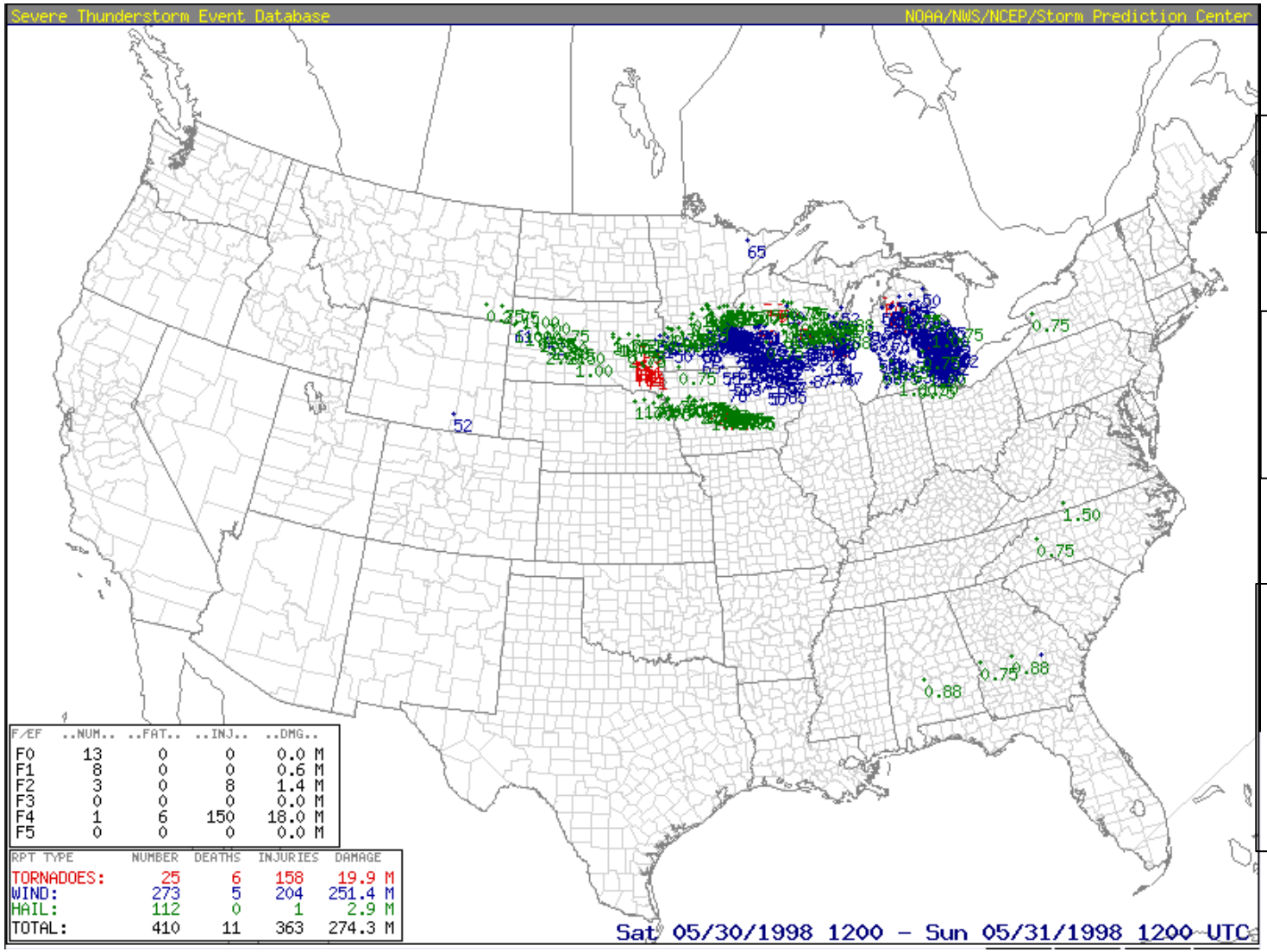
Retrospective Analysis of the 31 May 1998 Northeastern U.S. Severe Weather/Tornado Outbreak

Kevin S. Lipton

Meteorologist, NWS Albany NY

30 May 1998 Severe/Tornado Reports

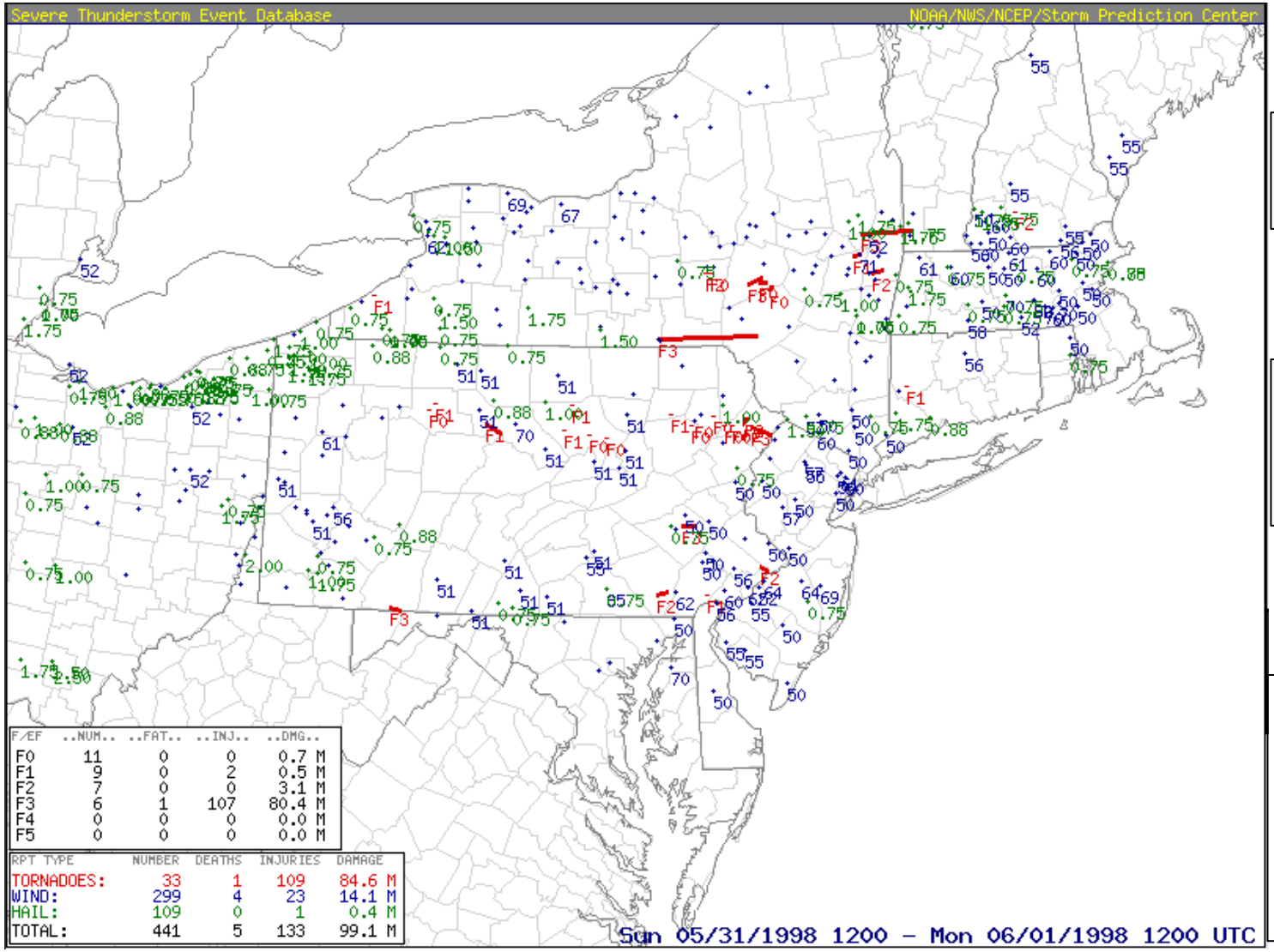


385 Severe Reports
Wind 273, Hail 112

25 Tornadoes
- 6 deaths/158 inj,
- 1 F4 (Spencer, SD)

Total Damage
$273.2 M
- $251.4 M Wind
- $ 2.9 M Hail
- $ 19.9 M Tors.

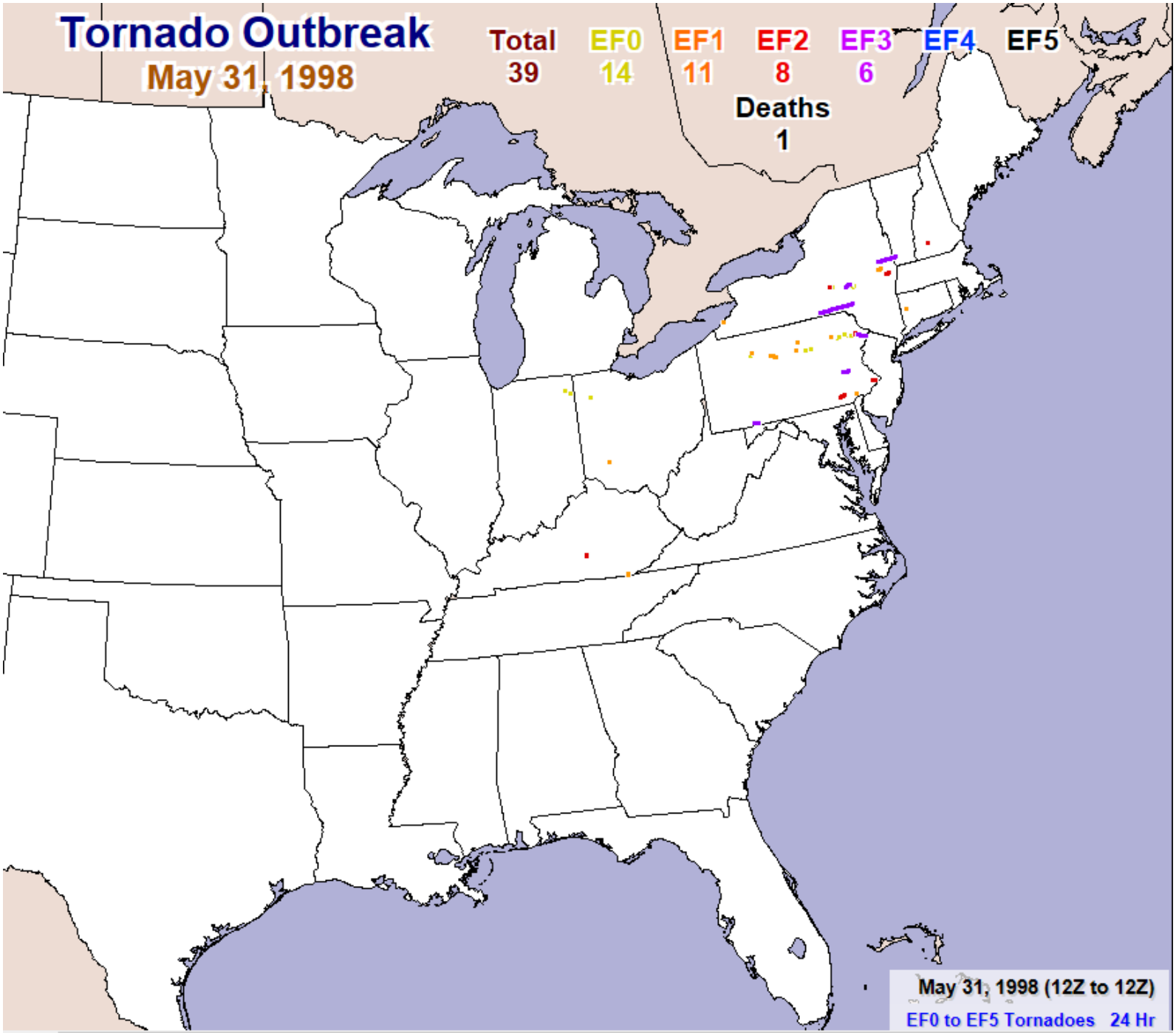
31 May 1998



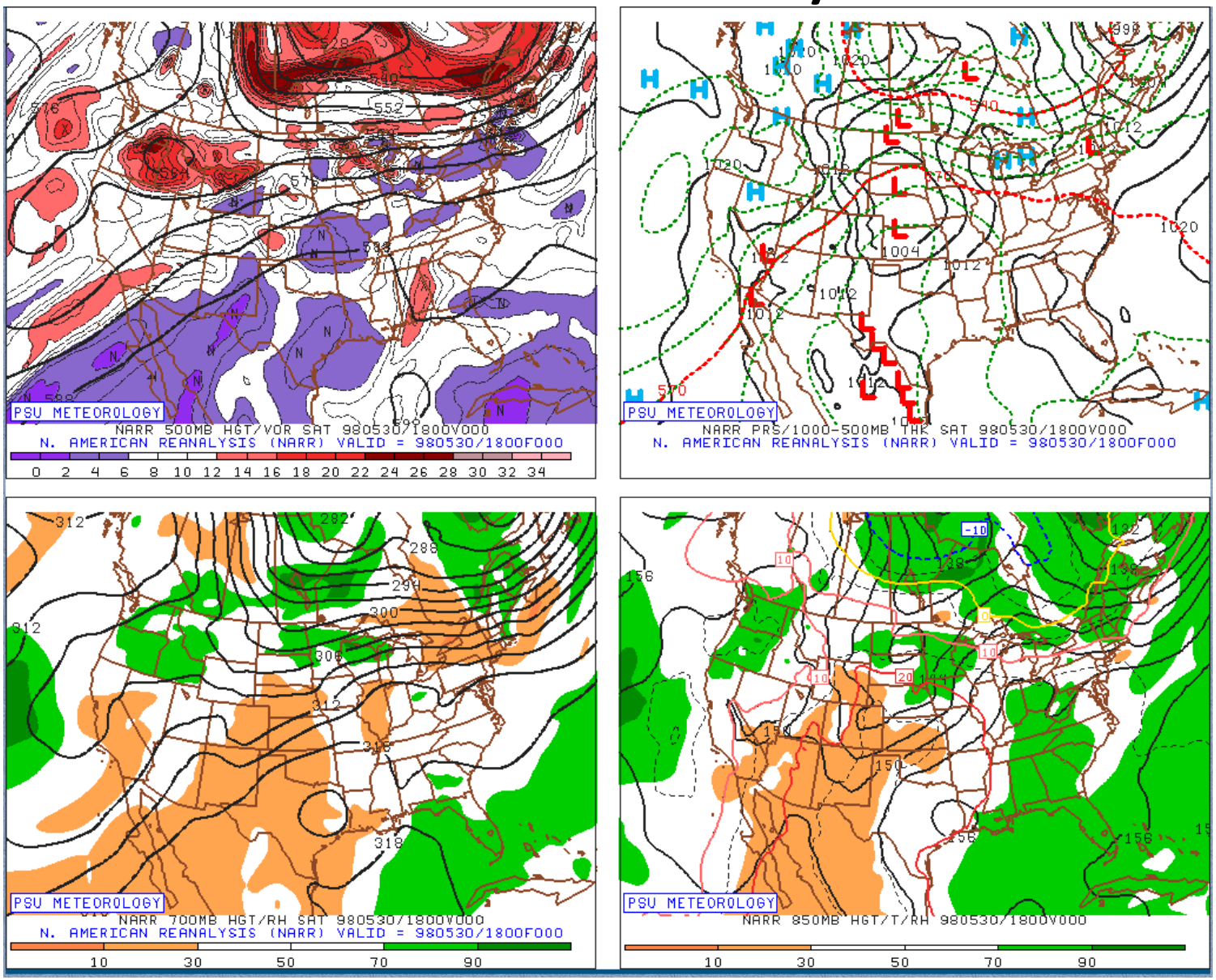
<u>408 Severe Reports</u>
Wind 299, Hail 109

<u>33 Tornadoes</u>
- 1 death, 109 inj,
- Six F3

<u>Total Damage</u>
$99.1 M
- $14.1 M Wind
- $ 0.4 M Hail
- $84.6 M Tors.

