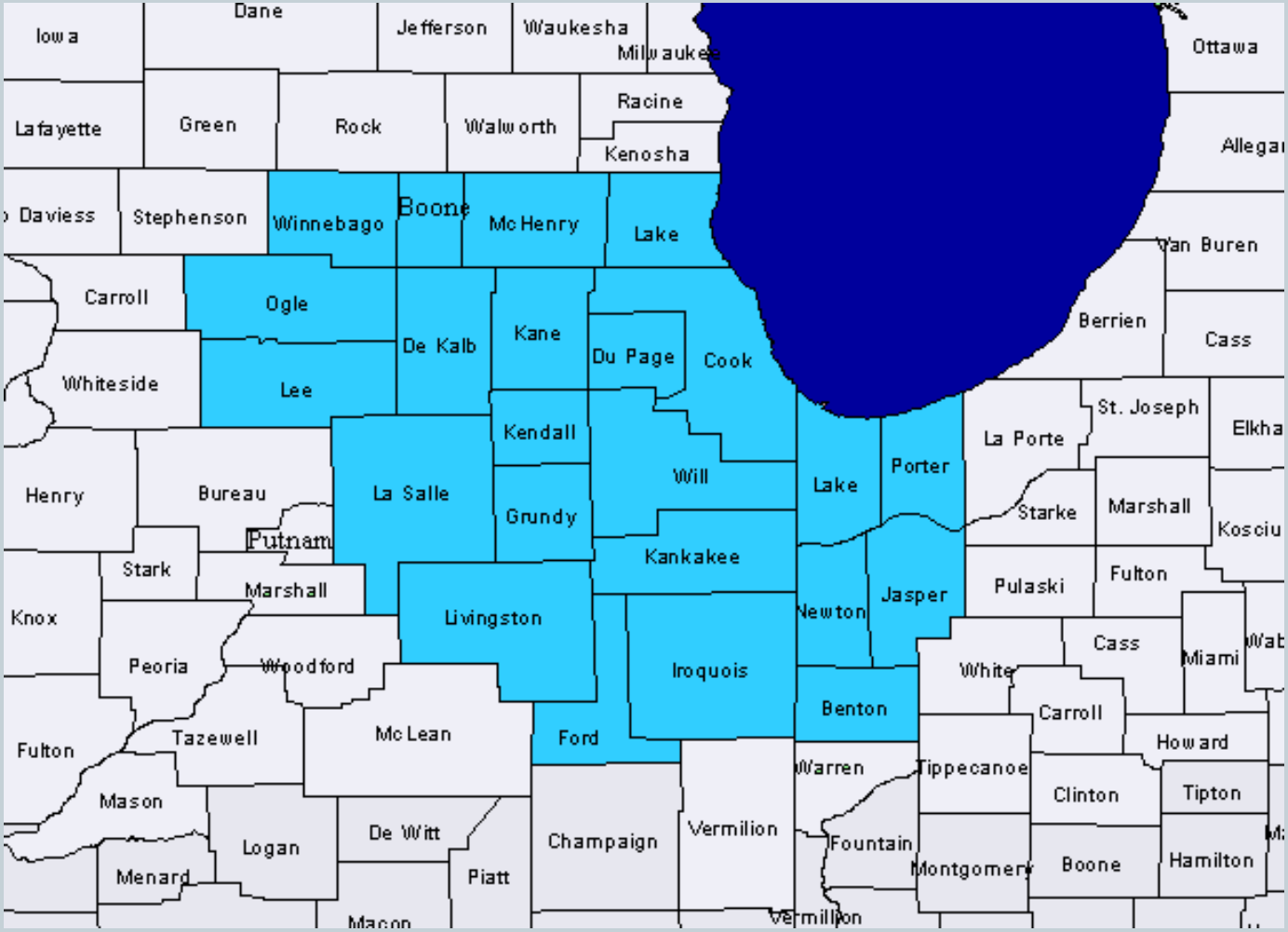
Winter Tornadoes Near Chicago

ERIC LENNING
SCIENCE AND OPERATIONS OFFICER
NOAA/NWS CHICAGO

Chicago (LOT) CWA



Wintertime Tornadoes in LOT CWA Since 1950

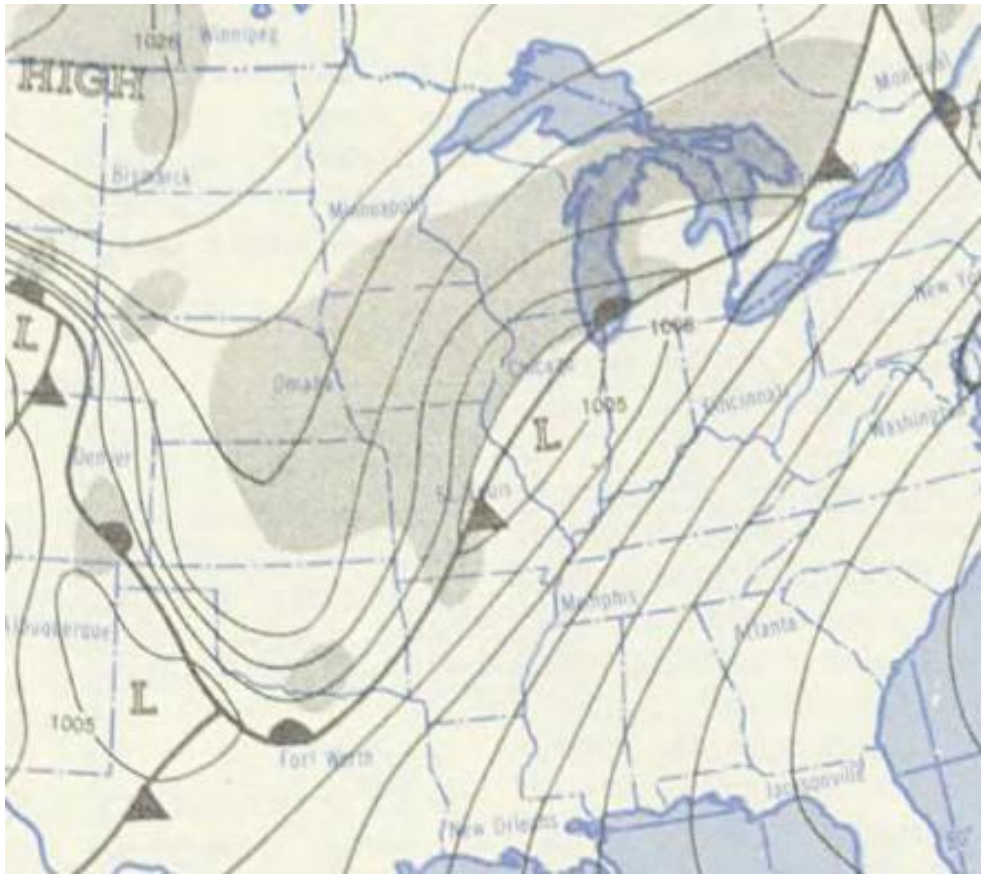
- ***January 25, 1950*** -- F2 tornado at Momence, Kankakee County
- **December 6, 1951** -- F2 tornado from Spring Valley, Bureau County to 7 miles northeast of Mendota, LaSalle County (25 mile path, 1 killed, 1 injured)
- **December 6, 1951*** -- F1 tornado from 1 mile north of Arlington Heights to .5 mile east of Buffalo Grove, Cook County (3 mile path)
- **December 3, 1955** -- F2 tornado from near Dana, LaSalle County to 5 miles south of Mazon, Grundy County (25 mile path, also crossed Livingston County)
- **December 8, 1966** -- F2 tornado 8 miles north of Rensselaer, Jasper County, IN (1 injured)
- **December 4, 1973** -- F1 tornado near Ashkum, Iroquois County
- **February 16, 2006** -- F1 near Pittwood, Iroquois County
- ***January 7, 2008*** -- EF3 Poplar Grove in Boone County to Lawrence in McHenry County
- **Summary:** Eight tornadoes (Three F1, Four F2 and One EF3)

Researching the Arlington Heights Tornado of December 6, 1951 – A Timeline

- December 26, 2007: “Delayed Report of a Tornado”
- January 2, 2008: WCM Allsopp seeks assistance in deciding whether tornado really did occur.
  - 12/06/1951 was unusually warm and moist for January
  - Email contained a very descriptive newspaper account – like an NWS damage survey.
- January 4, 2008: Article describing this rare wintertime tornado (and 6 others) is prepared for office webpage.

