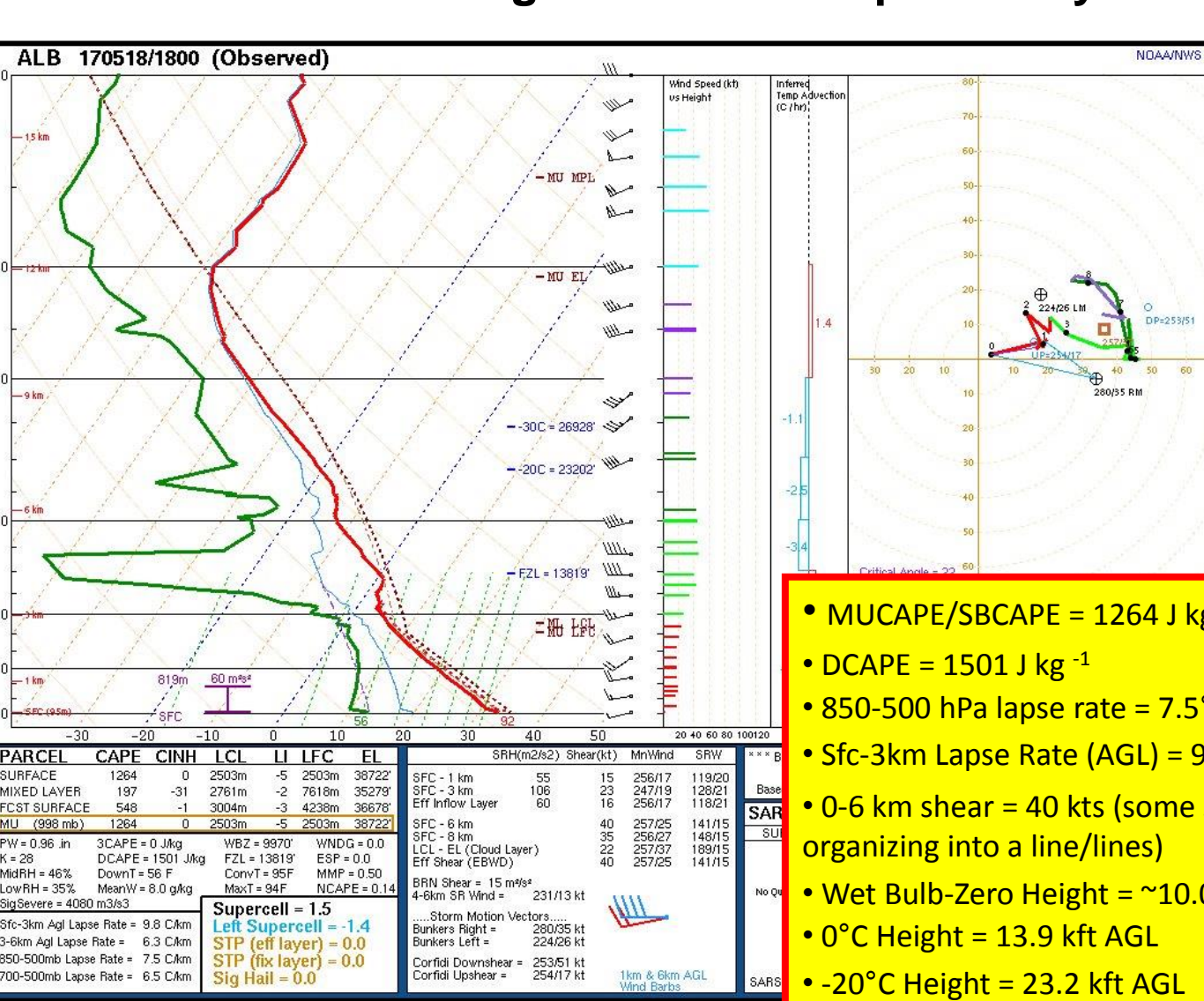
## Mesoscale and Sounding Analysis



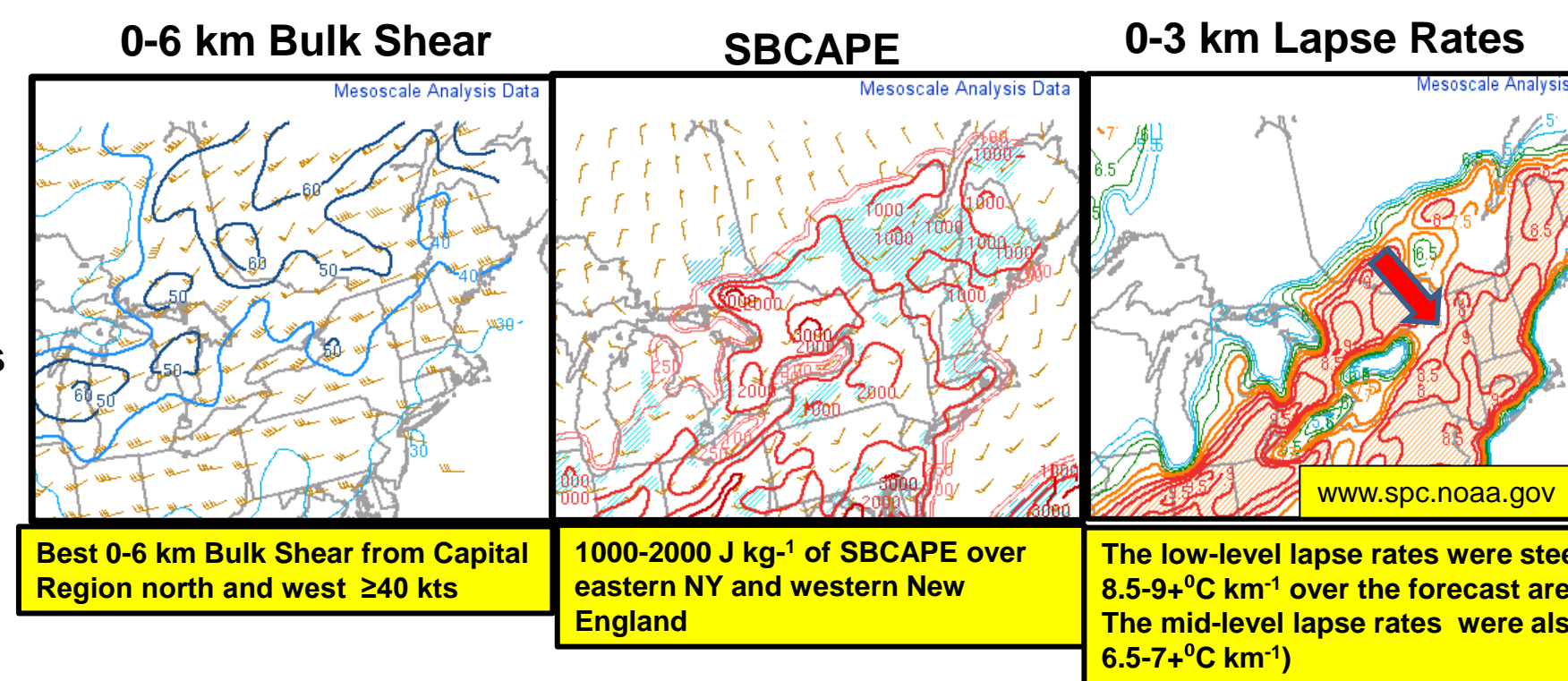
## 1800 & 2100 UTC 18 May 2017 WPC Surface Maps



