Late April Tornadoes

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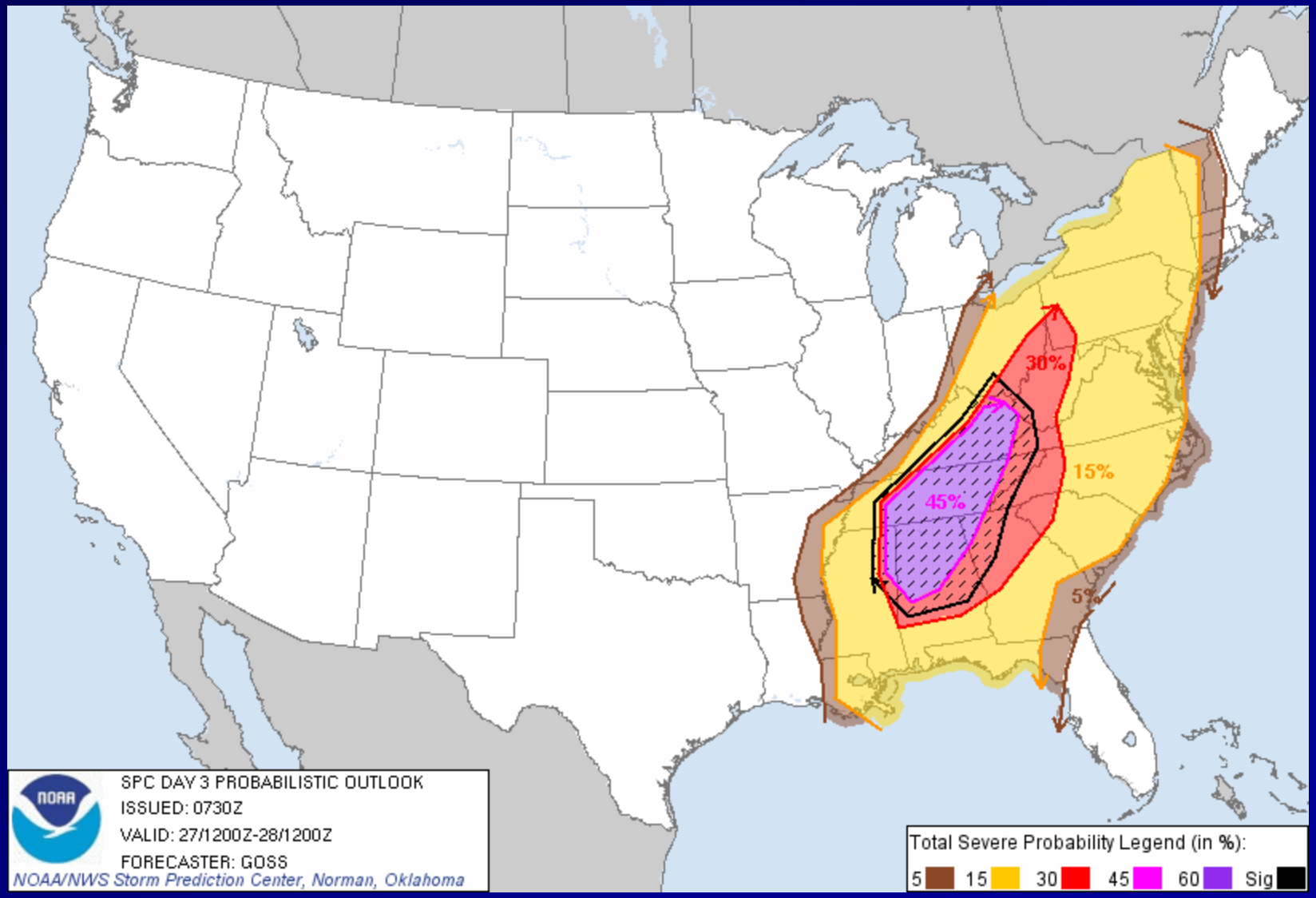
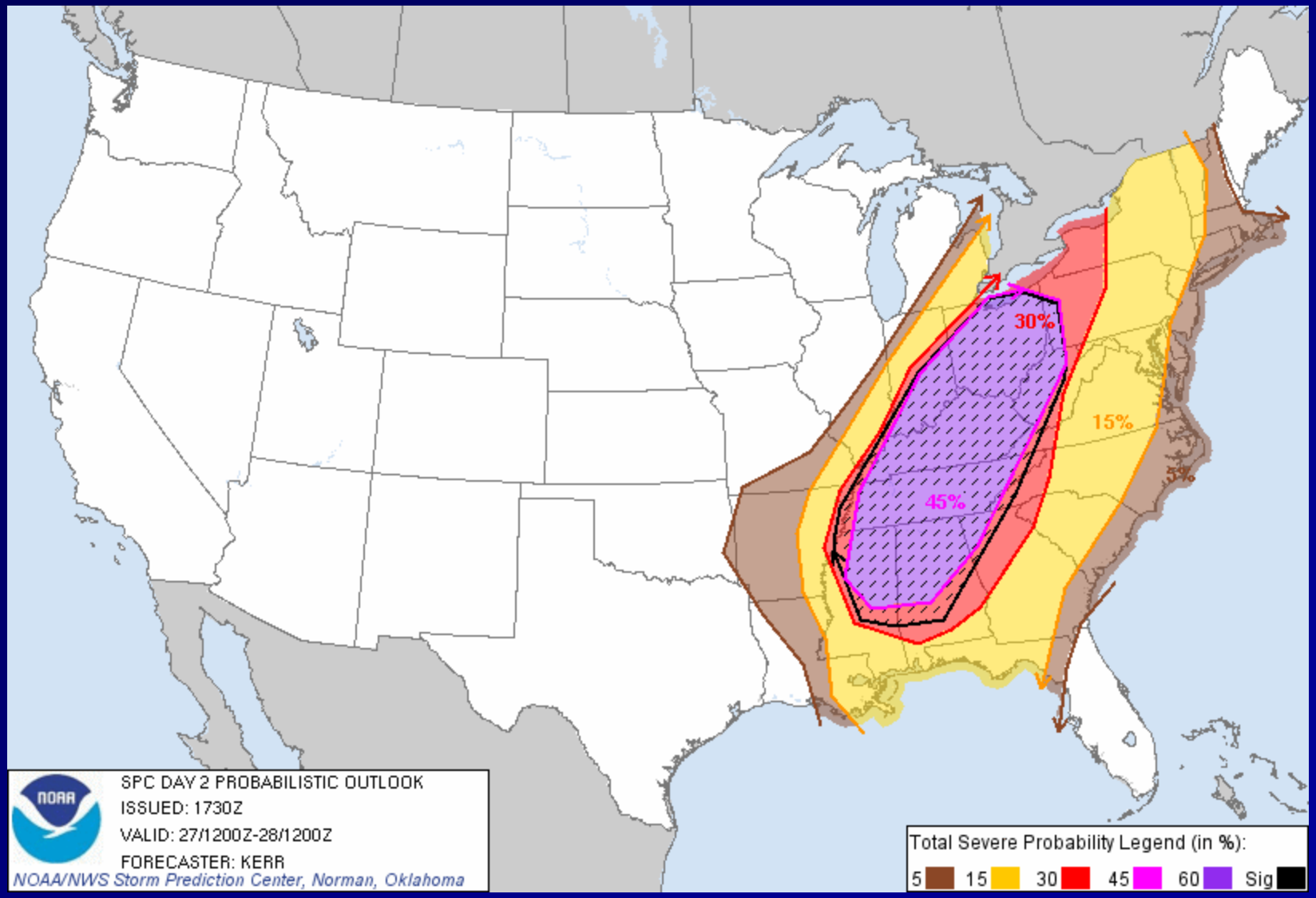
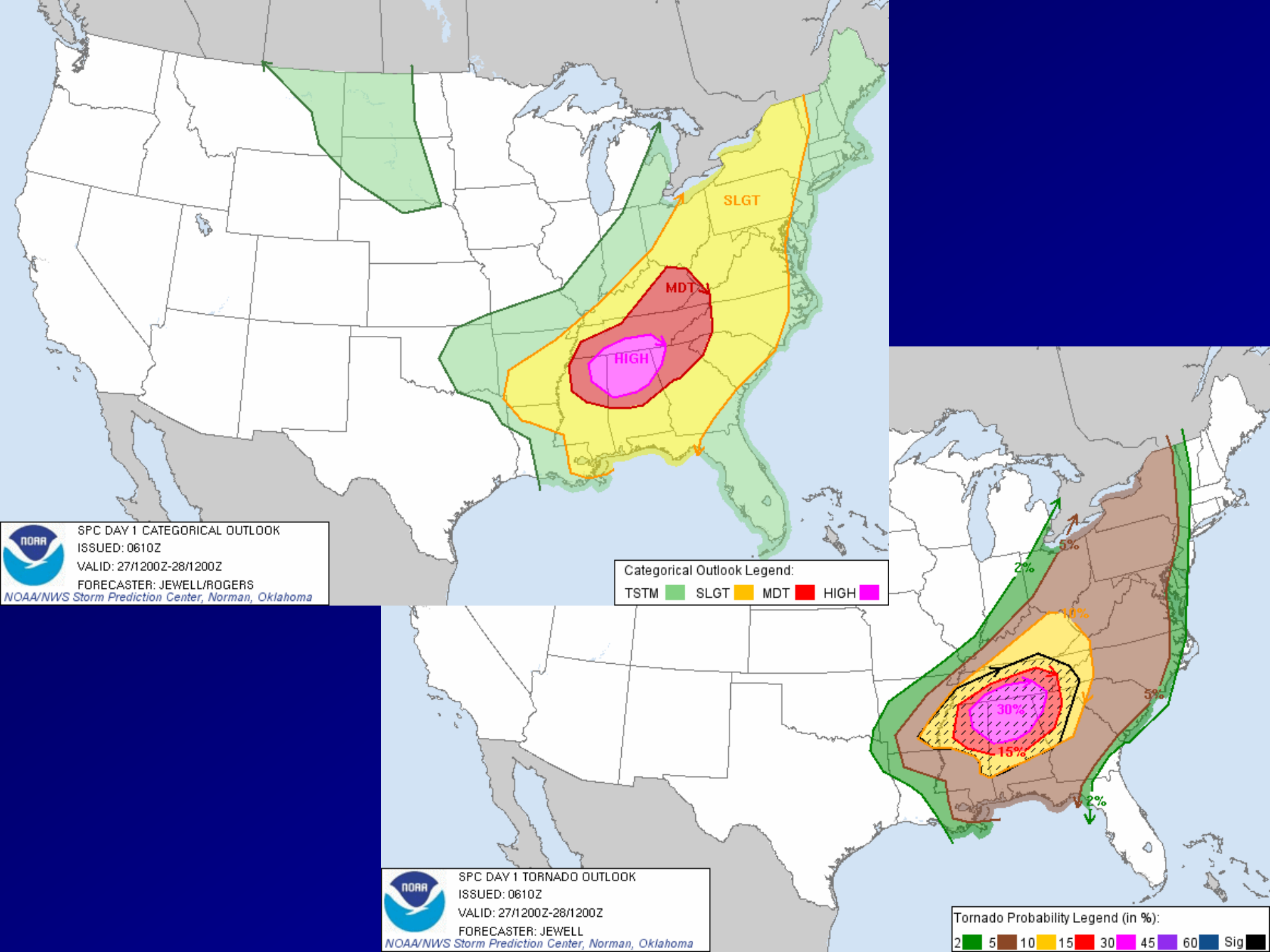
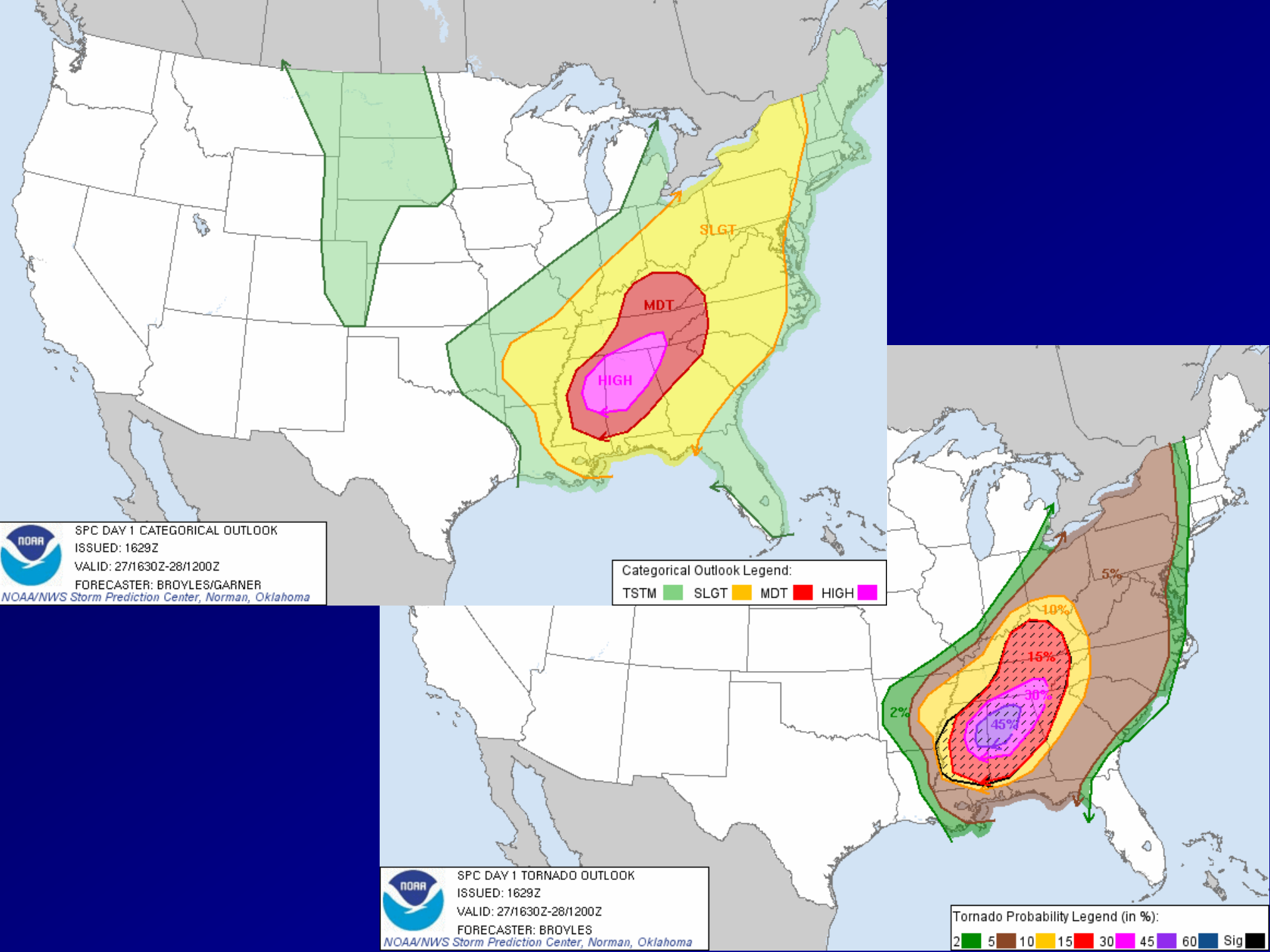
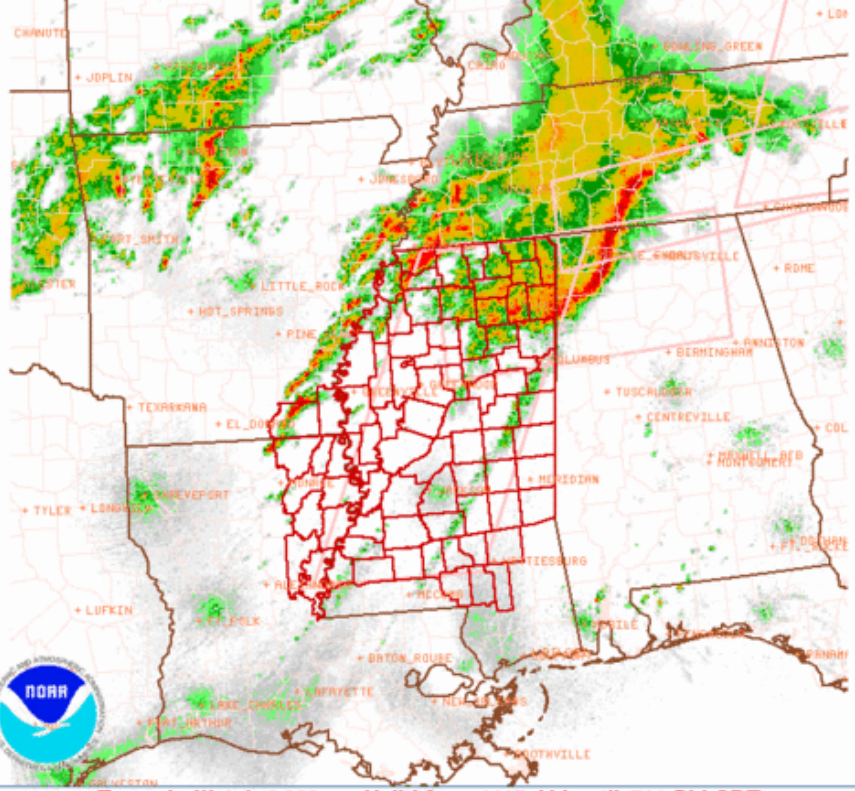
(Thanks to Jerry Brotzge, Greg Carbin, Victor Gensini, Kevin Manross, Kiel Ortega)