Fronts and Pressure Dec. 6, 1951 ~18z

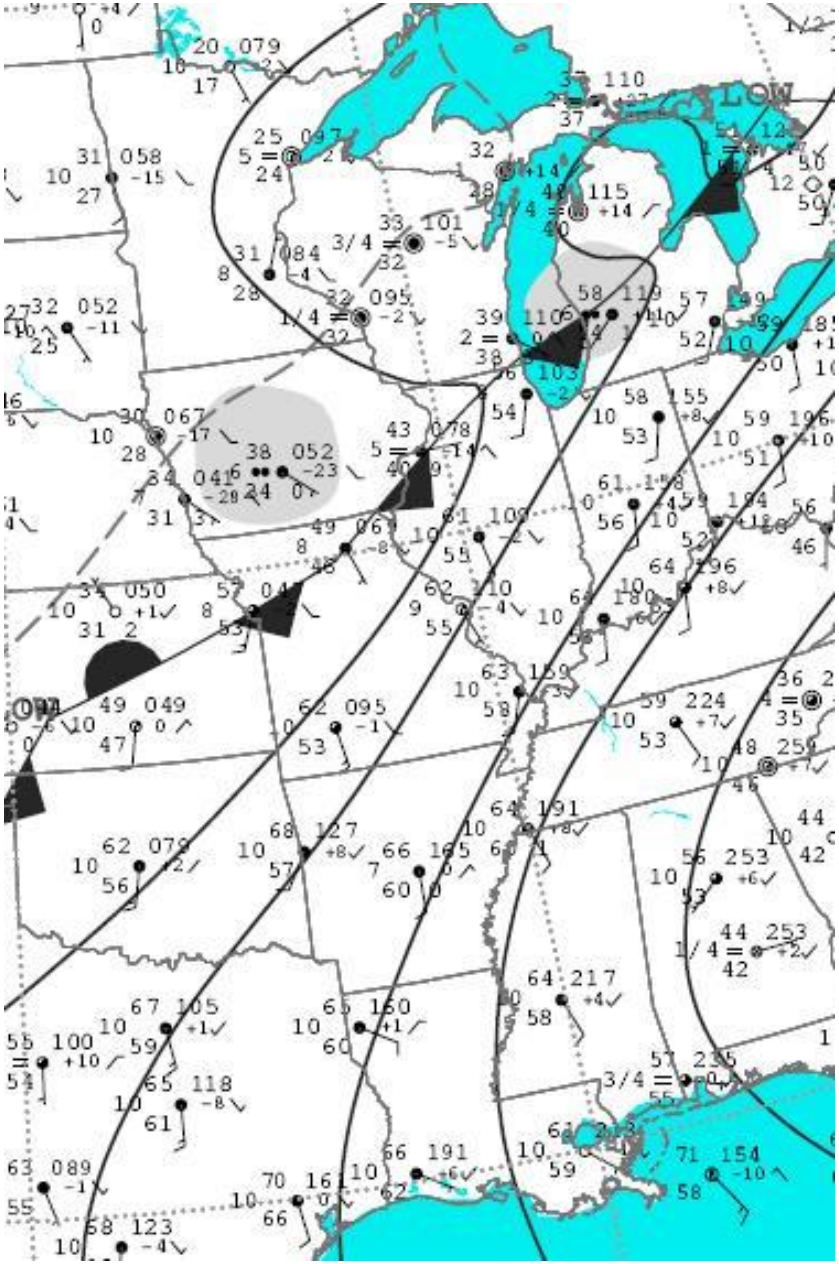
- Chicago LCD showed a record high of 65 degrees that day.
- Dewpoints were in the 50s ahead of front.

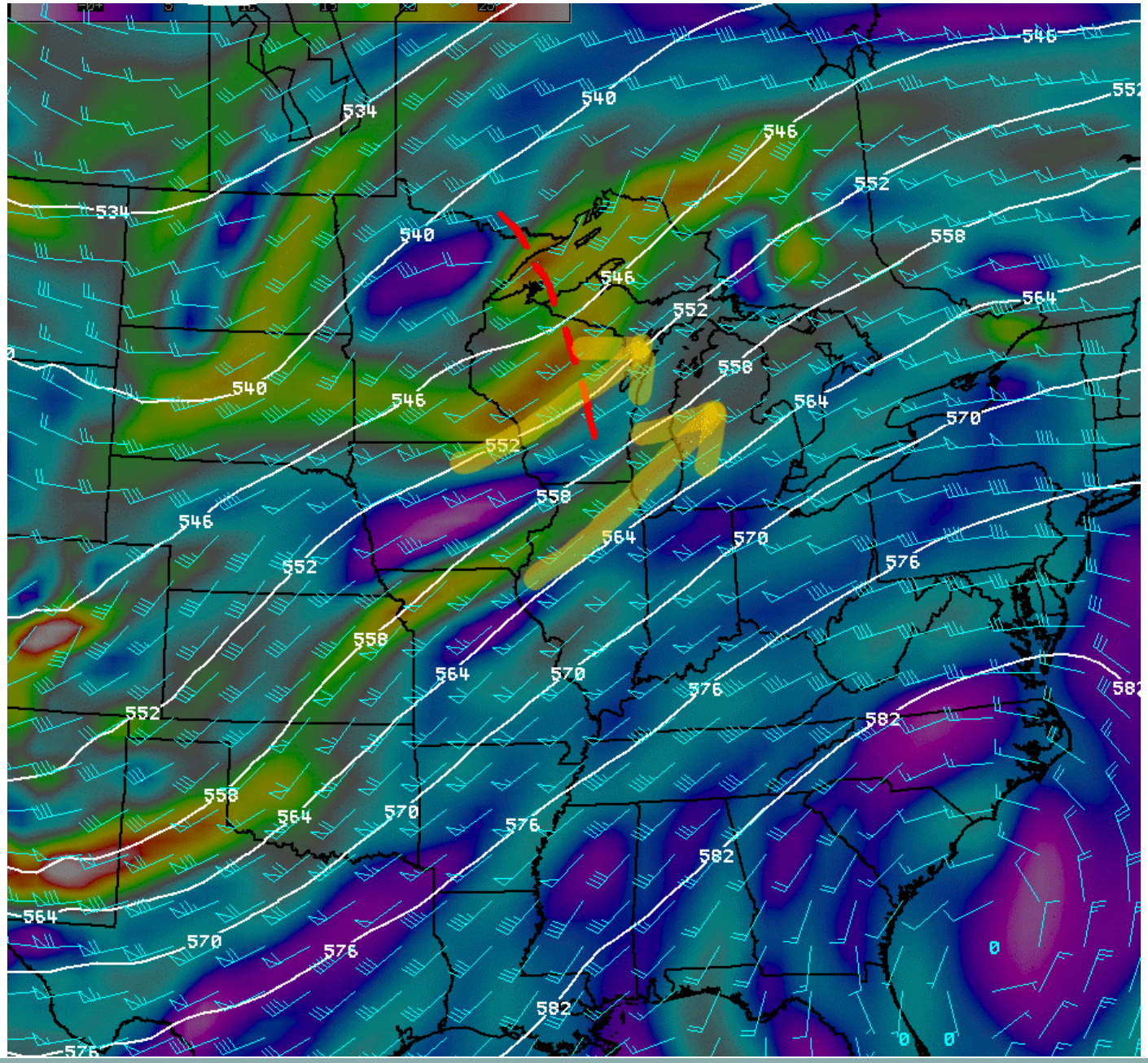


Something looks…familiar.