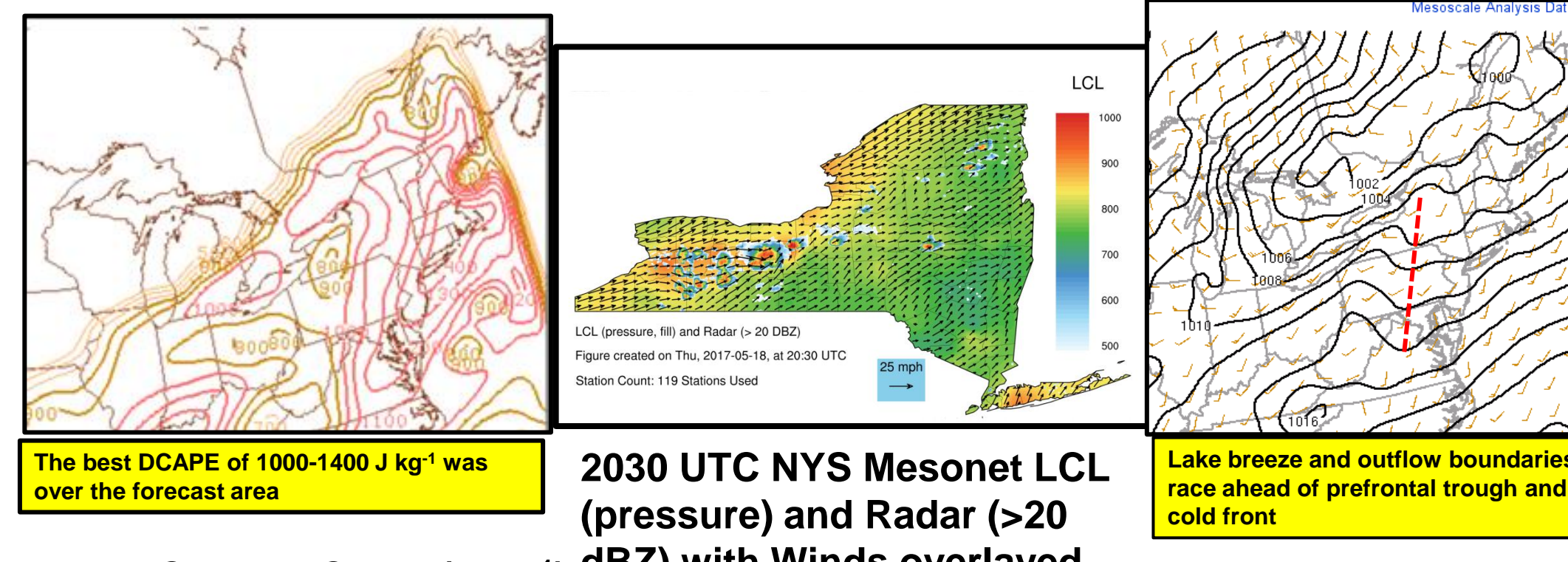
## Hot/Record Breaking Maximum Temps 18 May 2017