30%
15%
45%
5%
SPC DAY 3 PROBABILISTIC OUTLOOK
ISSUED: 0730Z
VALID: 27/1200Z-28/1200Z
FORECASTER: GOSS
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Total Severe Probability Legend (in %):
5 15 30 45 60 Sig


30%
15%
45%
SPC DAY 2 PROBABILISTIC OUTLOOK
ISSUED: 1730Z
VALID: 27/1200Z-28/1200Z
FORECASTER: KERR
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Total Severe Probability Legend (in %):
5 15 30 45 60 Sig

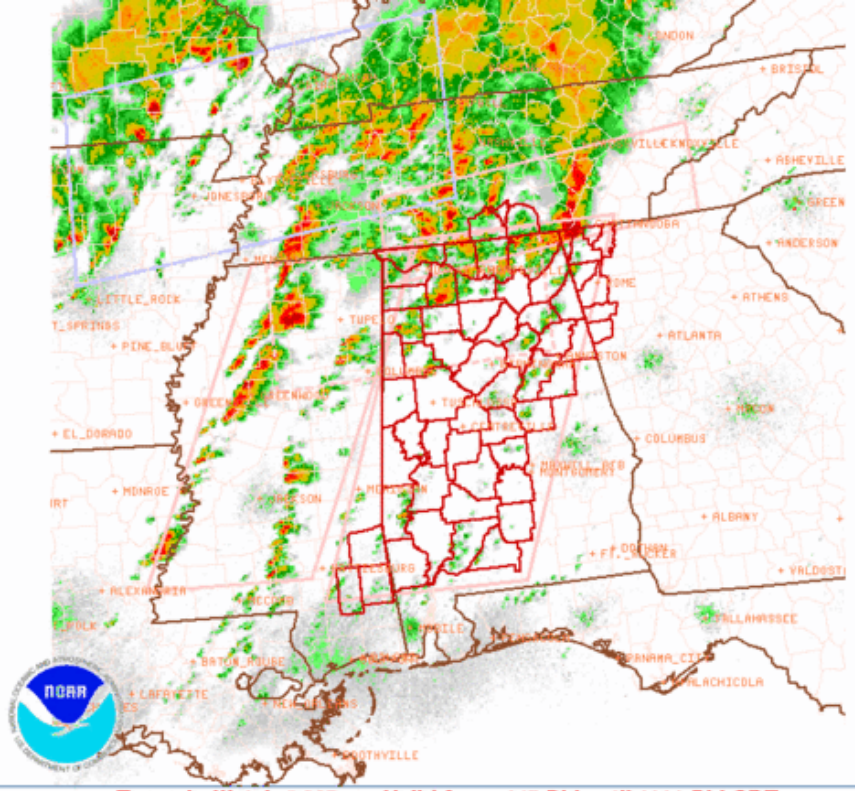

SLGT
MDT
HIGH
SPC DAY 1 CATEGORICAL OUTLOOK
ISSUED: 0610Z
VALID: 27/1200Z-28/1200Z
FORECASTER: JEWELL/ROGERS
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Categorical Outlook Legend:
TSTM SLGT MDT HIGH
2%
5%
10%
15%
30%
SPC DAY 1 TORNADO OUTLOOK
ISSUED: 0610Z
VALID: 27/1200Z-28/1200Z
FORECASTER: JEWELL
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Tornado Probability Legend (in %):
2 5 10 15 30 45 60 Sig