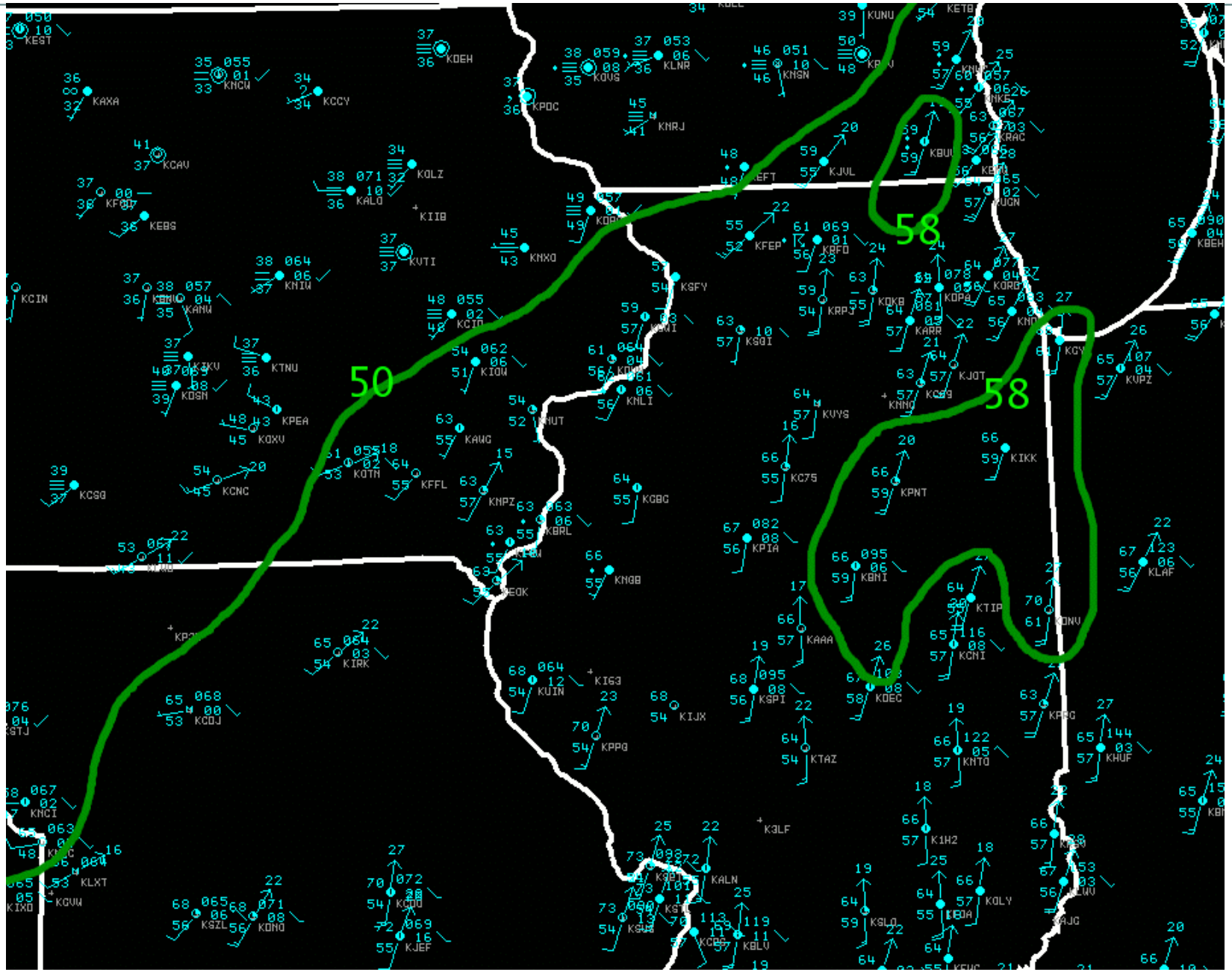
Fronts and Pressure Jan. 7, 2008 ~12z

- Chicago LCD showed a record high of 65 degrees that day.
- Dewpoints were in the 50s ahead of front.