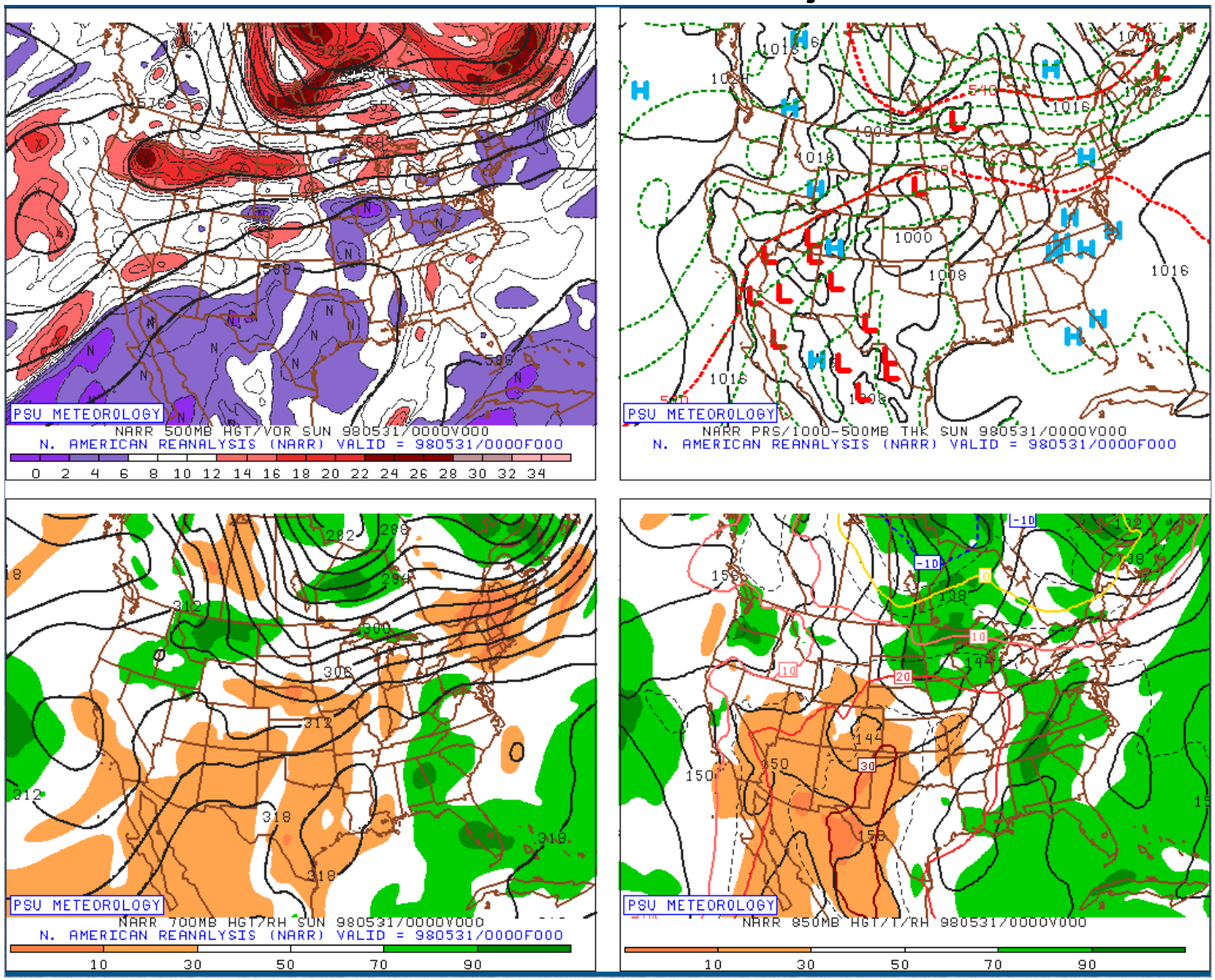

Tornado Outbreak
May 31, 1998
Total
39
EF0
14
EF1
11
EF2
8
EF3
6
EF4
EF5
Deaths
1
May 31, 1998 (12Z to 12Z)
EF0 to EF5 Tornadoes 24 Hr

