

May 8th 2009 **DERECHO**

By :Dana Brown

(c) 2001 C. Doswell



Introduction

DERECHO

- Associated weather phenomena that occurred with this derecho.
- Type of derecho, and how it was classified
- Storm Prediction Center forecasts 1-2 days in advance.
- Forecasting models before the occurrence of the derecho.
- Sounding of Springfield Missouri at 12Z and observations.
- Radar images before, during and after this major event.



Wild Facts

-The derecho resulted in widespread wind damage across southeast Missouri, southern Illinois and parts of northwestern Kentucky.

-The top wind speed recorded from the derecho was 106 mph in Carbondale, IL provided by the Carbondale Airport by a private backup anemometer.

-Average wind speed across Carbondale and all surrounding communities was around 90 mph.

-Multiple TORNADOES formed around the derecho and after surveying the damage, two tornadoes were rated as EF1 in southern IL, and an EF3 located in southern Missouri. All together 3 tornadoes in southern IL, and 22 tornadoes in southern Missouri.

LARGE HAIL reported in Williamson CO. IL. (1.75 in.) Confirmed by Emergency Management as well as by trained spotters; baseball size hail was reported by trained spotters in MO.

FLASH FLOODING occurred across southeast Missouri and southern Illinois. Upwards of 3-5 inches was common across these areas in a short amount of time. A spotter had reported just under an inch of rain within just less than 30 minutes. Roads were inundated with water across portions of southeast MO and southern IL.

-Derecho is a Spanish word meaning “straight ahead”

-Three types of derechos: serial, progressive, and hybrid.

-This particular derecho was classified as a progressive derecho.

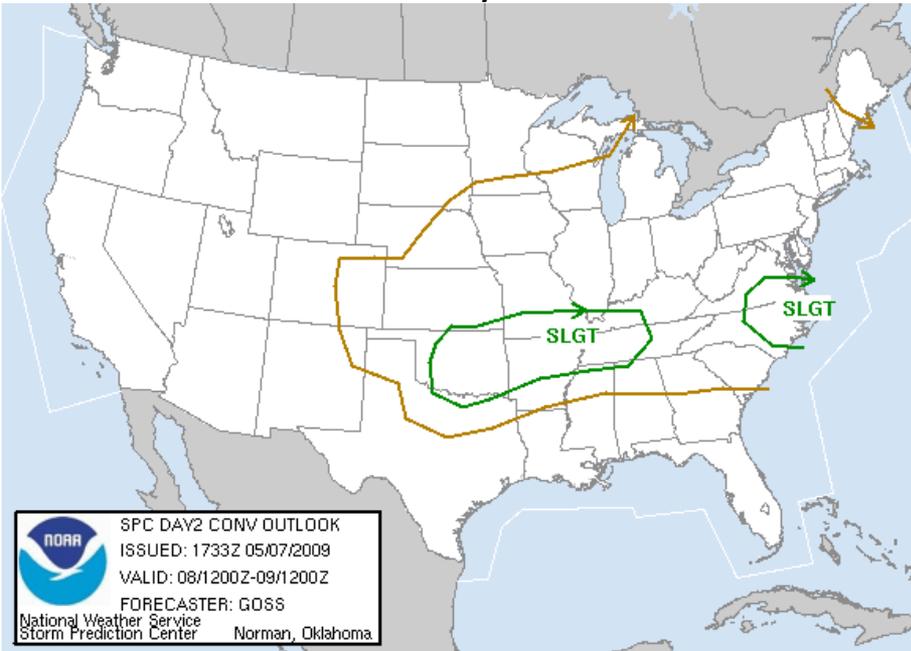
-A progressive derecho is affiliated with a single bow echo at first, and then grows in scale towards the derechos mature or latter stages.



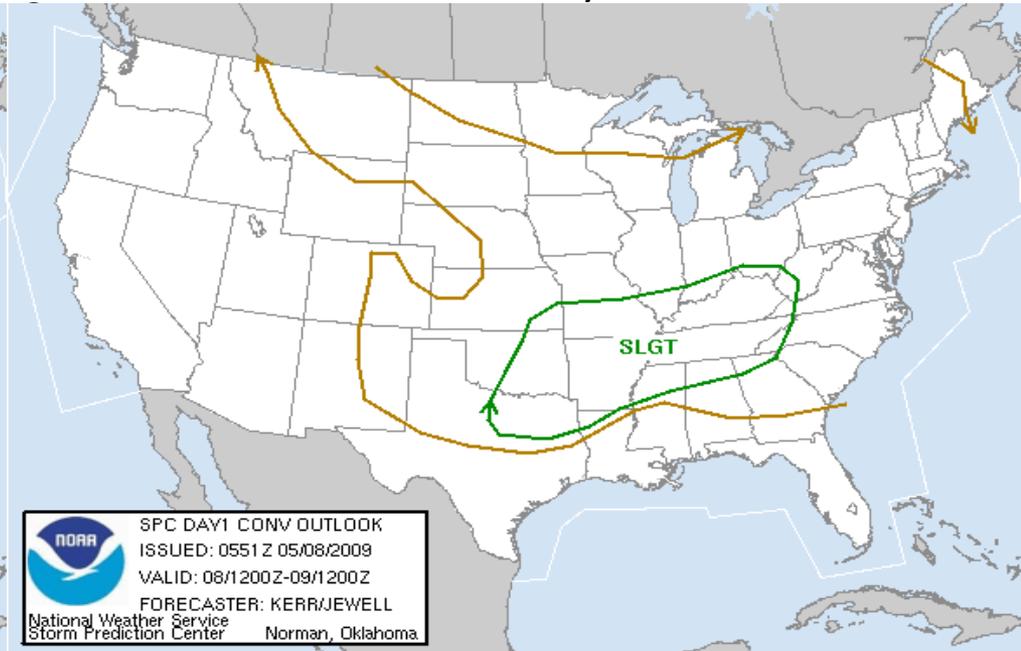
(c) 2002 C. Doswell

-This type of derecho is also associated with a stationary frontal boundary that helps to initiate heavy thunderstorm activity.

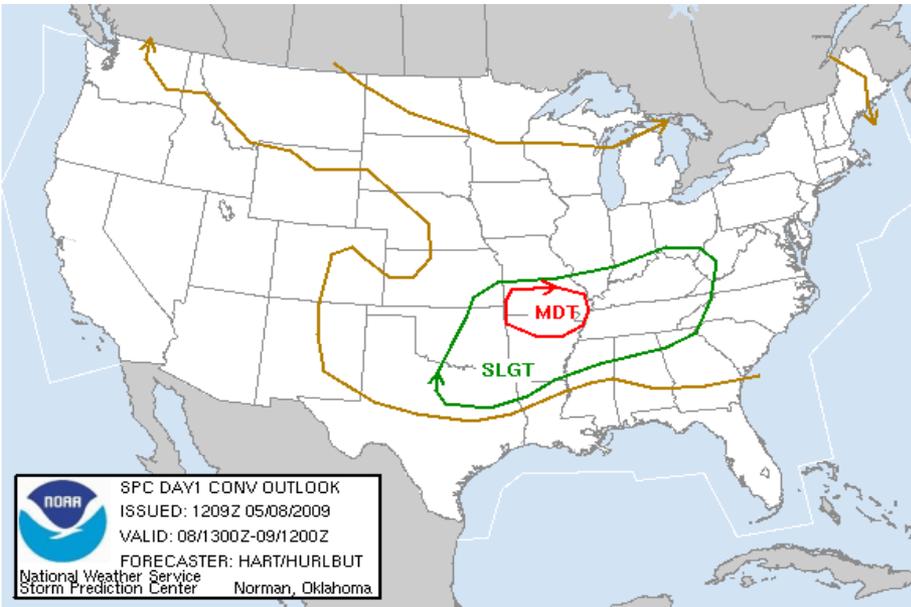
12:33 P.M. May 7th 2009



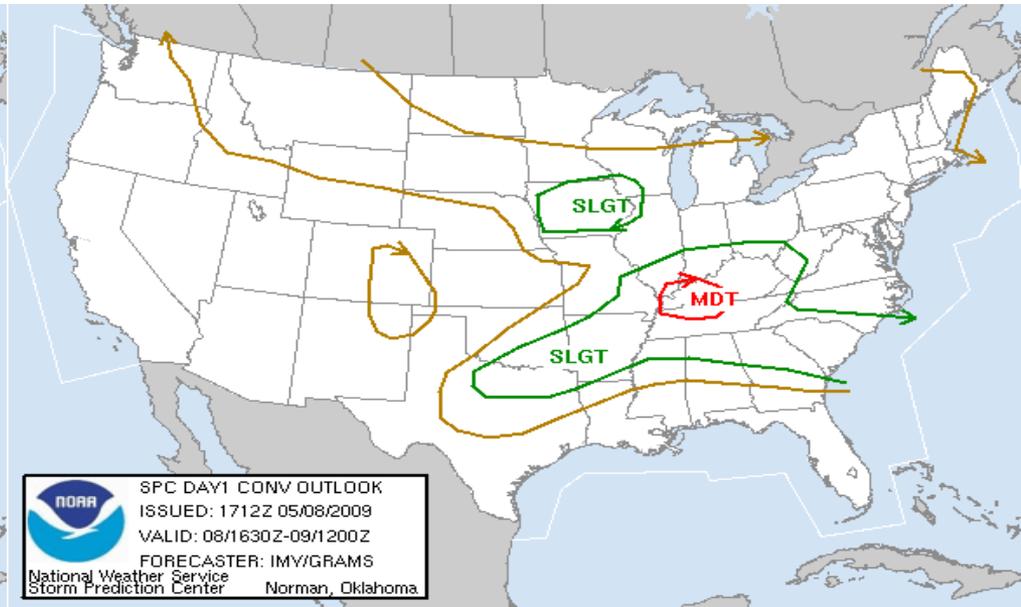
12:51 A.M. May 8th 2009



7:09 A.M. May 8th 2009



12:12 P.M. May 8th 2009

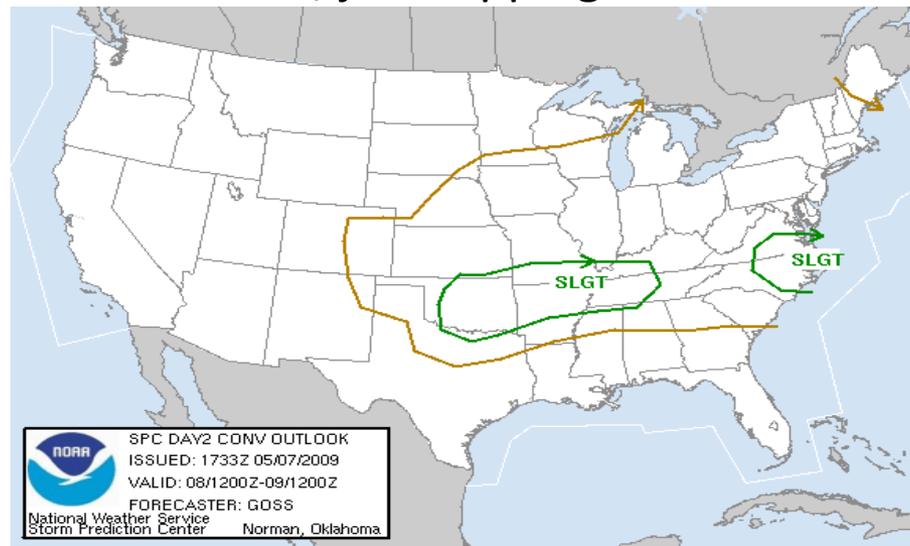


Storm Prediction Center

-Had only issued a 15% for large hail and damaging winds across southern Missouri, and western Kentucky at 12:33 P.M. May 7th 2009

-If storms developed across Oklahoma, Kansas and southwest Missouri, they would quickly become severe because of the mid-level low moisture content, steep lapse rates; the mid-level wave will help to materialize thunderstorms.