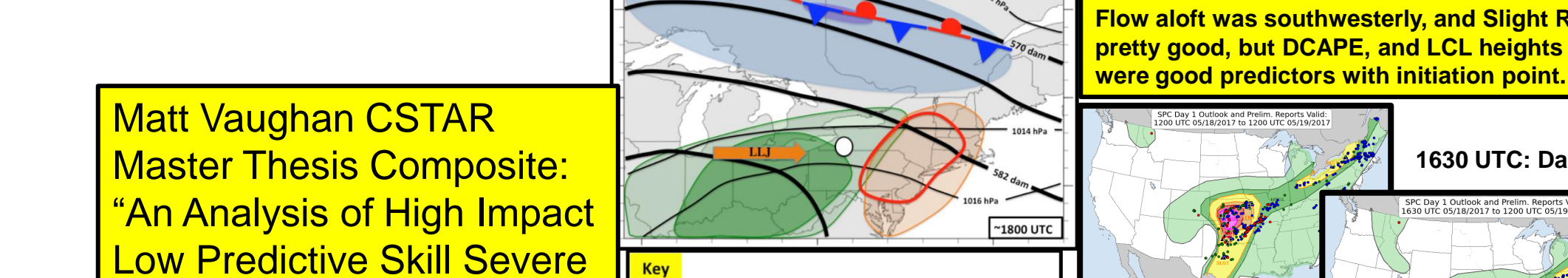
## 1800 UTC KALB Sounding



## 2000 UTC RAP 0-6 km Bulk Shear (kts), SBCAPE (J kg<sup>-1</sup>), & 0-3 km Lapse Rates (°C km<sup>-1</sup>)

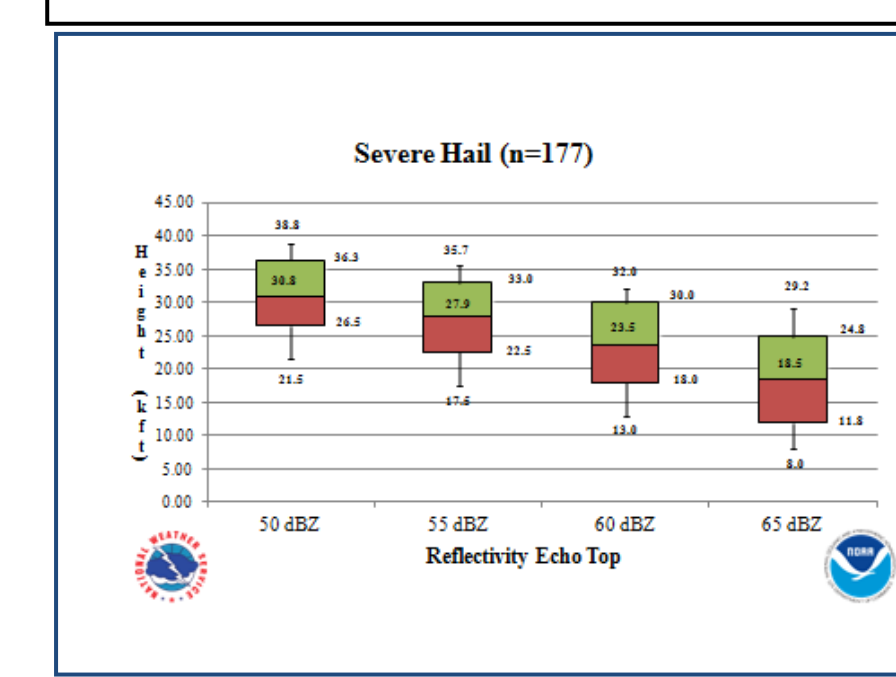


## 2030 UTC NYS Mesonet LCL (pressure) and Radar (>20 dBZ) with Winds overlaid



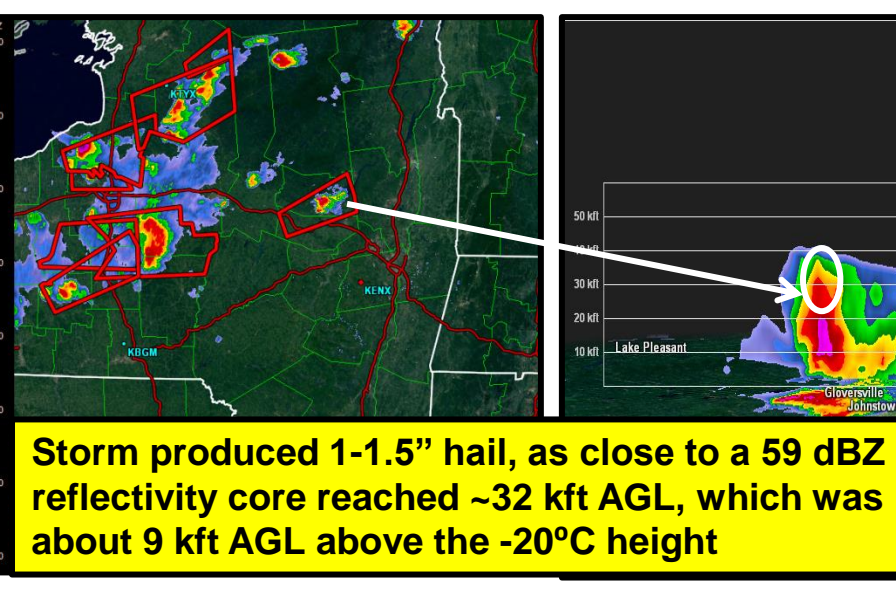
## WFO at Albany 1" Hail Study

- Storms producing nearly 400 hail reports from 2005-2010 across the Albany CWA were examined to find ways to warn on the new threshold for severe hail
- Hail reports were as small as 0.25" to as large as 2.60"
- An ER Tech Attachment was published on this study by Brian Frugis and Tom Wasula in August 2011
- Can be accessed at this link: <http://www.erh.noaa.gov/er/hq/ssd/erps/ta-list.html>

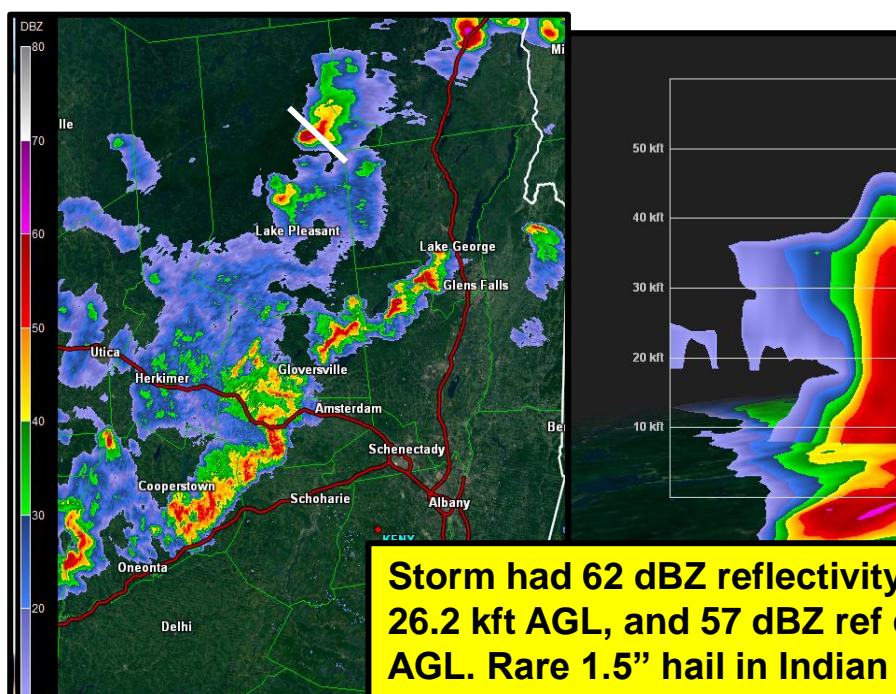


- Boxes are rather symmetrical
- Suggests data is well-distributed
- Median values are close to average values
- Suggests that either average or median values are a good mid-point for severe data
- 25% quartile value can be used as a lower-bound as a "caution level" for warning purposes
- 75% quartile value can be used as a "really should have it out if at or above" level

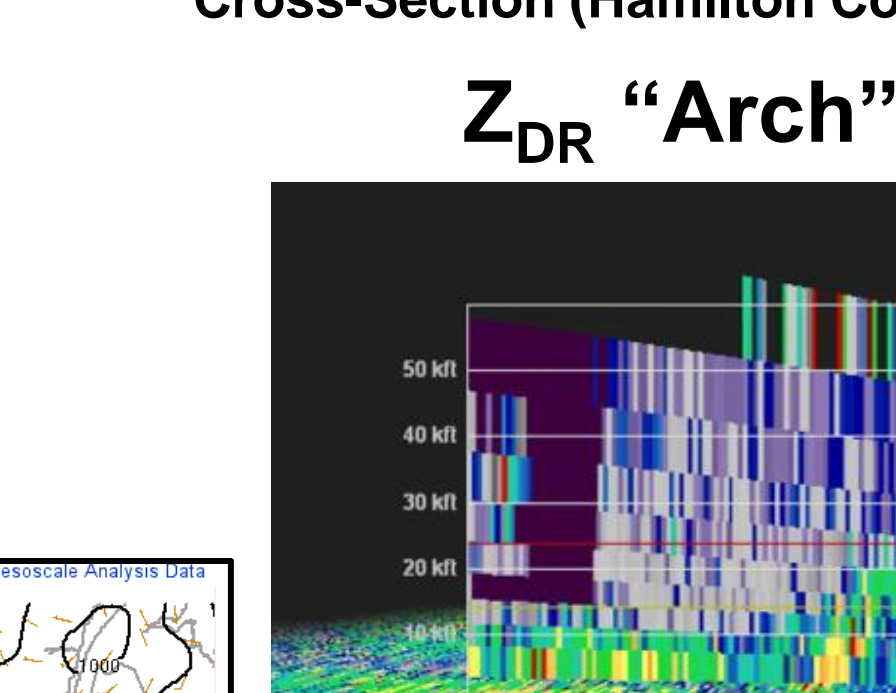
## Storm-Scale Analysis



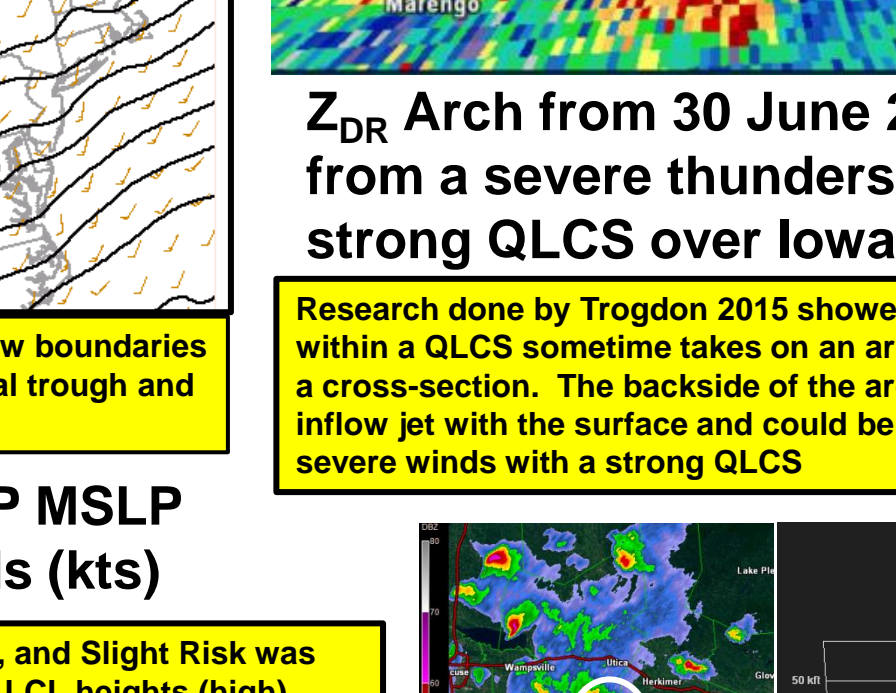
## 2157 UTC 0.5° KENX Base Reflectivity (REF) & Cross-Section (dBZ)