1800 UTC 30 May 1998



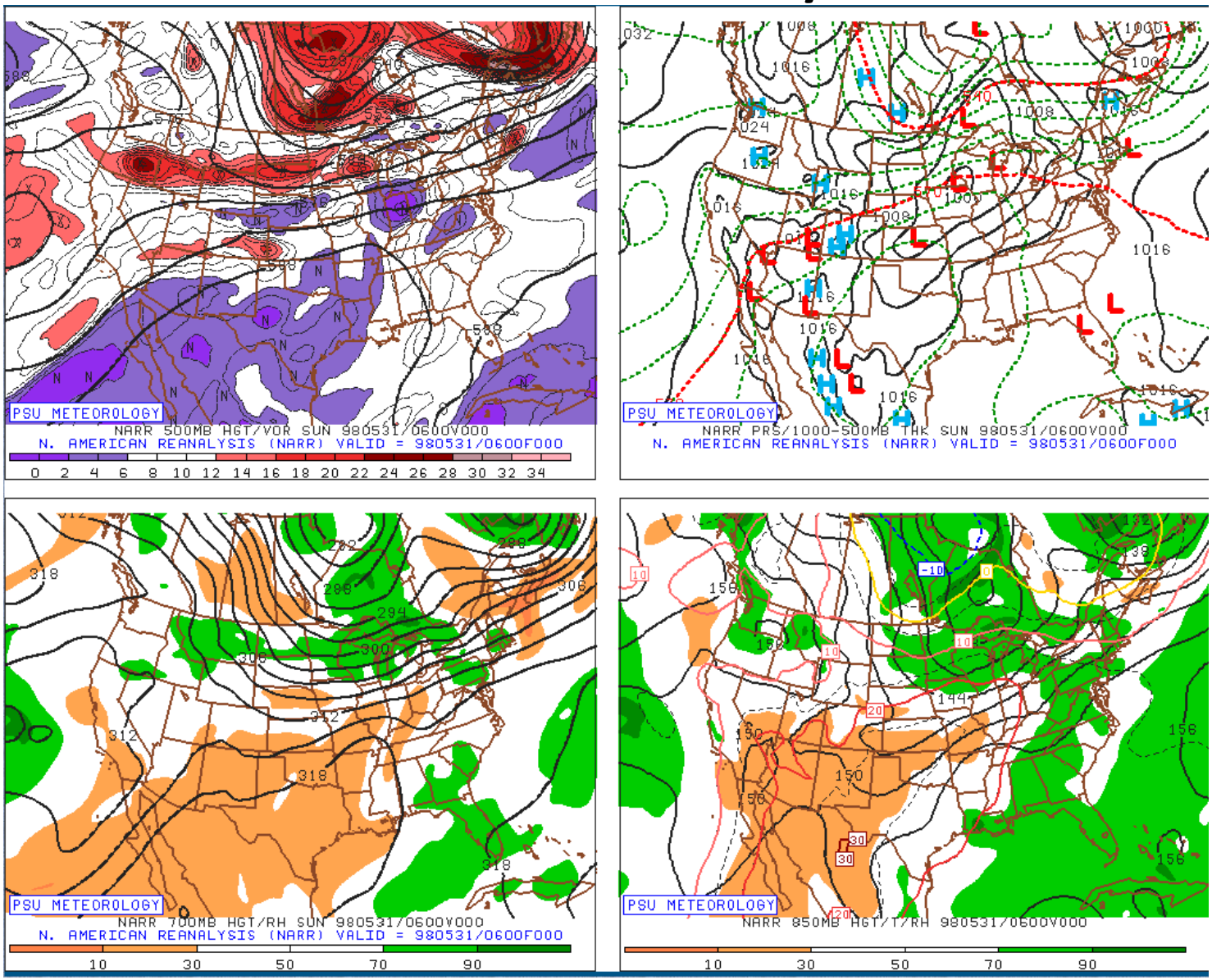
NARR Data/PSU e-Wall

0000 UTC 31 May 1998



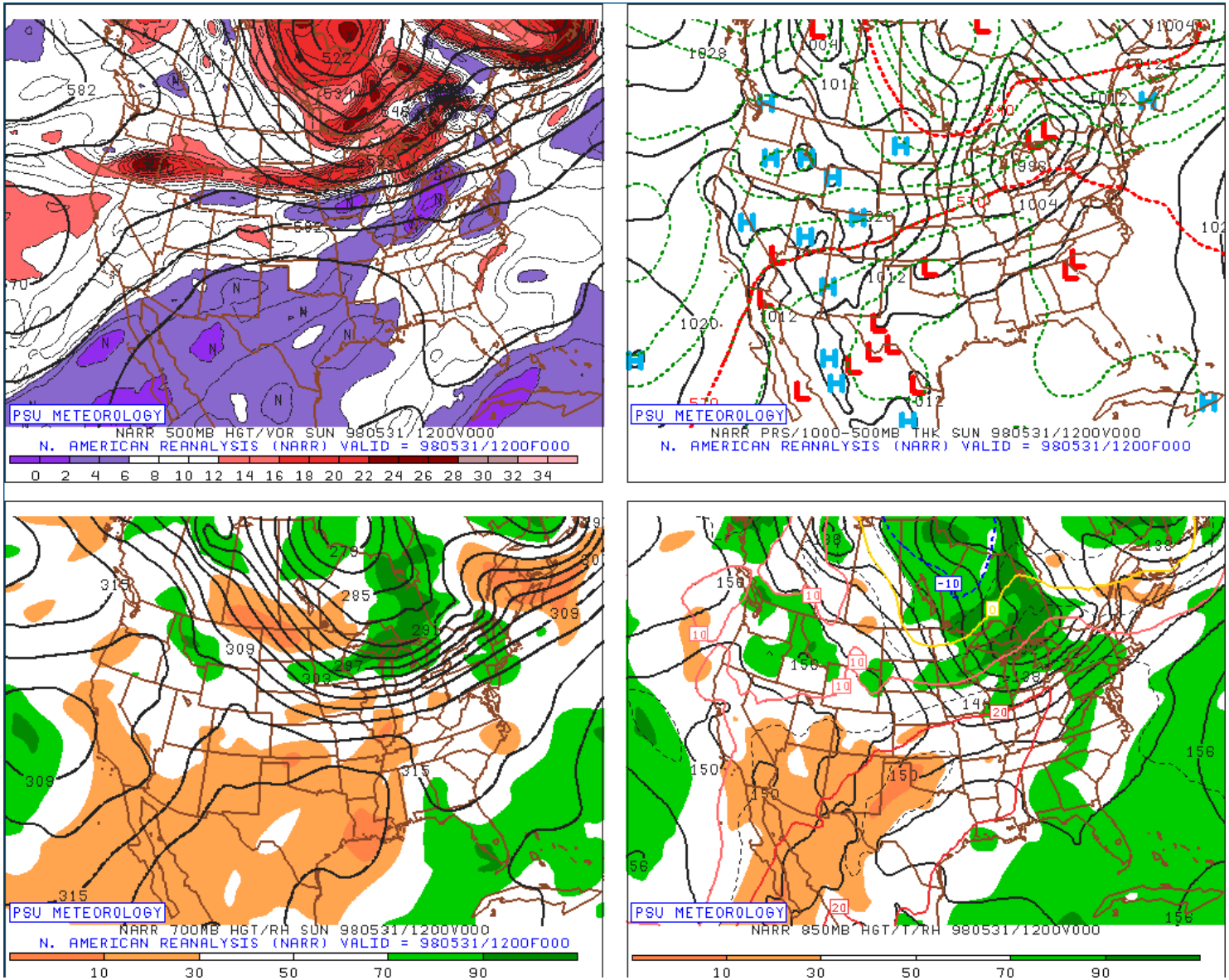
NARR Data/PSU e-Wall

0600 UTC 31 May 1998



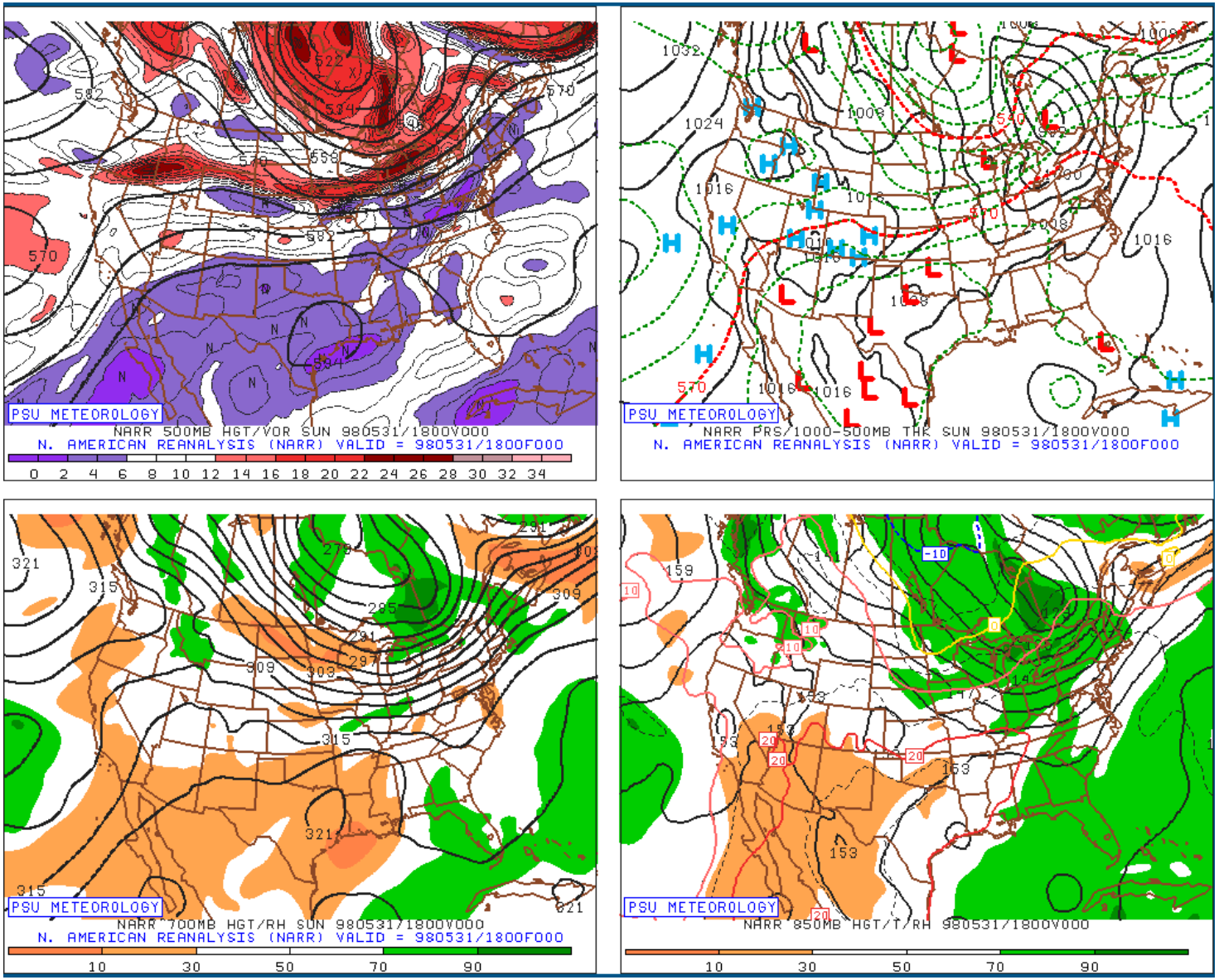
NARR Data/PSU e-Wall

1200 UTC 31 May 1998



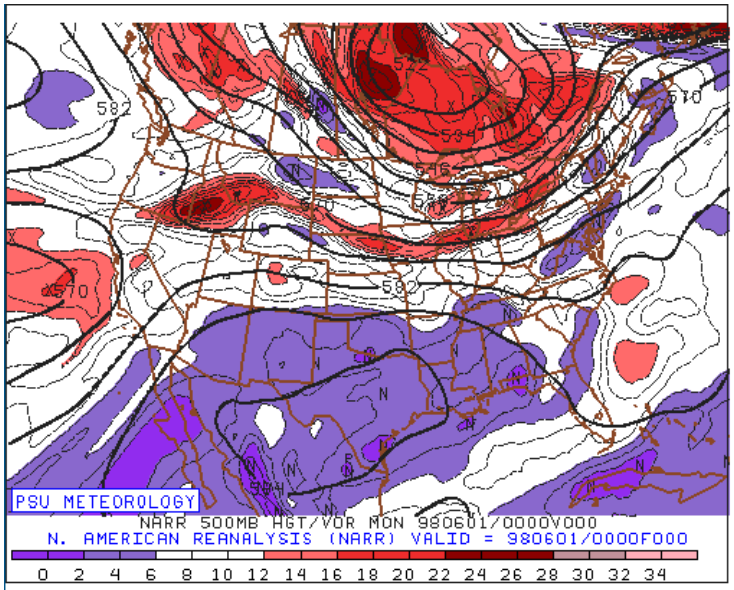
NARR Data/PSU e-Wall

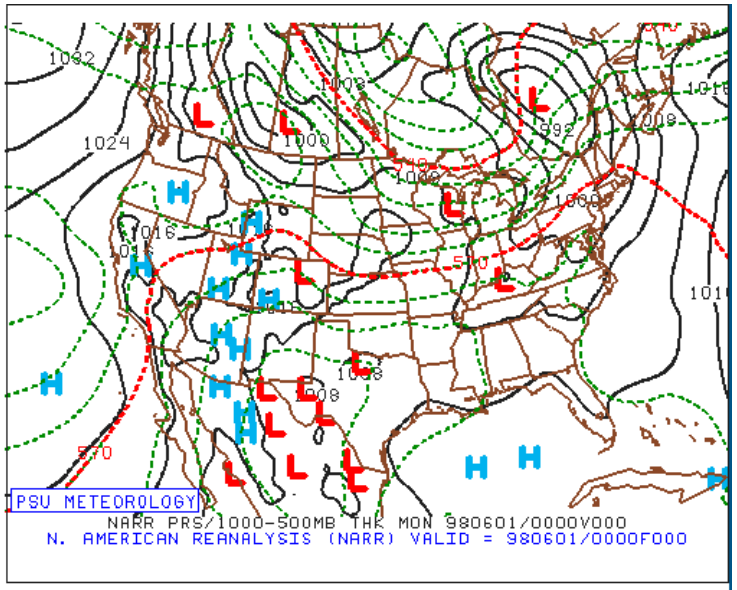
1800 UTC 31 May 1998

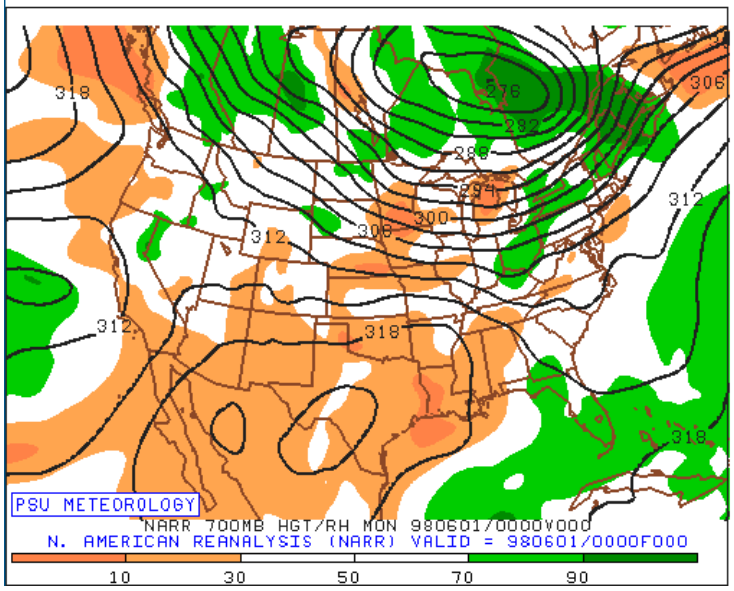


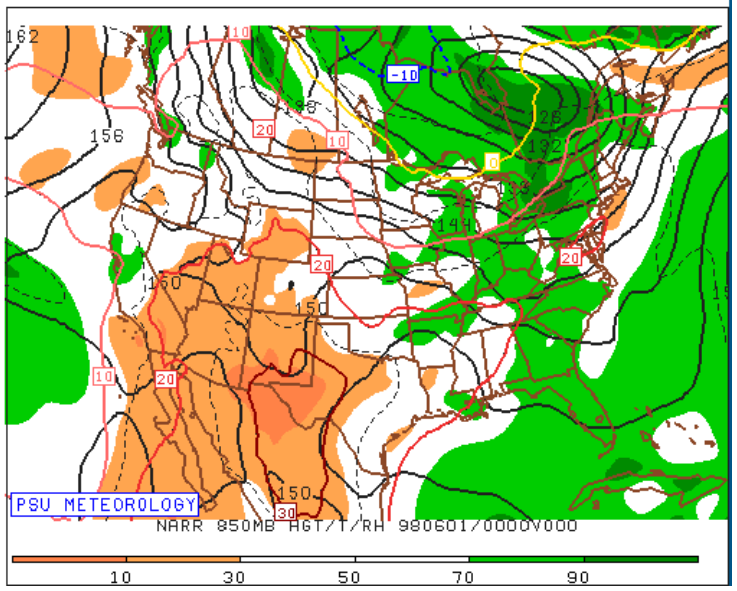
NARR Data/PSU e-Wall

0000 UTC 1 June 1998



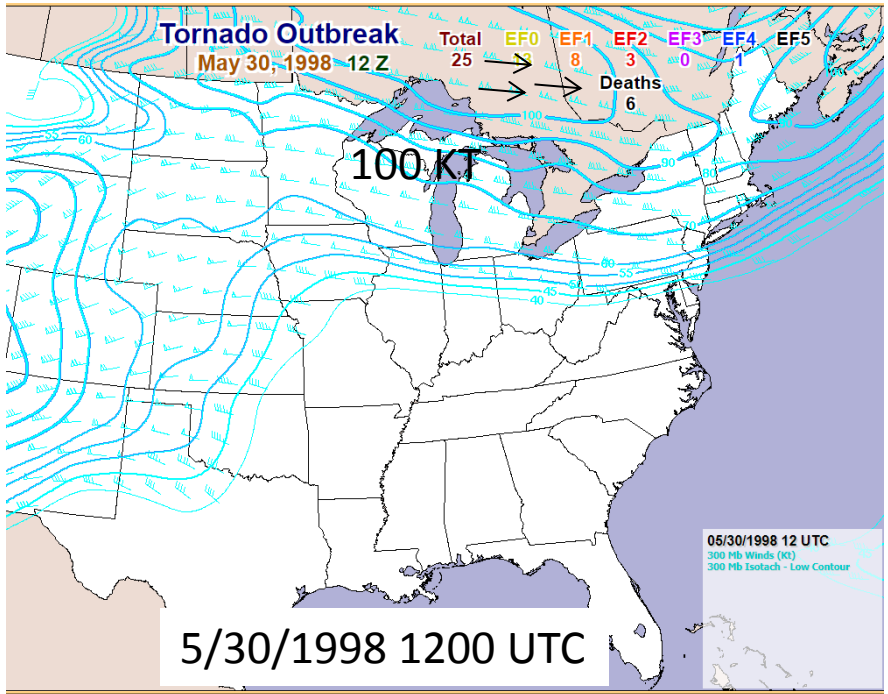


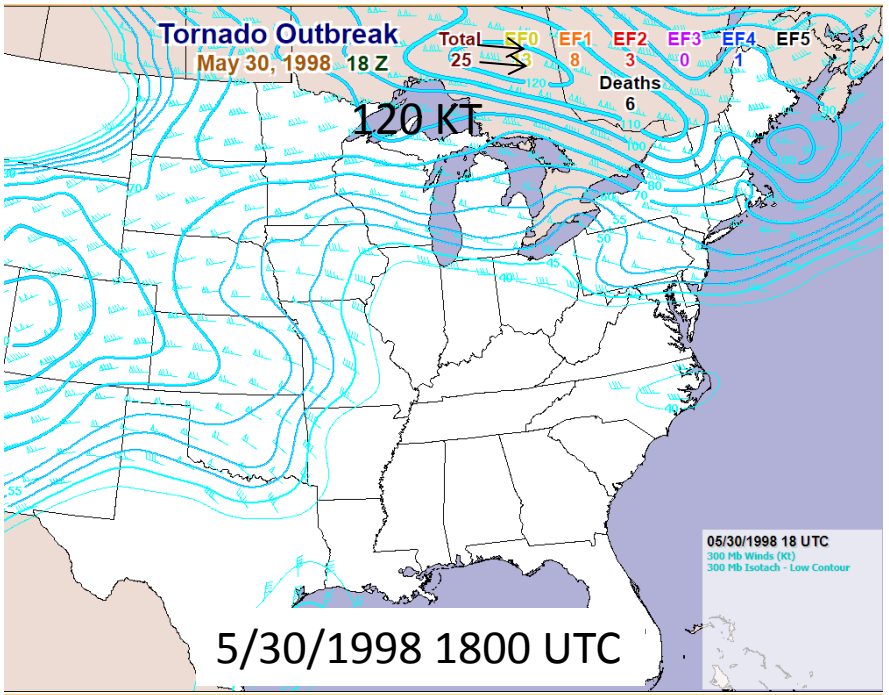


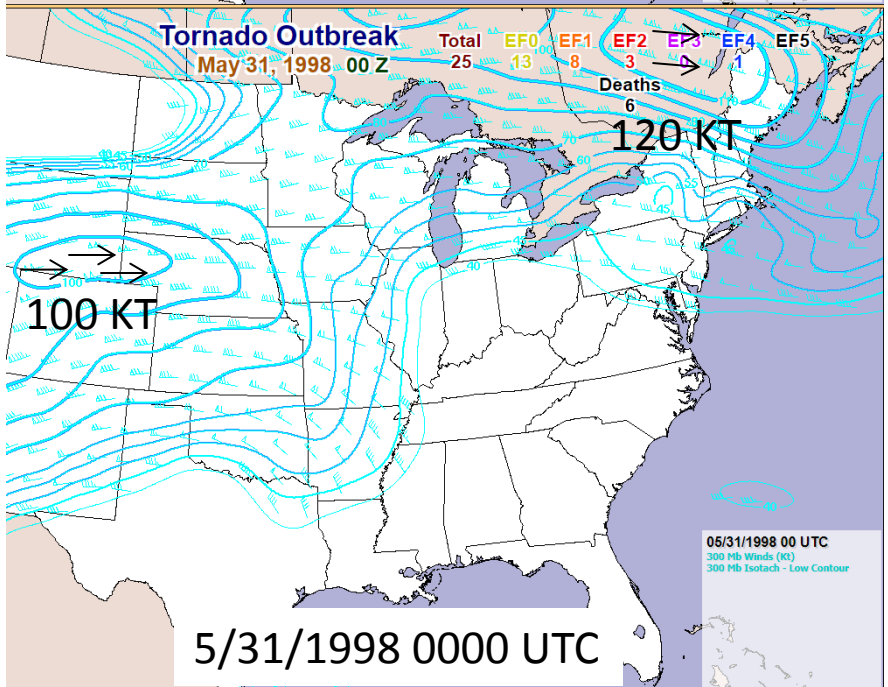


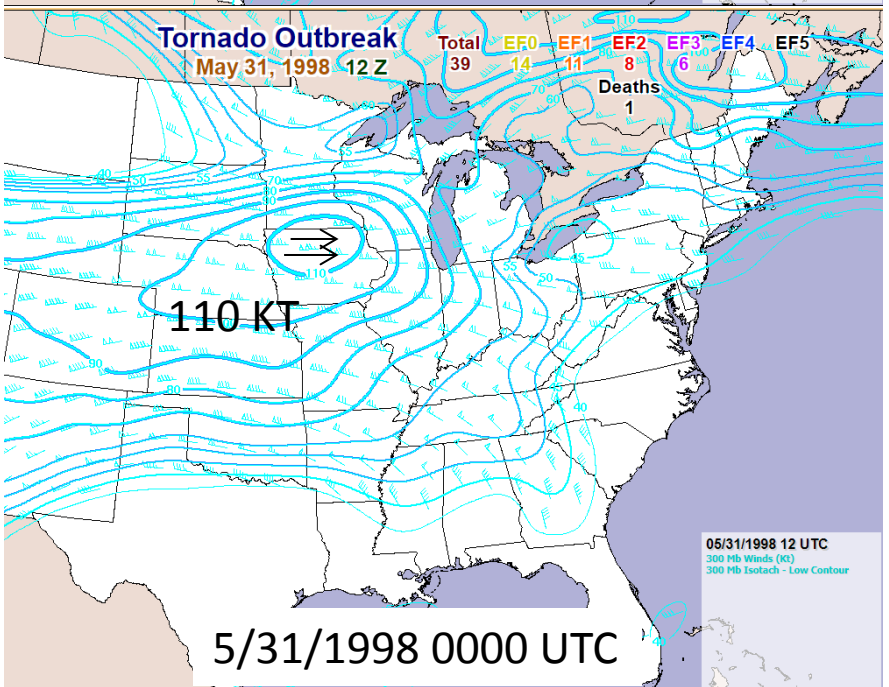
NARR Data/PSU e-Wall

300 mb Wind/Isotachs (KT) - (SPC Research/Violent Tornado Page)