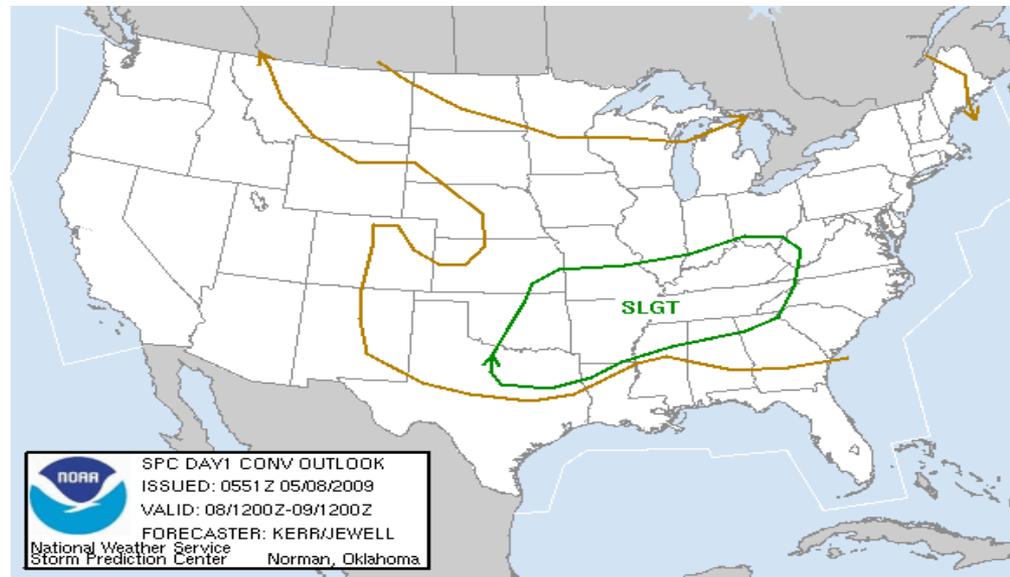
-SPC expected a MCS to form overnight and track southeastward into Oklahoma and then into Arkansas, just clipping the extreme southern edge of Missouri.



Storm Prediction Center

-The SPC had issued a slight risk at 12:51 A.M. May 8th 2009. SPC issued a 30% risk for damaging winds across southern Missouri and southern Illinois. 15% risk for large hail across southern Missouri and southern Illinois; the tornado risk was up to 5% across the same areas.

-SPC noted stronger forcing just on the south side of the jet stream, along with deep layer shear, and strong instability; these parameters gave SPC some indication for a MCS to form through 12Z may 8th.

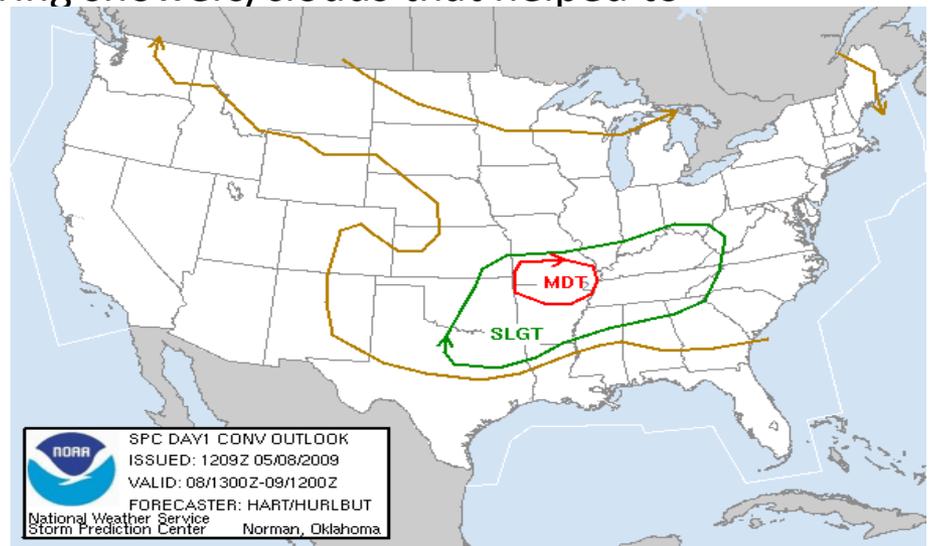


Storm Prediction Center

-The SPC placed a 45% risk for damaging winds across southern Missouri, along with a 30% risk for large hail. Southern IL remained under a 15% risk for large hail and damaging winds. Southern IL and southern MO, were both under a 5% risk for tornadoes at 7:09 A.M. May 8th 2009

-SPC anticipated the bow echo that progressed into Kansas, would have tracked southeastward into northern Arkansas.

-Largest concern was how far east the bow echo would progress before it dissipated? Reasoning behind this is the MCS that had assembled across TN River Valley overnight, had lingering showers/clouds that helped to stabilize the atmosphere.



Hourly max/min barometric pressure, SIU 5/8/2009

Pressure
(mb)

Time
(CST)

991.6

8:14 A.M.

990.4

9:00

988.7

9:57

985.9

10:11

991.8

10:42

988.7

11:00

982.6

11:54

982.1

12:16 P.M.