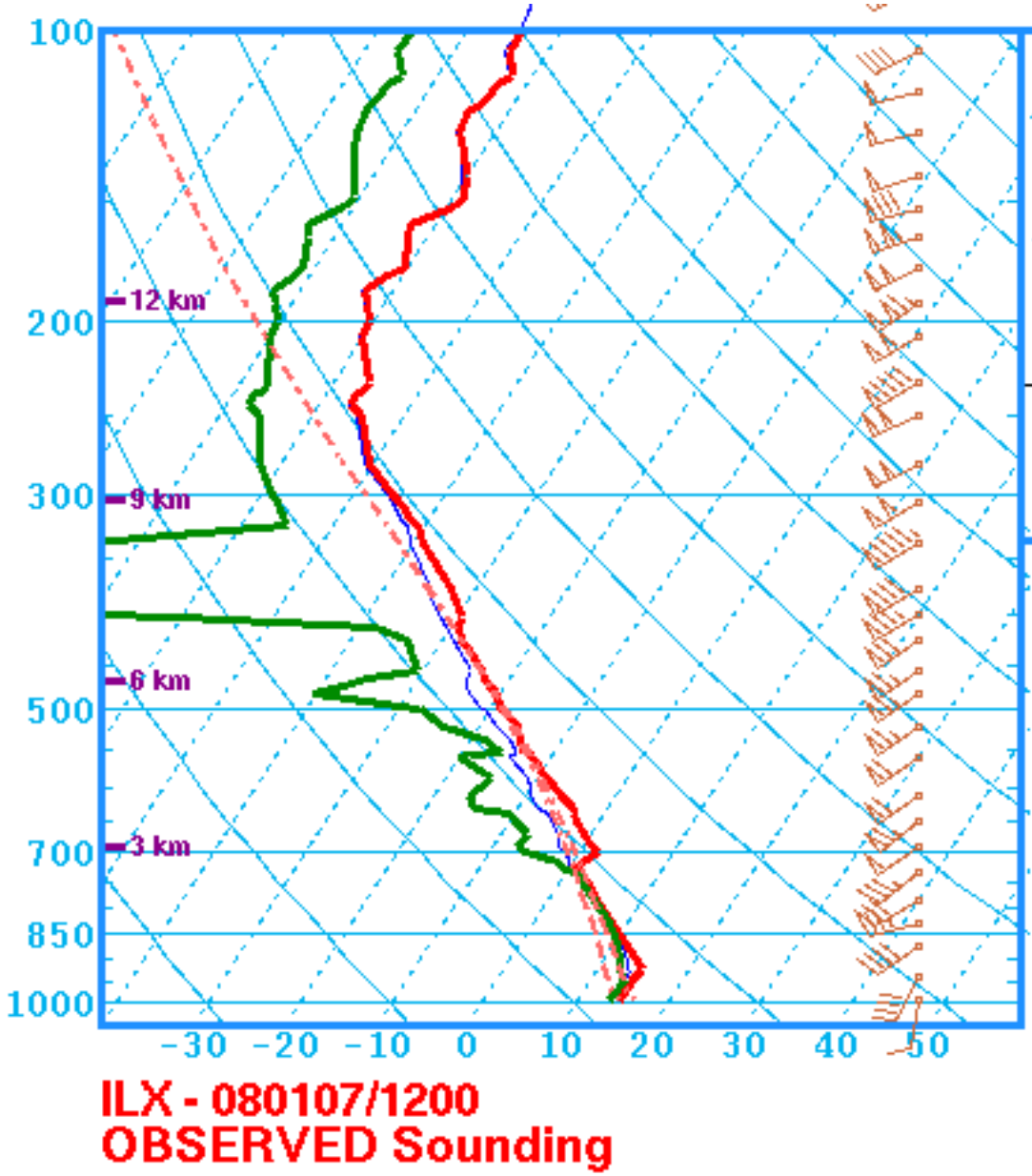


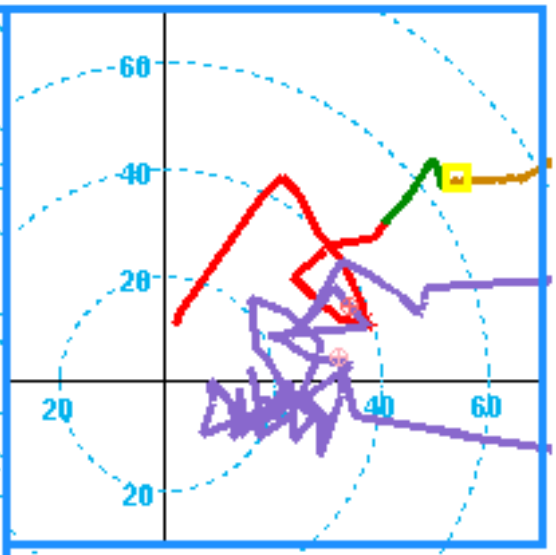


500mb Heights, Winds, Vorticity at 00Z Jan. 8, 2008



Station plot and dewpoints for 21Z on January 7, 2008

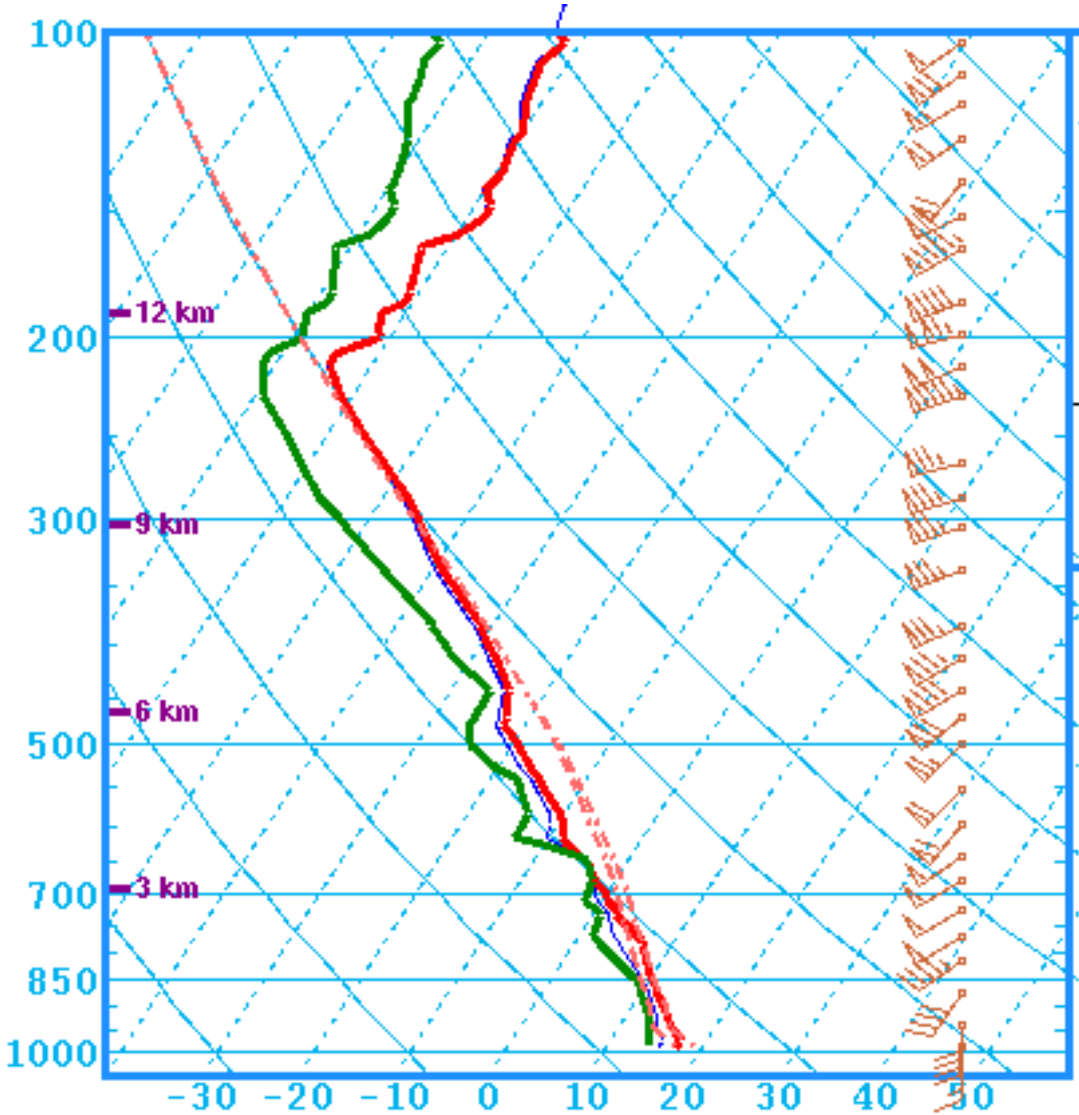


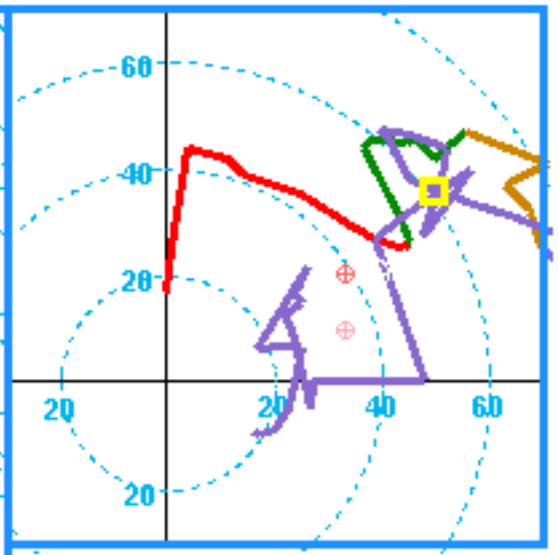


Sfc CAPE (J/kg)	1
Sfc CIN (J/kg)	-330
Sfc LI 500mb (C)	0
Sfc NU Cap (C)	4
Sfc NU LFC Hgt (m;agl)	5482
ML CAPE (J/kg)	1594
ML CIN (J/kg)	-201
ML NU LFC Hgt (m;agl)	-999
Mod PM Hail Size (in.)	nan
Supercell Composite Param	1.00
WBZ Hgt (ft;agl)	8596
Mean RH (%)	18
Sfc-3km AGL LR (C/km)	5.0
3km-6km AGL LR (C/km)	7.8
DCAPE (J/kg)	544
6km Shear (kt)	59
1km Helicity (m2/s2)	277
3km Helicity (m2/s2)	368
BRN Shear (m2/s2)	63
Sfc-2km SR Wind (kt)	17
4-6km SR Wind (kt)	26
Estimated Storm Motion (kt)	251/43

ILX - 080107/1200
OBSERVED Sounding

NWS/NCEP/SPC





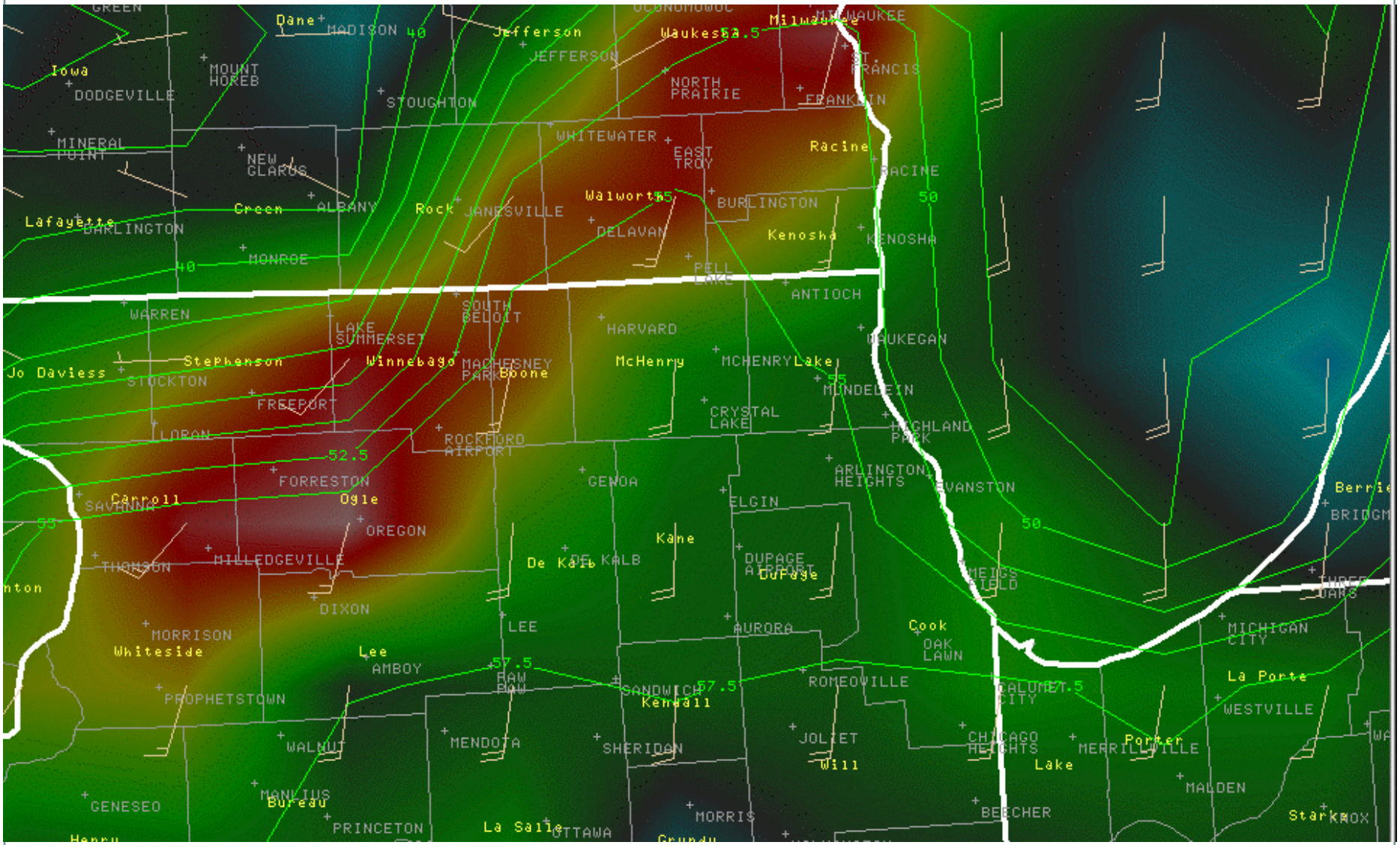
Sfc CAPE (J/kg)	529
Sfc CIN (J/kg)	-91
Sfc LI 500mb (C)	-4
Sfc NU Cap (C)	2
Sfc NU LFC Hgt (m;agl)	2369
ML CAPE (J/kg)	1974
ML CIN (J/kg)	-130
ML NU LFC Hgt (m;agl)	-999
Mod PM Hail Size (in.)	6.9
Supercell Composite Param	1.00
WBZ Hgt (ft;agl)	8850
Mean RH (%)	40
Sfc-3km AGL LR (C/km)	6.5
3km-6km AGL LR (C/km)	7.4
DCAPE (J/kg)	437
6km Shear (kt)	66
1km Helicity (m2/s2)	318
3km Helicity (m2/s2)	357
BRN Shear (m2/s2)	116
Sfc-2km SR Wind (kt)	23
4-6km SR Wind (kt)	26
Estimated Storm Motion (kt)	242/43