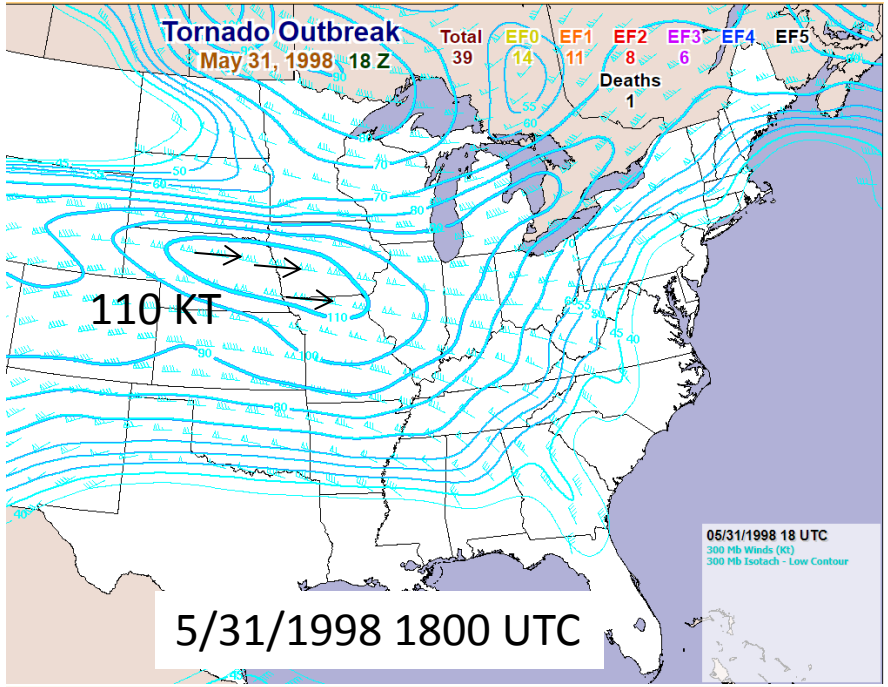


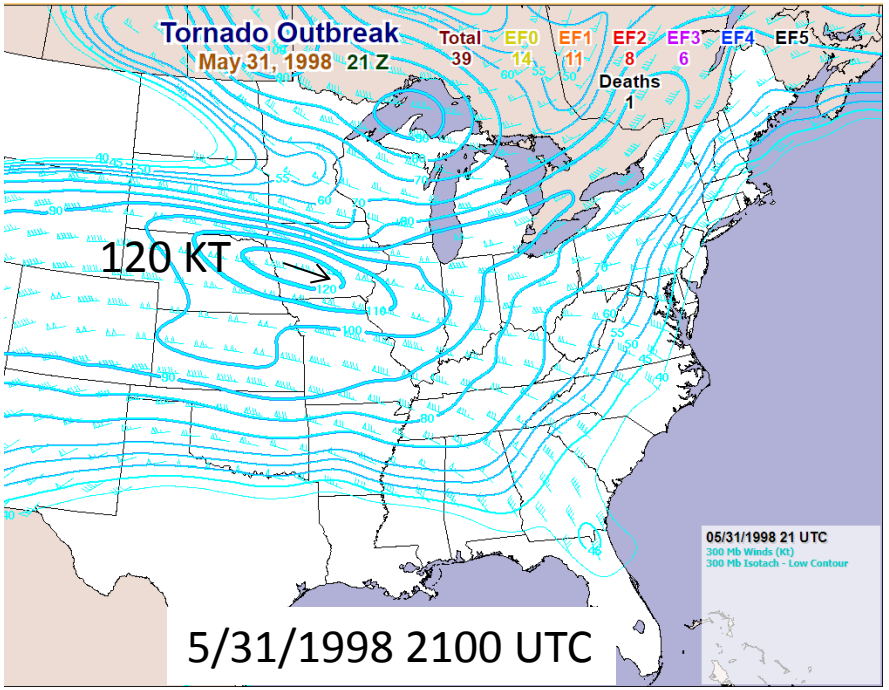


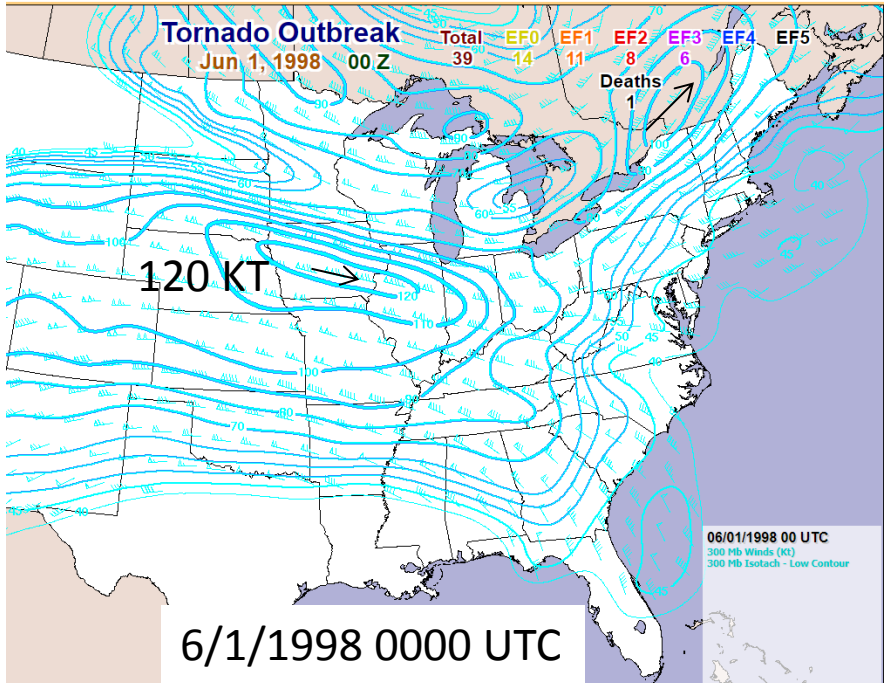


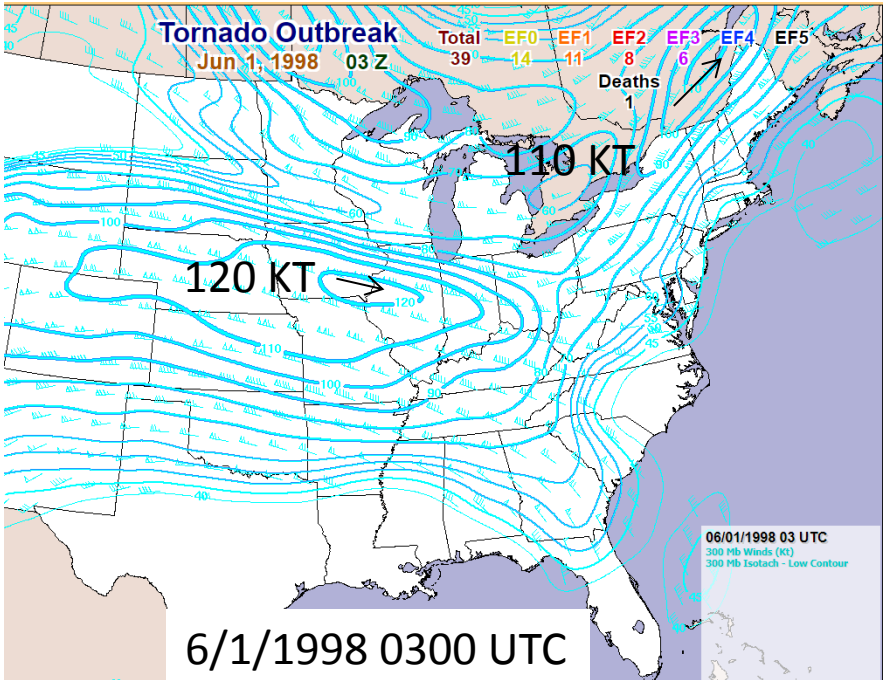


300 mb Wind/Isotachs (KT) - (SPC Research/Violent Tornado Page)

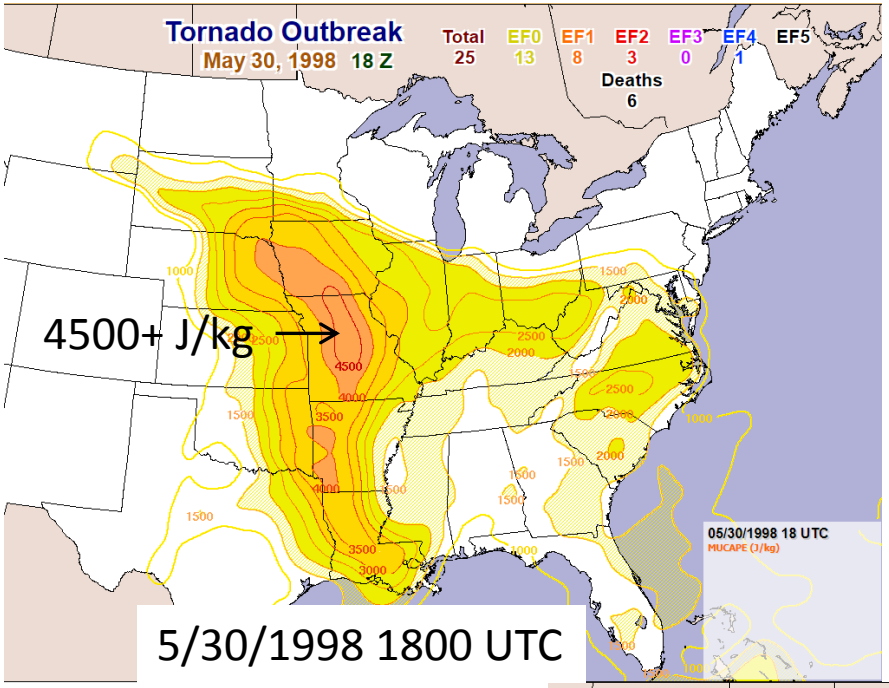


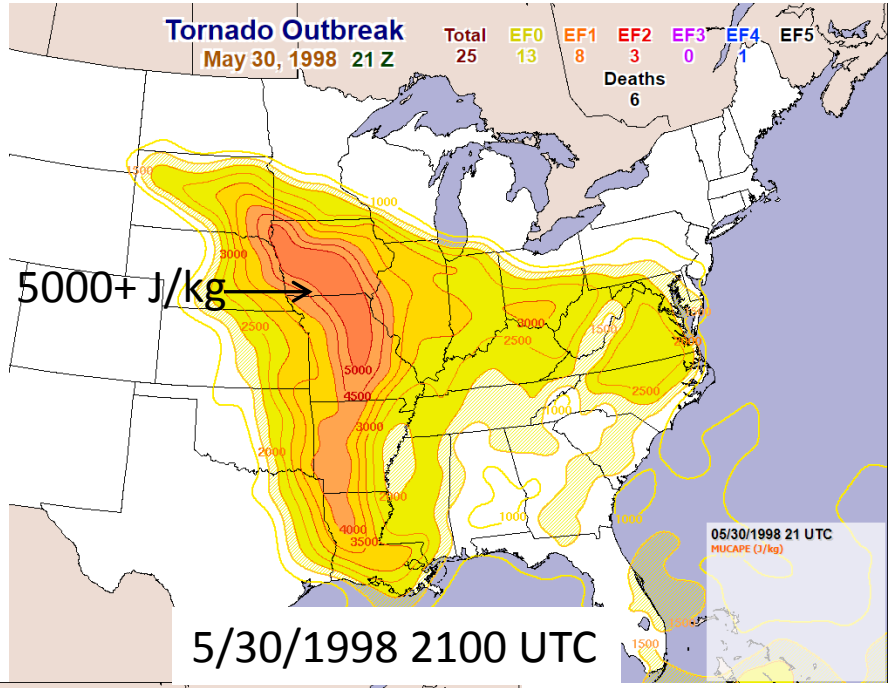


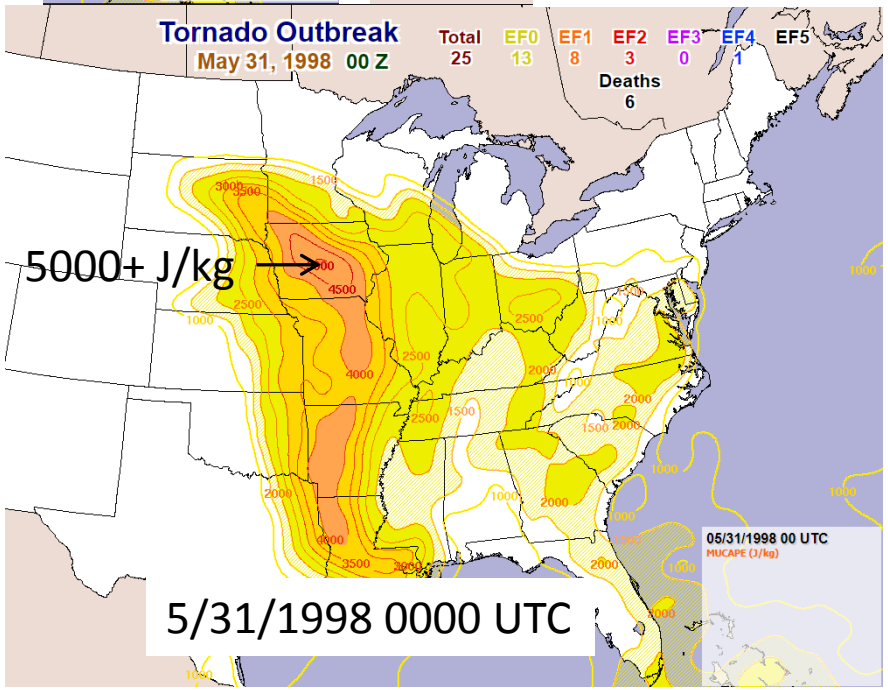




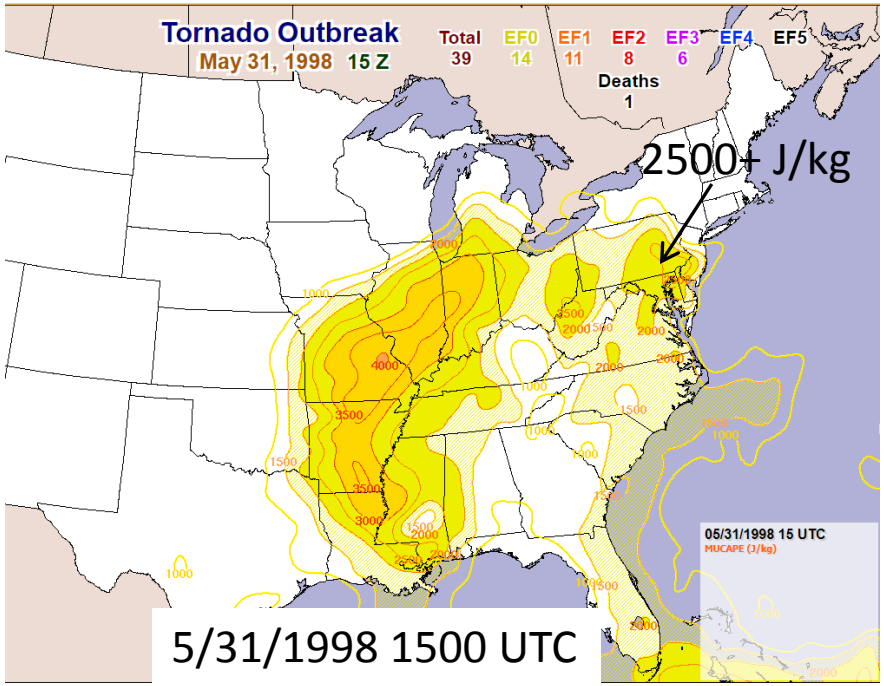
MUCAPE (J/kg) – SPC Research/Violent Tornado Page

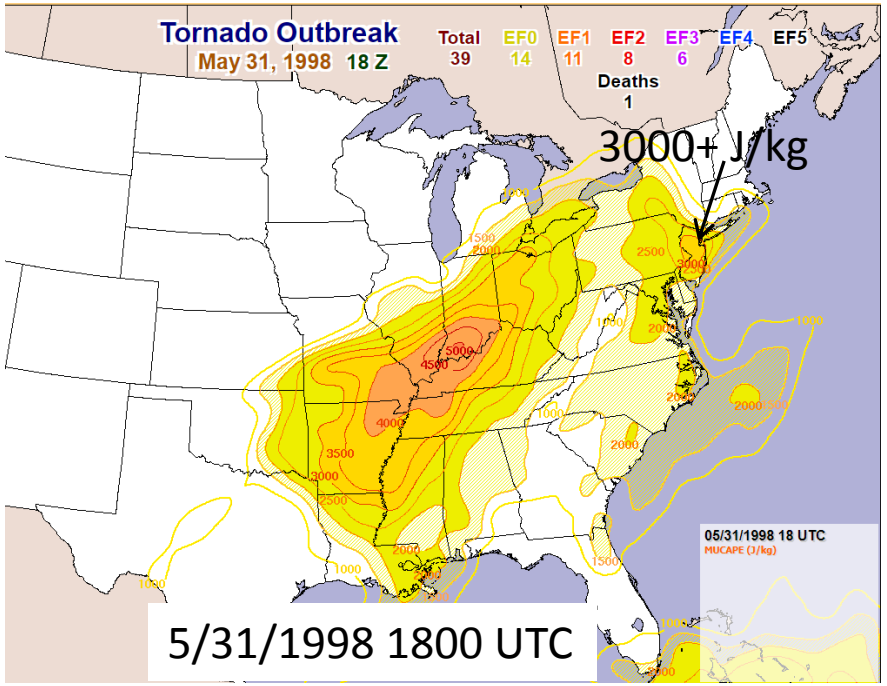


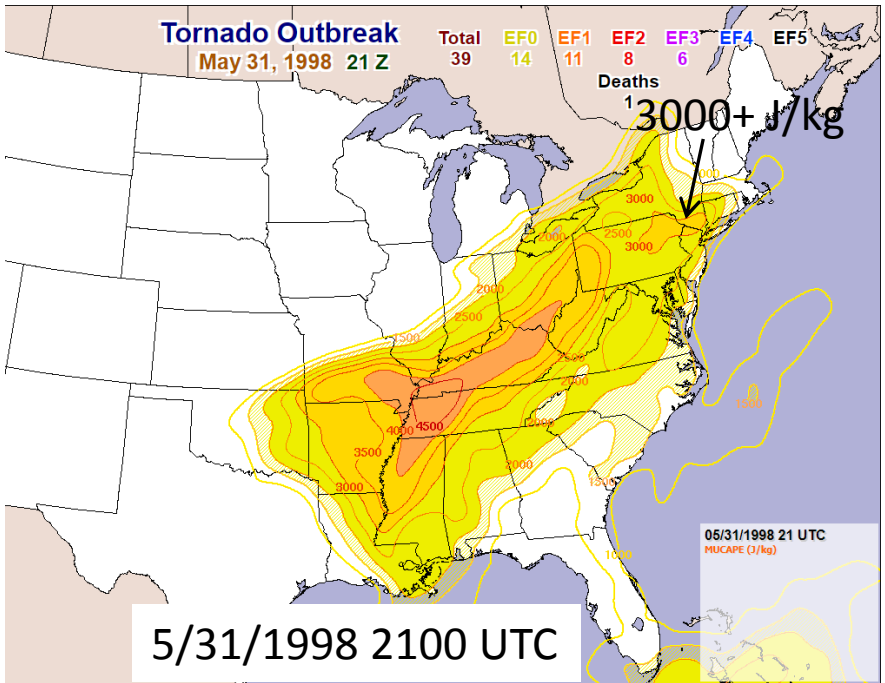


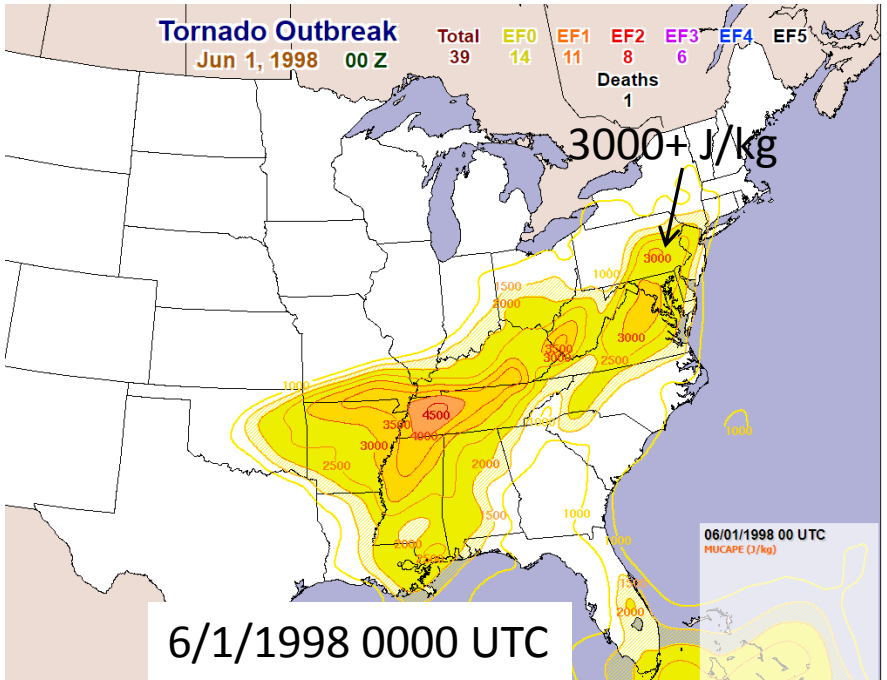


MUCAPE (J/kg) – (SPC Violent Tornado Page)