988.4

12:54

986.7

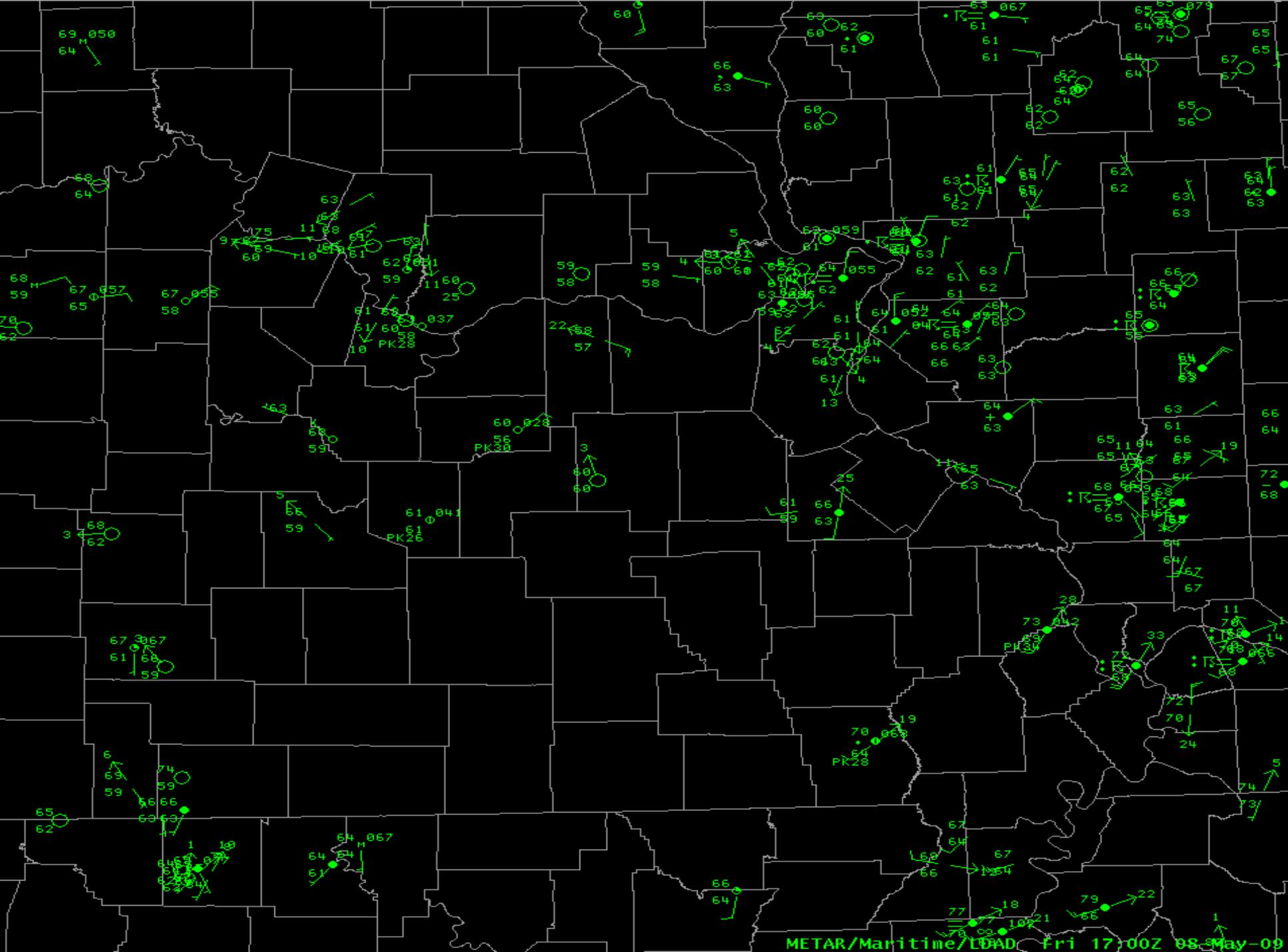
1:05

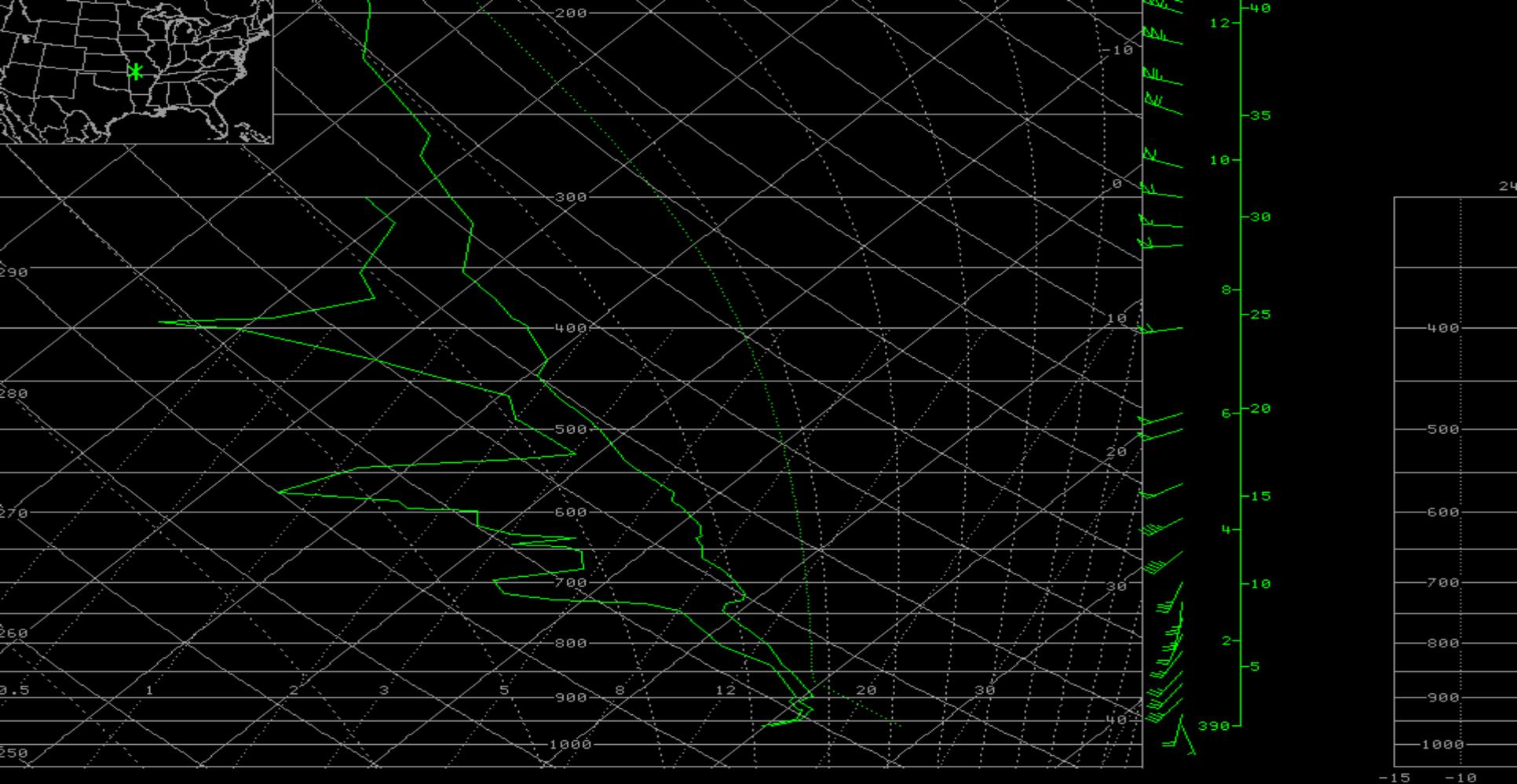
989.3

1:59

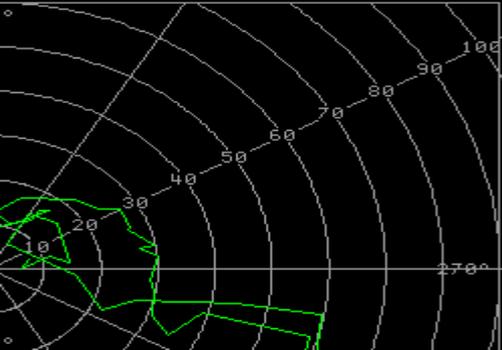
Hourly Max gusts, SIU, 5/8/2009

<i>Gust</i> <u>(mph)</u>	<i>Time</i> <u>(CST)</u>	<i>Direction</i> <u>(deg)</u>
11.86	9:50 A.M.	143.5
30.71	10:44	87.9
41.08	11:54	194.1
77.38	12:21 P.M.	299.4
Anemometer broke		





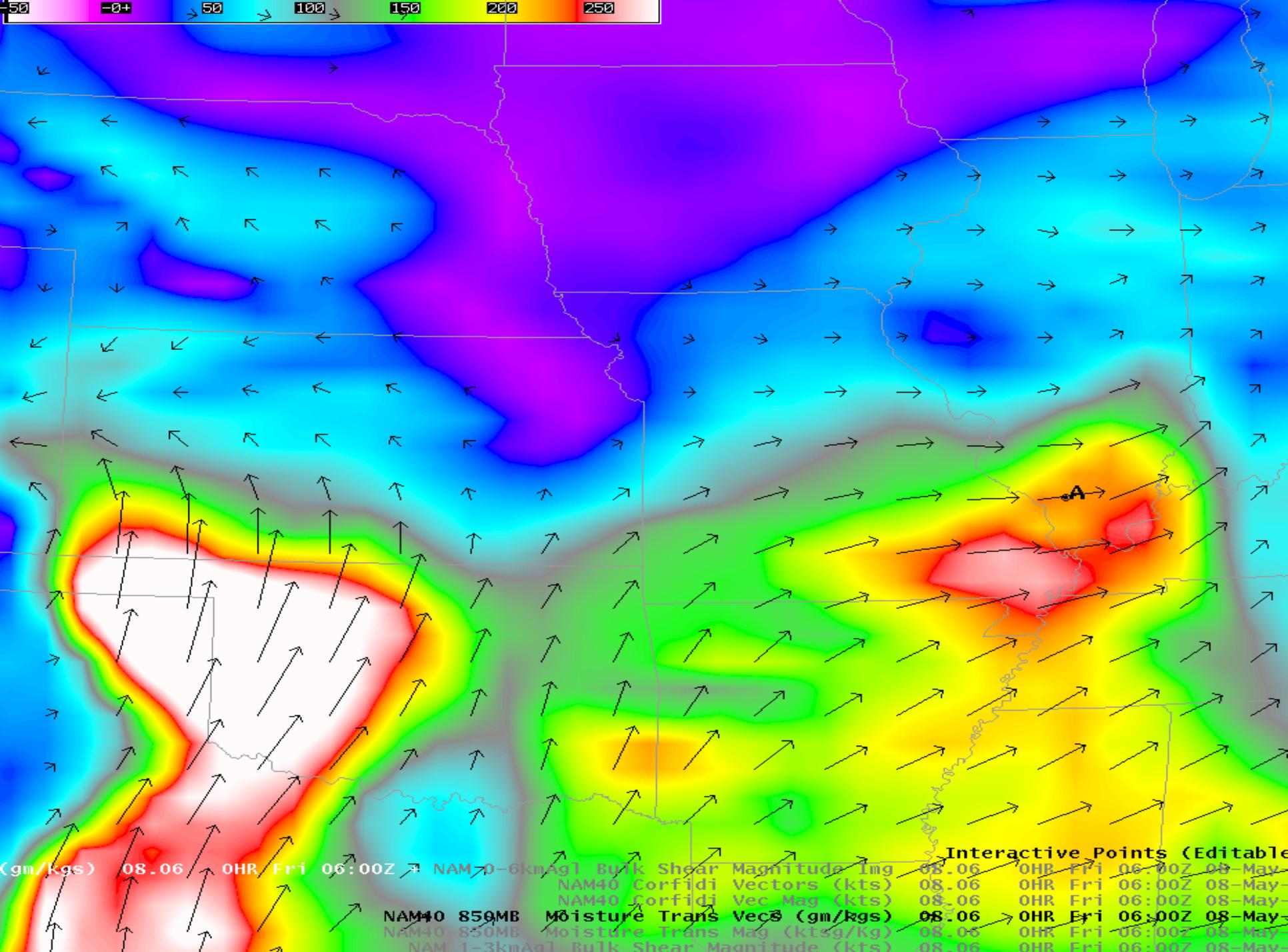
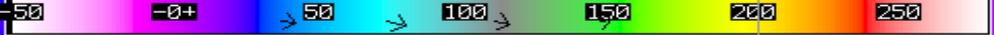
GRAPH SPEED IN m/s



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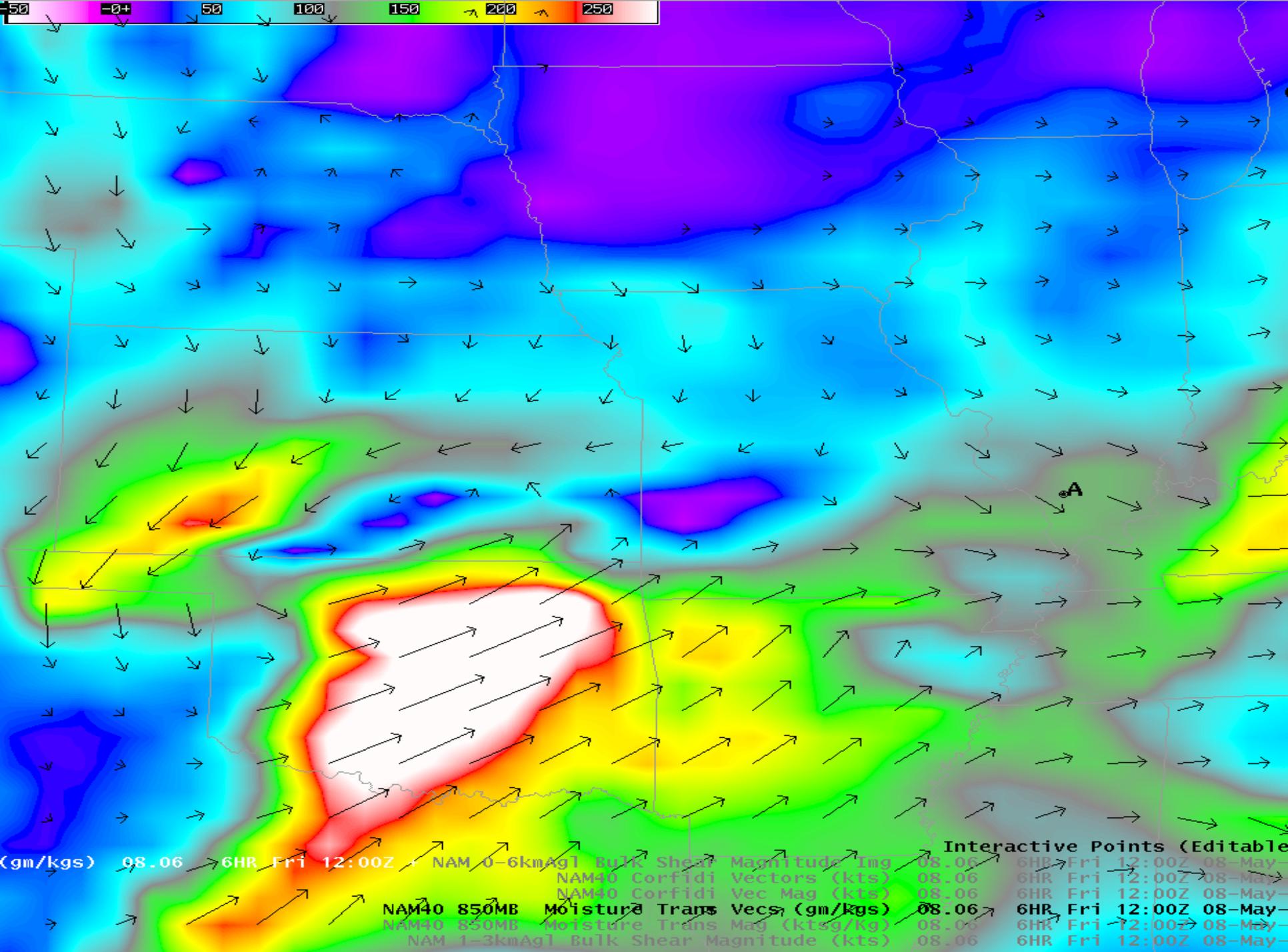
PRECIP WATER= 1.51 in
K-INDEX= 32
TOTALS INDEX= 57
SWEAT INDEX= 565
DRY MICROBURST POT=2: GST < 30 kts
FREEZING LEVEL= 13860 ft ASL
WET-BULB ZERO HGT= 11947 ft ASL
0-6 KM AVG WIND= 225°/33 kts
0-6 KM STM MTN (30R75)= 255°/24 kts
0-3 KM STM REL HELICITY= 268 m²/s²
FORECAST MAX TEMP= 82° F
TRIGGER TEMP= 27° C/80° F
SOARING INDEX= 212 ft/min
MDPI/WINDEX = 0.97/21