ILX - 080108/0000
OBSERVED Sounding

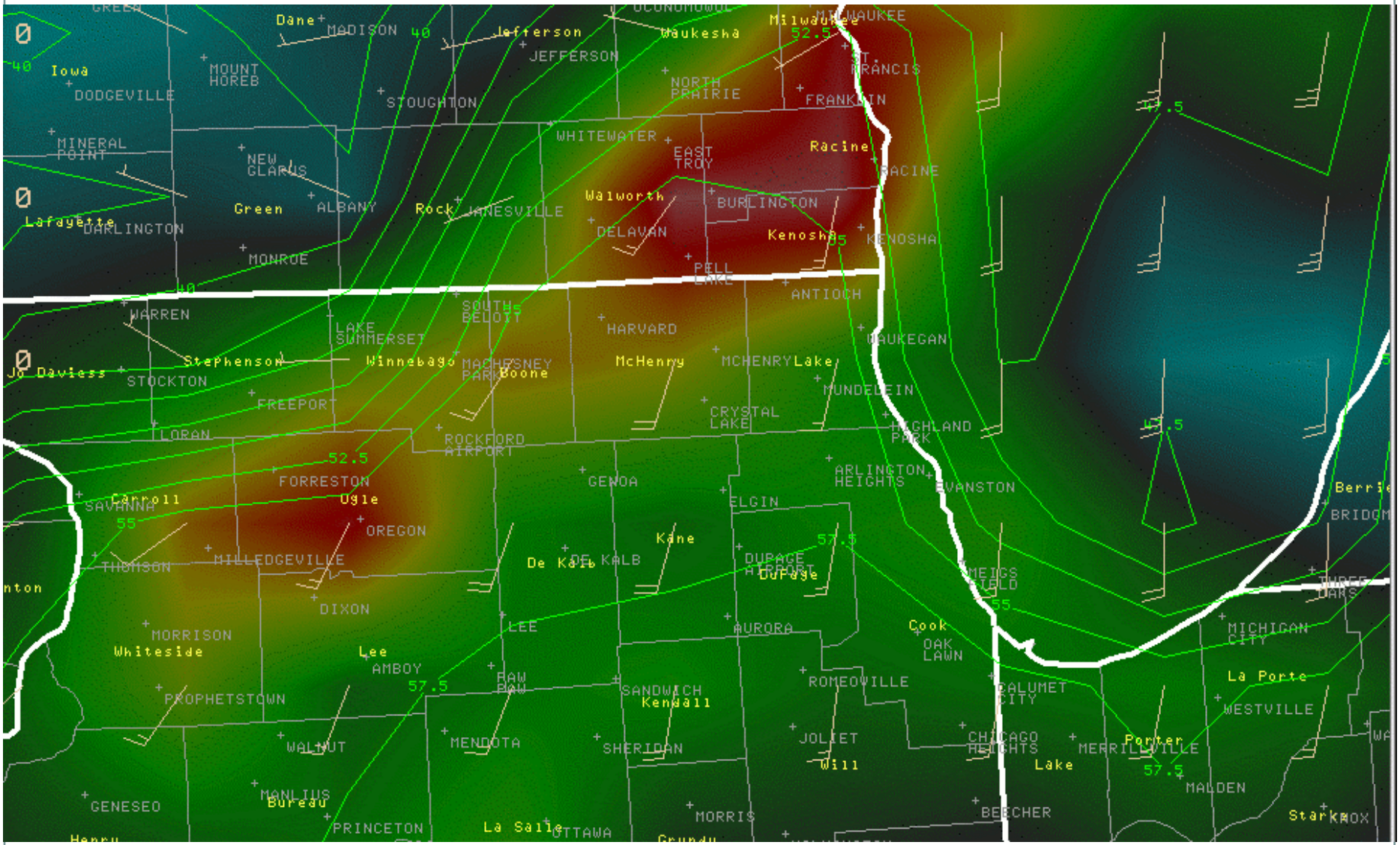
NWS/NCEP/SPC

Moisture Flux Convergence

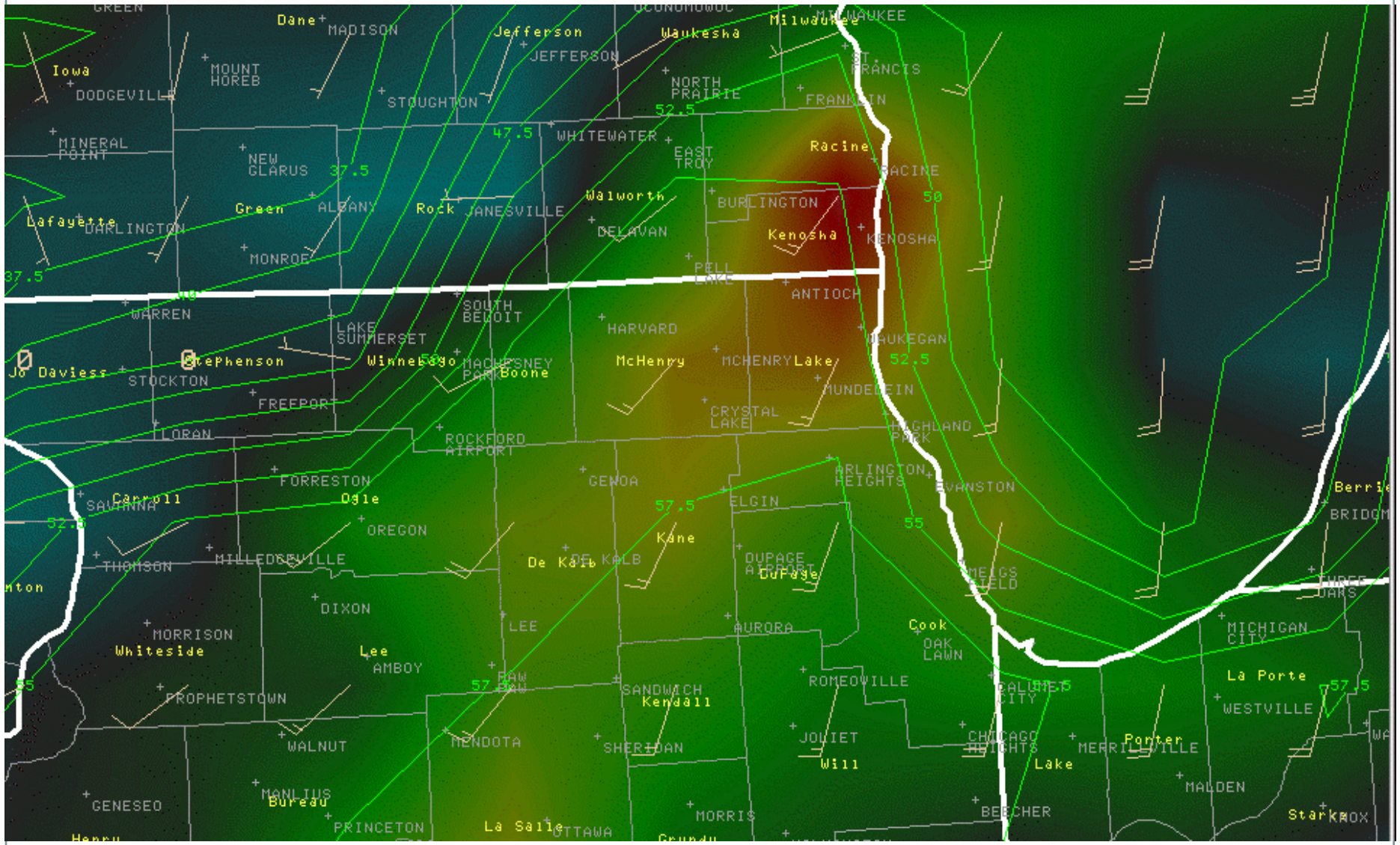
- Higher boundary layer moisture is thought to aid significant tornado development in an otherwise conducive environment.