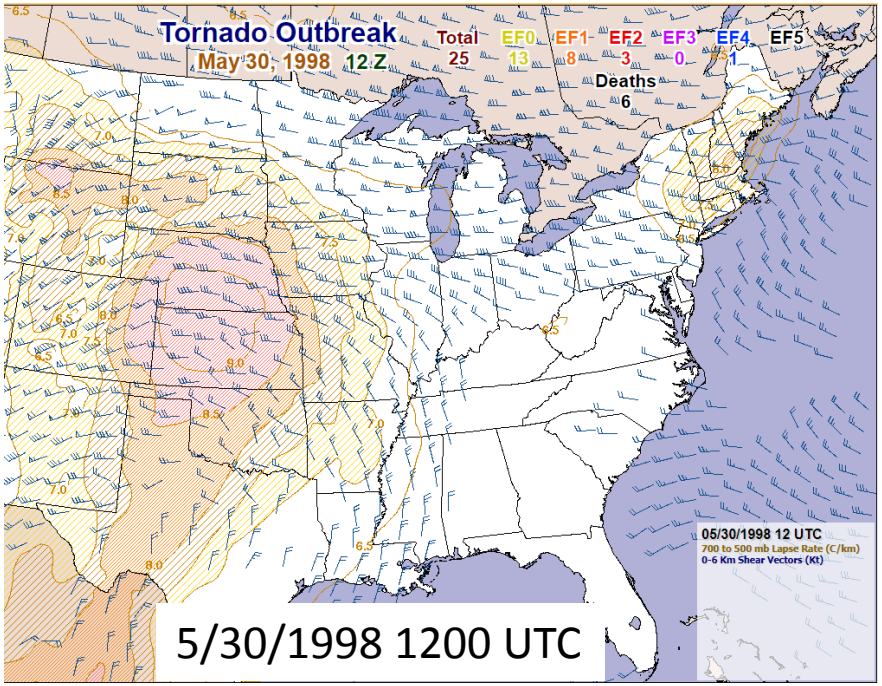




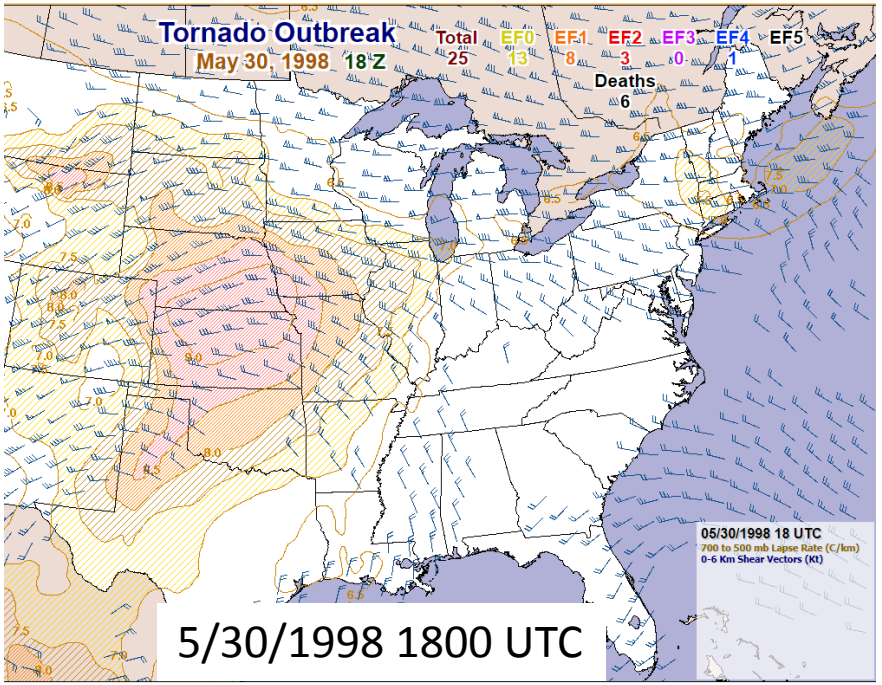




700-500 mb Lapse Rate (C/km) and 0-6 km Bulk Shear (KT) – (SPC Violent Tornado Page)



5/30/1998 1200 UTC



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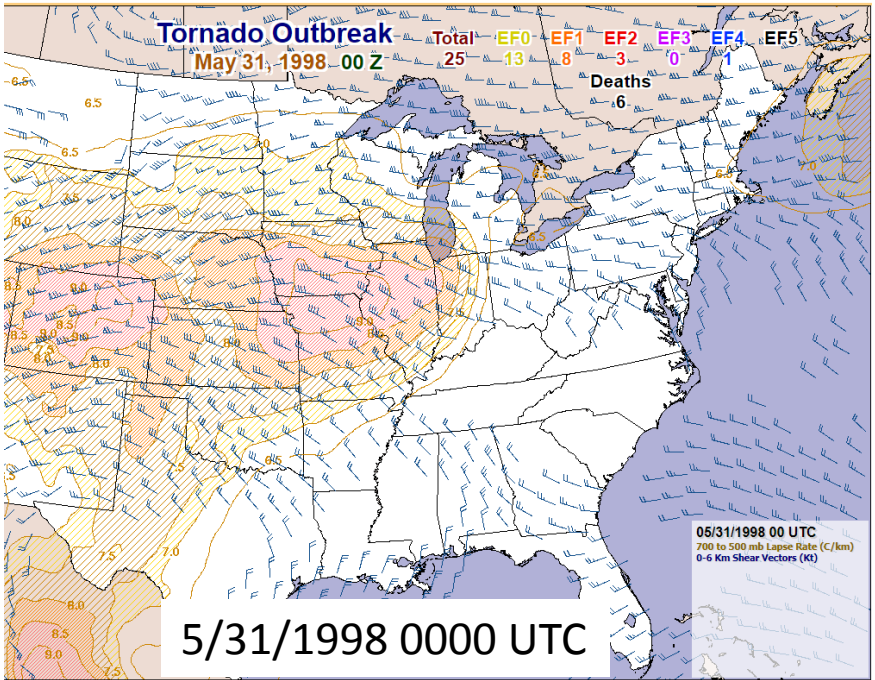
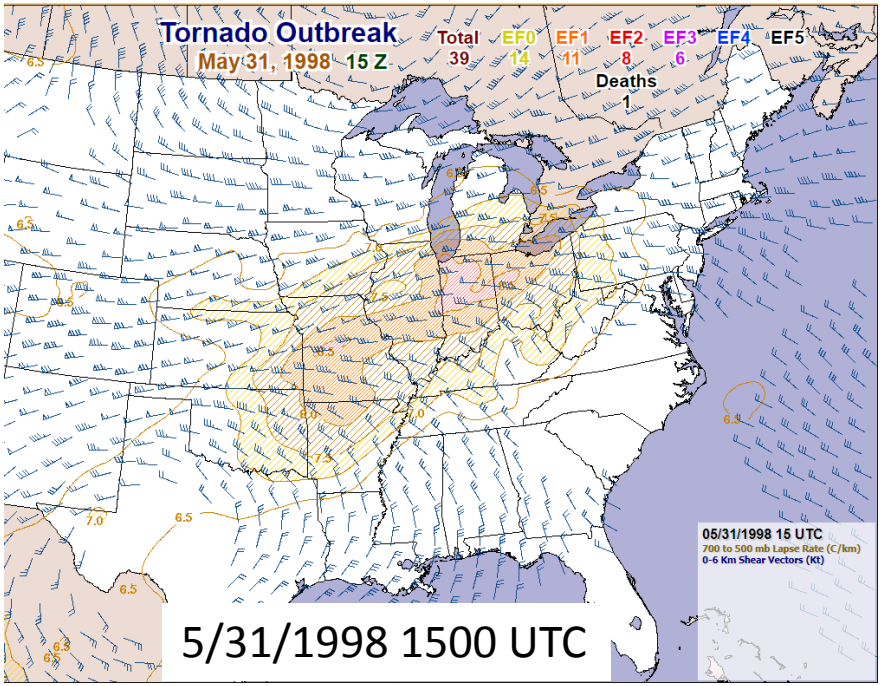
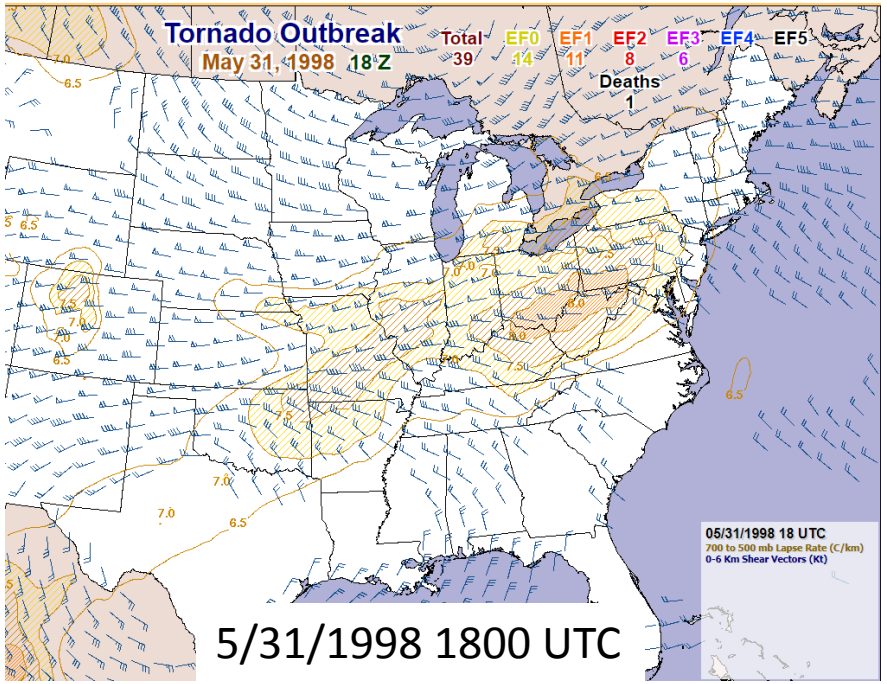


5/31/1998 0000 UTC

700-500 mb Lapse Rate (C/km) and 0-6 km Bulk Shear (KT) – SPC Violent Tornado Page



5/31/1998 1500 UTC



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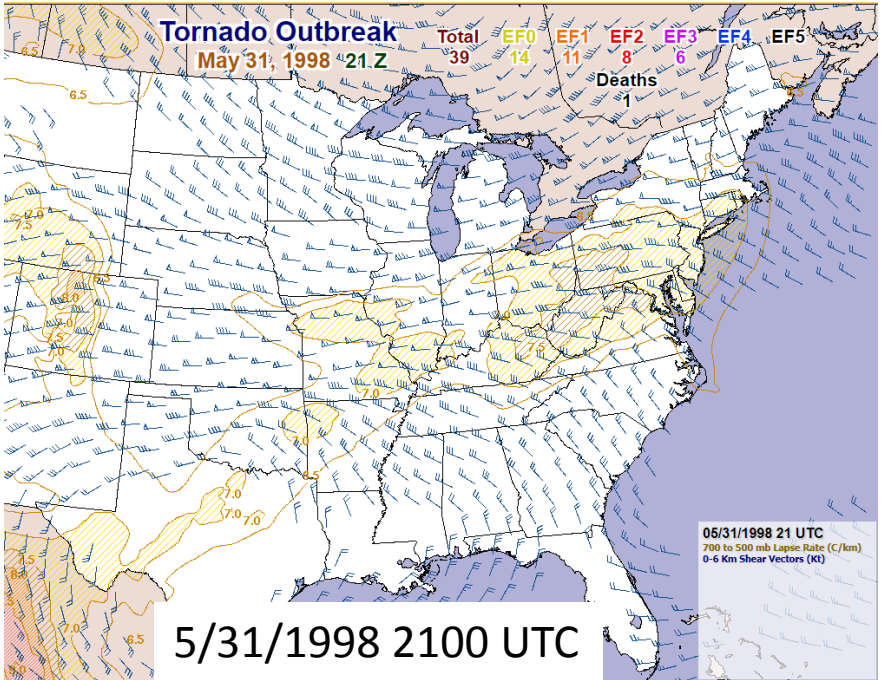
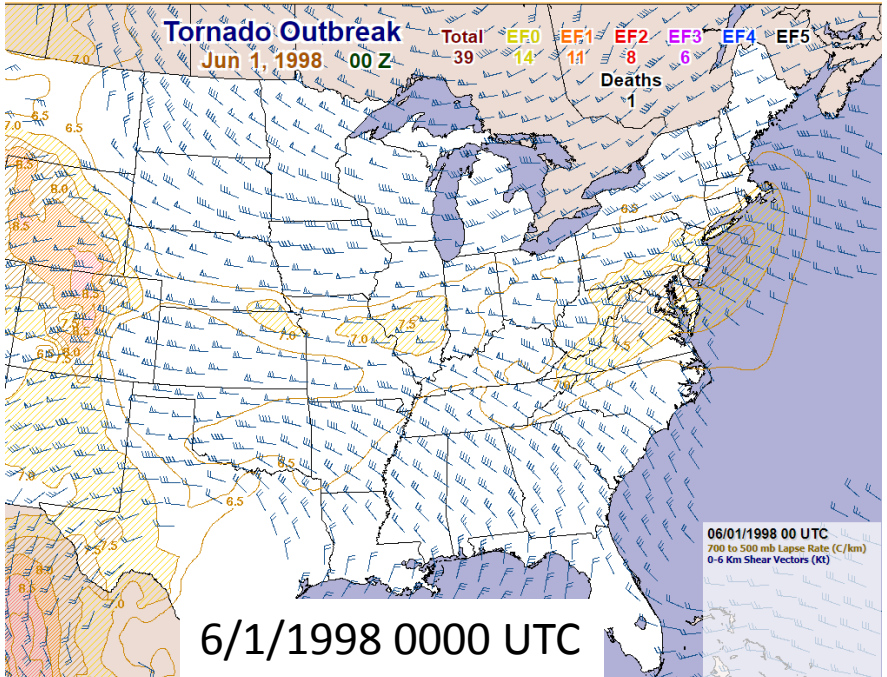
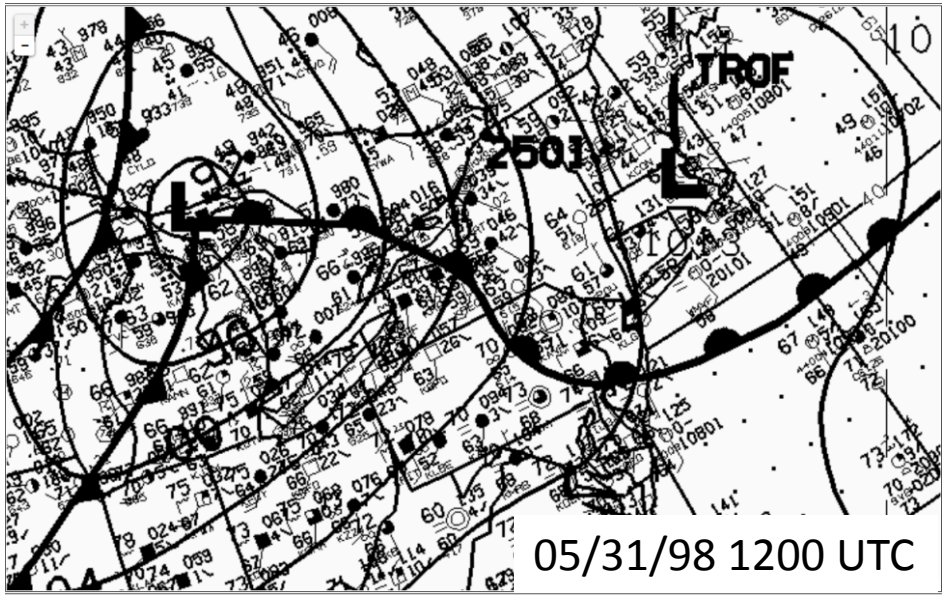