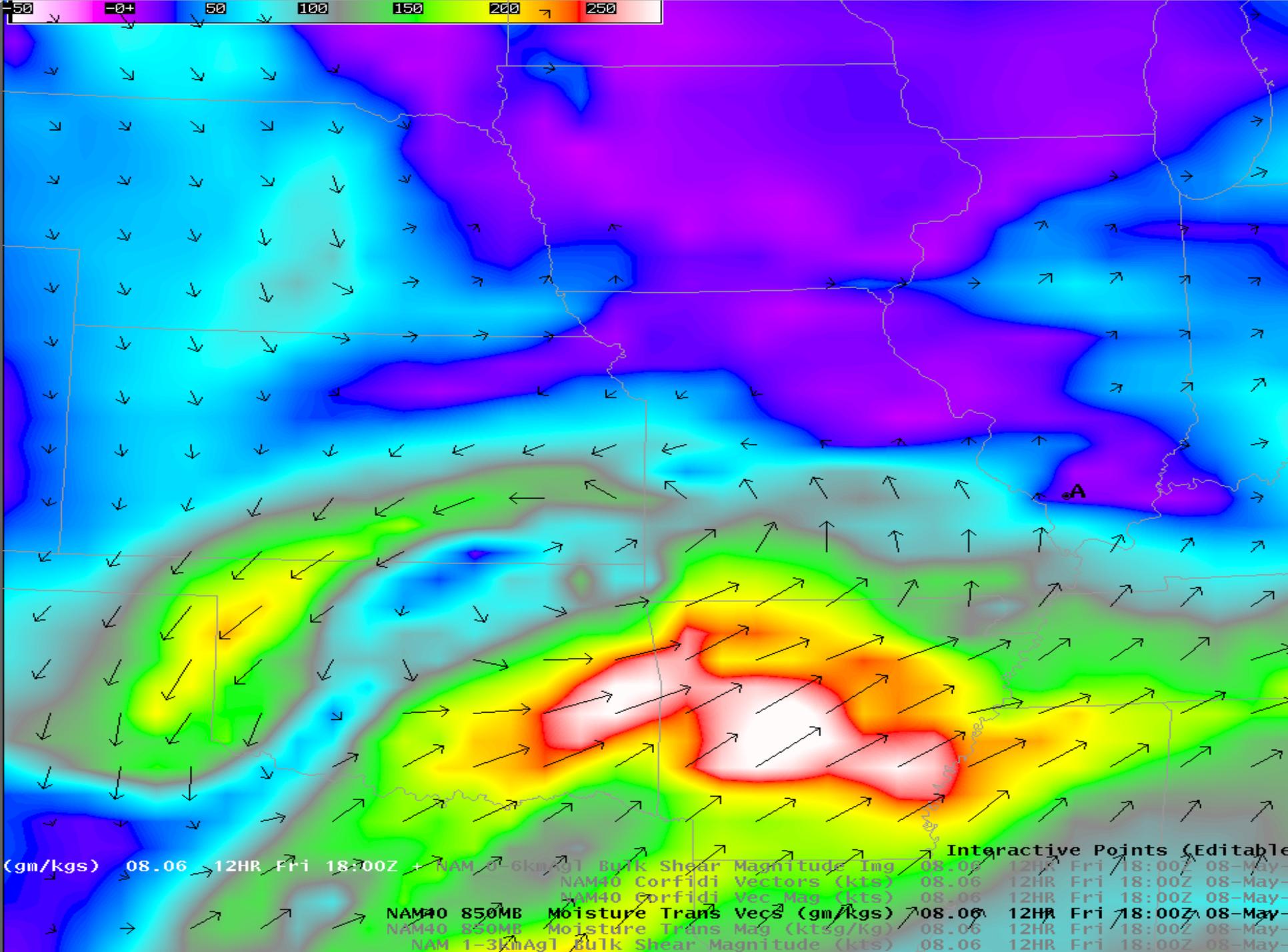
* -PARCEL- T=FCST MAX;Td=50 mb MEAN
* MOD PARCEL P= 958 mb
* MOD PARCEL T/Td= 82/69° F;27/20° C
* CONVECTIVE TEMP= 69° F
* LIFTED INDEX= -10.0
* CCL= 1279 ft ASL/ 958 mb
* LCL= 4141 ft ASL/ 867 mb
* LFC= 4141 ft ASL/ 867 mb
* MAX HAILSIZE= 27.5 cm/10.8 in
* MAX VERTICAL VELOCITY= 75 m/s
* EQUIL LEVEL= 42404 ft ASL/176 mb
* APPROX CLOUD TP=NA
* POSITIVE ENERGY ABV LFC= 4117 J/KG
* NEGATIVE ENERGY BLW LFC=NONE
* BULK RICHARDSON NUMBER= 84.7
  
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(gm/kg) 08.06 OHR Fri 06:00Z NAM 0-6km Agl Bulk Shear Magnitude (kts) 08.06 OHR Fri 06:00Z 08-May-
 NAM40 Corfidi Vectors (kts) 08.06 OHR Fri 06:00Z 08-May-
 NAM40 Corfidi Vec Mag (kts) 08.06 OHR Fri 06:00Z 08-May-
 NAM40 850MB Moisture Trans Vecs (gm/kg) 08.06 OHR Fri 06:00Z 08-May-
 NAM40 850MB Moisture Trans Mag (kts/kg) 08.06 OHR Fri 06:00Z 08-May-
 NAM 1-3km Agl Bulk Shear Magnitude (kts) 08.06 OHR Fri 06:00Z 08-May-

Interactive Points (Editable)





(gm/kgs) 08.06 12HR Fri 18:00Z + NAM 0-6km Agl Bulk Shear Magnitude (mg) 08.06 12HR Fri 18:00Z 08-May-08

NAM40 Corfidi Vectors (kts) 08.06 12HR Fri 18:00Z 08-May-08

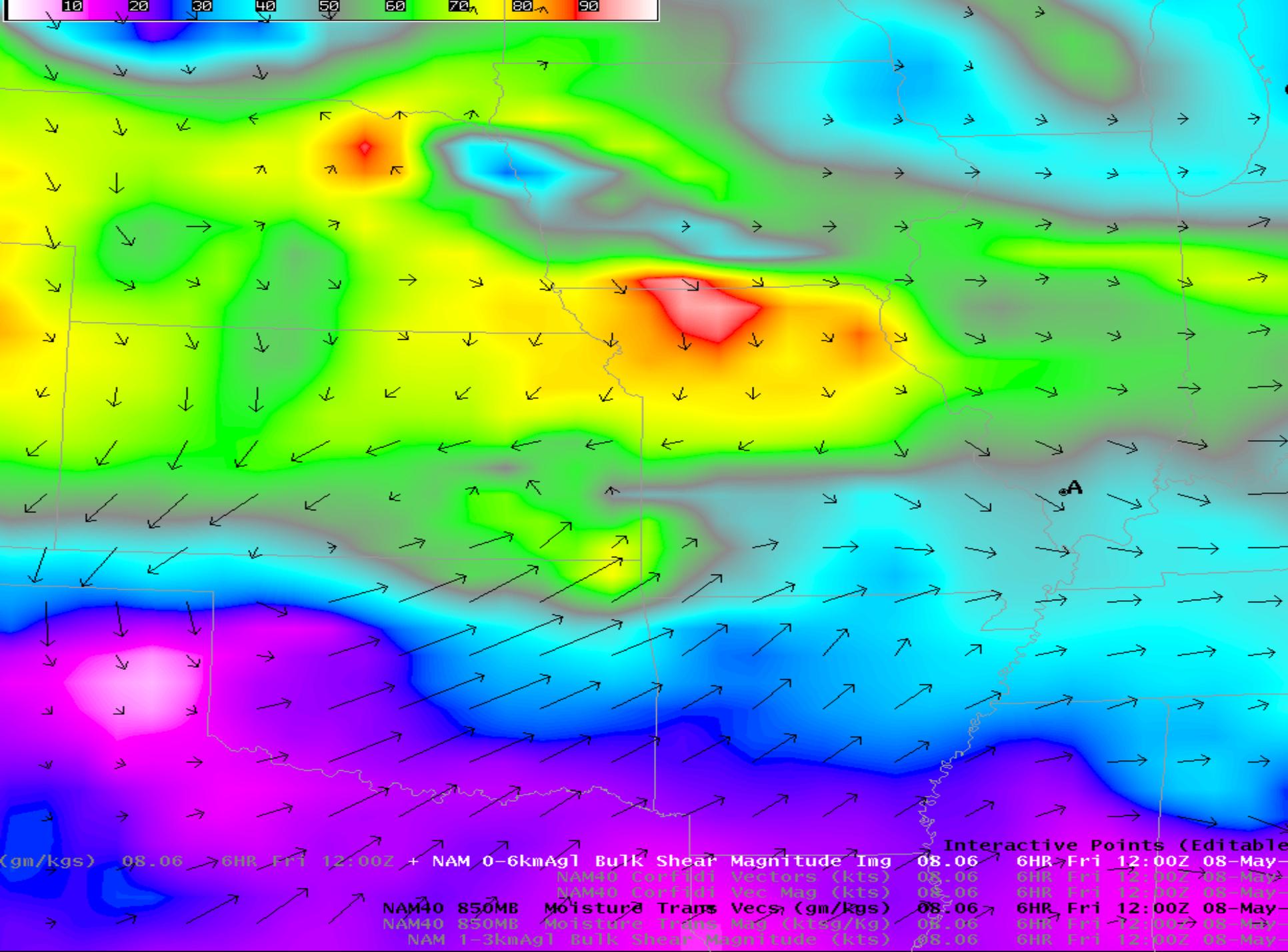
NAM40 Corfidi Vec Mag (kts) 08.06 12HR Fri 18:00Z 08-May-08

NAM40 850MB Moisture Trans Vecs (gm/kgs) 08.06 12HR Fri 18:00Z 08-May-08

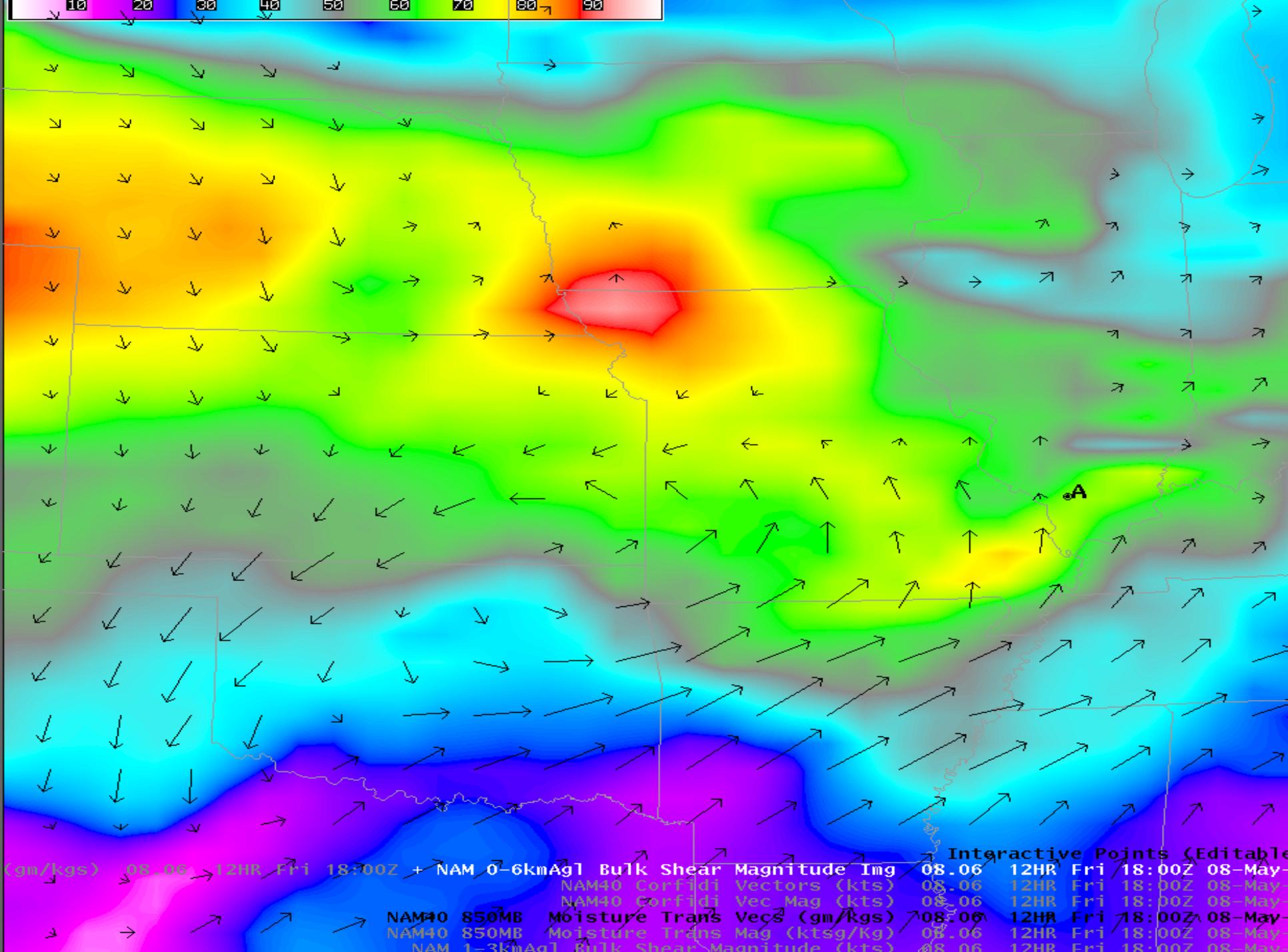
NAM40 850MB Moisture Trans Mag (kts) 08.06 12HR Fri 18:00Z 08-May-08