SLGT
MDT
HIGH
SPC DAY 1 CATEGORICAL OUTLOOK
ISSUED: 1629Z
VALID: 27/1630Z-28/1200Z
FORECASTER: BROYLES/GARNER
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Categorical Outlook Legend:
TSTM SLGT MDT HIGH
5%
10%
15%
30%
45%
2%
SPC DAY 1 TORNADO OUTLOOK
ISSUED: 1629Z
VALID: 27/1630Z-28/1200Z
FORECASTER: BROYLES
NOAA/NWS Storm Prediction Center, Norman, Oklahoma
Tornado Probability Legend (in %):
2 5 10 15 30 45 60 Sig



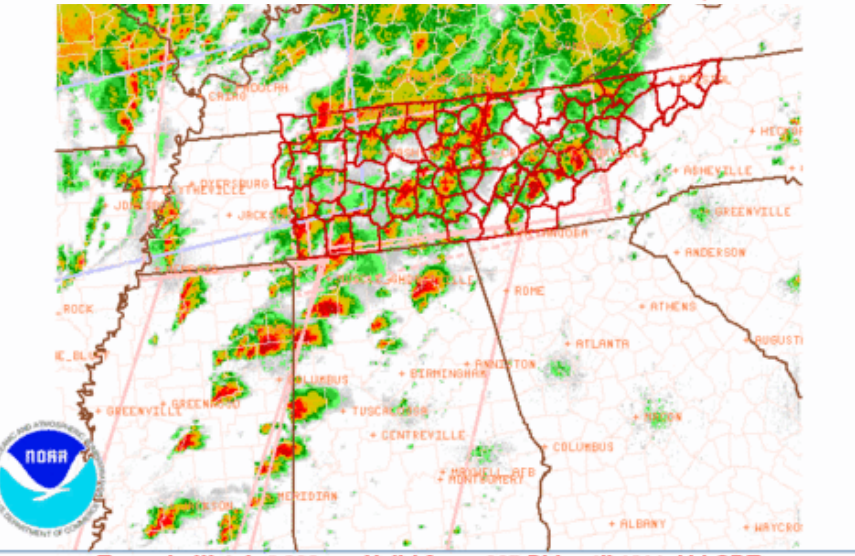
Tornado Watch # 232 - Valid from 1105 AM until 700 PM CDT

NOAA/NWS/Storm Prediction Center — Updated: 20110427/1606 UTC



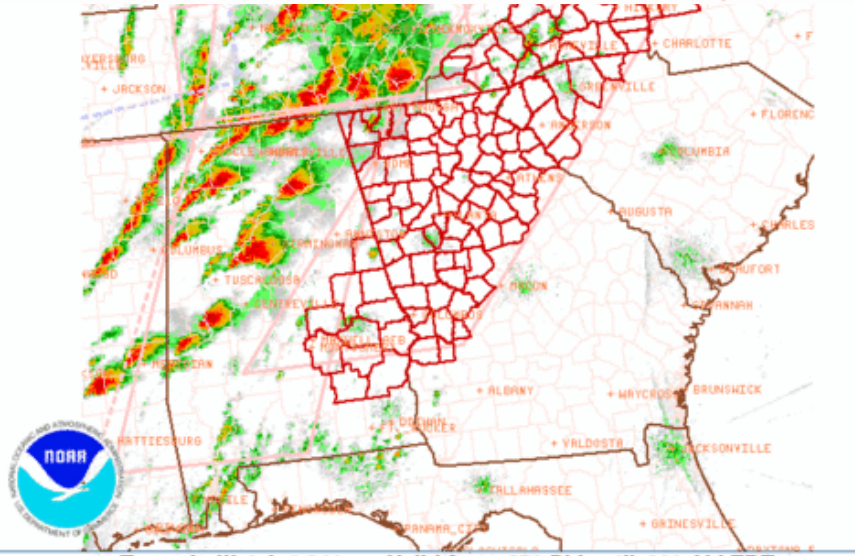
Tornado Watch # 235 - Valid from 145 PM until 1000 PM CDT

NOAA/NWS/Storm Prediction Center — Updated: 20110427/1846 UTC



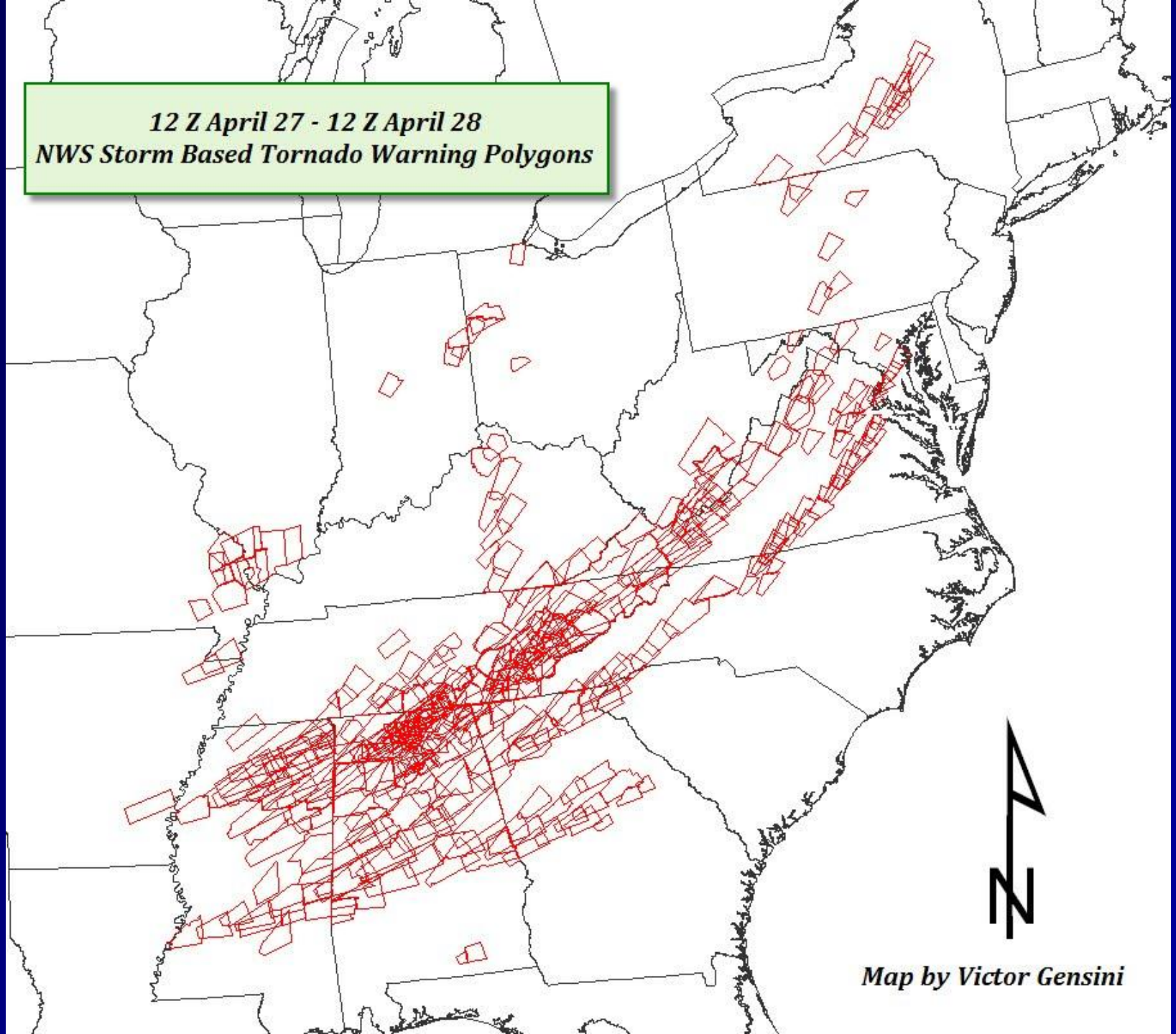
Tornado Watch # 238 - Valid from 335 PM until 1200 AM CDT