## 2309 UTC 0.5° KENX Base REF (dBZ) & Cross-Section (Hamilton Co.)



## Z<sub>DR</sub> "Arch" (not arc)



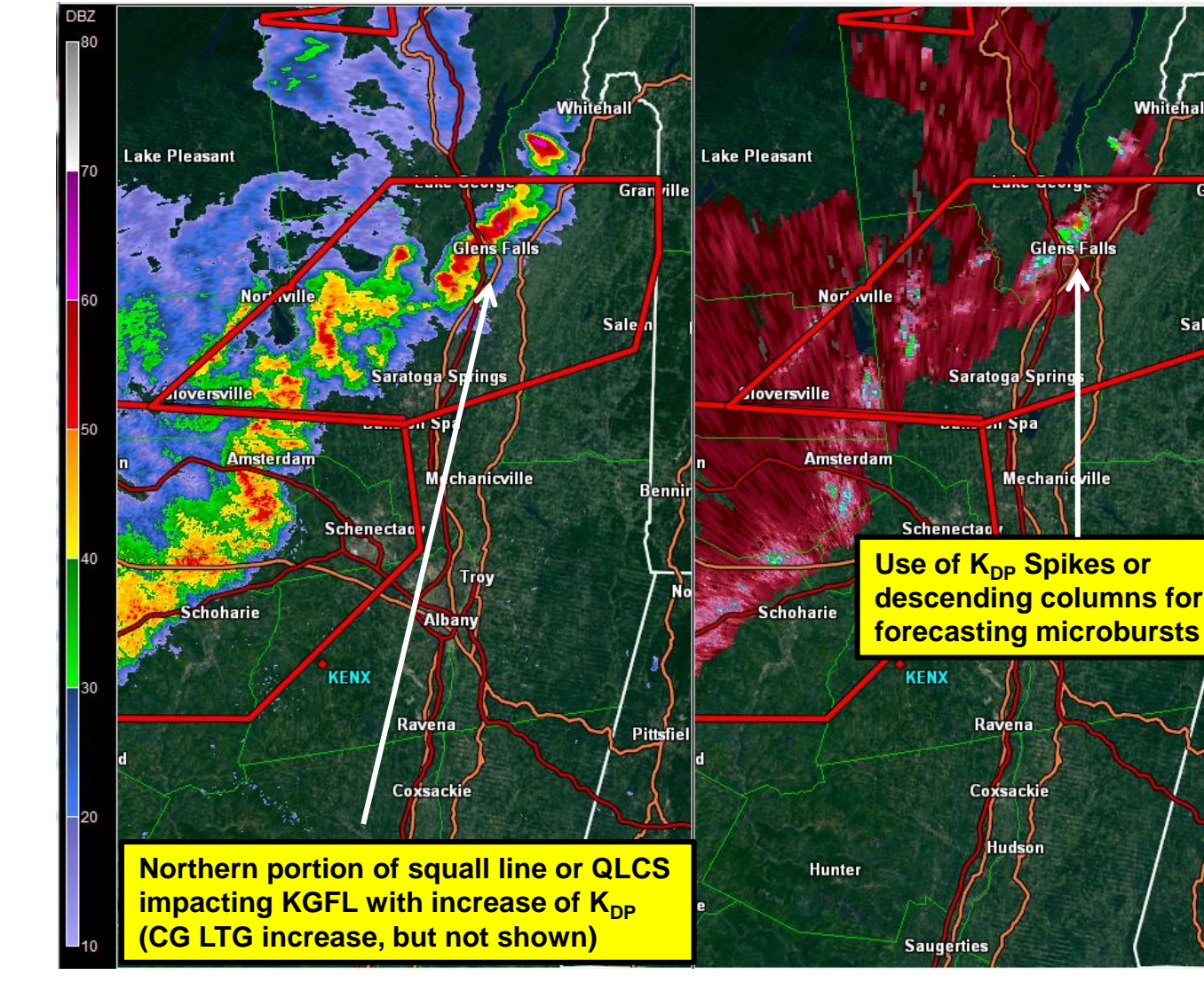
## 2100 UTC RAP MSLP (hPa) & Winds (kts)



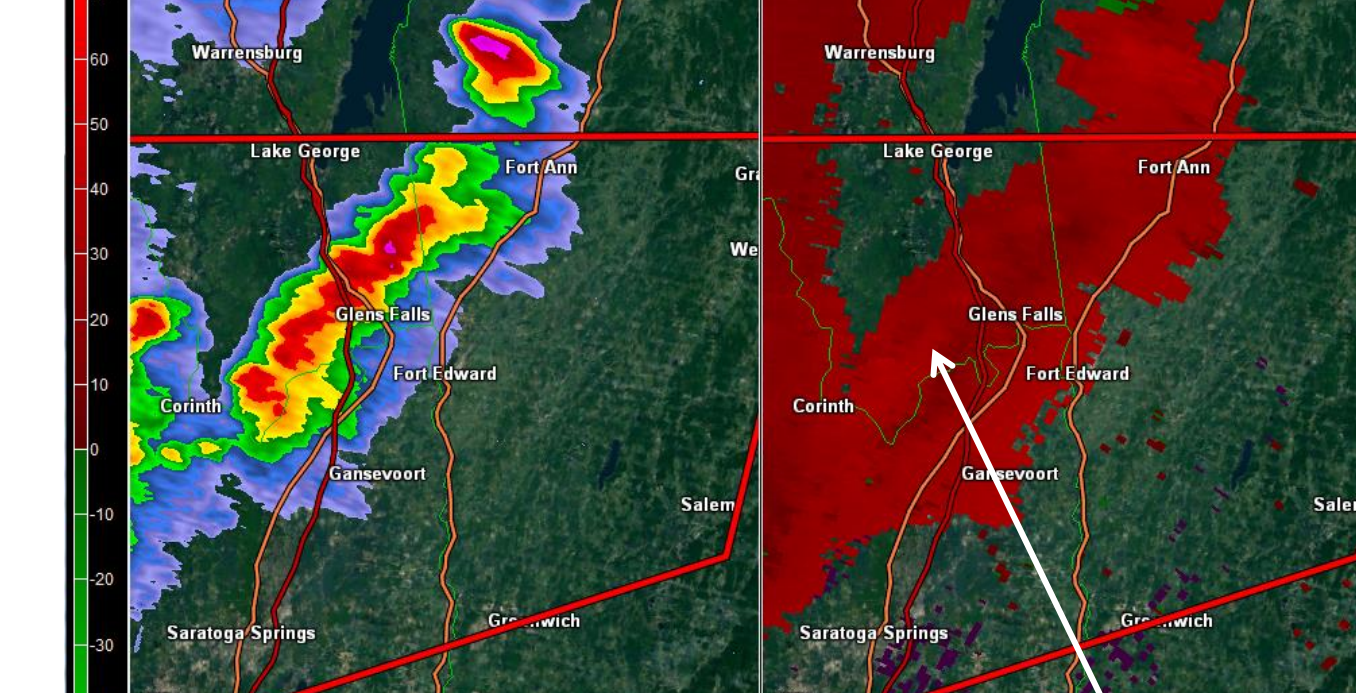
## 2225 UTC KENX Base REF (dBZ) & Z<sub>DR</sub> X-section (dB)