NAM 1-3km Agl Bulk Shear Magnitude (kts) 08.06 12HR Fri 18:00Z 08-May-08

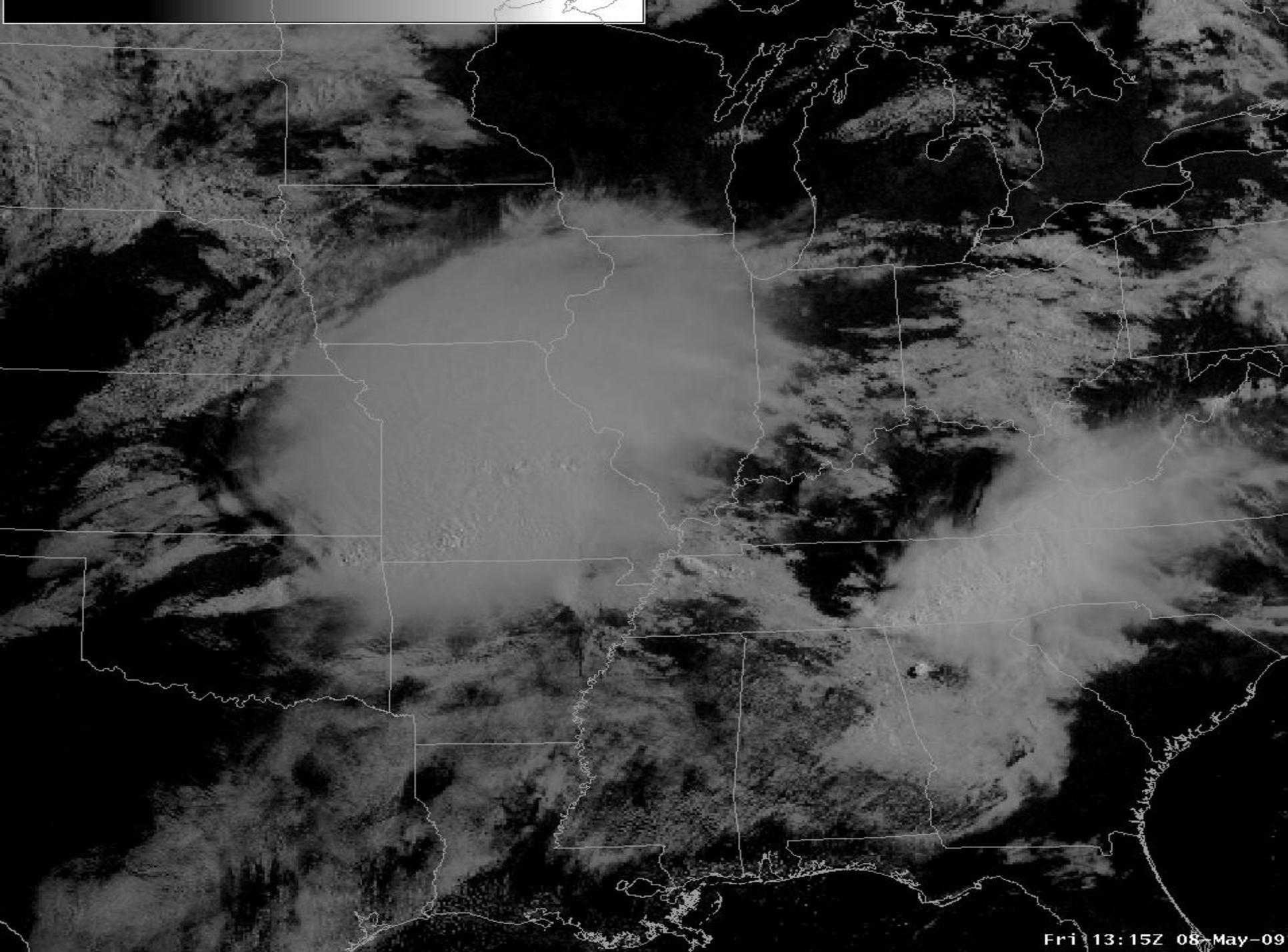
Interactive Points (Editable)



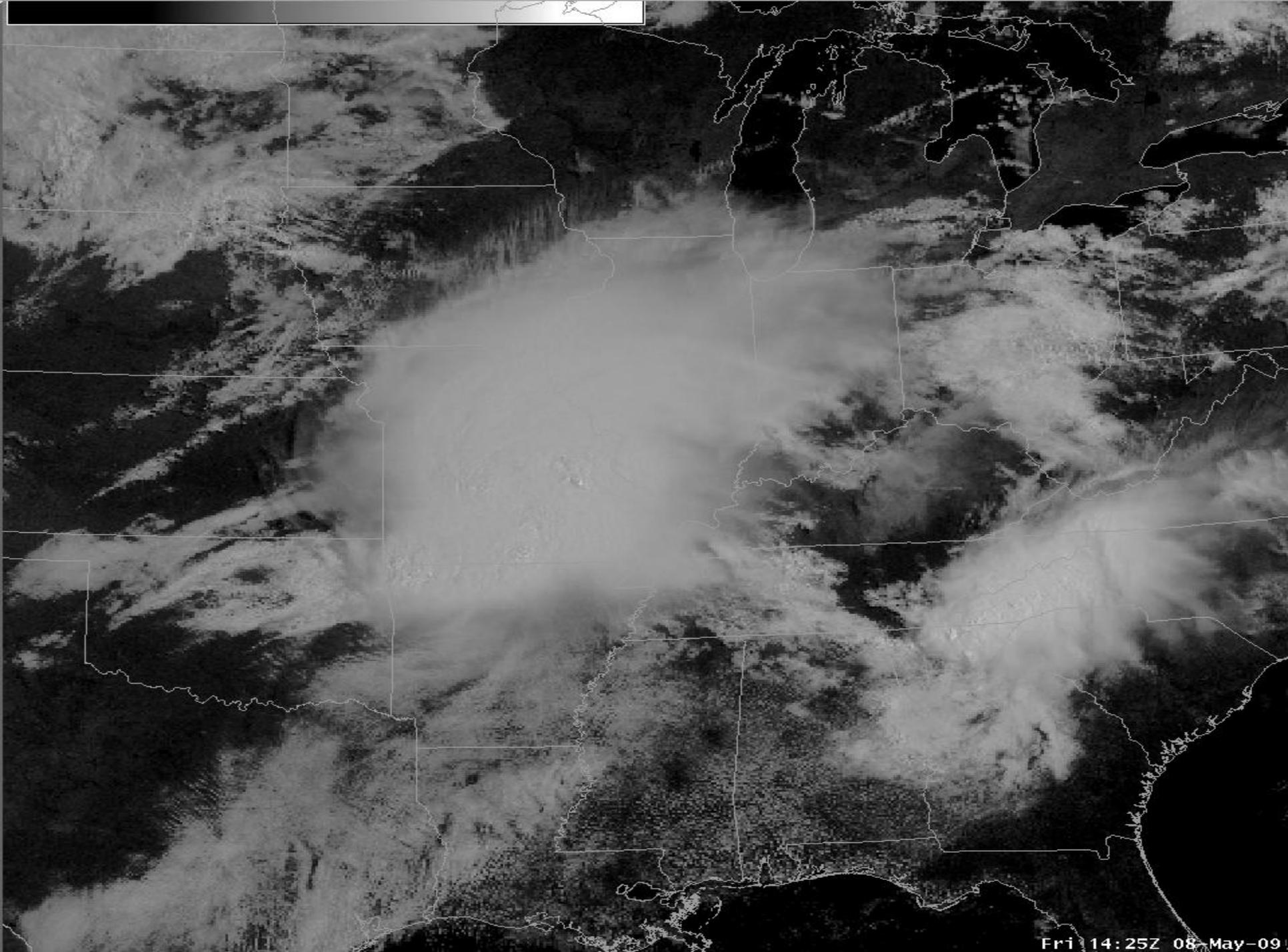
(gm/kgs) 08.06 6HR Fri 12:00Z + NAM 0-6kmAg1 Bulk Shear Magnitude Img 08.06 6HR Fri 12:00Z 08-May-
 NAM40 Corfidi Vectors (kts) 08.06 6HR Fri 12:00Z 08-May-
 NAM40 Corfidi Vec Mag (kts) 08.06 6HR Fri 12:00Z 08-May-
 NAM40 850MB Moisture Trans Vecs (gm/kgs) 08.06 6HR Fri 12:00Z 08-May-
 NAM40 850MB Moisture Trans Mag (kt/g/kg) 08.06 6HR Fri 12:00Z 08-May-
 NAM 1-3kmAg1 Bulk Shear Magnitude (kts) 08.06 6HR Fri 12:00Z 08-May-