RUC Forecast of Surface Moisture Flux Convergence at 23Z on Jan. 7, 2008

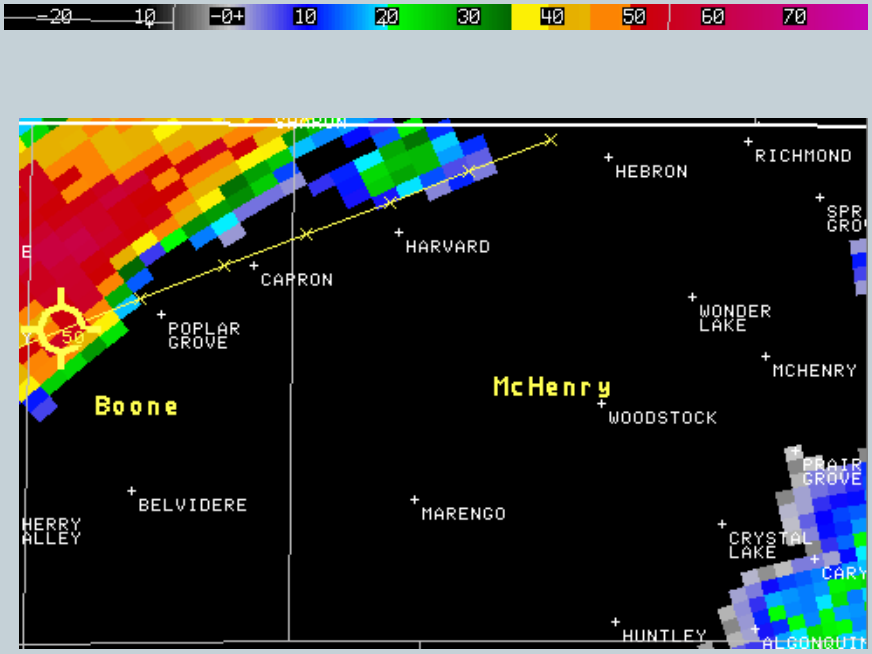


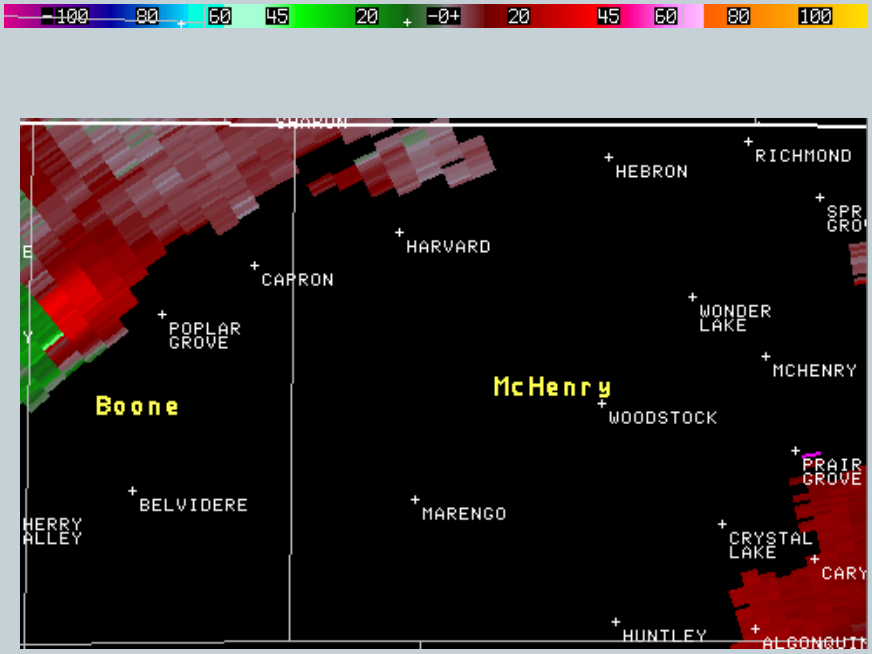
RUC Forecast of Surface Moisture Flux Convergence at 00Z on Jan. 8, 2008



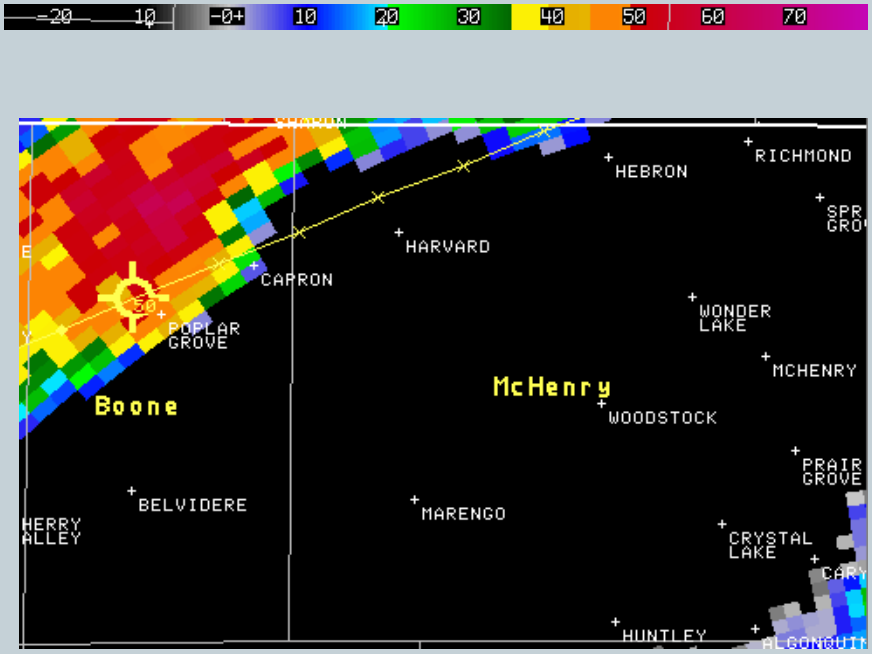
RUC Forecast of Surface Moisture Flux Convergence at 01Z on Jan. 8, 2008

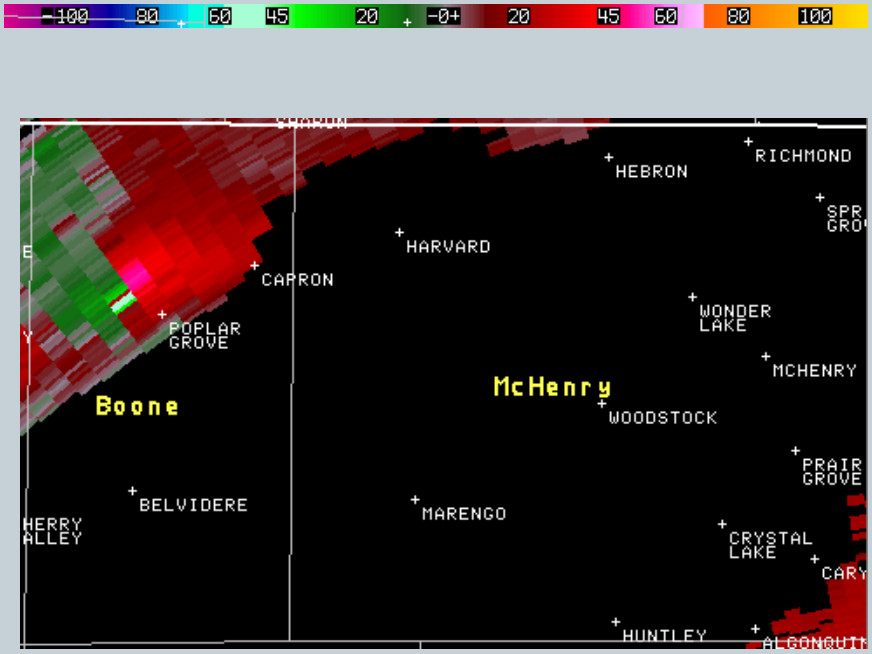
KLOT Radar 2125Z (3:25 PM)



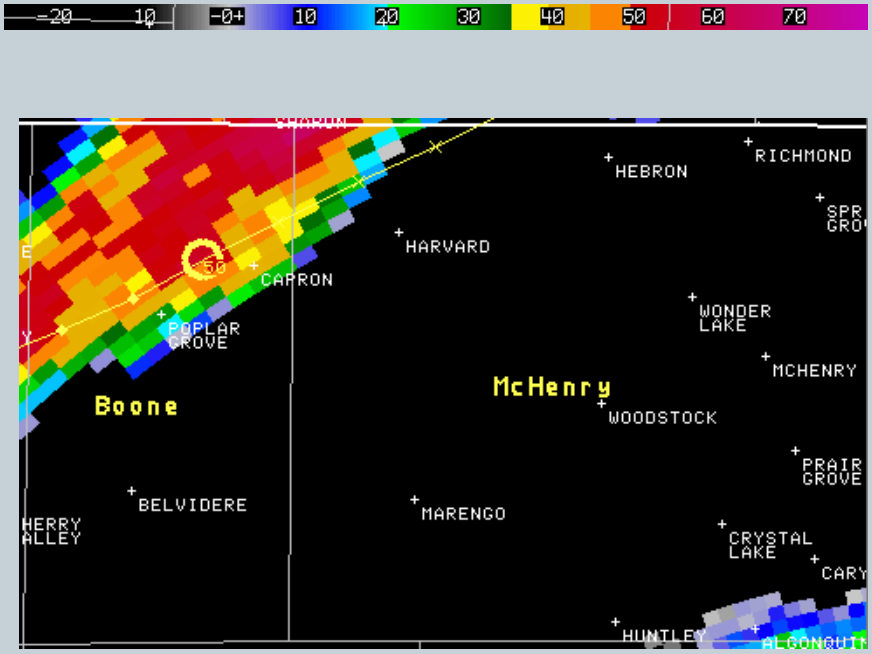


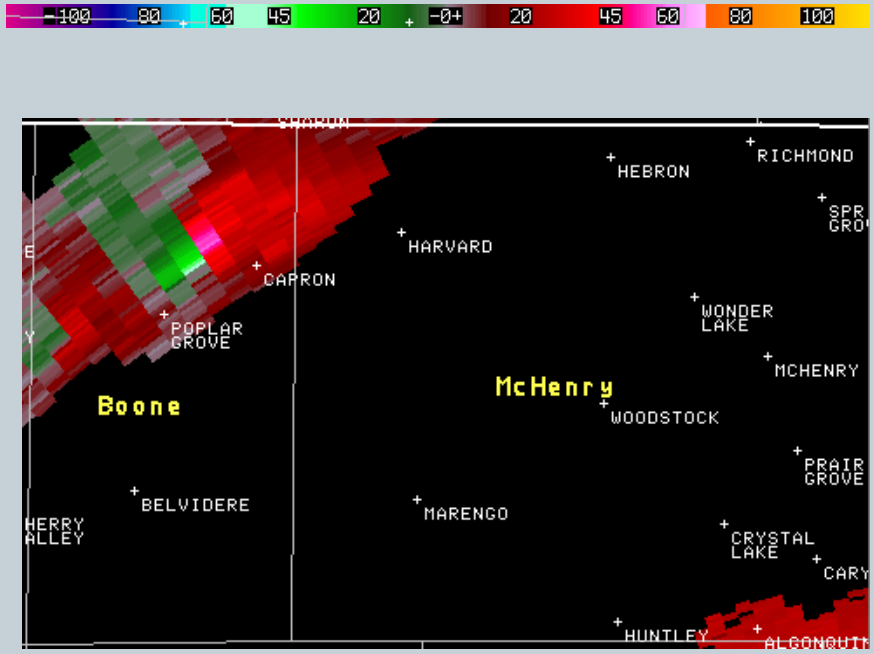
KLOT Radar 2130Z (3:30 PM)