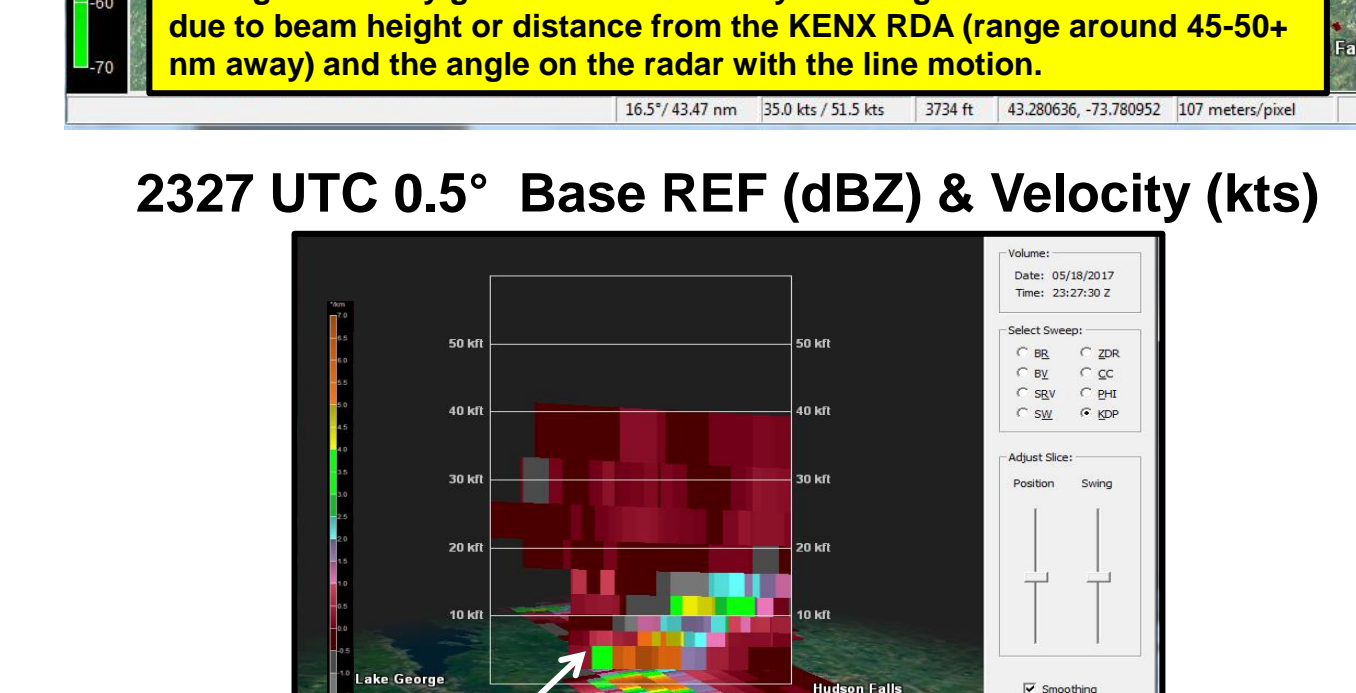
## Storm-Scale Analysis 18 May 2017



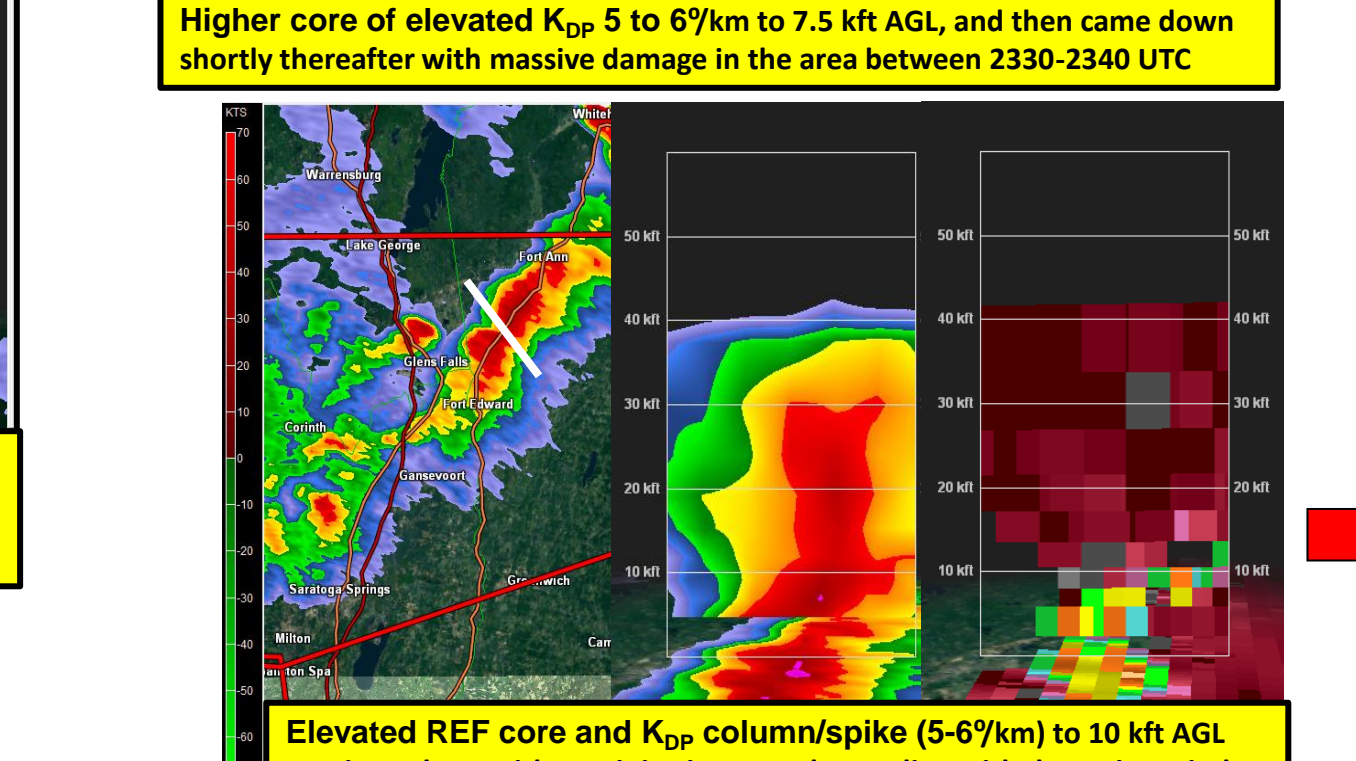
## 2327 UTC KENX 0.5° Base REF (dBZ) & K<sub>DP</sub> (°/km)