NOAA/NWS/Storm Prediction Center — Updated: 20110427/2037 UTC



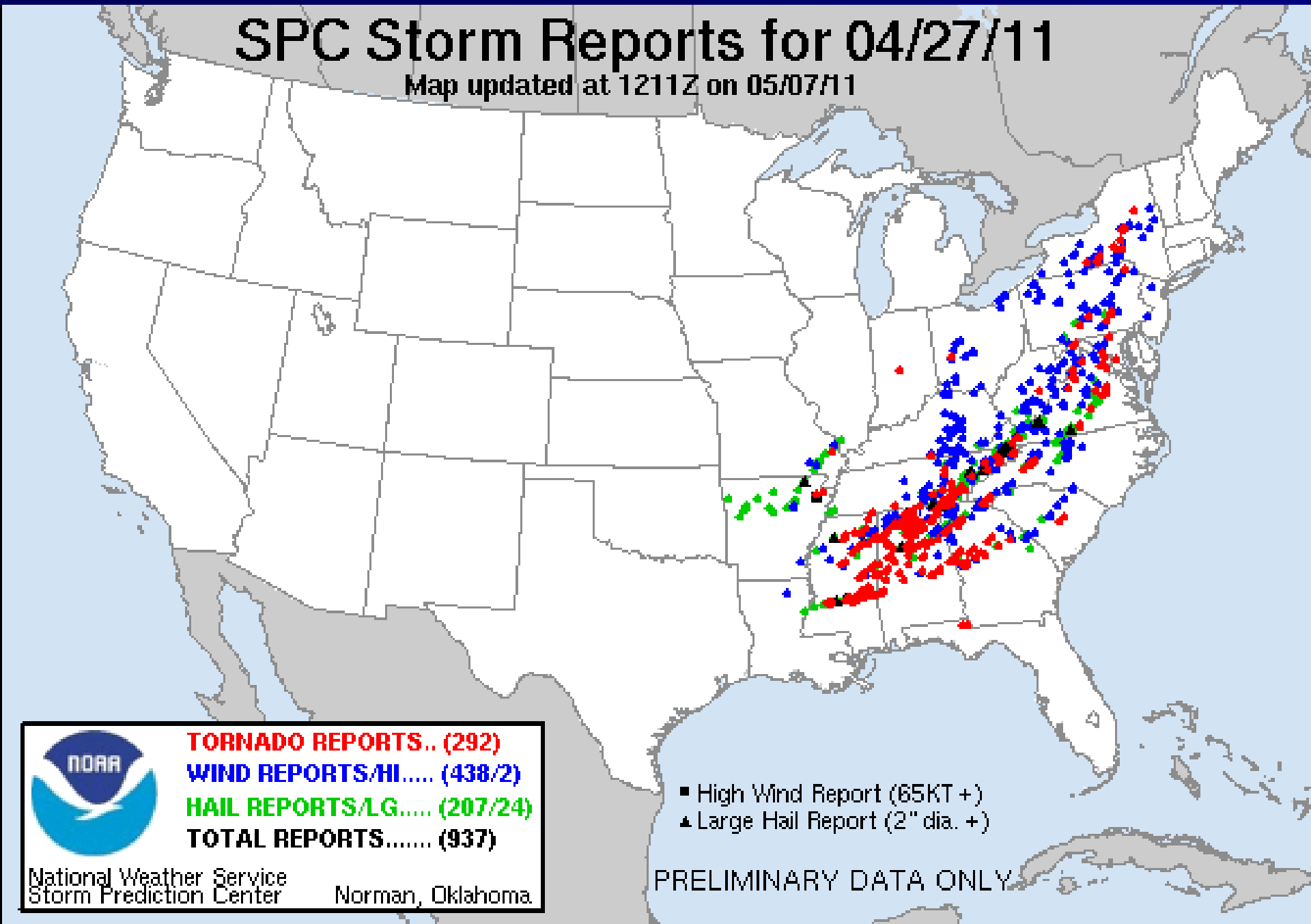
Tornado Watch # 241 - Valid from 650 PM until 200 AM EDT

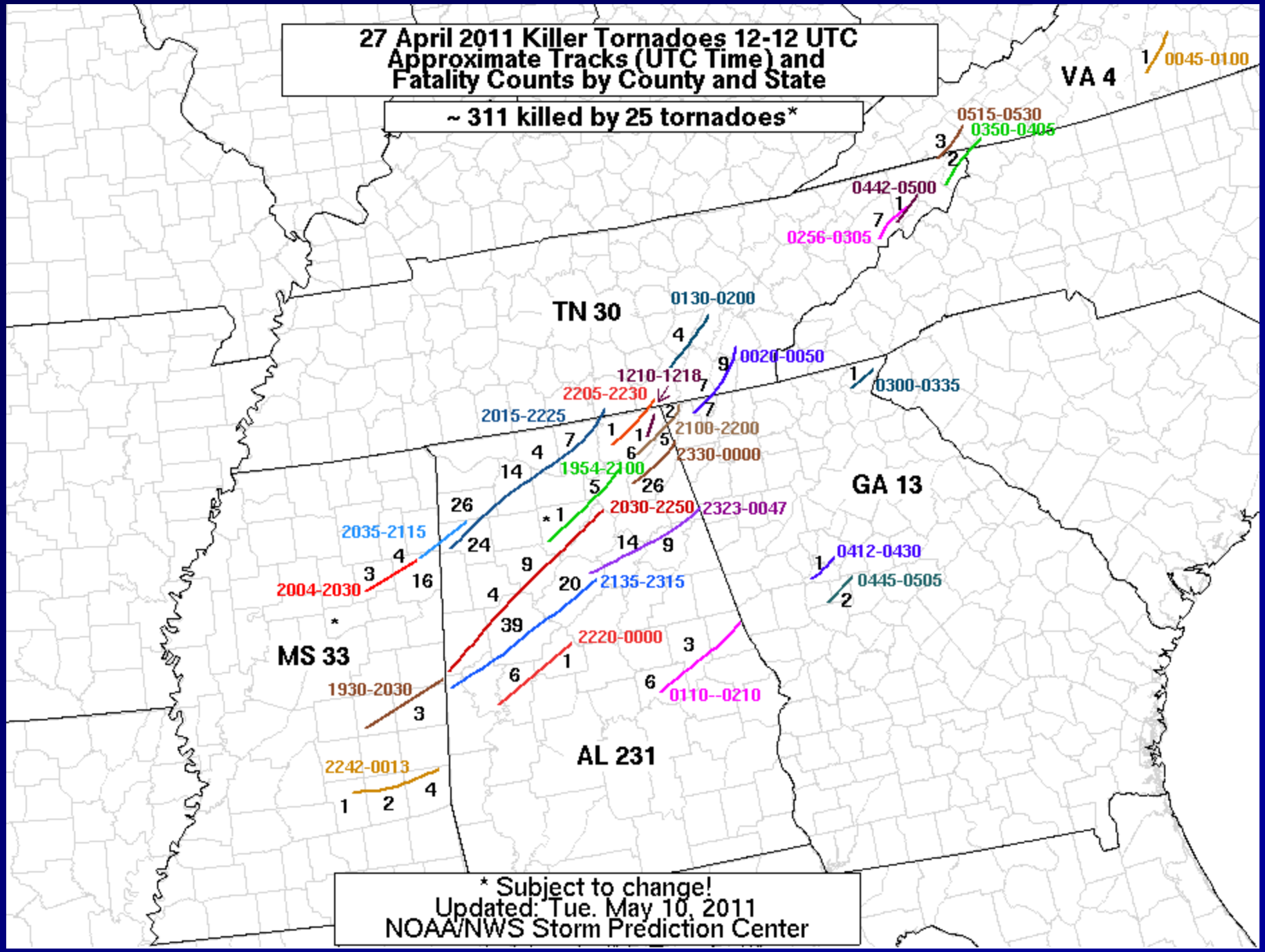
NOAA/NWS/Storm Prediction Center — Updated: 20110427/2251 UTC