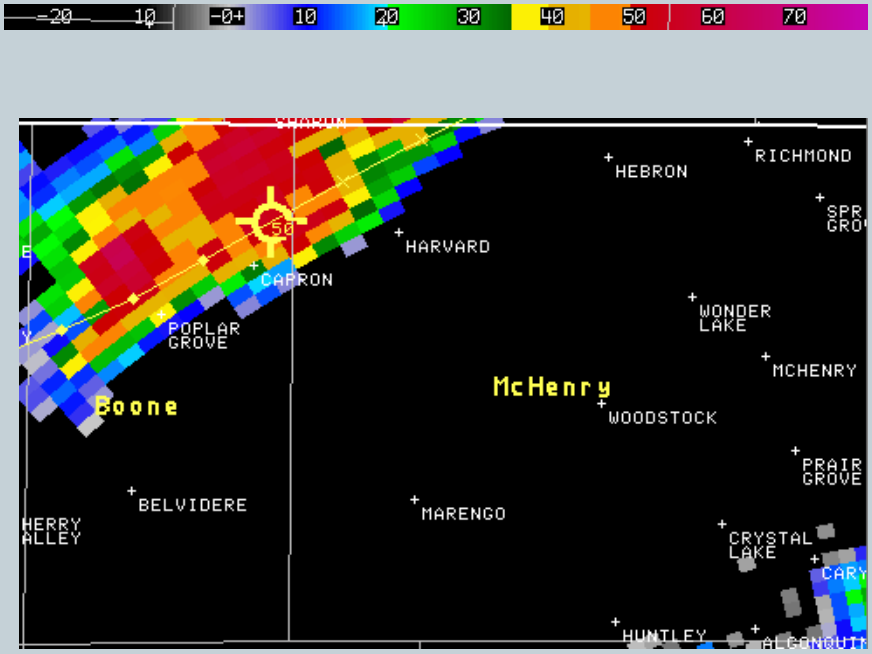


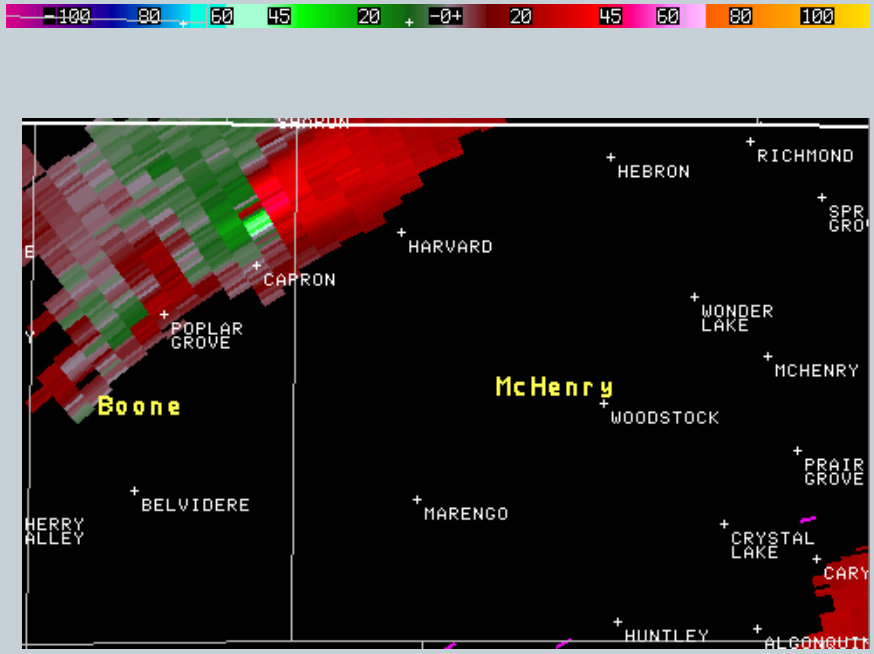
KLOT Radar 2135Z (3:35 PM)



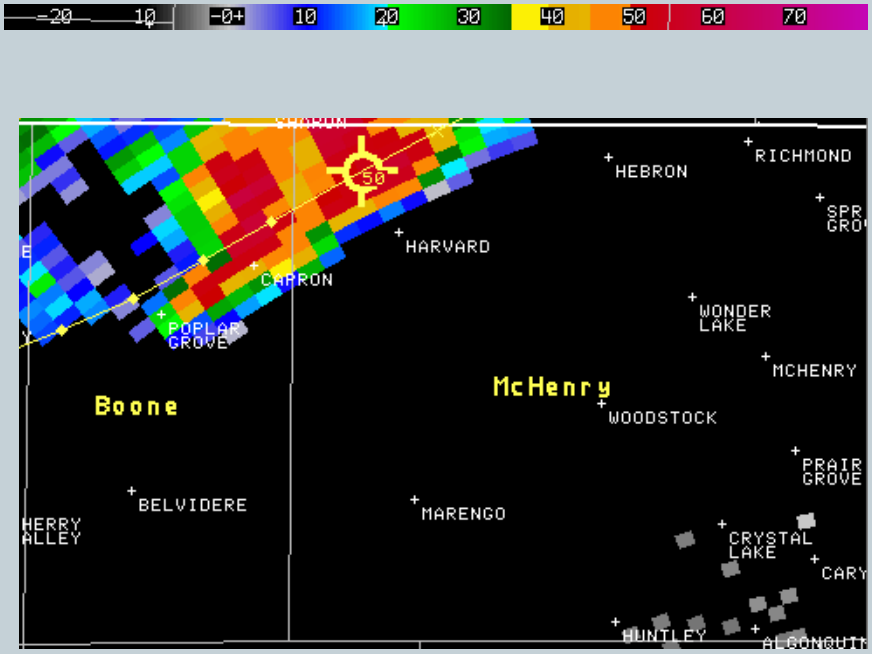


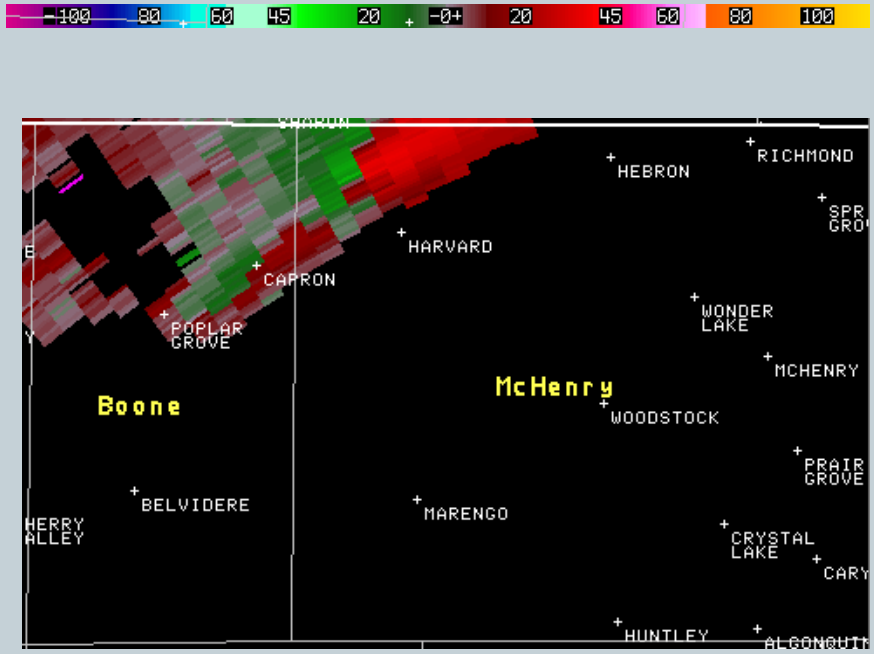
KLOT Radar 2139Z (3:39 PM)