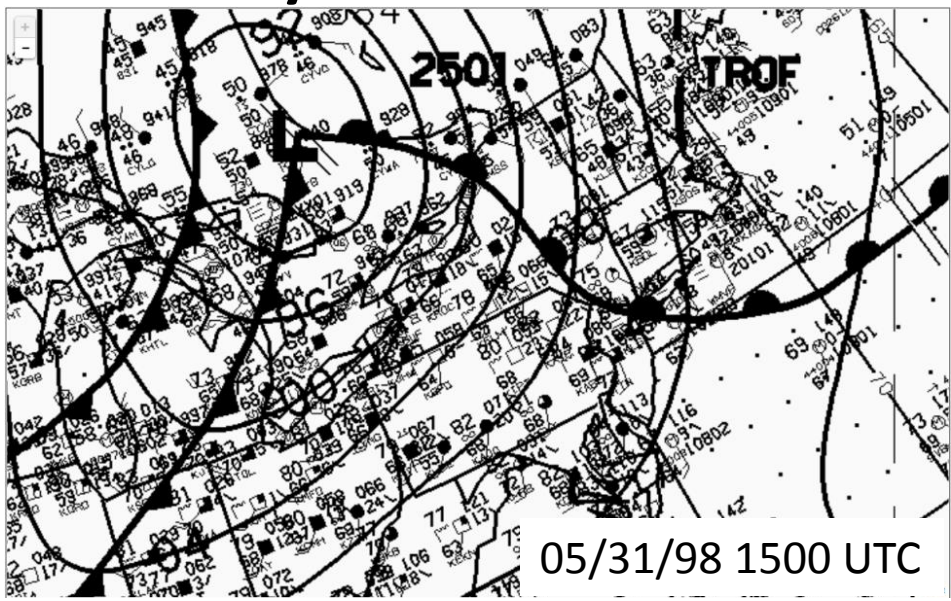
5/31/1998 2100 UTC

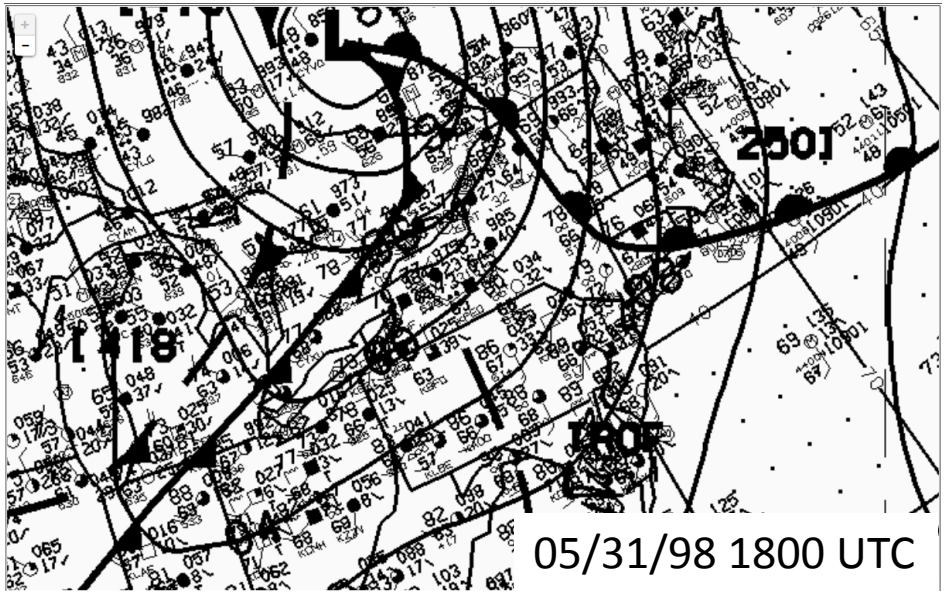


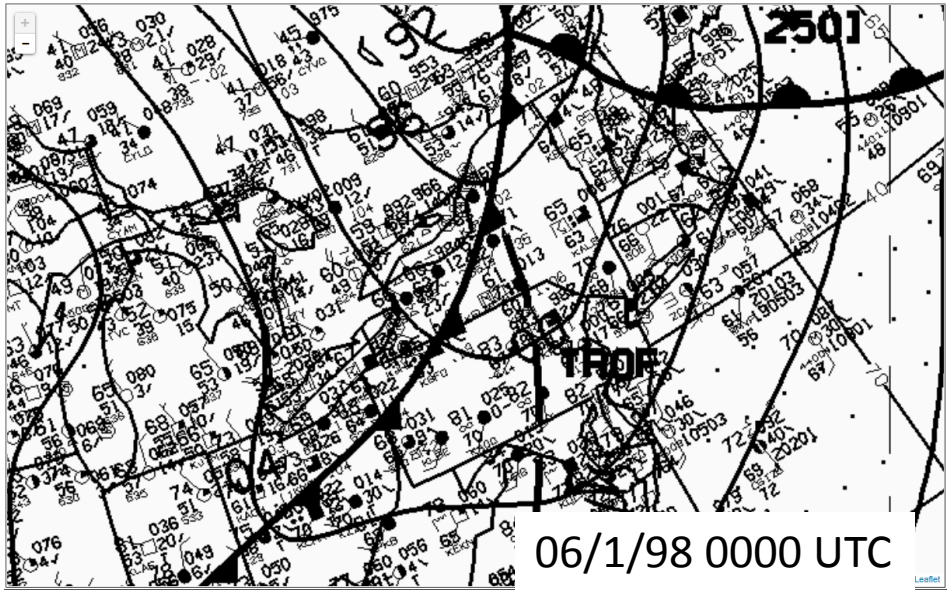
6/1/1998 0000 UTC

WPC Surface Analyses





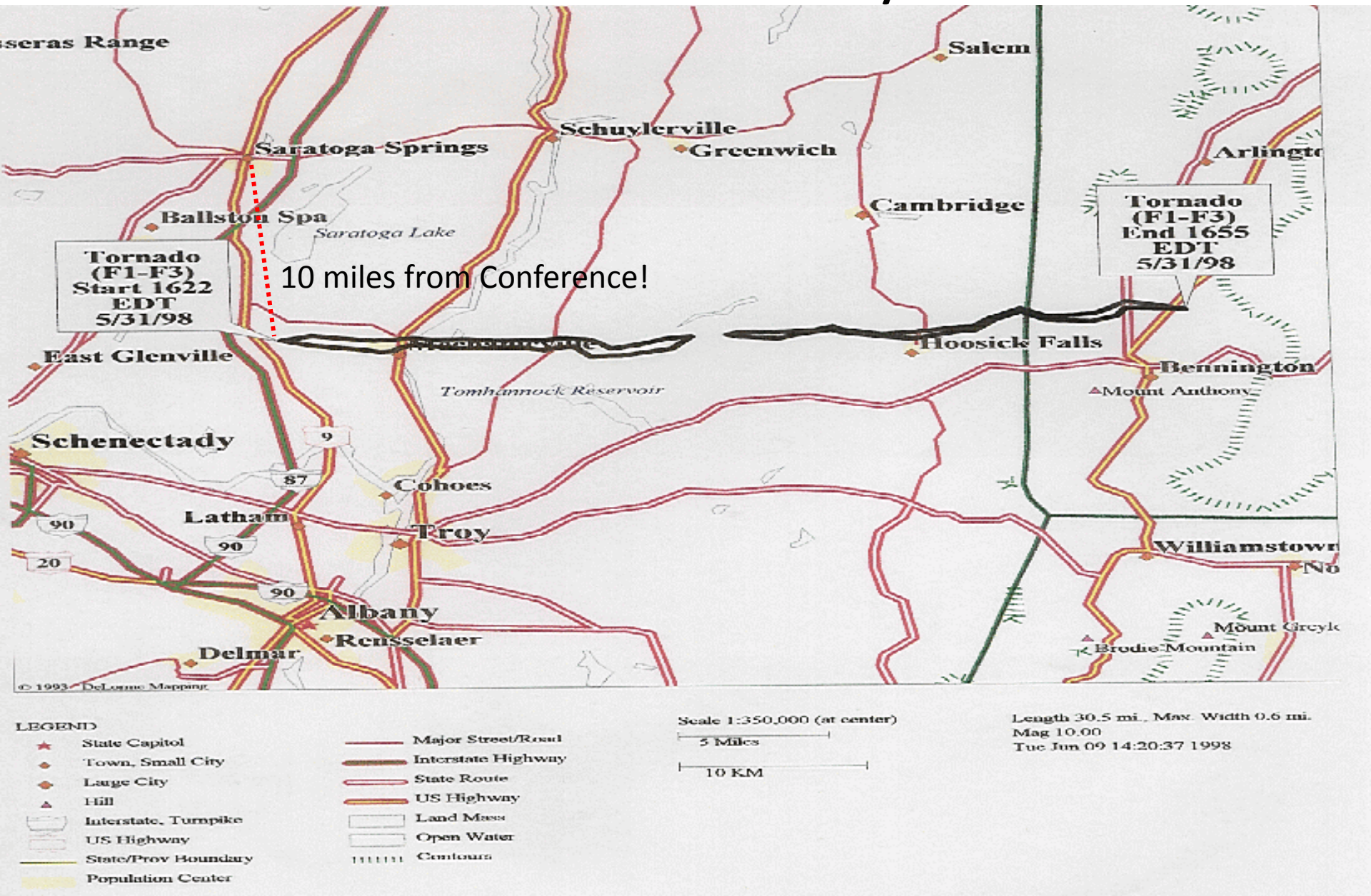


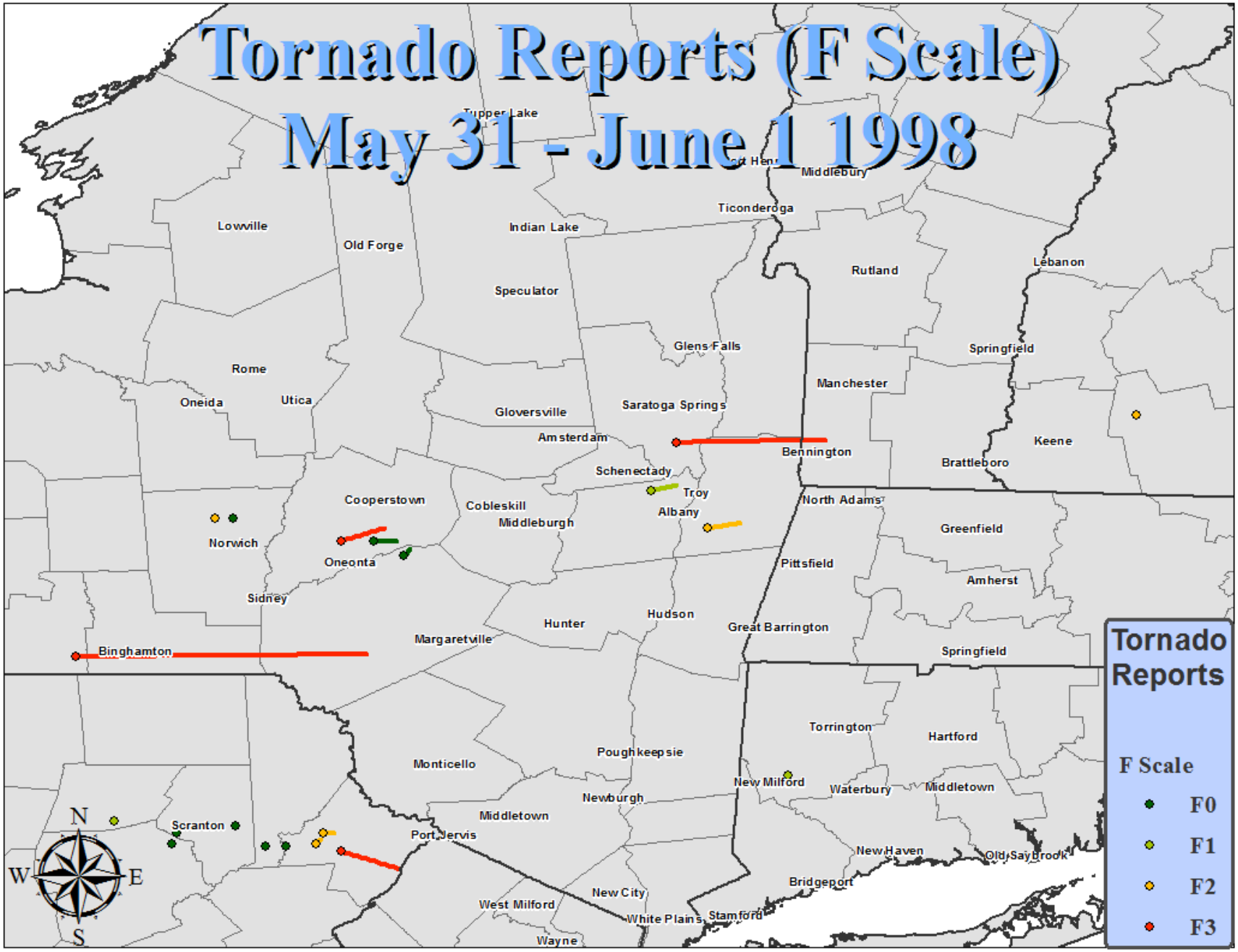


Mechanicville-Stillwater, NY Tornado – 31 May 1998

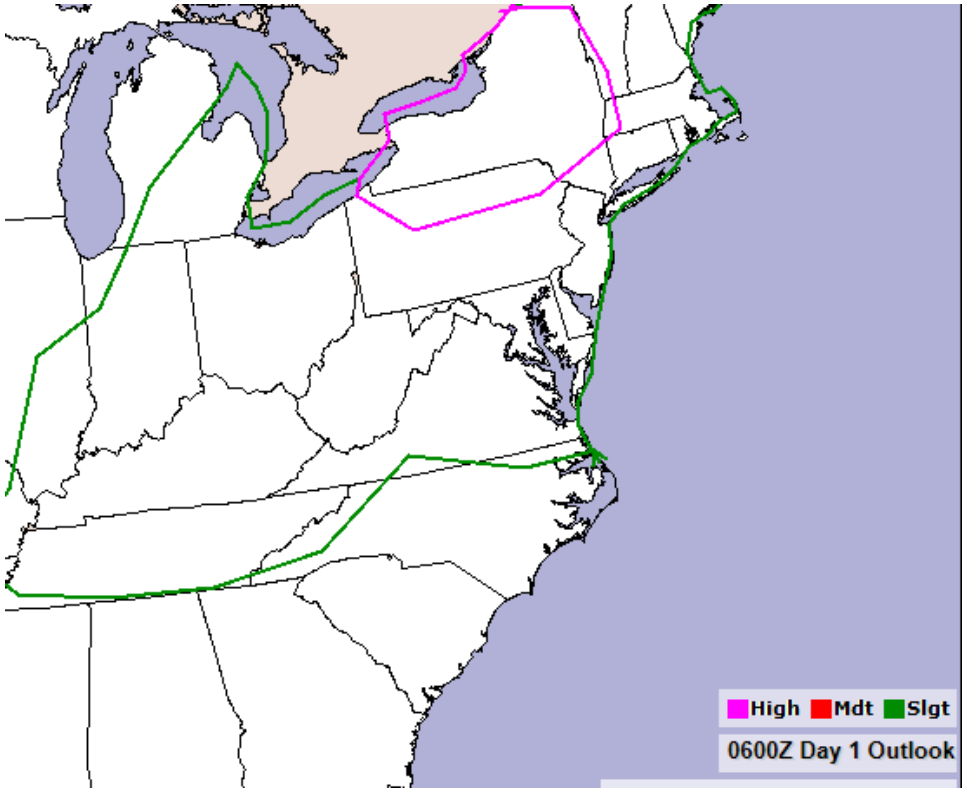
- ***Estimated Damage: $70.63M***
- ***Strength: F2-F3***
- ***Path Length: 31 miles***
- ***Path Width: 970 yards***
- ***Time Frame: 1622-1655 EDT***
- ***Injuries: 68***

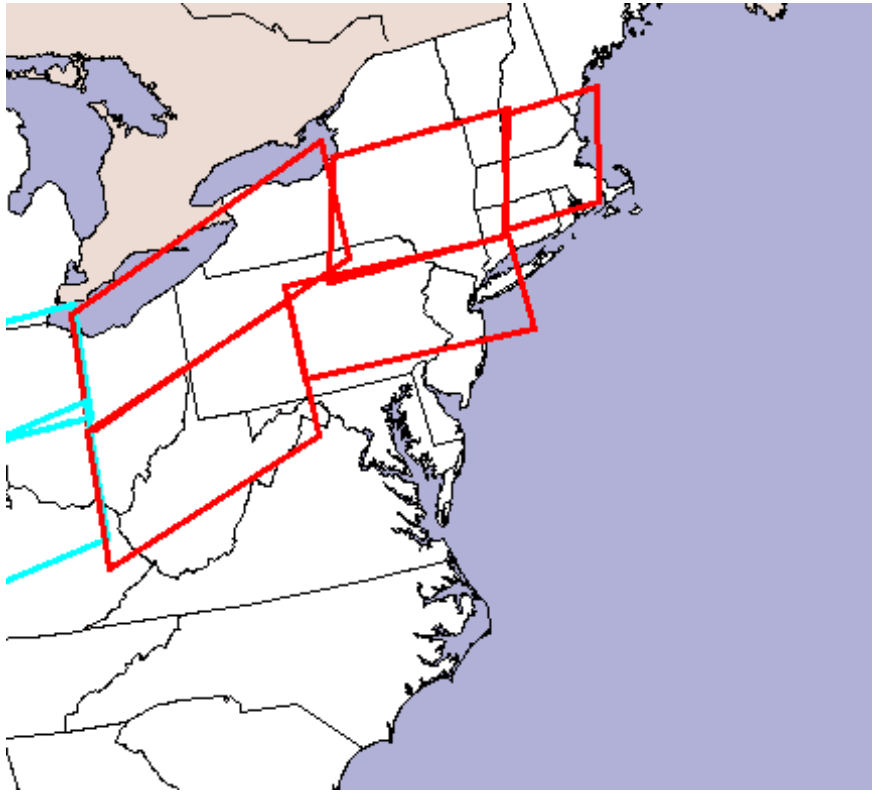
TORNADO TRACK FOR MECHANICVILLE (ROUTE 67) TORNADO 2022 UTC - 2055 UTC 31 May 1998.