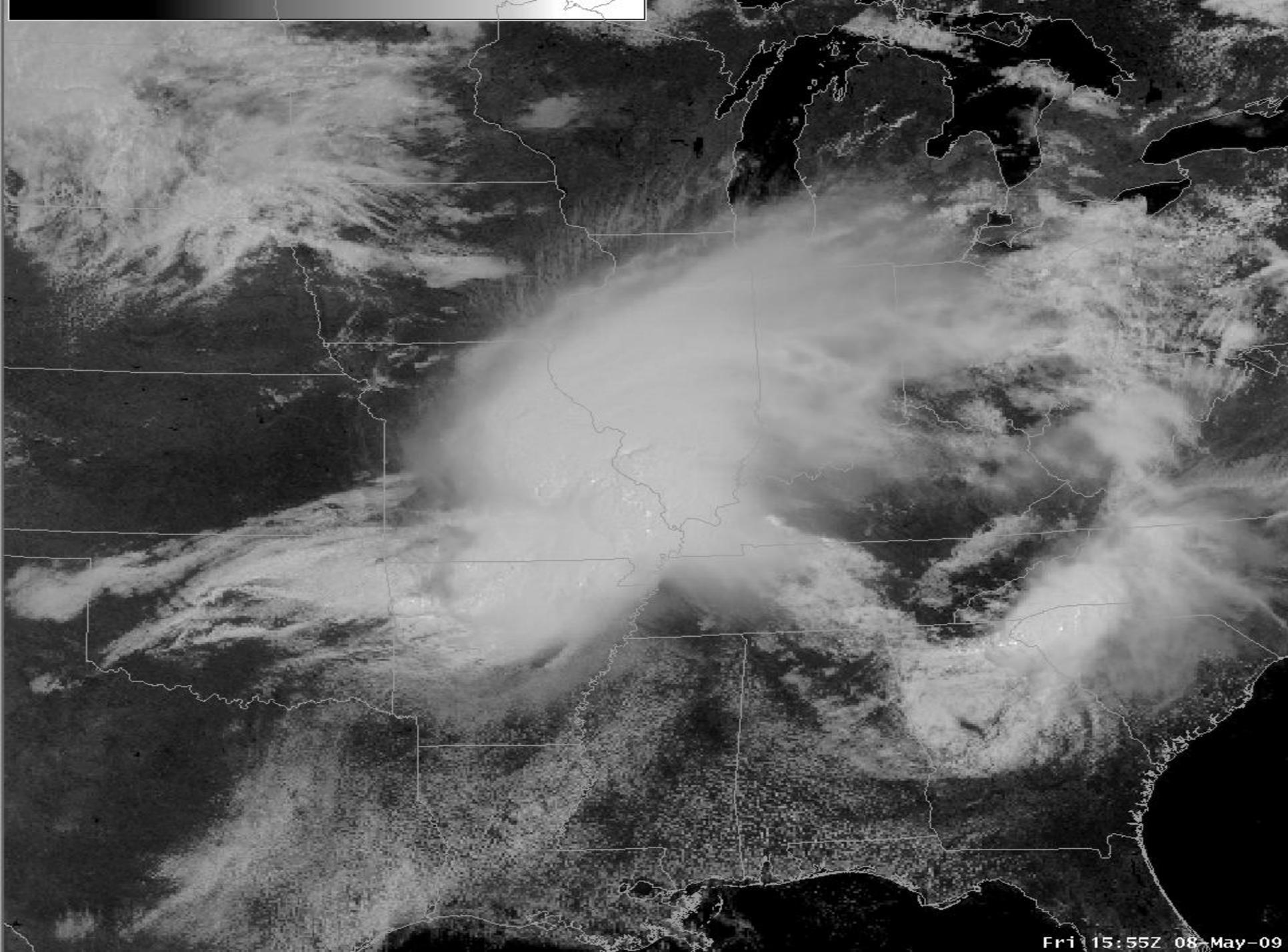
Interactive Points (Editable)											
gm/Kgs)	08.06	12HR	Fri	18:00Z	NAM 0-6kmAg1 Bulk Shear Magnitude	Img	08.06	12HR	Fri	18:00Z	08-May-
					NAM40 Corridi Vectors (kts)		08.06	12HR	Fri	18:00Z	08-May-
					NAM40 Corridi Vec Mag (kts)		08.06	12HR	Fri	18:00Z	08-May-
					NAM40 850MB Moisture Trans Vecs (gm/Kgs)		08.06	12HR	Fri	18:00Z	08-May-
					NAM40 850MB Moisture Trans Mag (kts/Kg)		08.06	12HR	Fri	18:00Z	08-May-