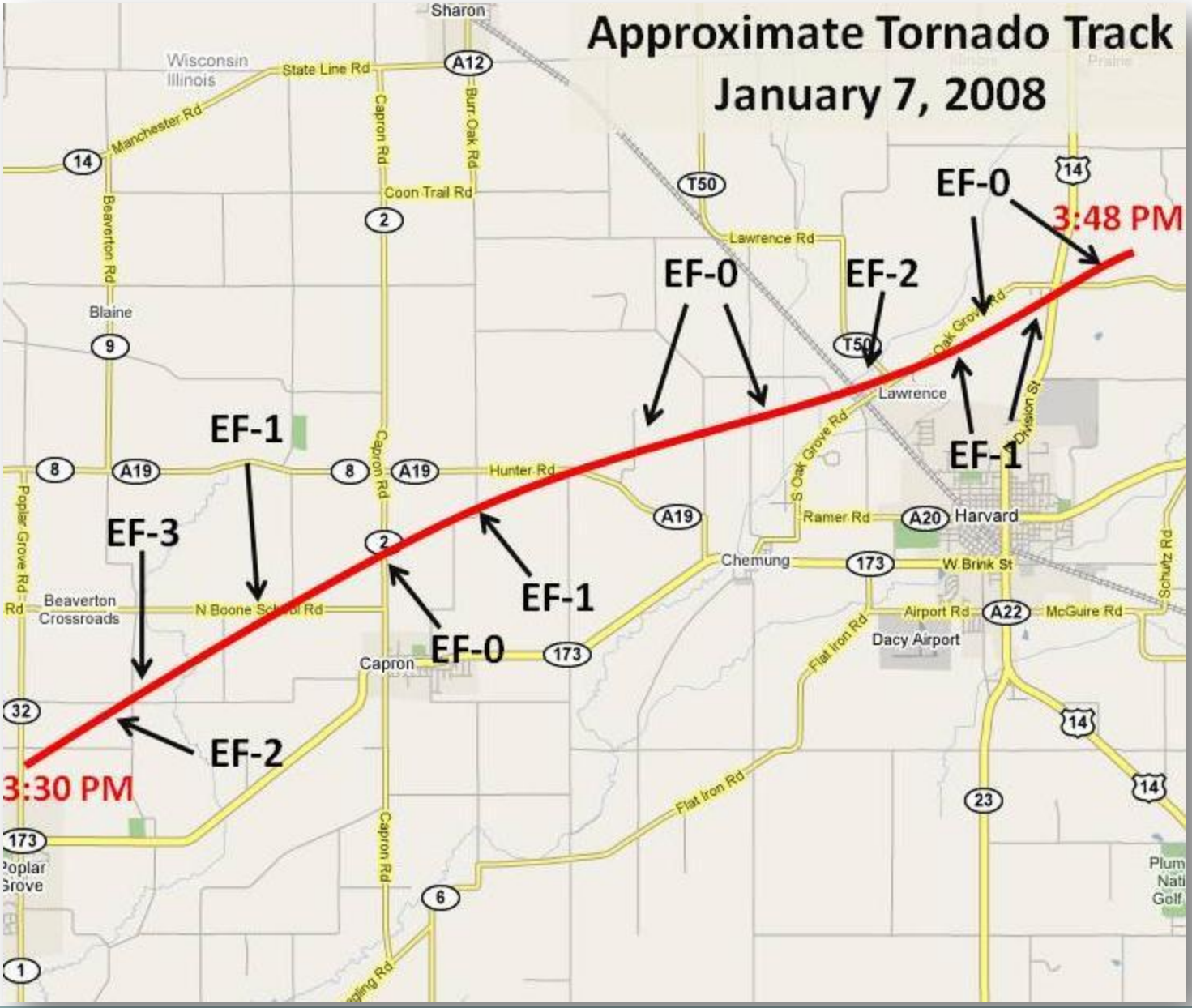




KLOT Radar 2145Z (3:45 PM)

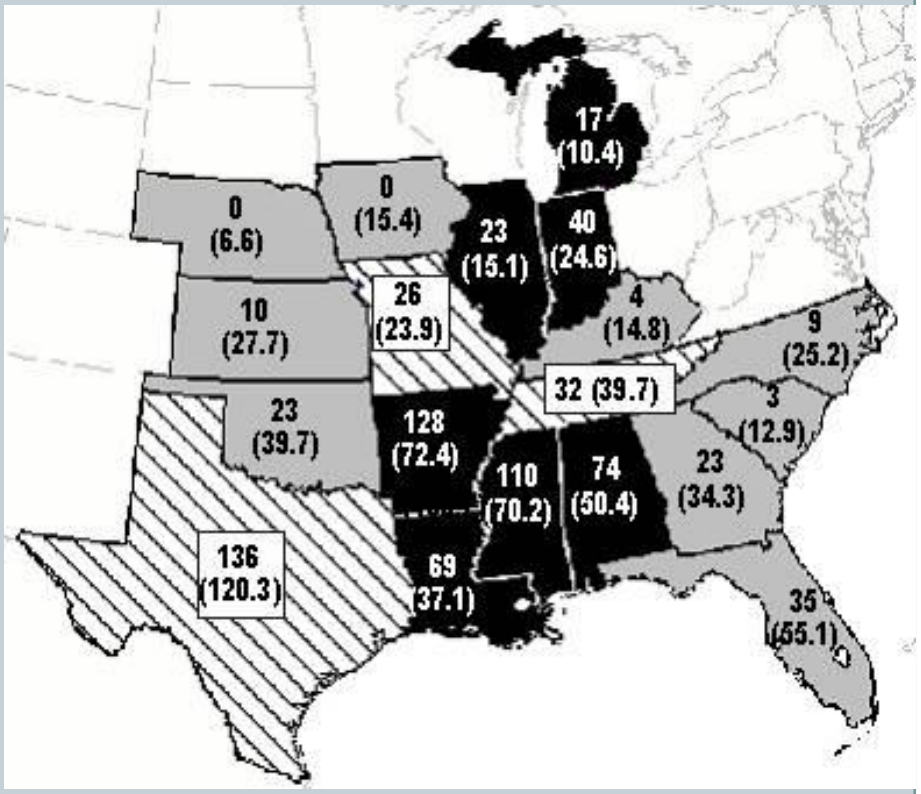





Approximate Tornado Track
January 7, 2008
3:30 PM
3:48 PM
EF-0
EF-1
EF-2
EF-3
EF-0
EF-0
EF-2
EF-1
EF-1
Sharon
Wisconsin
Illinois
State Line Rd
A12
Manchester Rd
Capron Rd
Burr Oak Rd
Coon Trail Rd
Beaverton Rd
Blaine
T50
Lawrence Rd
Oak Grove Rd
Lawrence
Division St
S Oak Grove Rd
Hunter Rd
A19
Ramer Rd
A20
Harvard
Chemung
173
W Brink St
Schultz Rd
Poplar Grove Rd
Beaverton
Crossroads
N Boone School Rd
Airport Rd
A22
McGuire Rd
Dacy Airport
Capron
Flat Iron Rd
32
23
Plum
Golf

Role of El Niño–Southern Oscillation (ENSO)

- January 1950 LN
- December 1951 EN – N
- December 1955 LN
- December 1966 Weak LN
- December 1973 LN
- February 2006 Weak LN
- January 2008 LN



Tornadoes during LN winters. States outlined in black have > 125% of the expected number of tornadoes (Cook and Schaefer, MWR pending)

Something else of interest in LOT CWA?

Oceanic Niño Index (ONI) from Climate Prediction Center

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
1964	**0.9**	0.4	0.0	**-0.5**	**-0.7**	**-0.7**	**-0.7**	**-0.8**	**-1.0**	**-1.1**	**-1.1**	**-1.0**
1965	**-0.8**	**-0.5**	-0.2	0.0	0.3	**0.7**	**1.0**	**1.3**	**1.5**	**1.6**	**1.6**	**1.5**
1966	**1.2**	**1.1**	**0.8**	**0.5**	0.3	0.2	0.2	0.0	-0.2	-0.2	-0.3	-0.3
1967	-0.4	-0.5	-0.6	-0.5	-0.2	0.0	0.0	-0.2	-0.4	-0.5	-0.4	**-0.5**
1968	**-0.7**	**-0.8**	**-0.8**	**-0.7**	-0.4	0.0	0.3	0.3	0.3	0.4	**0.7**	**0.9**
1969	**1.0**	**1.0**	**0.9**	**0.8**	**0.6**	**0.5**	0.4	0.4	**0.6**	**0.7**	**0.7**	**0.6**
1970	**0.5**	0.3	0.2	0.1	0.0	-0.3	**-0.6**	**-0.7**	**-0.7**	**-0.7**	**-0.8**	**-1.1**
1971	**-1.3**	**-1.4**	**-1.2**	**-0.9**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-1.0**	**-0.9**
1972	**-0.7**	-0.3	0.0	0.3	**0.6**	**0.8**	**1.1**	**1.4**	**1.6**	**1.8**	**2.1**	**2.1**
1973	**1.8**	**1.2**	**0.5**	0.0	**-0.5**	**-0.8**	**-1.0**	**-1.2**	**-1.4**	**-1.7**	**-1.9**	**-2.0**
1974	**-1.8**	**-1.6**	**-1.2**	**-1.1**	**-0.9**	**-0.7**	**-0.5**	-0.4	**-0.5**	**-0.7**	**-0.8**	**-0.7**
1975	**-0.6**	**-0.6**	**-0.7**	**-0.8**	**-0.9**	**-1.1**	**-1.3**	**-1.3**	**-1.5**	**-1.6**	**-1.7**	**-1.7**
1976	**-1.6**	**-1.2**	**-0.9**	**-0.6**	**-0.5**	-0.2	0.1	0.3	**0.6**	**0.8**	**0.8**	**0.8**
1977	**0.6**	**0.5**	0.3	0.2	0.2	0.4	0.4	0.4	**0.5**	**0.7**	**0.8**	**0.8**

1965: F4 tornado in April
1972: F4 tornado in September
1976: F4 tornado in June
Only other violent tornadoes in LOT CWA: April 1967 (F4) and August 1990 (F5)

http://www.cpc.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

Summary

- Winter tornadoes are quite rare in the LOT CWA: 1950 had been last January tornado.
- La Niña associated with increased frequency of winter tornadoes in IL and IN.
- Similarities between events: La Niña pattern, record warm temperatures, ample moisture, frontal boundary.
- Winter tornadoes more likely to be strong/severe.