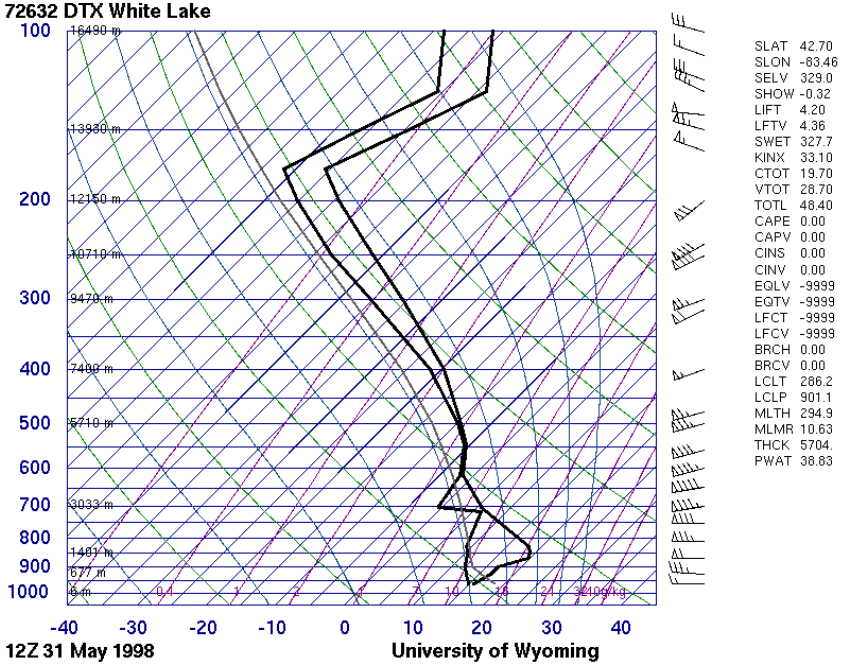

Tornado Reports (F Scale)
May 31 - June 1 1998
Tupper Lake
Middlebury
Ticonderoga
Lowville
Old Forge
Indian Lake
Rutland
Lebanon
Speculator
Glens Falls
Springfield
Rome
Manchester
Oneida
Utica
Gloversville
Saratoga Springs
Amsterdam
Bennington
Keene
Brattleboro
Schenectady
Troy
Albany
North Adams
Cooperstown
Cobleskill
Middleburgh
Greenfield
Norwich
Oneonta
Pittsfield
Amherst
Sidney
Hunter
Hudson
Great Barrington
Binghamton
Margaretville
Springfield
Torrington
Hartford
Poughkeepsie
Monticello
New Milford
Waterbury
Middletown
Newburgh
Middletown
Scranton
Port Jervis
New Haven
Old Saybrook
Bridgeport
New City
West Milford
White Plains
Stamford
Wayne
N
W
E
S
Tornado Reports
F Scale
F0
F1
F2
F3

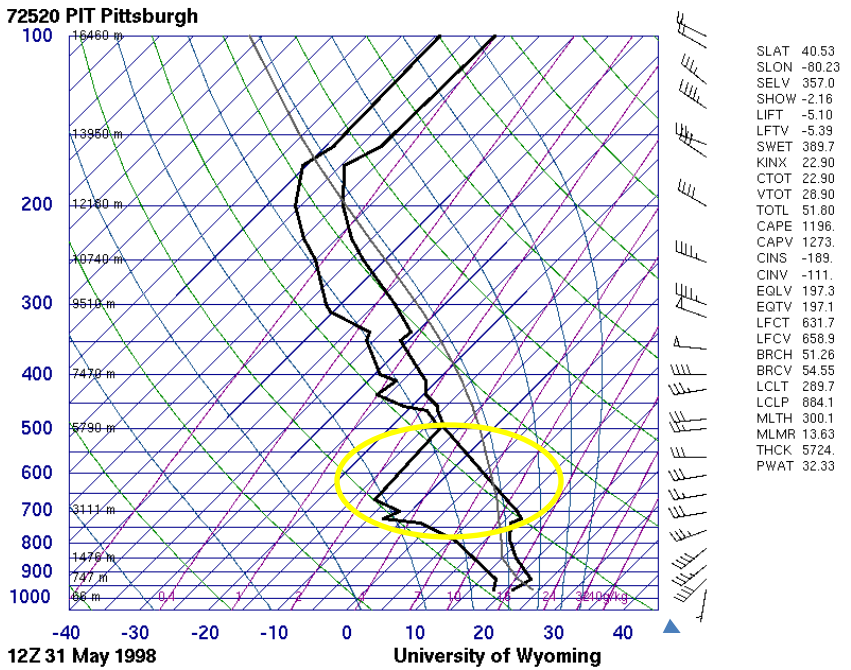
SPC Day 1 Outlook/Tornado Watches
31 May 1998