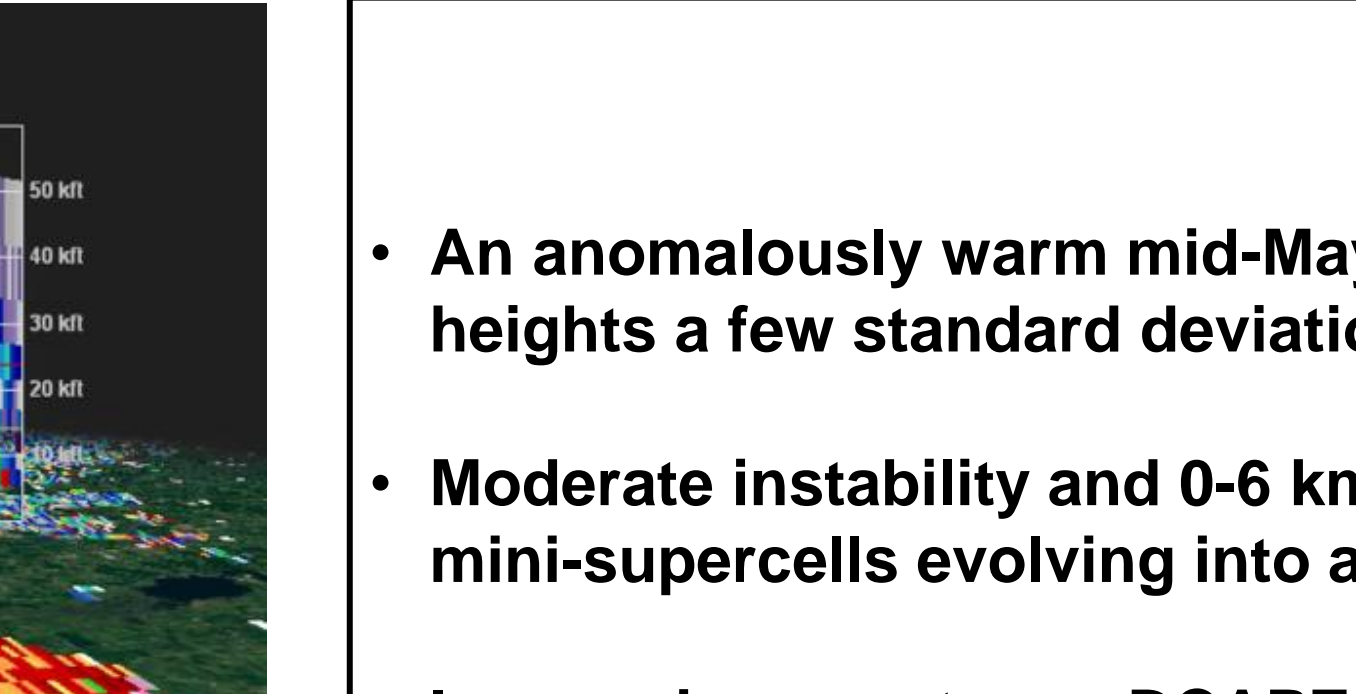
## 2327 UTC 0.5° Base REF (dBZ) & Velocity (kts)