12 Z April 27 - 12 Z April 28
NWS Storm Based Tornado Warning Polygons
N
Map by Victor Gensini

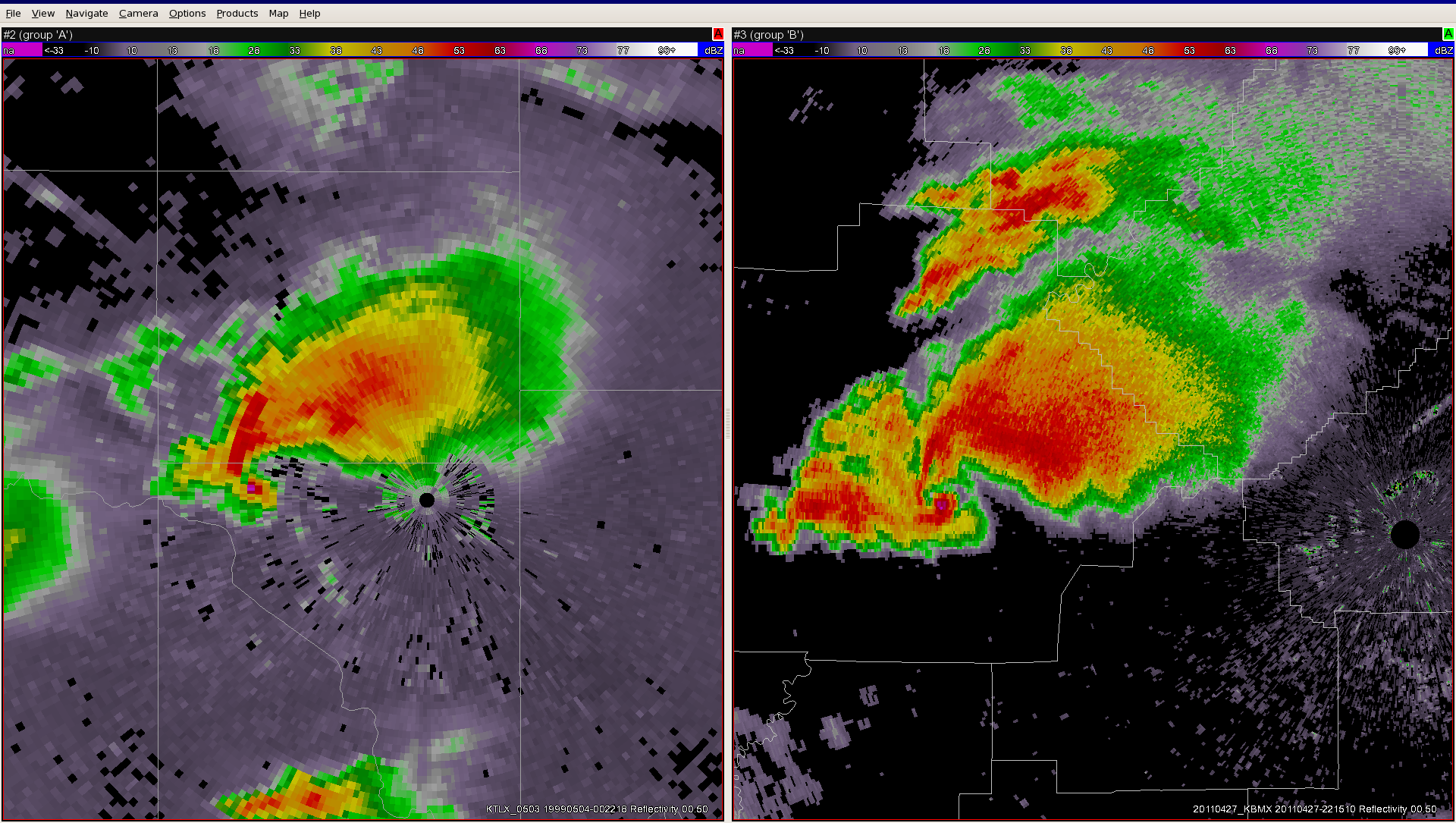
SPC Storm Reports for 04/27/11

Map updated at 1211Z on 05/07/11

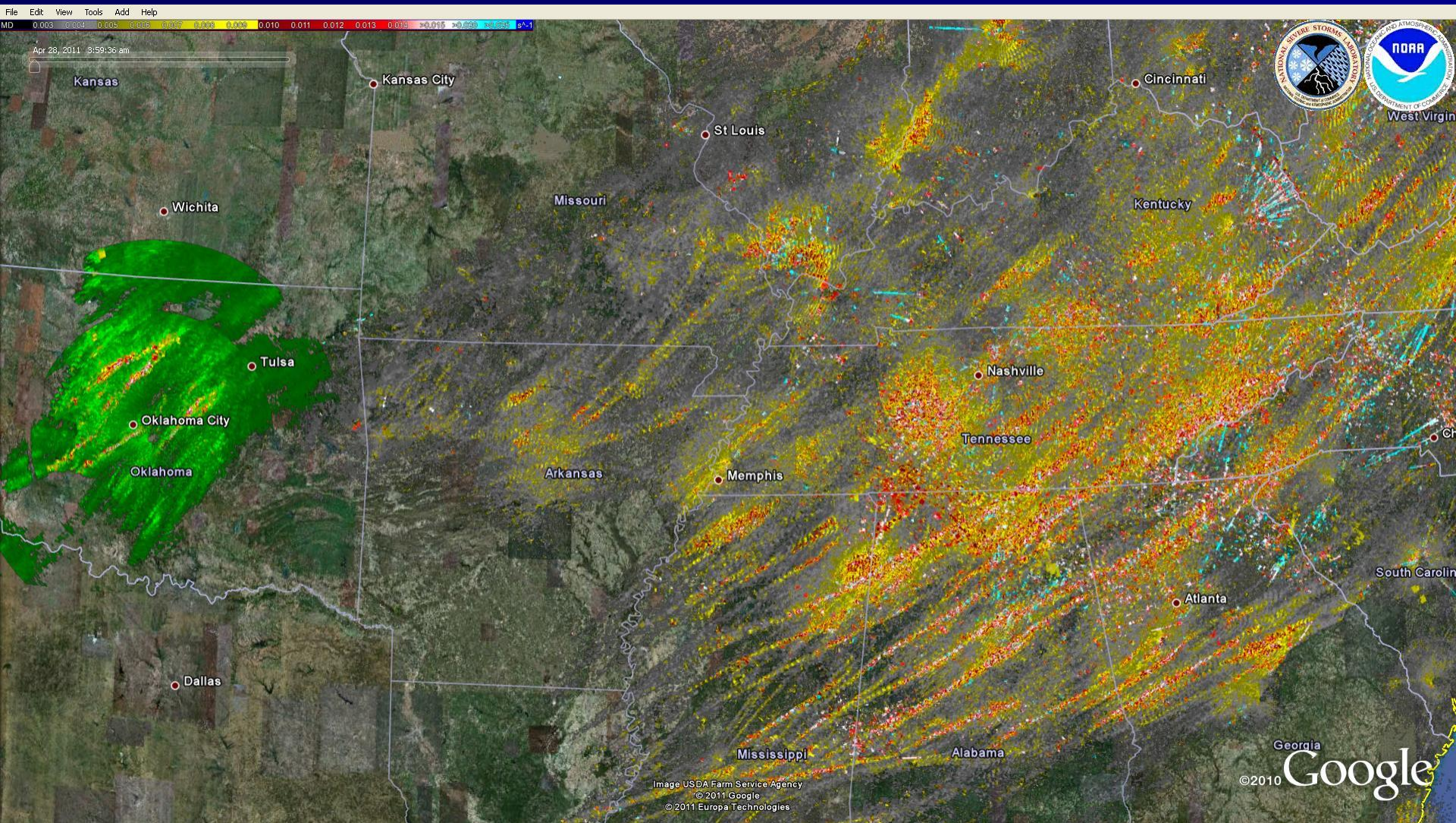



27 April 2011 Killer Tornadoes 12-12 UTC
Approximate Tracks (UTC Time) and
Fatality Counts by County and State
~ 311 killed by 25 tornadoes*
VA 4
TN 30
GA 13
MS 33
AL 231
0045-0100
1
0515-0530
0350-0405
3
2
0442-0500
1
7
0256-0305
0130-0200
4
0020-0050
9
1210-1218
7
2205-2230
2
1
2015-2225
1
7
4
14
1
1
6
5
2100-2200
2330-0000
1954-2100
5
26
0300-0335
1
26
24
* 1
2030-2250
2323-0047
14
9
2035-2115
4
3
16
2004-2030
*
9
4
20
2135-2315
39
0412-0430
1
0445-0505
2
2220-0000
3
6
1
6
0110--0210
1930-2030
3
2242-0013
1
2
4
* Subject to change!
Updated: Tue. May 10, 2011
NOAA/NWS Storm Prediction Center

Radar reflectivity (OKC vs. Tuscaloosa)

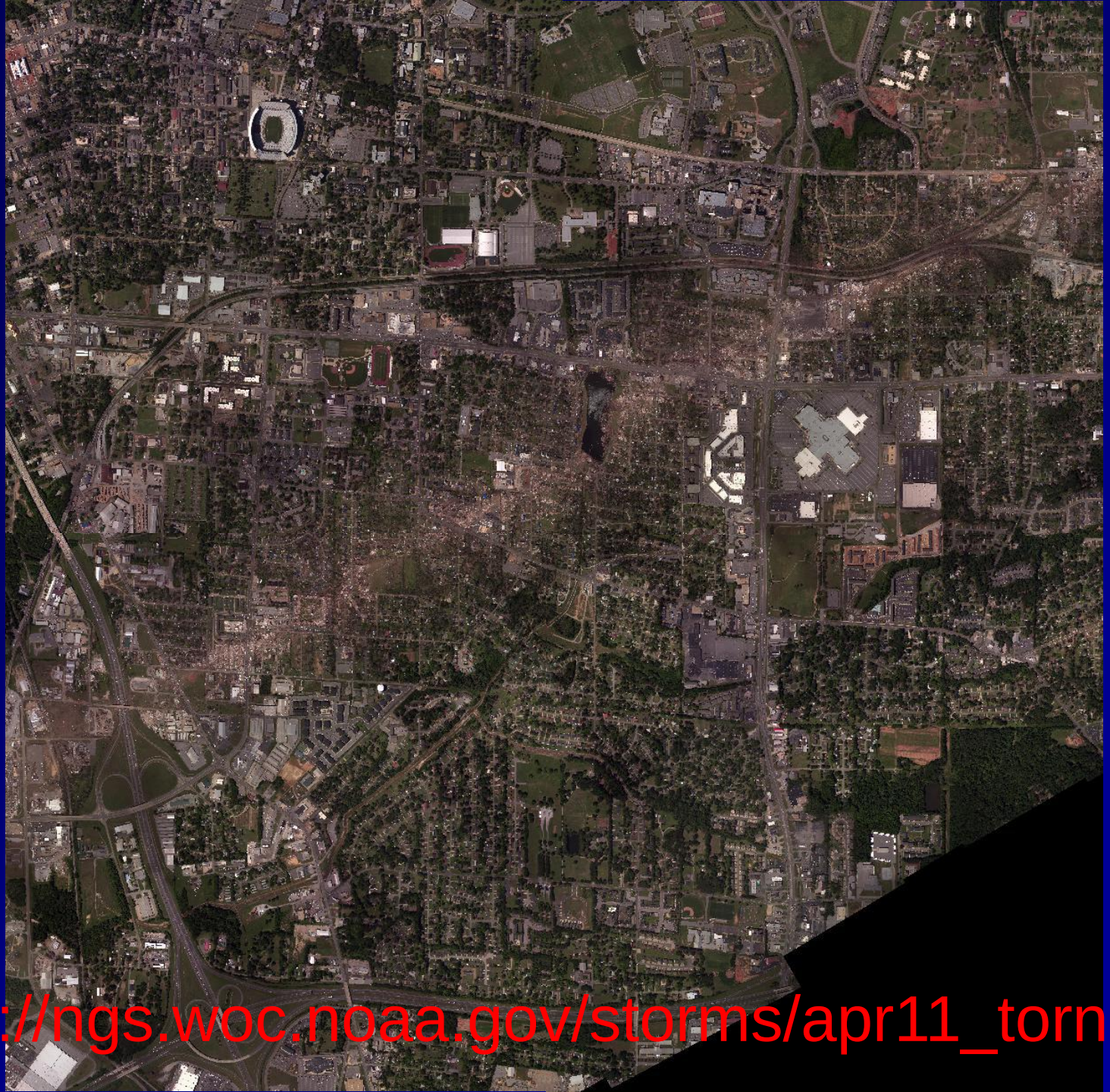


Rotation tracks (3 May 99 vs April 11)