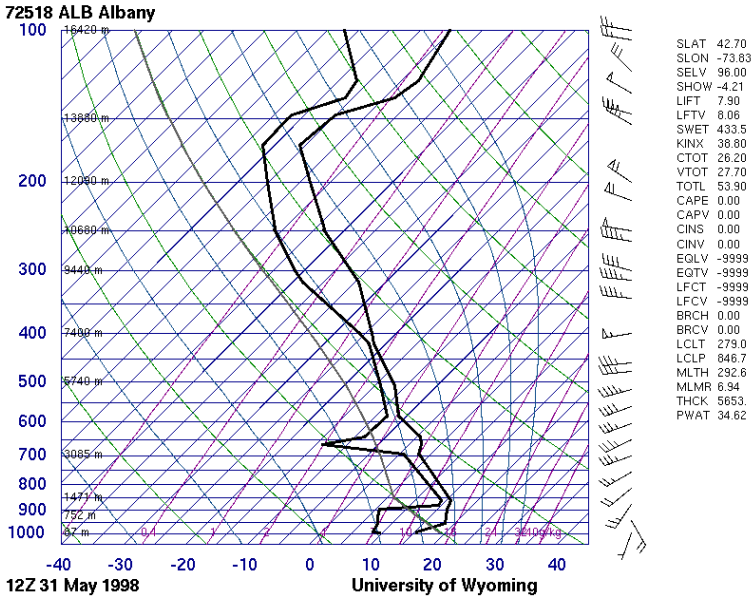
1200 UTC/31 May 1998 Regional Soundings





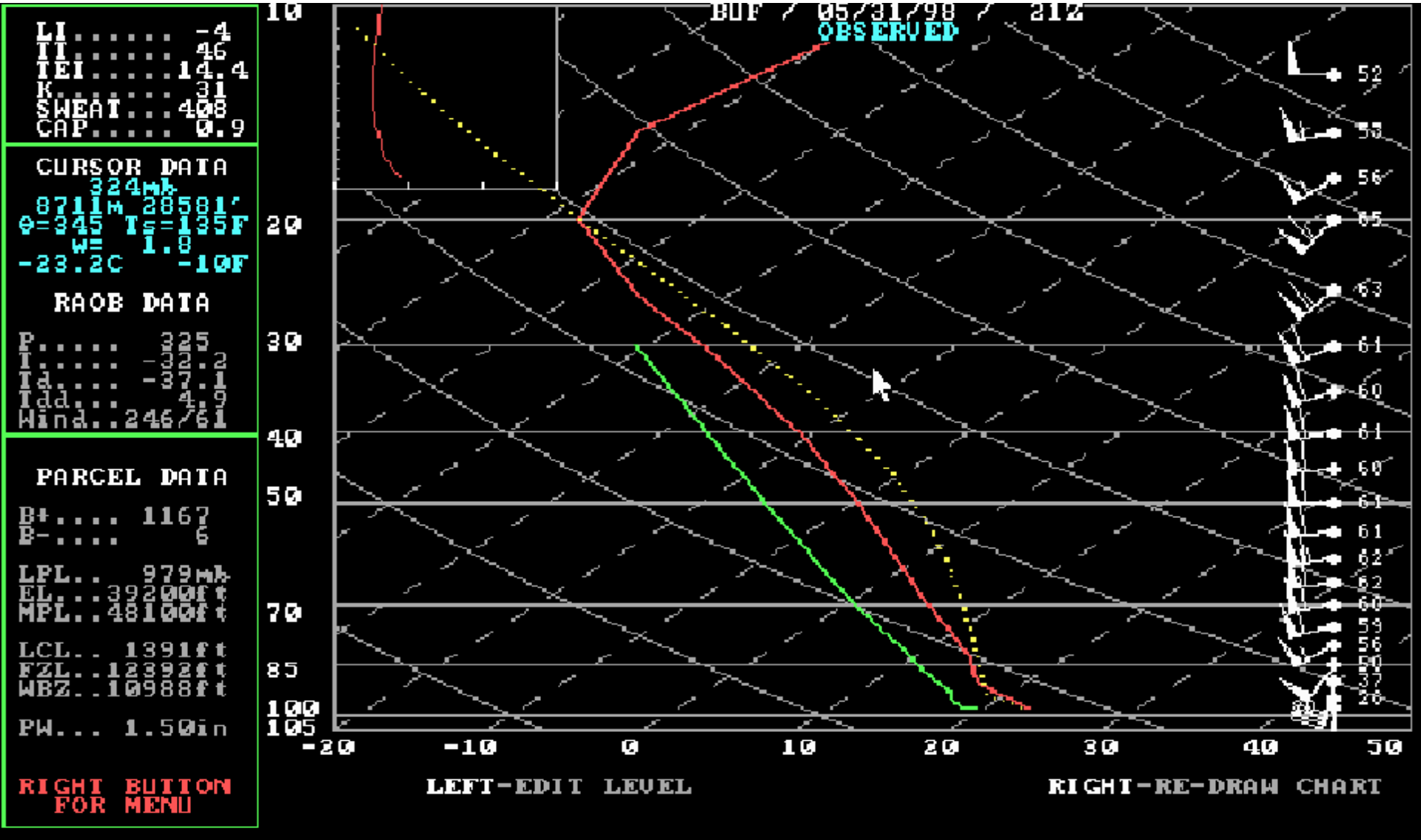
DTX 700-500
LR = 5.5 C/km

PIT 700-500
LR = 8.3 C/km

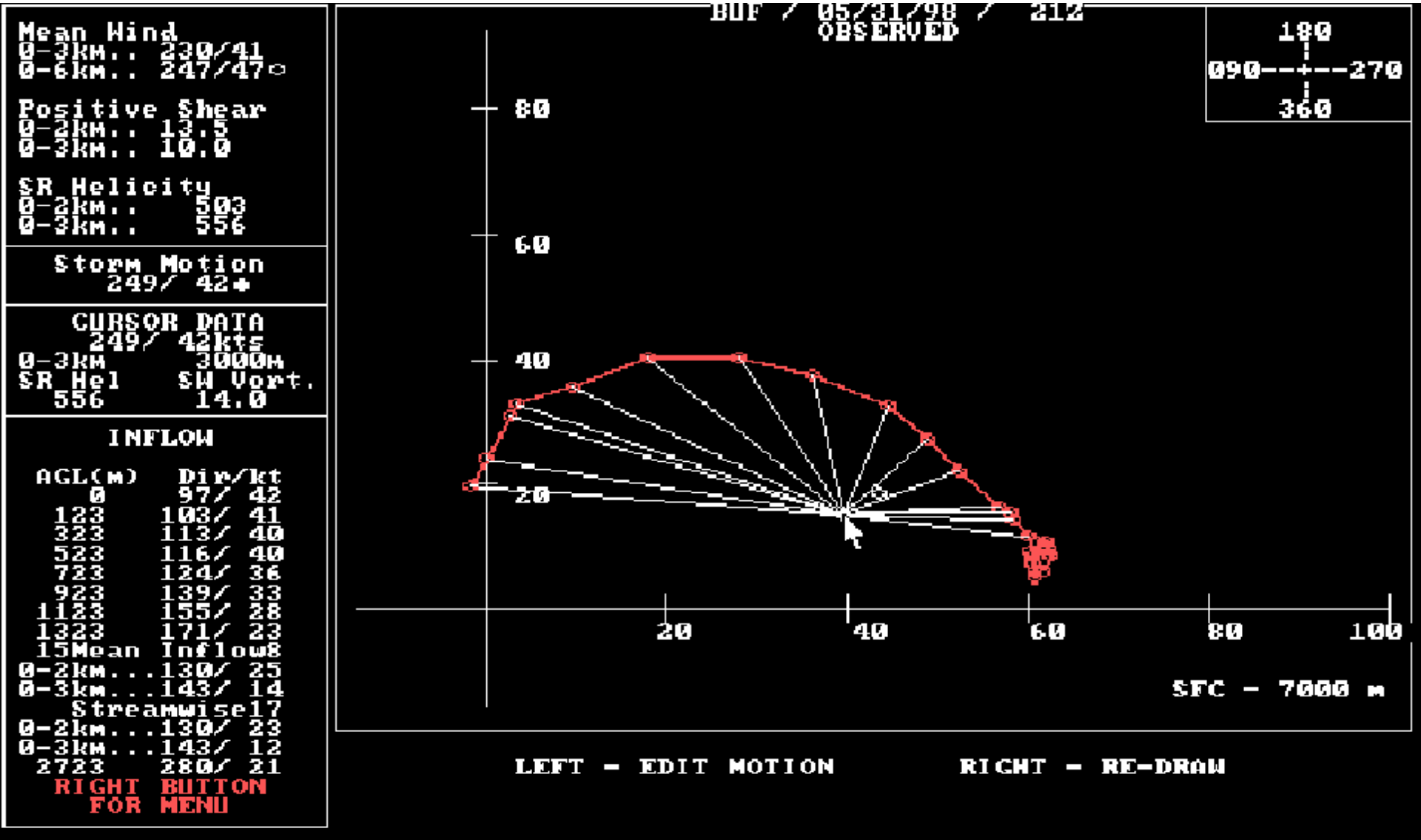


ALB 700-500
LR = 6.1 C/km

BUF ETA MODEL SOUNDING 1200 UTC 31 May 1998
Modified for ALB 2100 UTC



BUF 1200 UTC 31 May 1998 ETA MODEL HODOGRAPH
Modified for ALB 2100 31 May 1998



Possible Physical Processes involved with Tornadogenesis

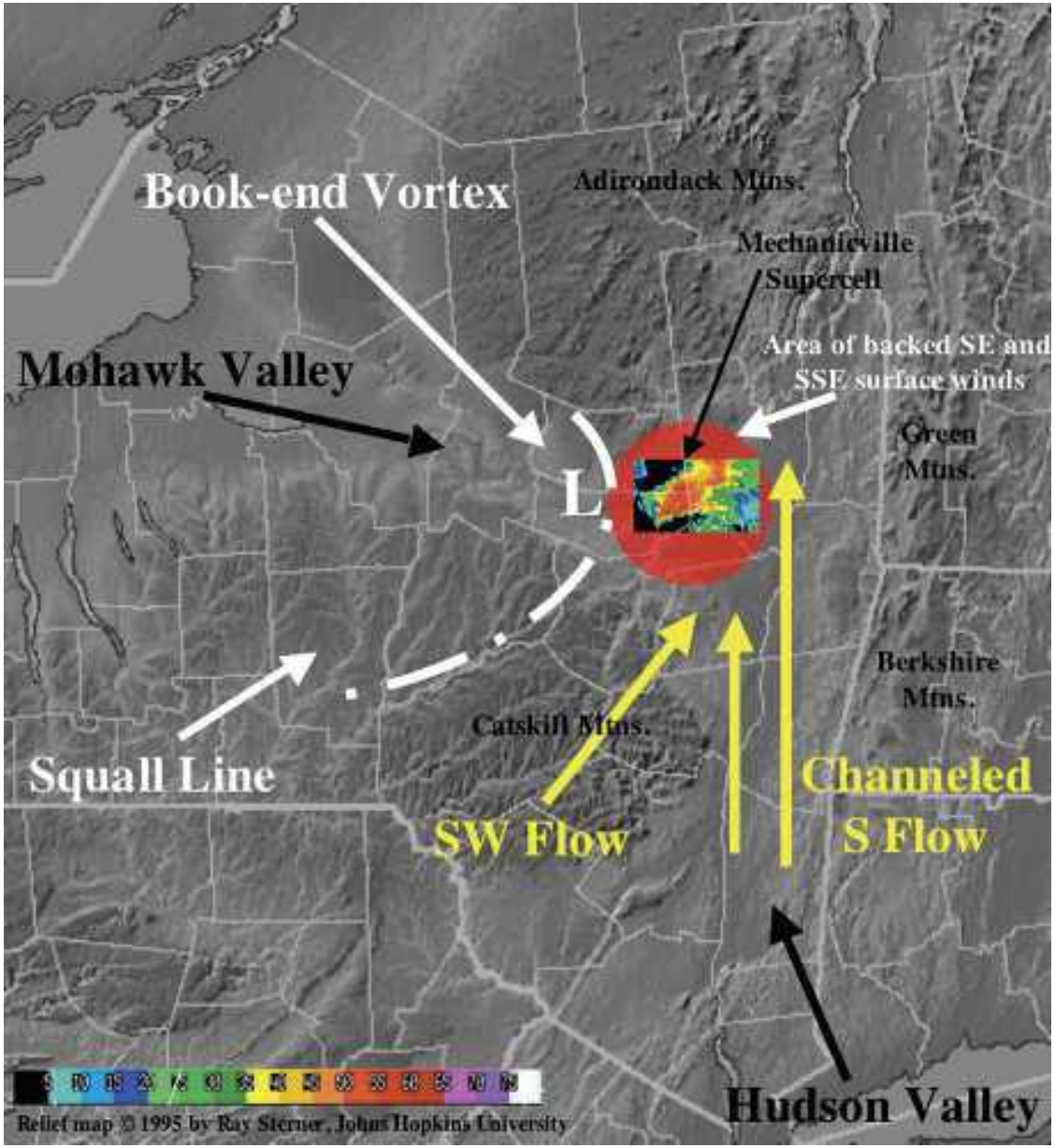
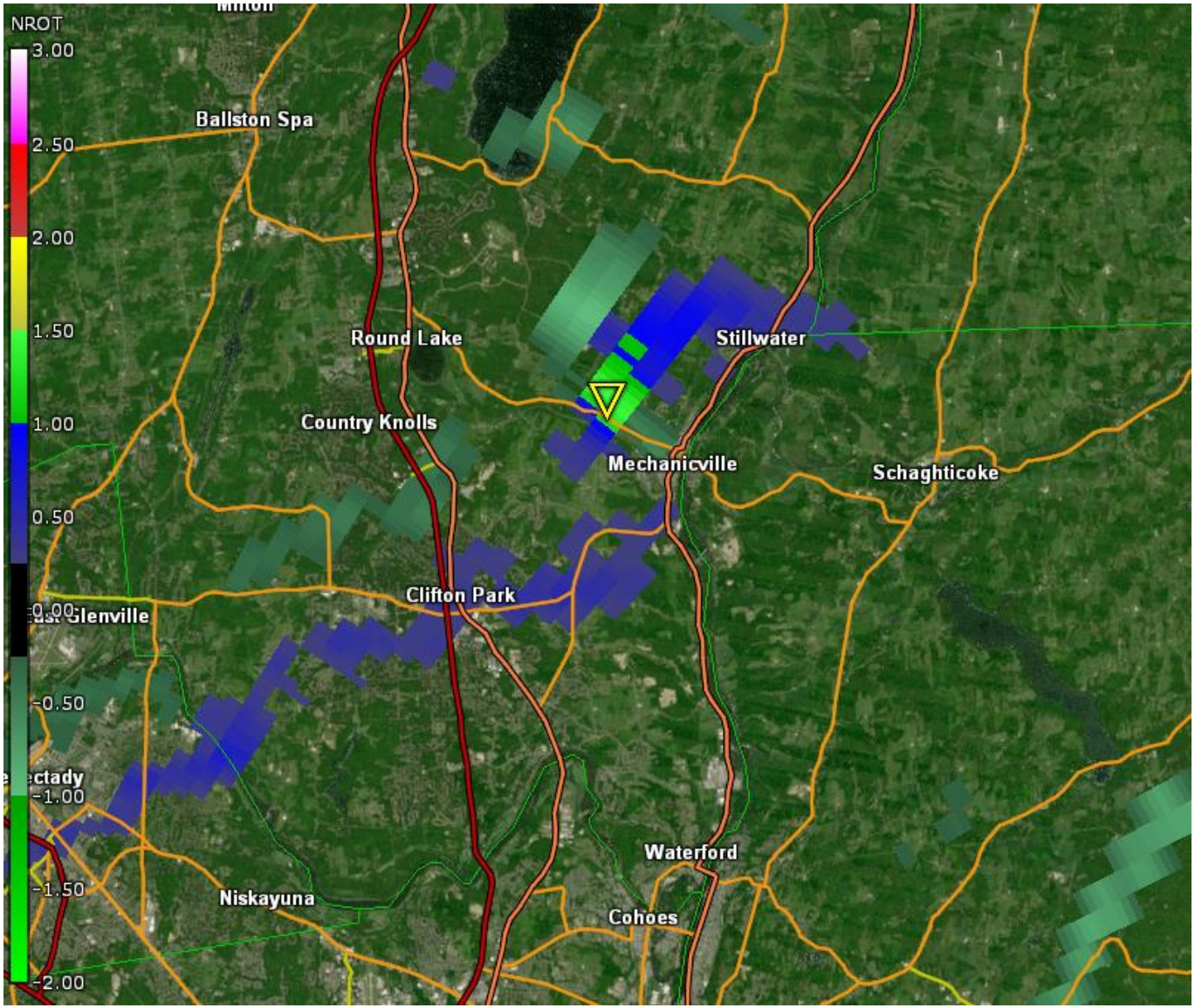
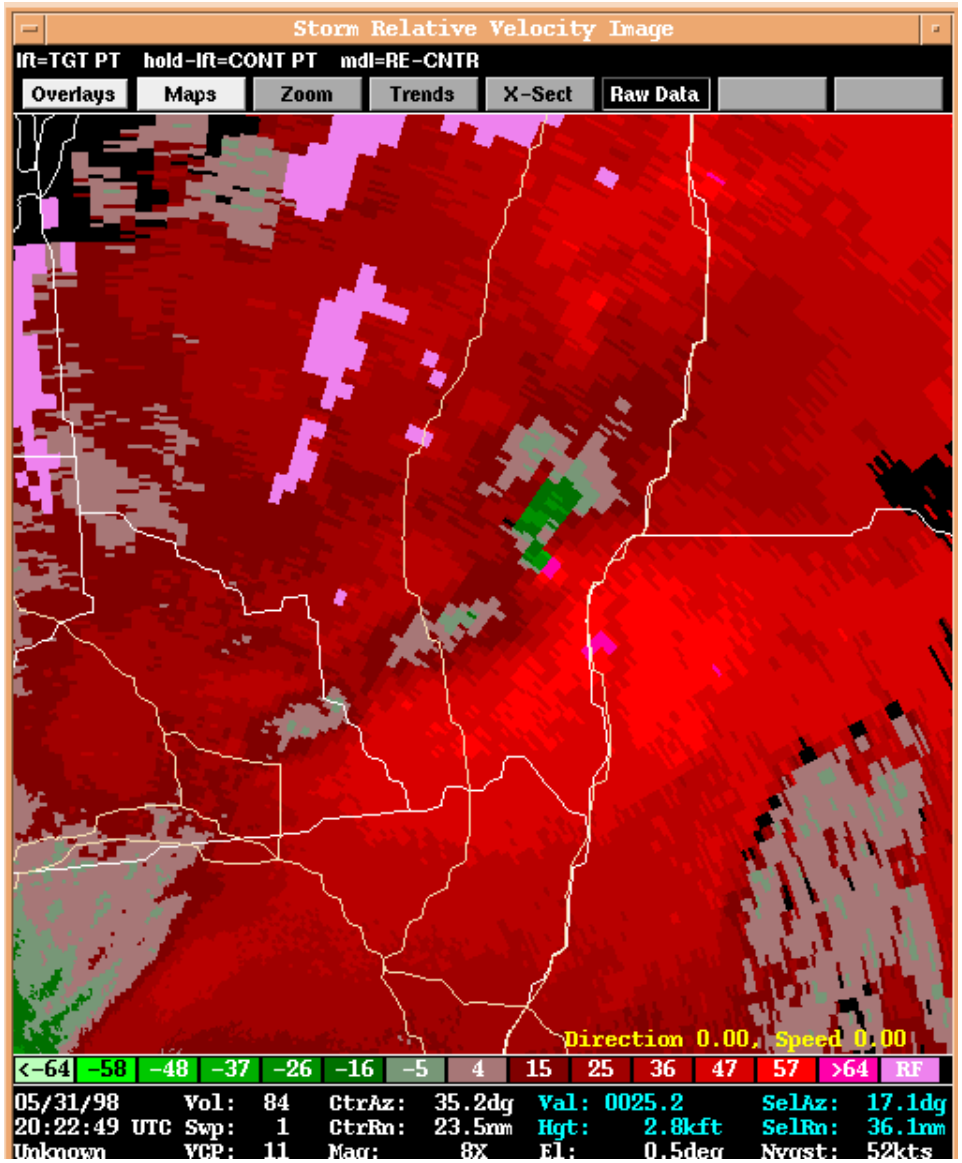


Figure 24 from Weather and Forecasting "A Multiscale Examination of the 31 May 1998 Mechanicville, NY, Tornado" by LaPenta, Bosart, Galarneau Jr., and Dickinson

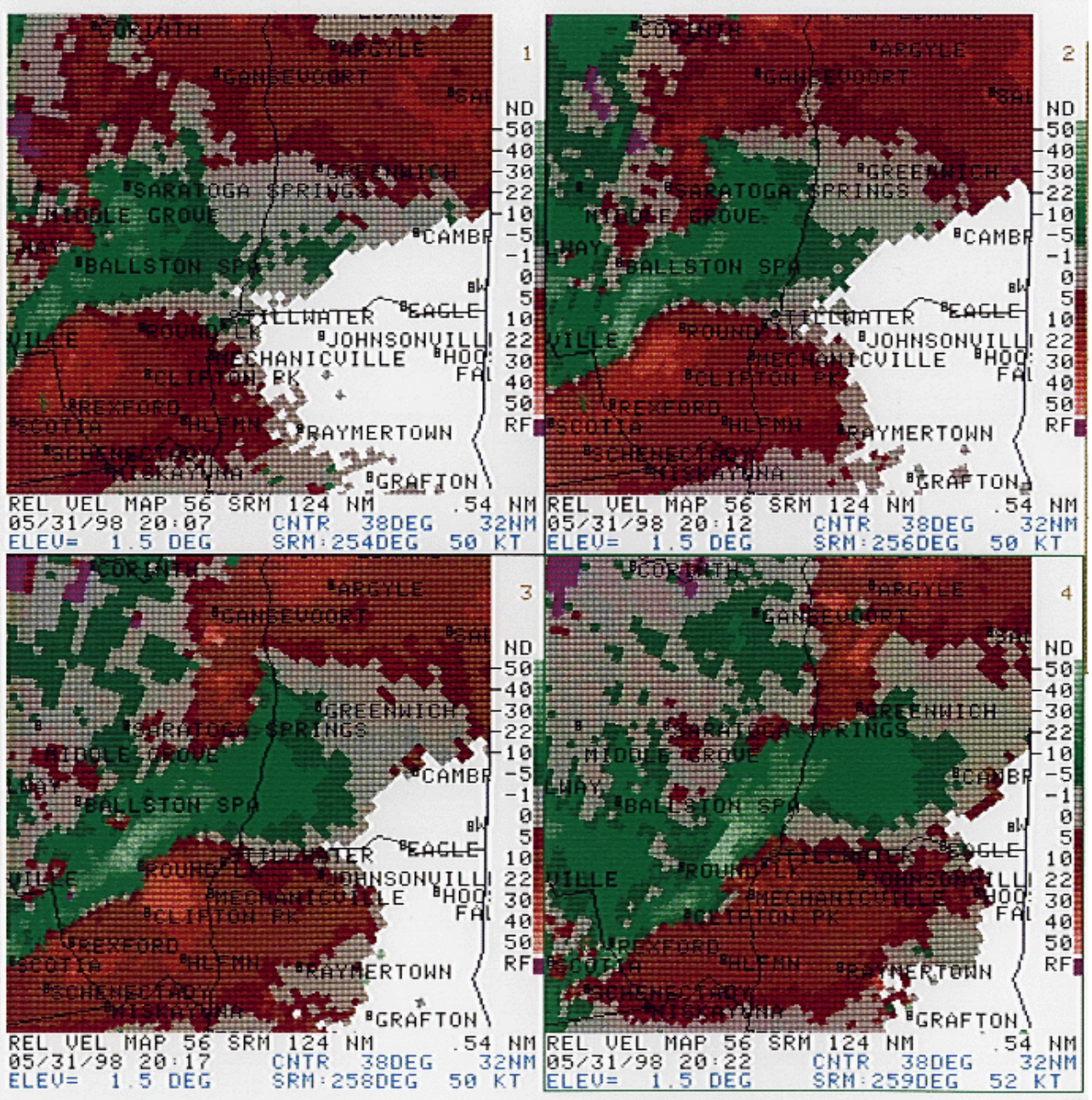
KENX – Normalized Rotation (NROT)
GR2 Analyst – 2023 UTC 31 May 1998



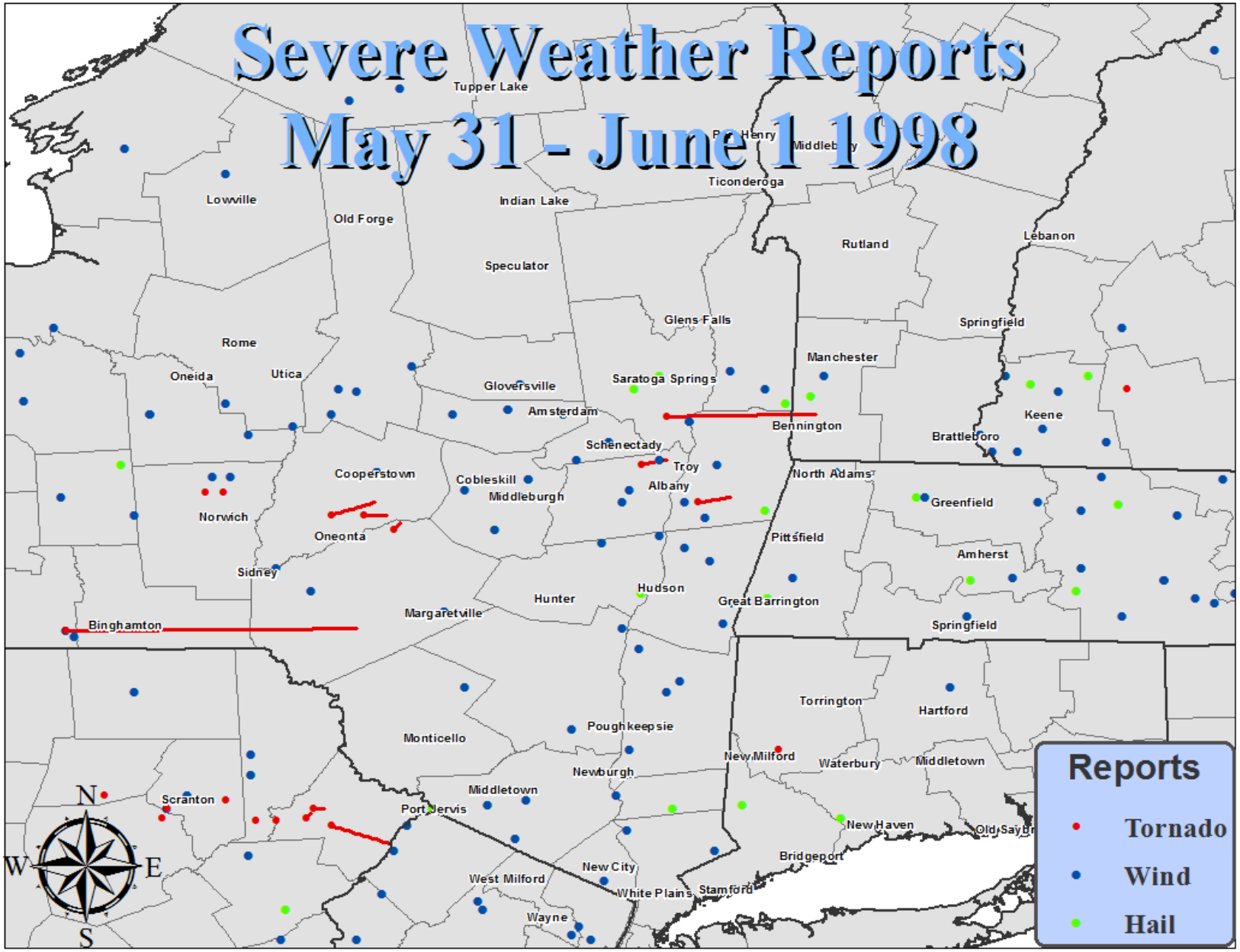
KENX WSR-88D STORM RELATIVE MOTION AT 2022 UTC 31 May 1998. TVS JUST WEST OF MECHANICVILLE WITH SHEAR .063/S.



KENX SRM 2007-2022 UTC 31 May 1998



DAMAGE MAP FOR NWSFO ALBANY, NY CWA ON 31 May 1998.



Pics Courtesy John S. Quinlan, NWS Albany

Picture Courtesy of NY SEMO

Summary

- Widespread Severe Thunderstorm/Tornado Outbreak included Six F3 Tornadoes from PA to New England, and was part of a 2-day event which included the F4 Spencer Tornado the prior day, and a derecho from upper Midwest to eastern Great Lakes.

- Strong upper level jet, including dual-jet structure, northern edge of Elevated Mixed Layer (EML) and strong low/mid level wind fields likely contributed to the widespread intensity of event.

- Local topographical features, combined with sub-mesoscale convective features likely enhanced tornadogenesis for Mechanicville, NY tornado

References

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