					NAM 1-3kmAg1 Bulk Shear Magnitude (kts)		08.06	12HR	Fri	18:00Z	08-May-



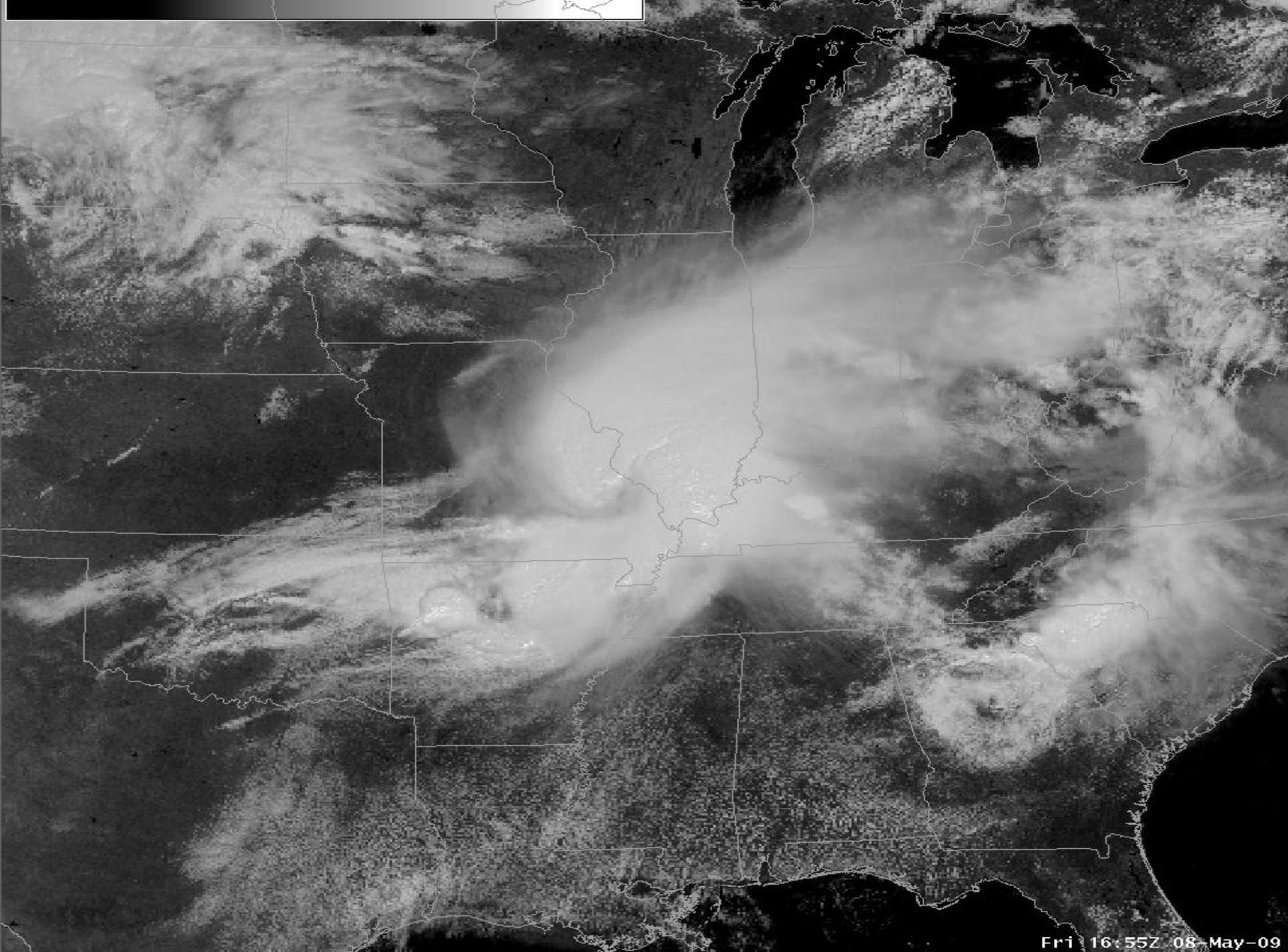
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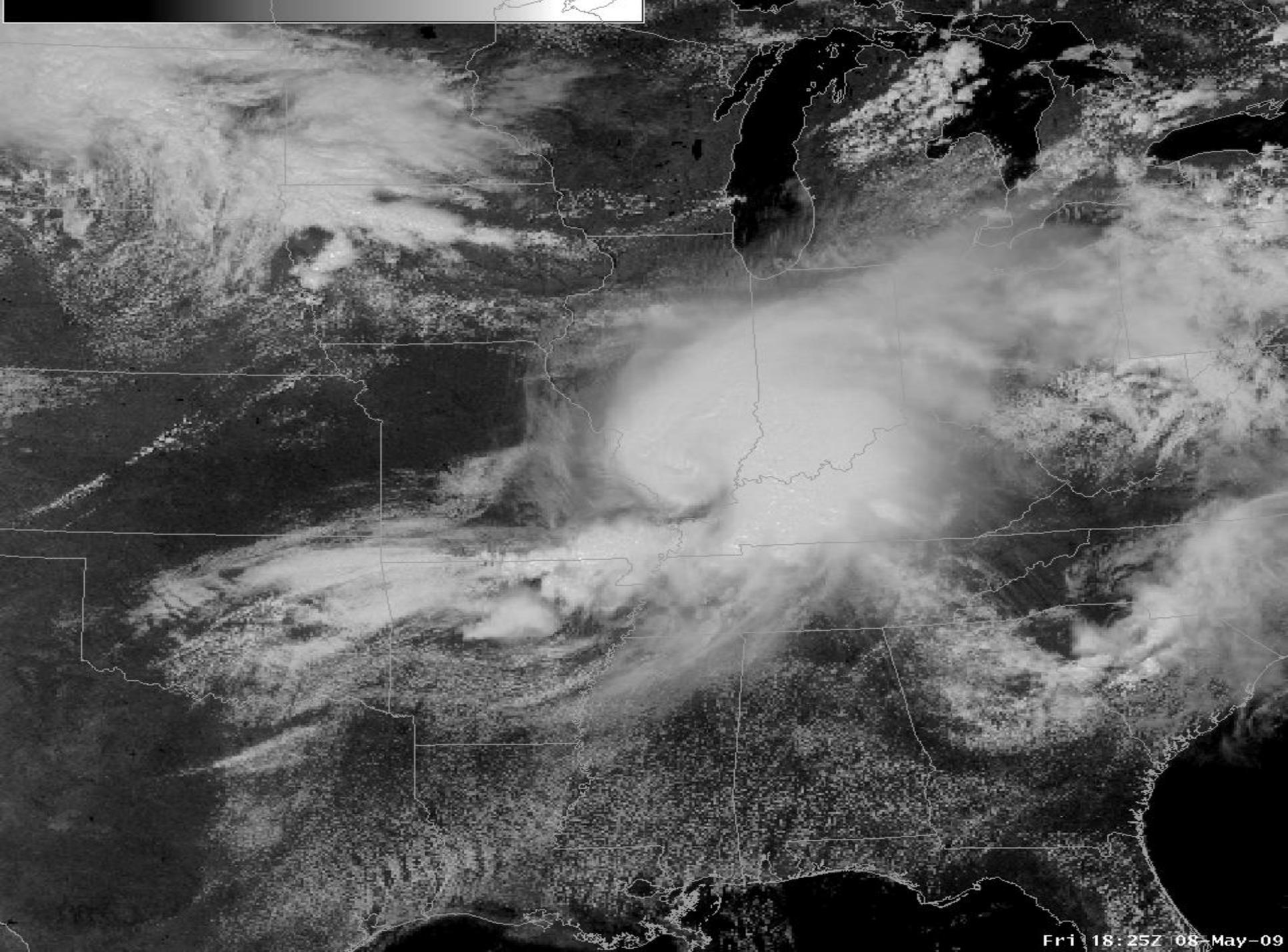
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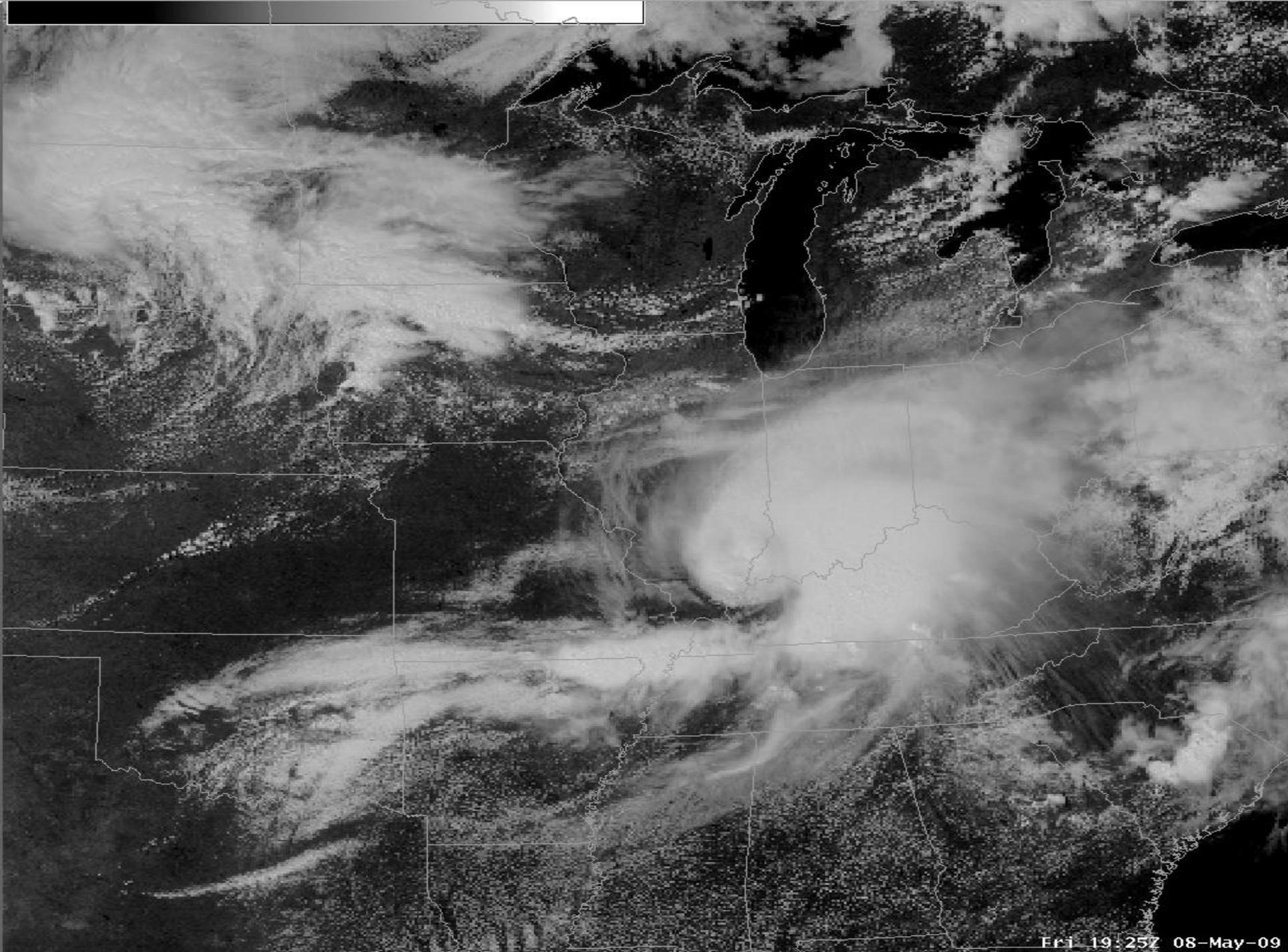
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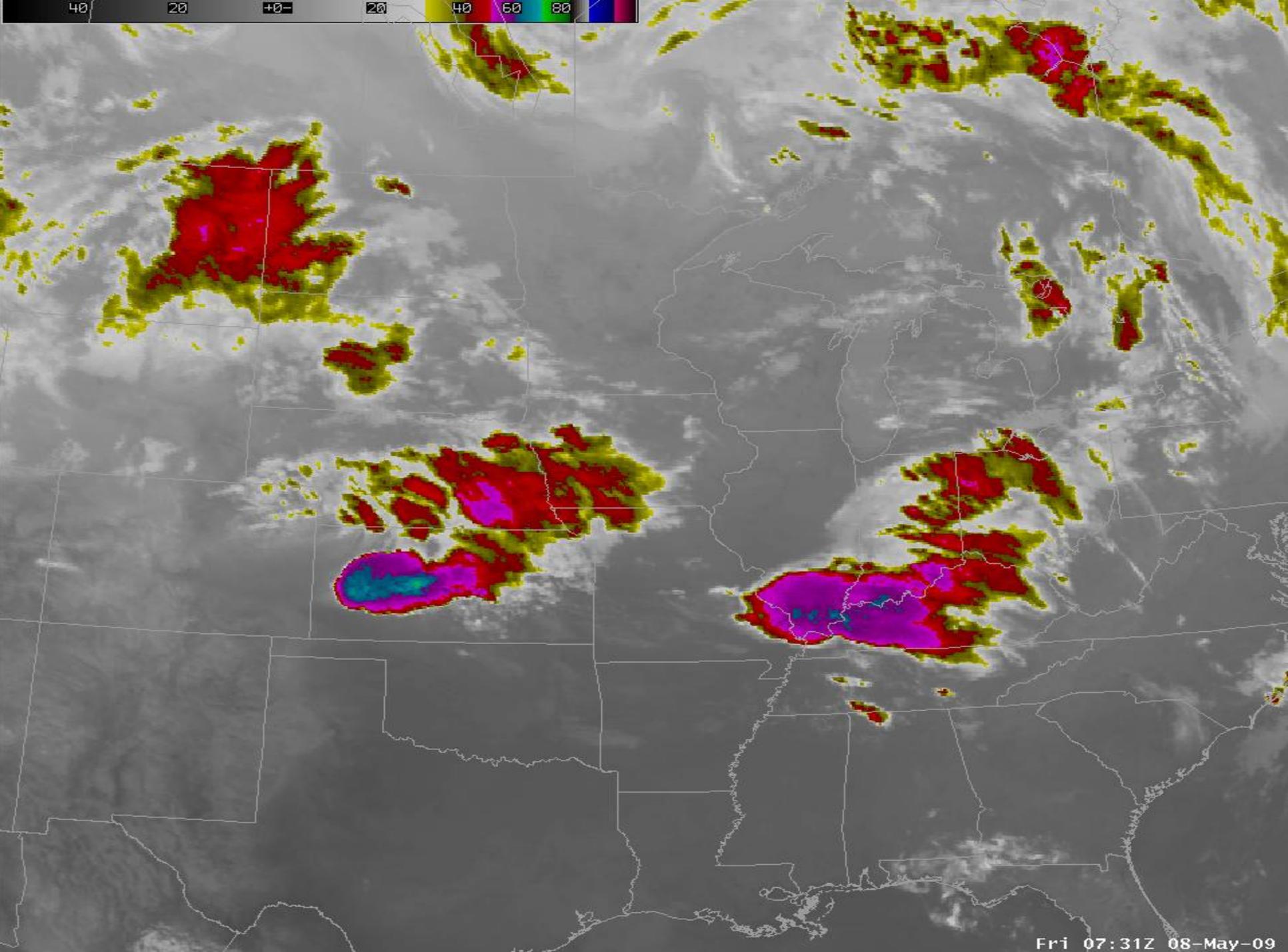
Fri 16:55Z 08-May-09