SMITH


The Birmingham News

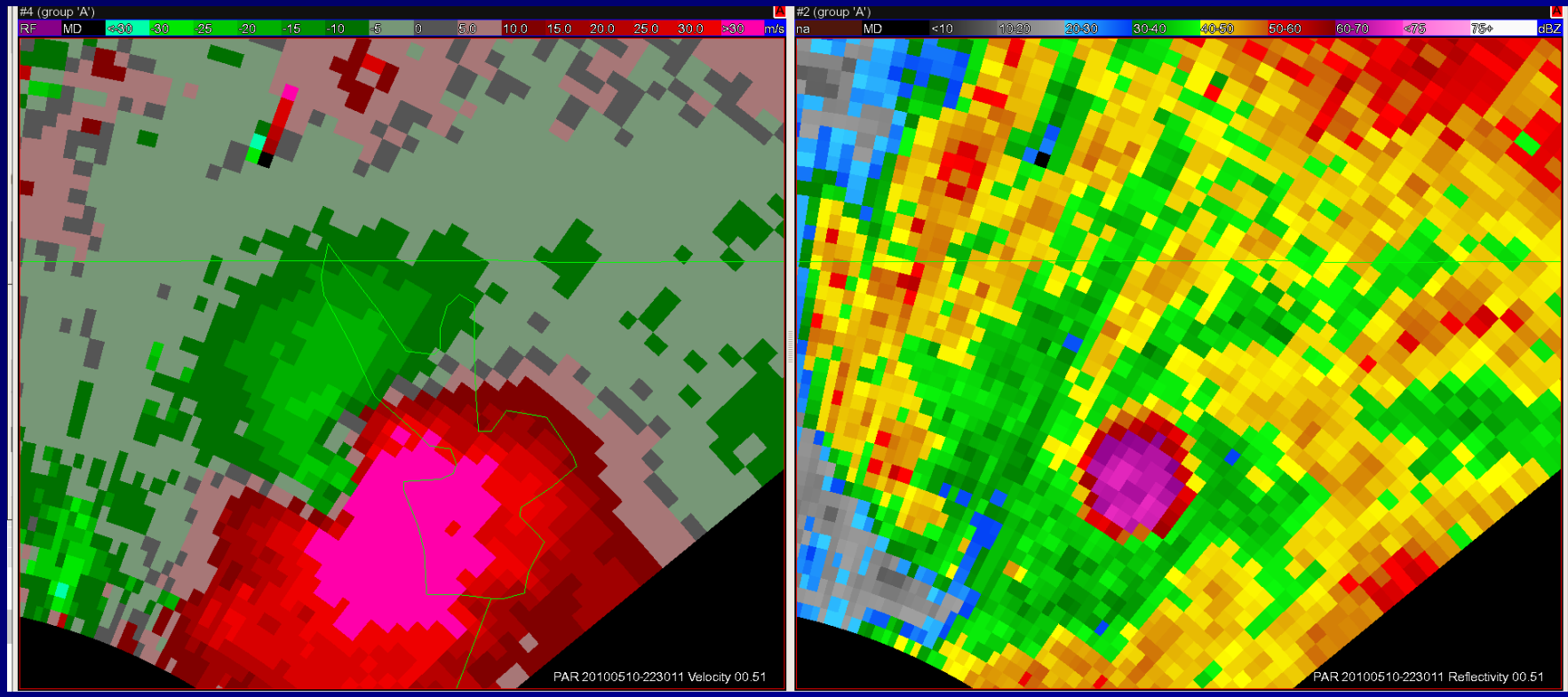


http://ngs.woc.noaa.gov/storms/apr11_tornado/

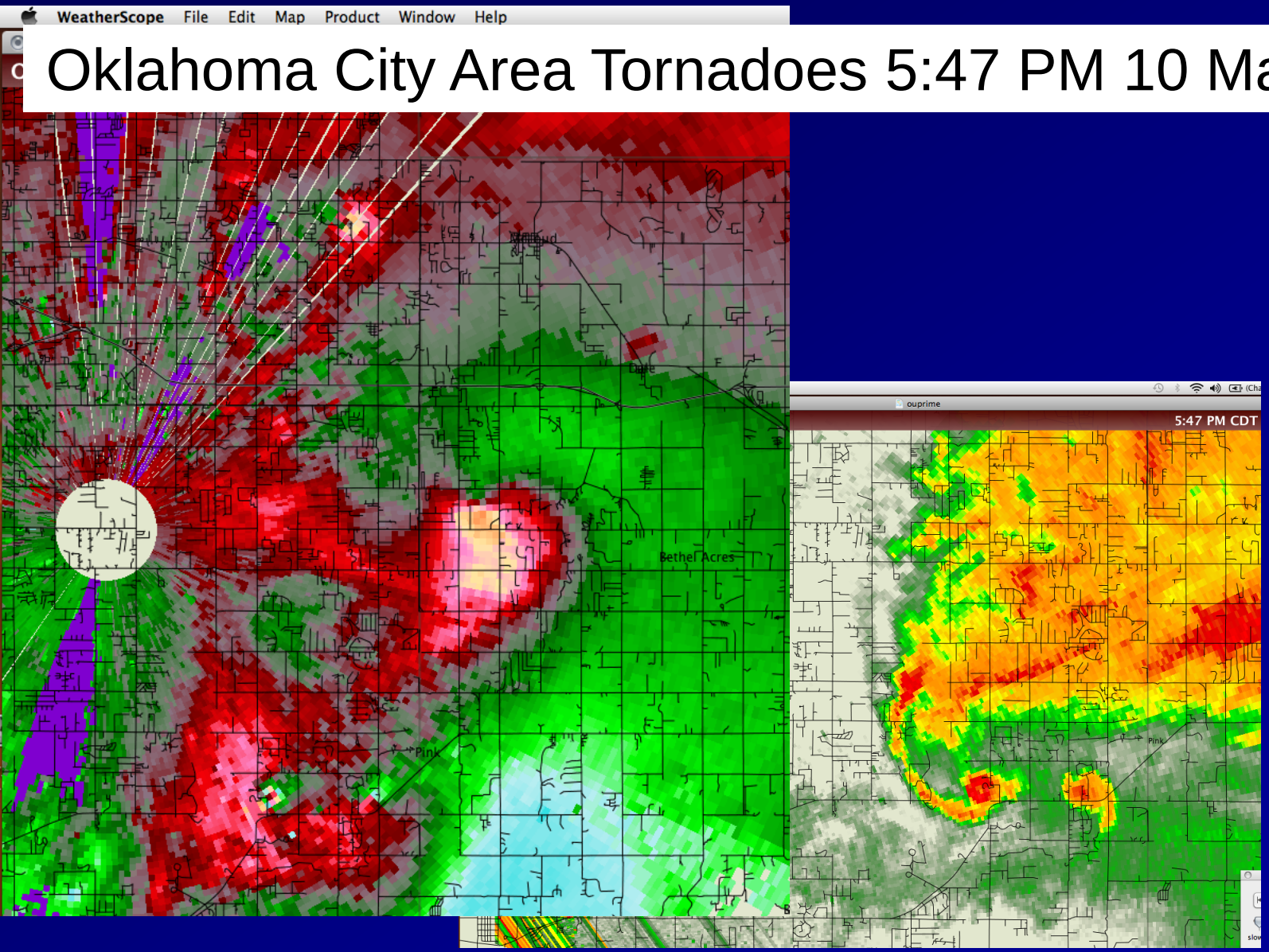
Future Radar Developments

- Polarimetric radar (deploying now)
  - Improves precip, sees tornado debris
- Phased-array
- Gap-filling radars

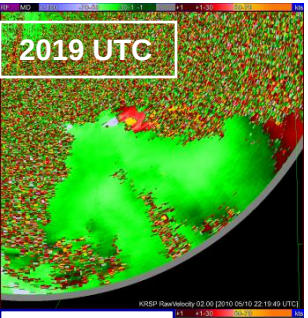
Phased Array Radar (10 May 2010) Lake Stanley Draper Tornado

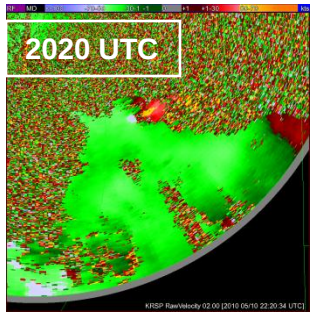


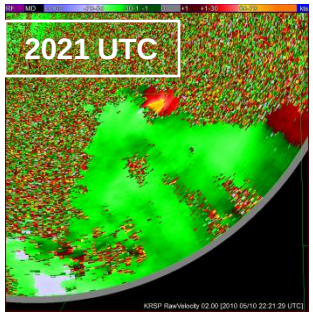
Oklahoma City Area Tornadoes 5:47 PM 10 May 2010