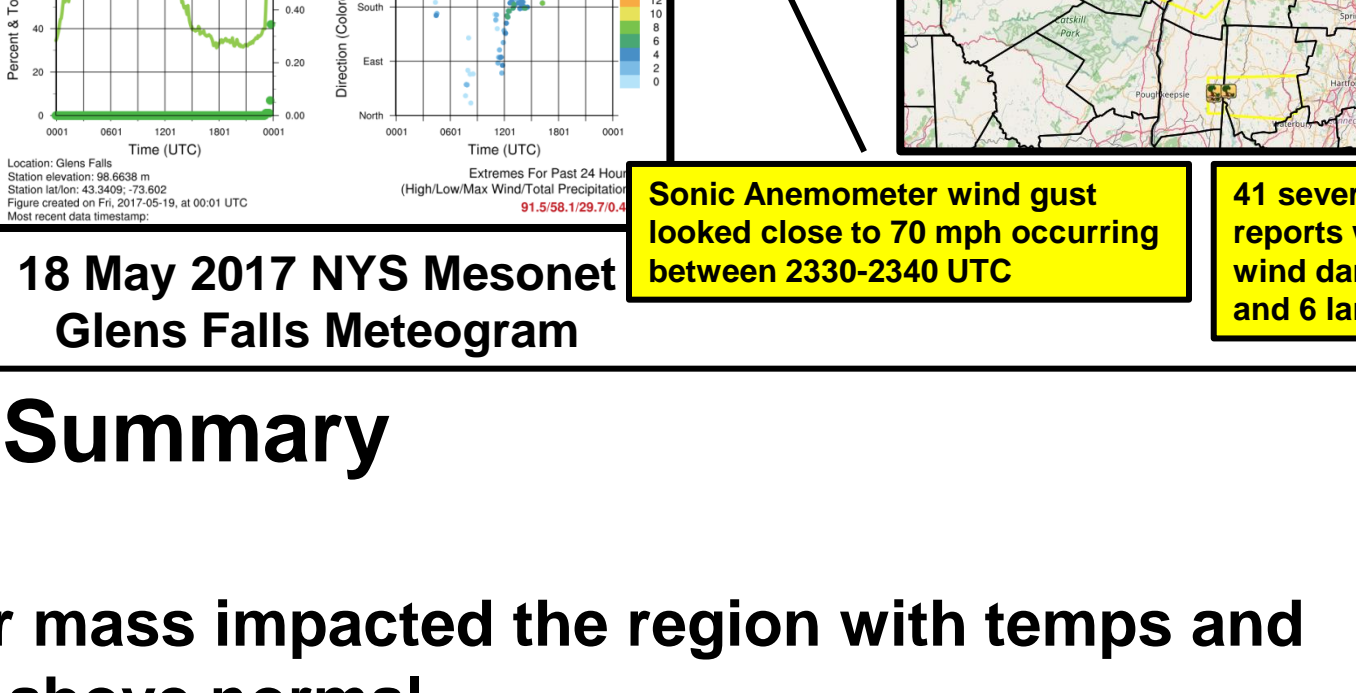
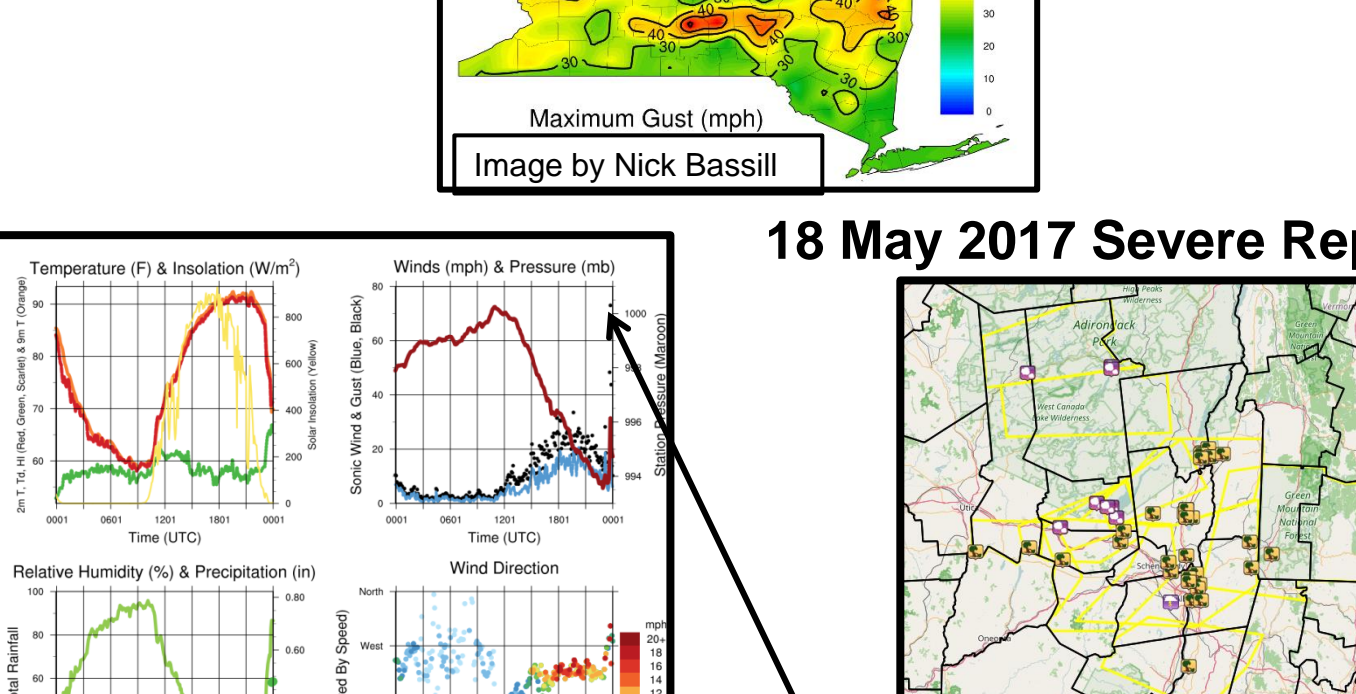
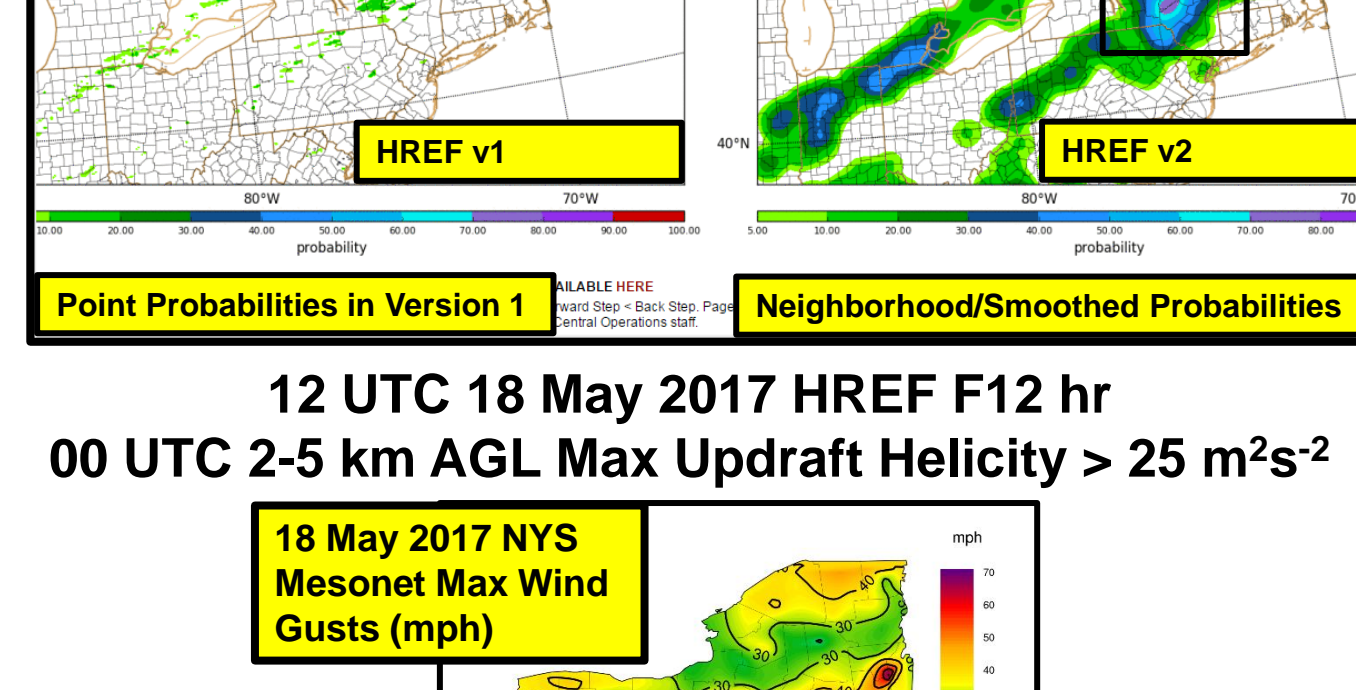
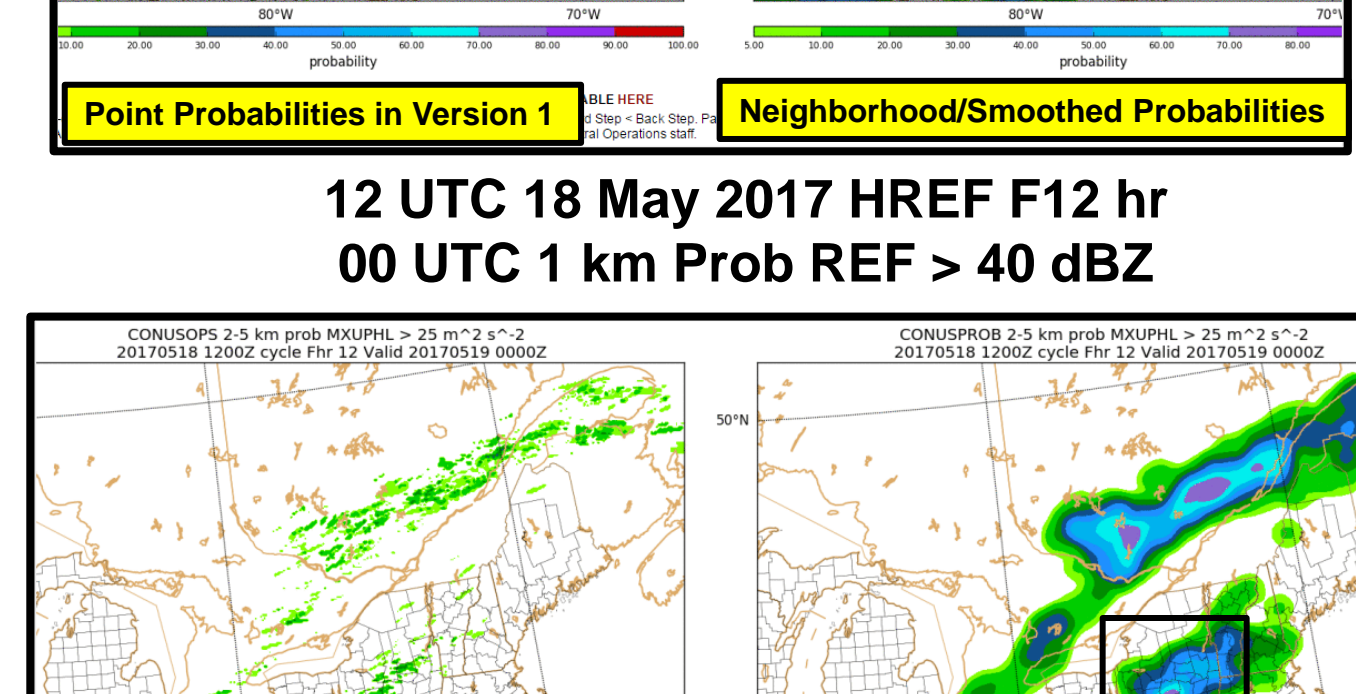
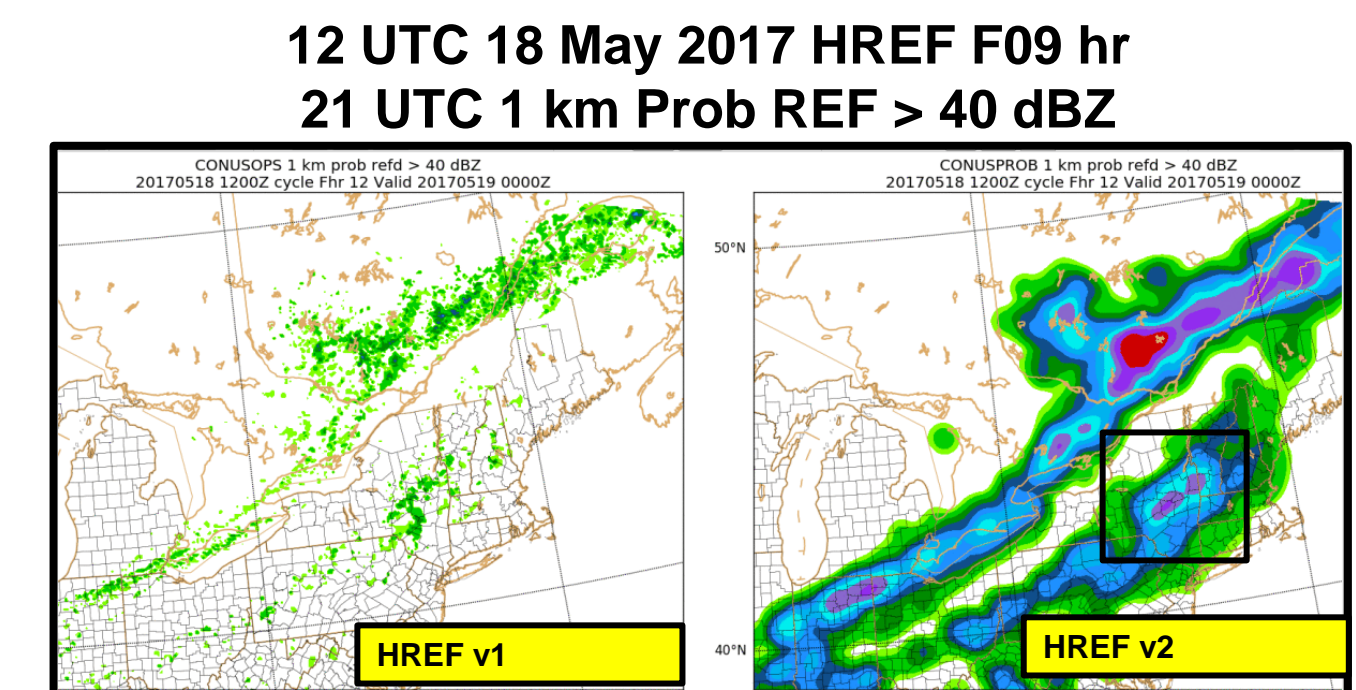
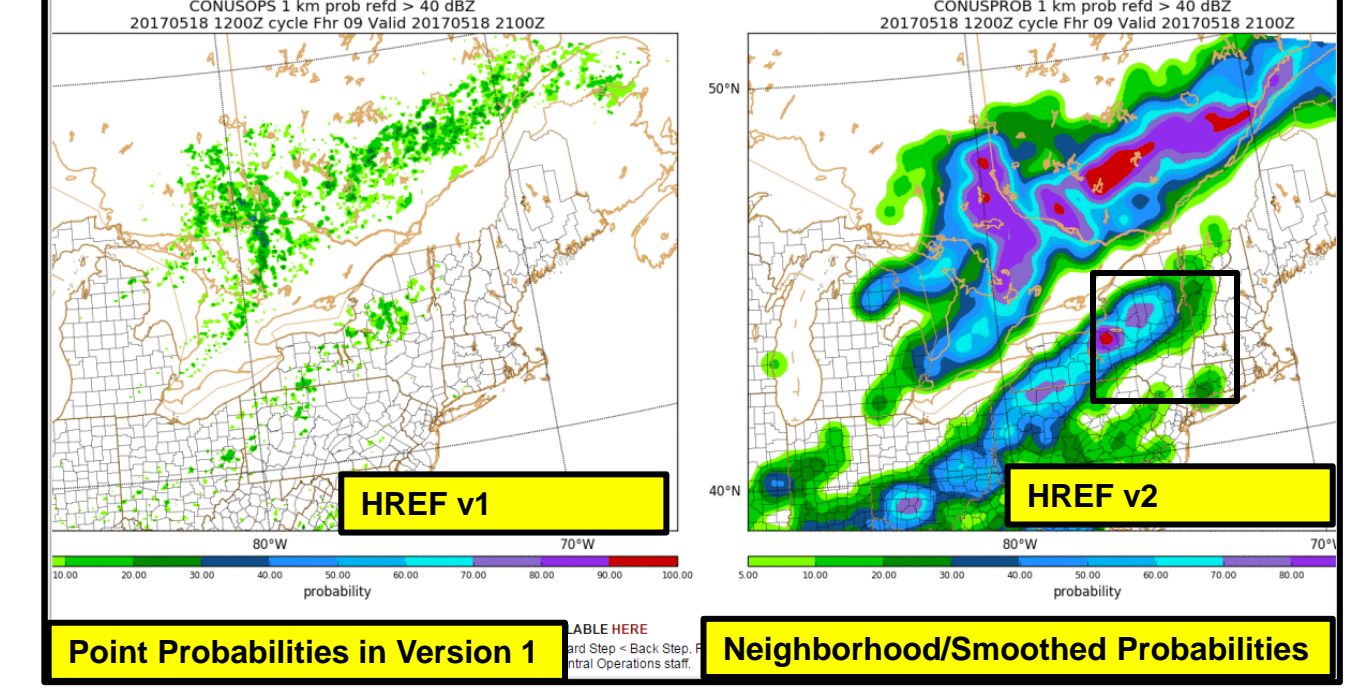
## 2327 UTC KENX KDP (°/km) Cross-section



## 2333 UTC 0.5° Base REF (dBZ) & K<sub>DP</sub> (°/km) X-sections



## HREF Performance



## Summary

- An anomalously warm mid-May air mass impacted the region with temps and heights a few standard deviations above normal
- Moderate instability and 0-6 km bulk shear (40 knots or greater) supported discrete mini-supercells evolving into a QLCS and finally a squall line
- Impressive or extreme DCAPE coupled with steep low-level lapse rates (inverted-V signature) supported significant damaging wind threat across eastern New York and western New England
- Elevated reflectivity cores (application of 1" hail study results), Z<sub>DR</sub> Arches, and K<sub>DP</sub> Columns/Spikes helped with warning decision making for damaging winds & macroburst
- NYS Mesonet was very helpful with warning decision making and verification
- 1200 UTC HREF v2 did a good job with forecast over the Albany forecast area
- Albany forecast area had 41 severe reports (mostly damaging winds) with a POD: 1.0, FAR:0.17, and an average lead time of 26.4 minutes.