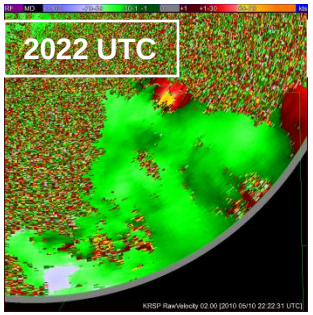


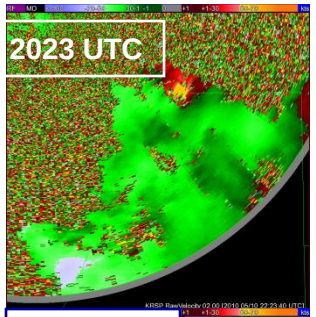
CASA and NEXRAD – May 10, 2010

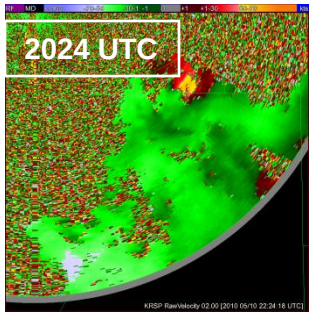


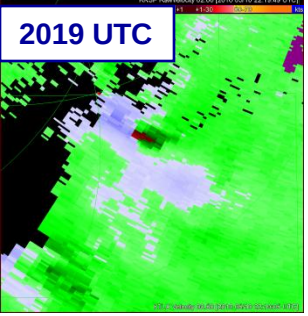


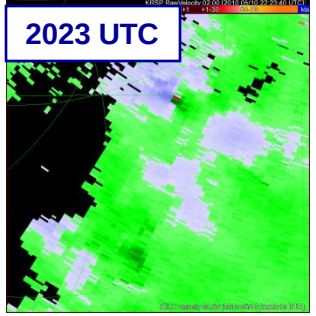


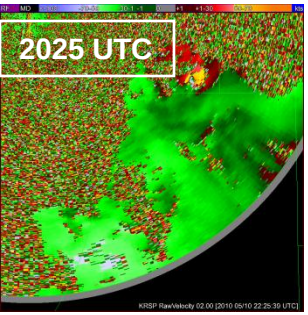


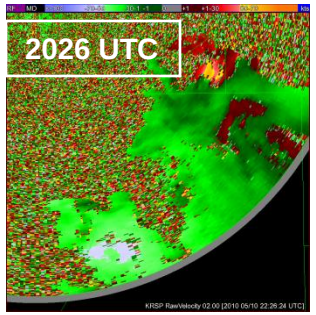


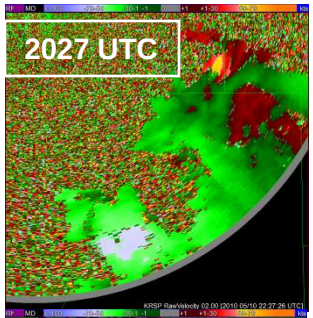


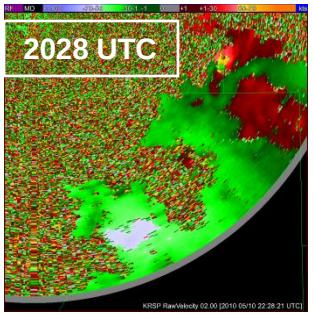


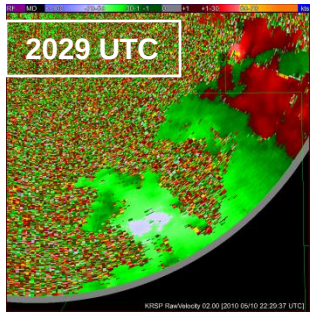


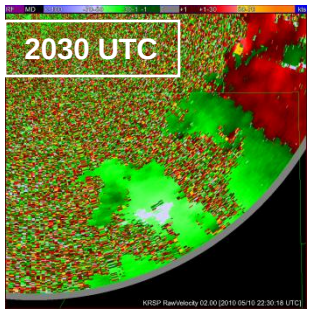


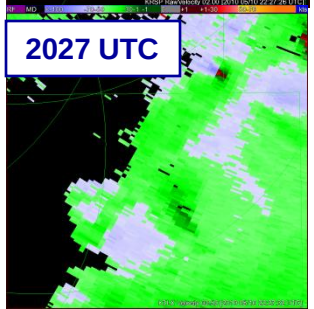












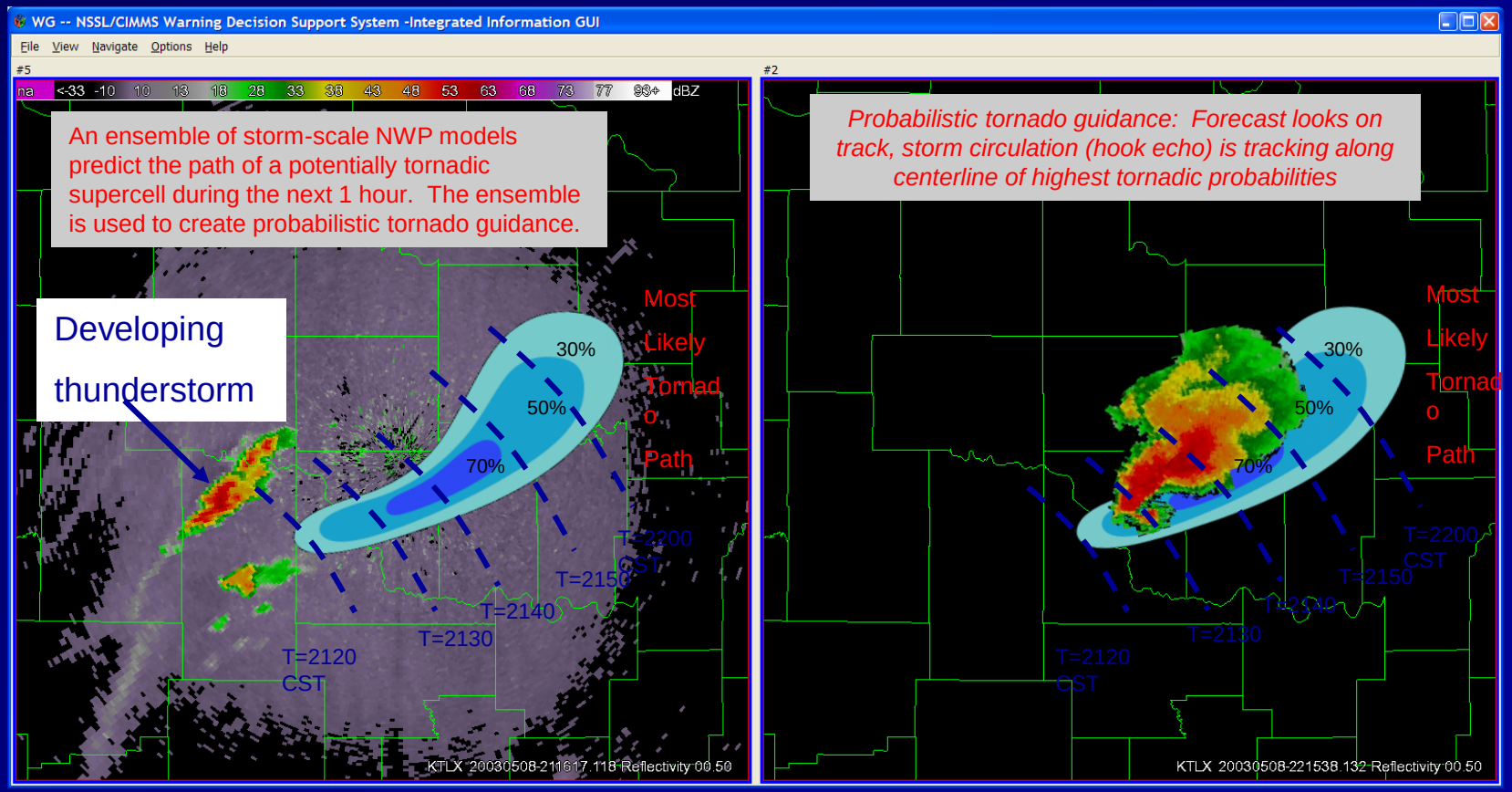
Future of Forecasting

- Ensembles based on radar input
- Run often for a few hours
- Generate probability of environmental conditions

Convective-scale Warn-on-Forecast Vision

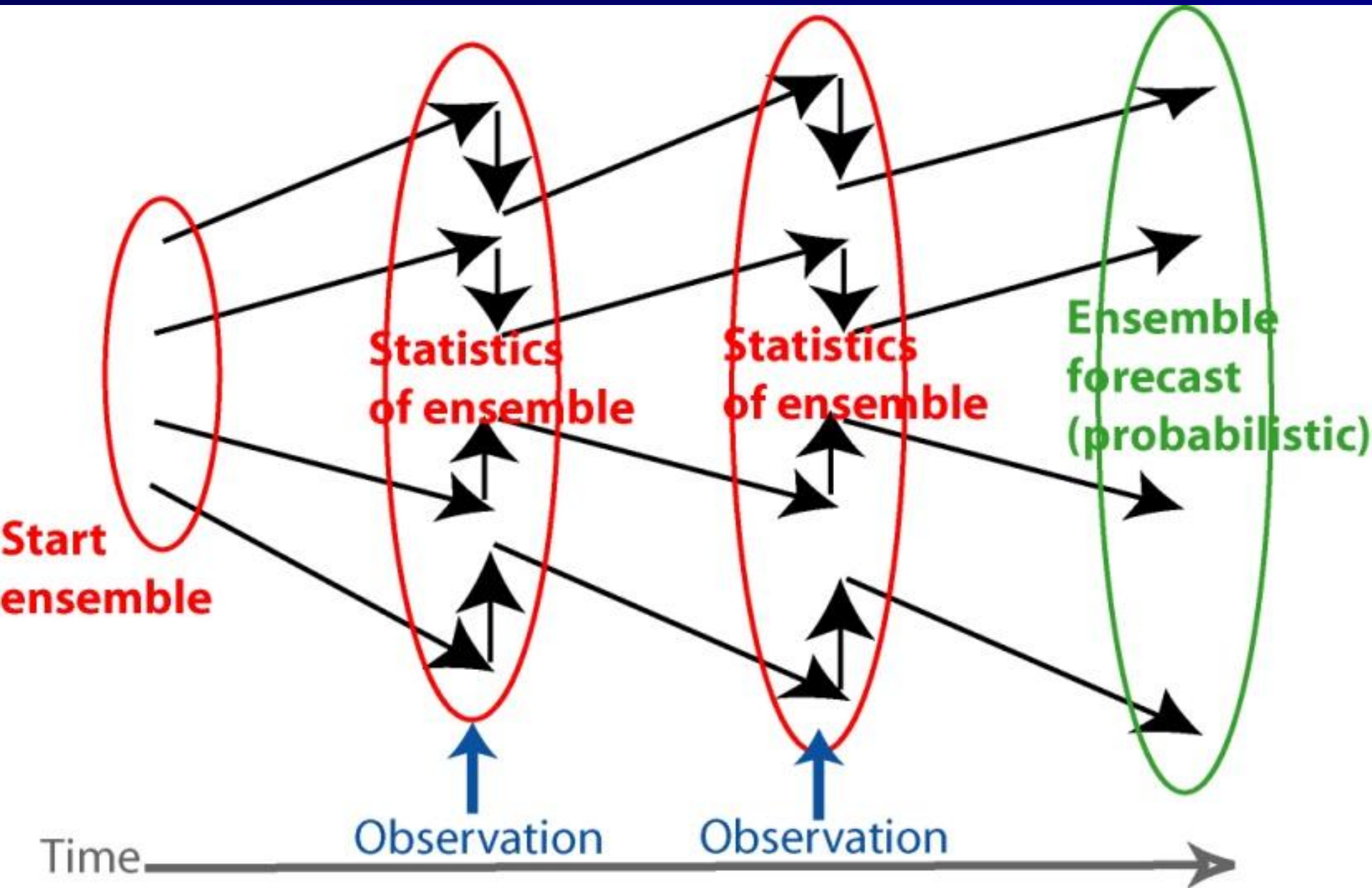
Radar and Initial Forecast at 2100 CST

Radar at 2130 CST: Accurate Forecast



Stensrud et al. 2009 (October *BAMS*)

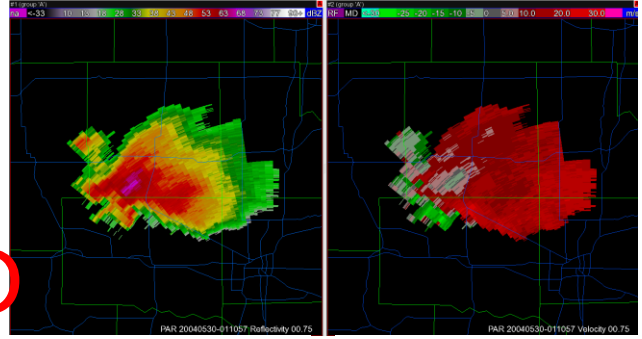
Generating the ensemble



Data Impact

Phased Array vs 88D

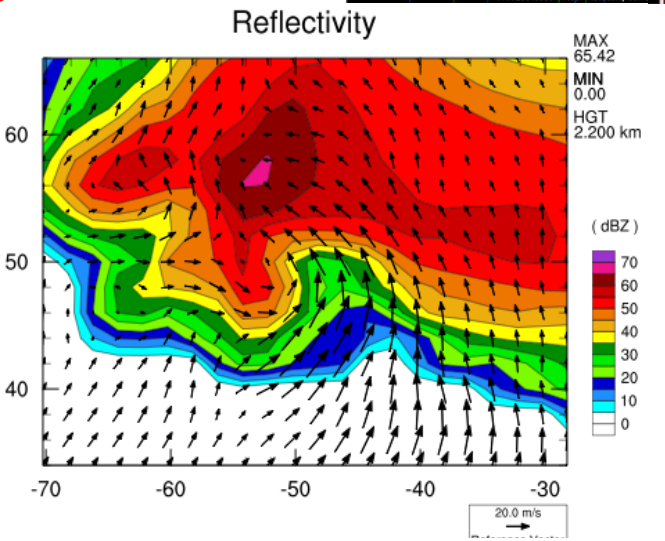
29 May 2004

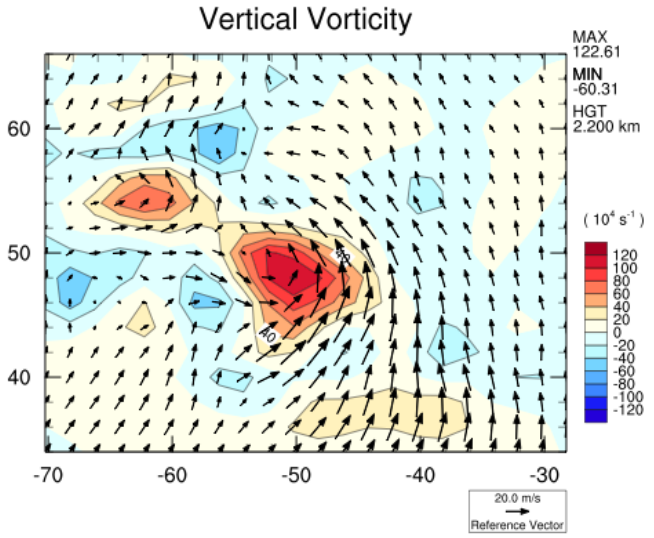


PAR

20 Minutes

(20 Volumes)

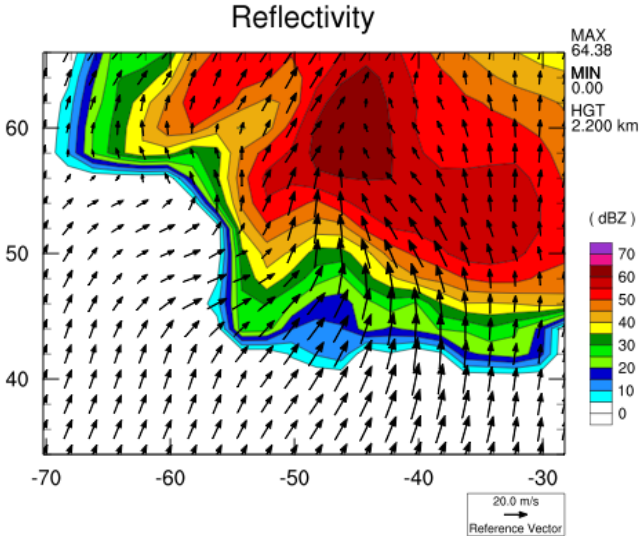


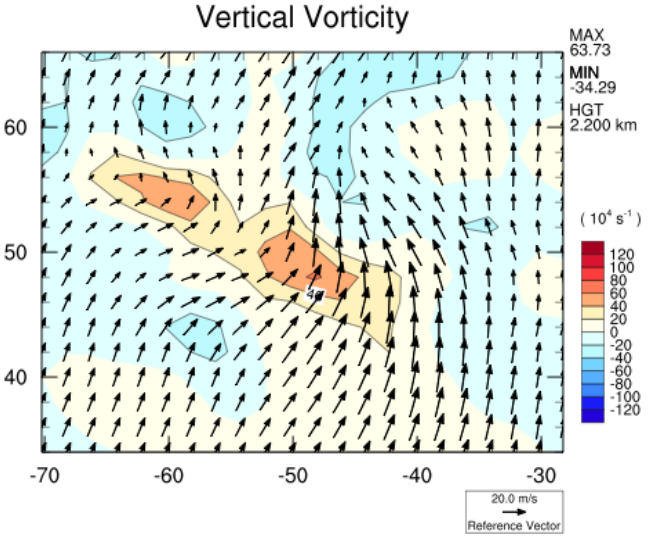


WSR-88D

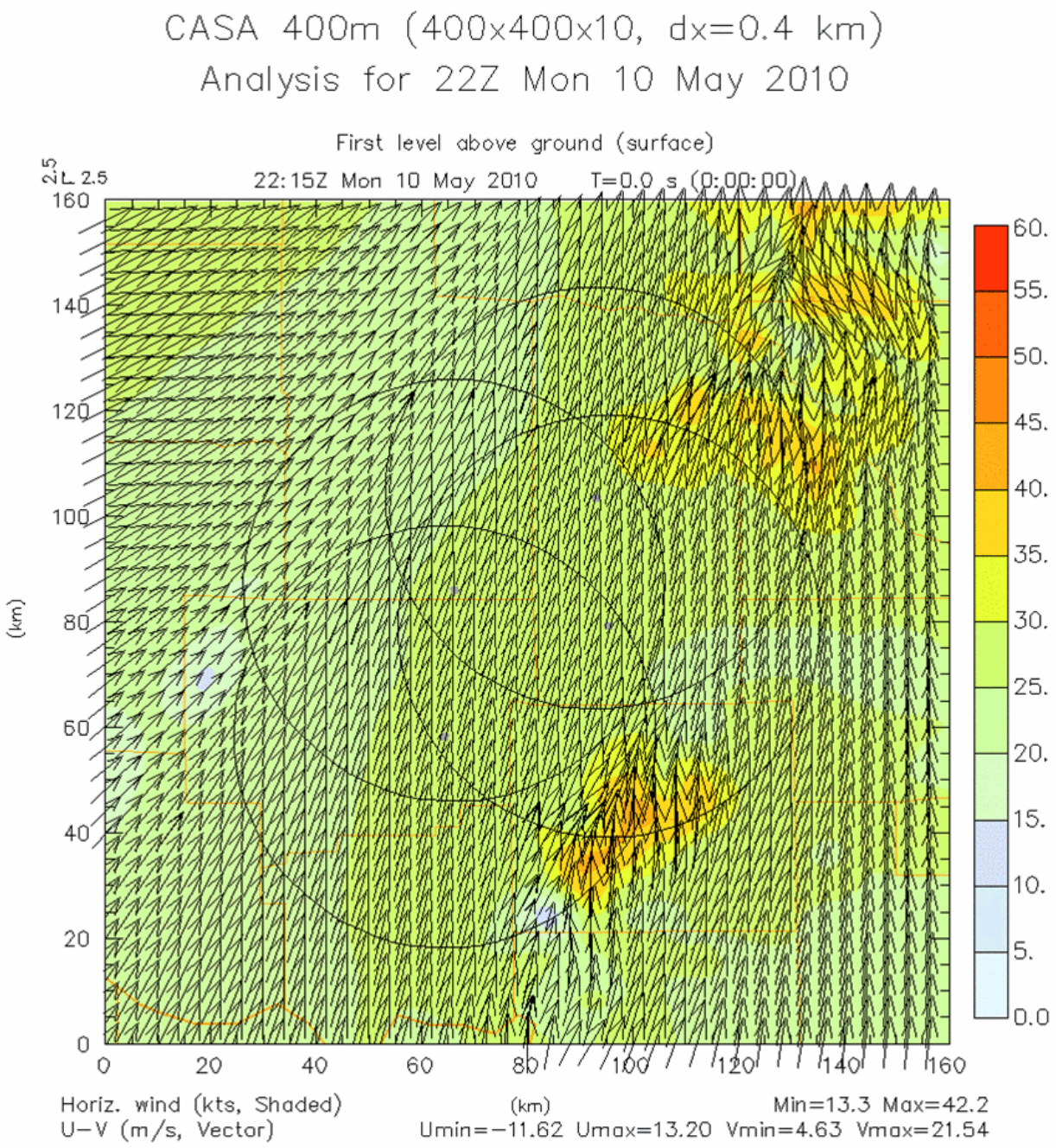
20 Minutes

(5 Volumes)





Thompson and Wicker


CASA 400m (400x400x10, dx=0.4 km)
Analysis for 22Z Mon 10 May 2010
First level above ground (surface)
22:15Z Mon 10 May 2010 T=0.0 s (0:00:00)
2.5
160
140
120
100
80
60
40
20
0
(km)
0
20
40
60
80
100
120
140
160
60.
55.
50.
45.
40.
35.
30.
25.
20.
15.
10.
5.
0.0
Horiz. wind (kts, Shaded)
U-V (m/s, Vector)
(km)
Min=13.3 Max=42.2
Umin=-11.62 Umax=13.20 Vmin=4.63 Vmax=21.54

Challenges

- Rapid and accurate data quality control
  - Ordinary vs. extraordinary
- Model error
- Sensitivity to errors in environmental conditions
- Assimilation method to use?
- Ensemble methods for convective-scale