Fri 18:25Z 08-May-09



Fri 19:25Z 08-May-09



40

20

+0-

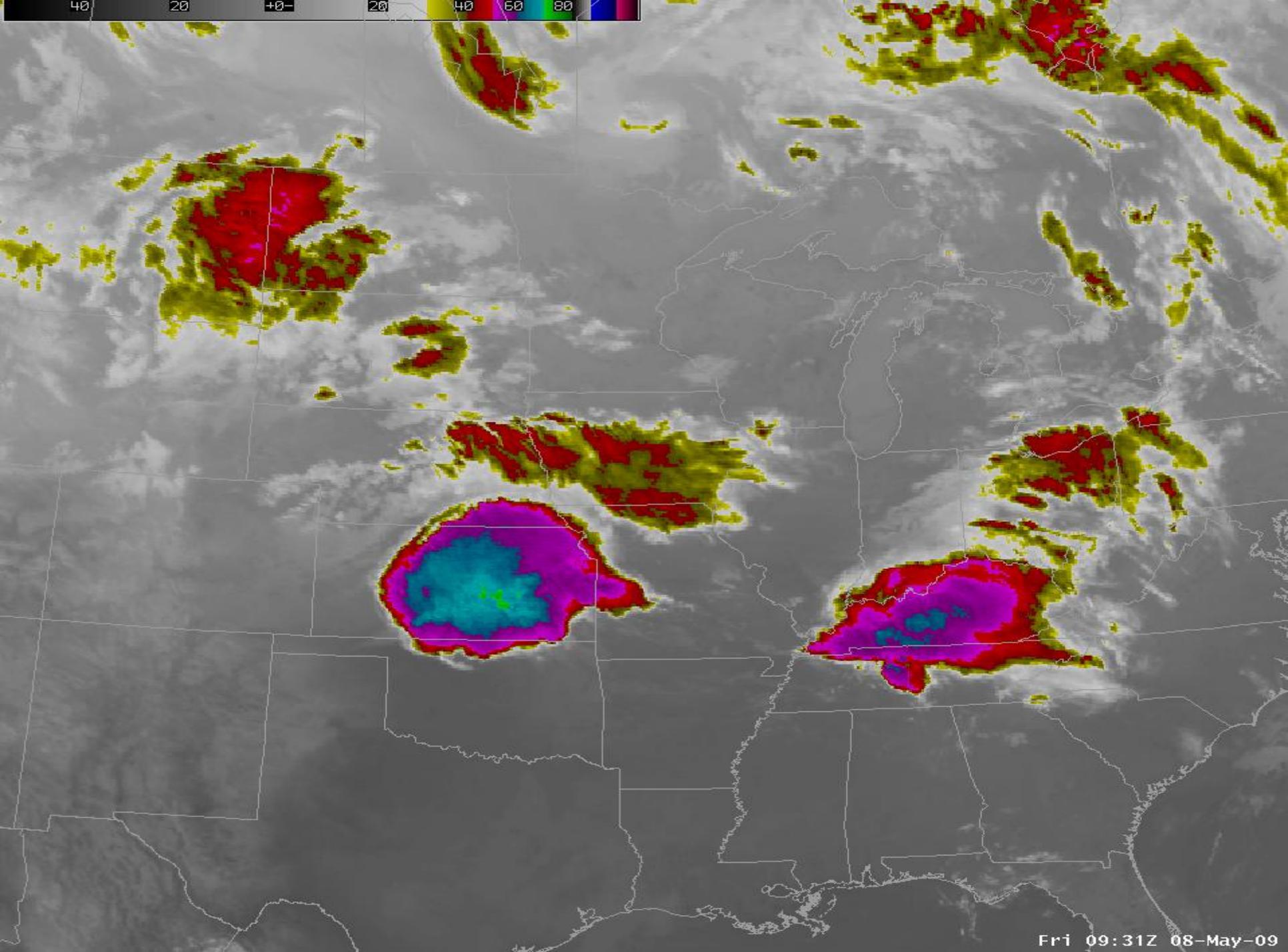
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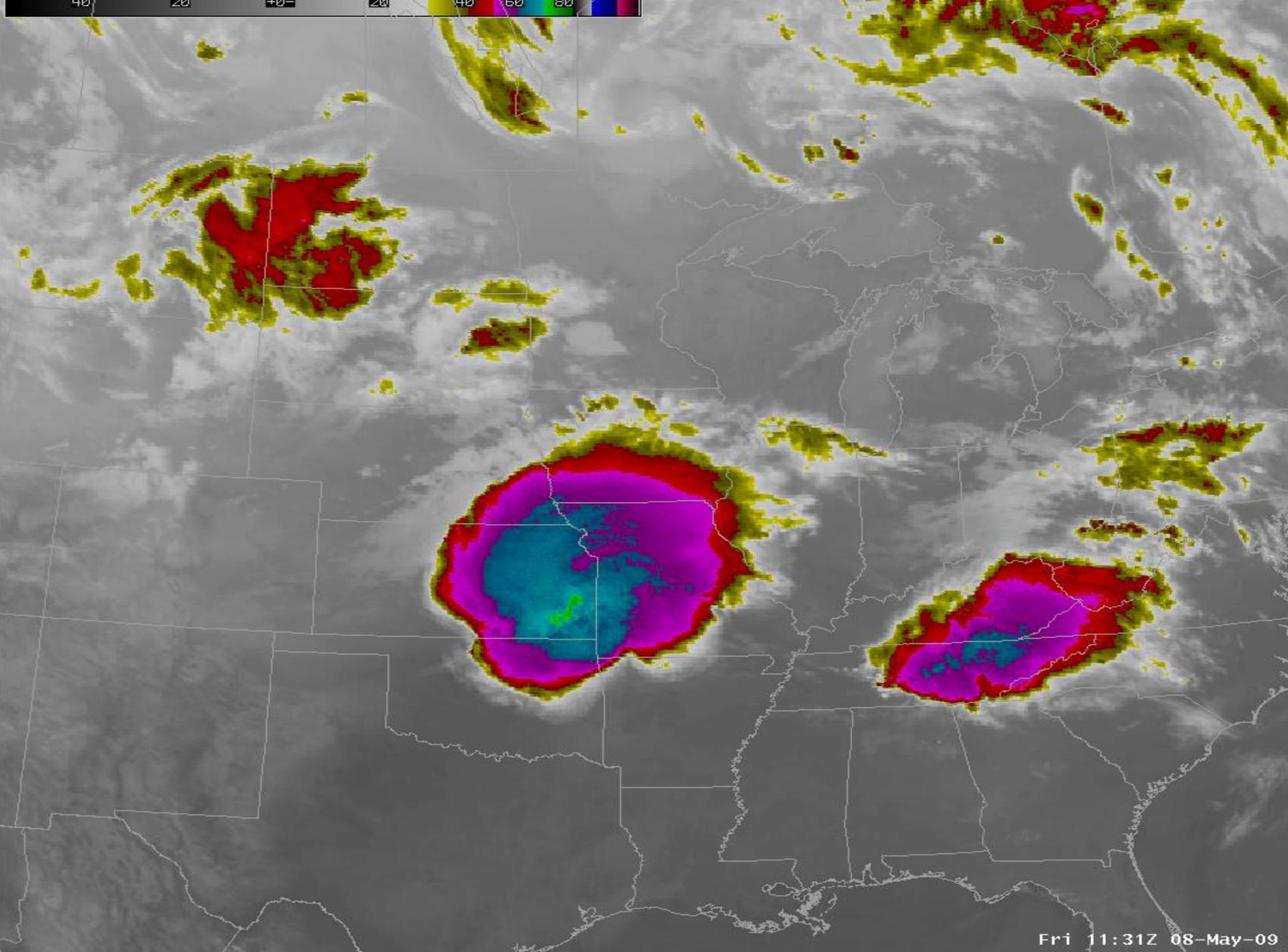
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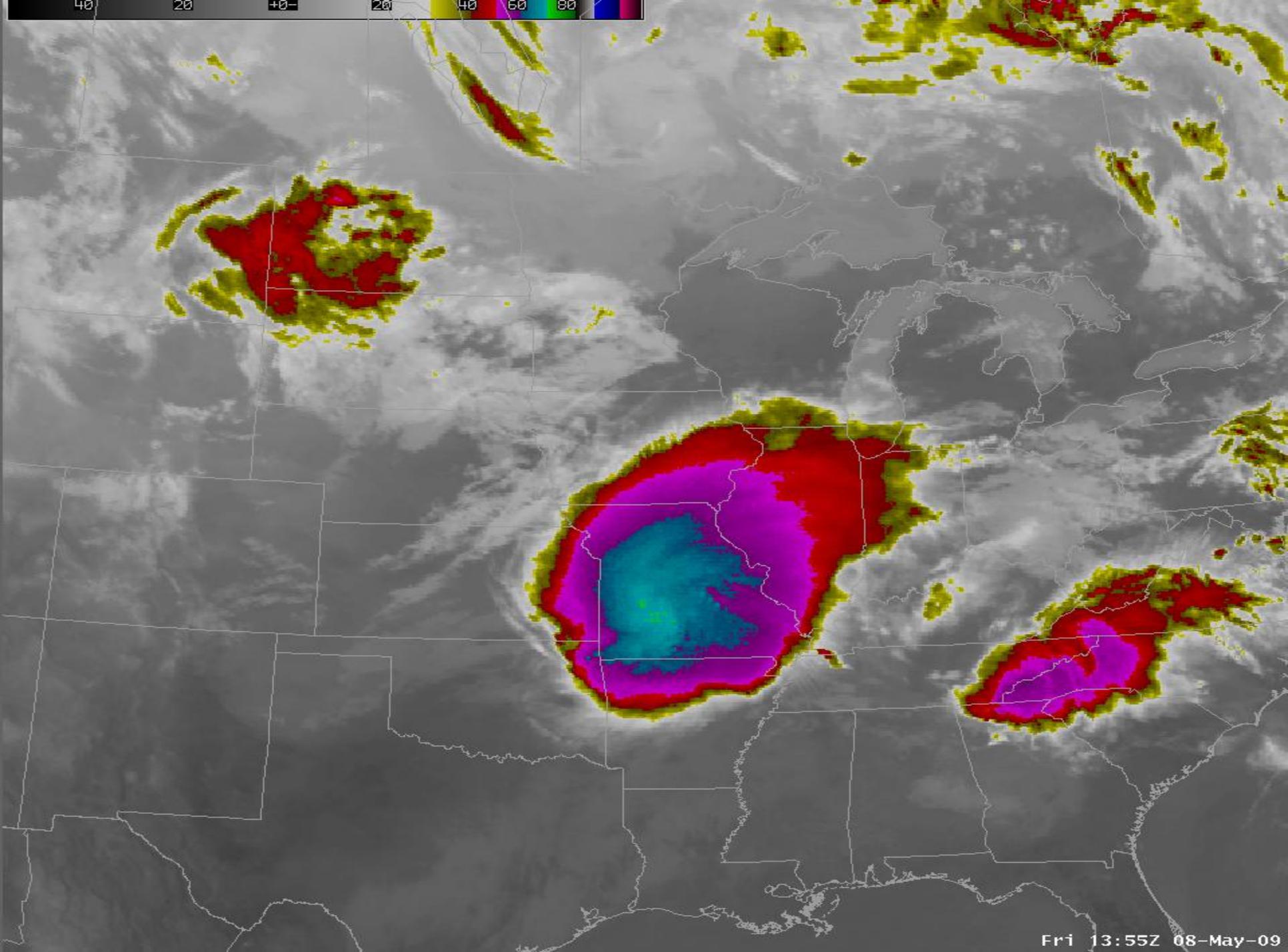
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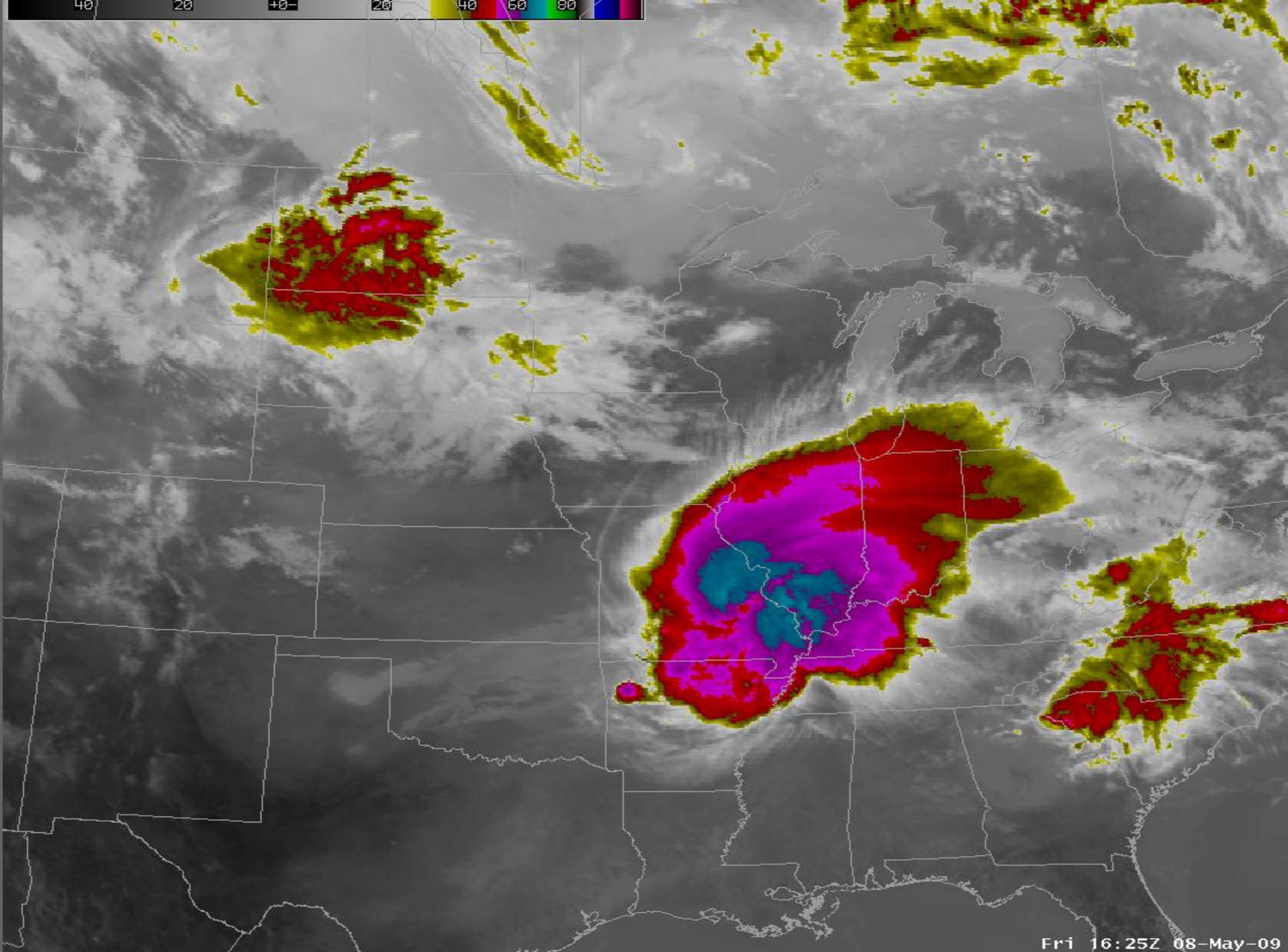
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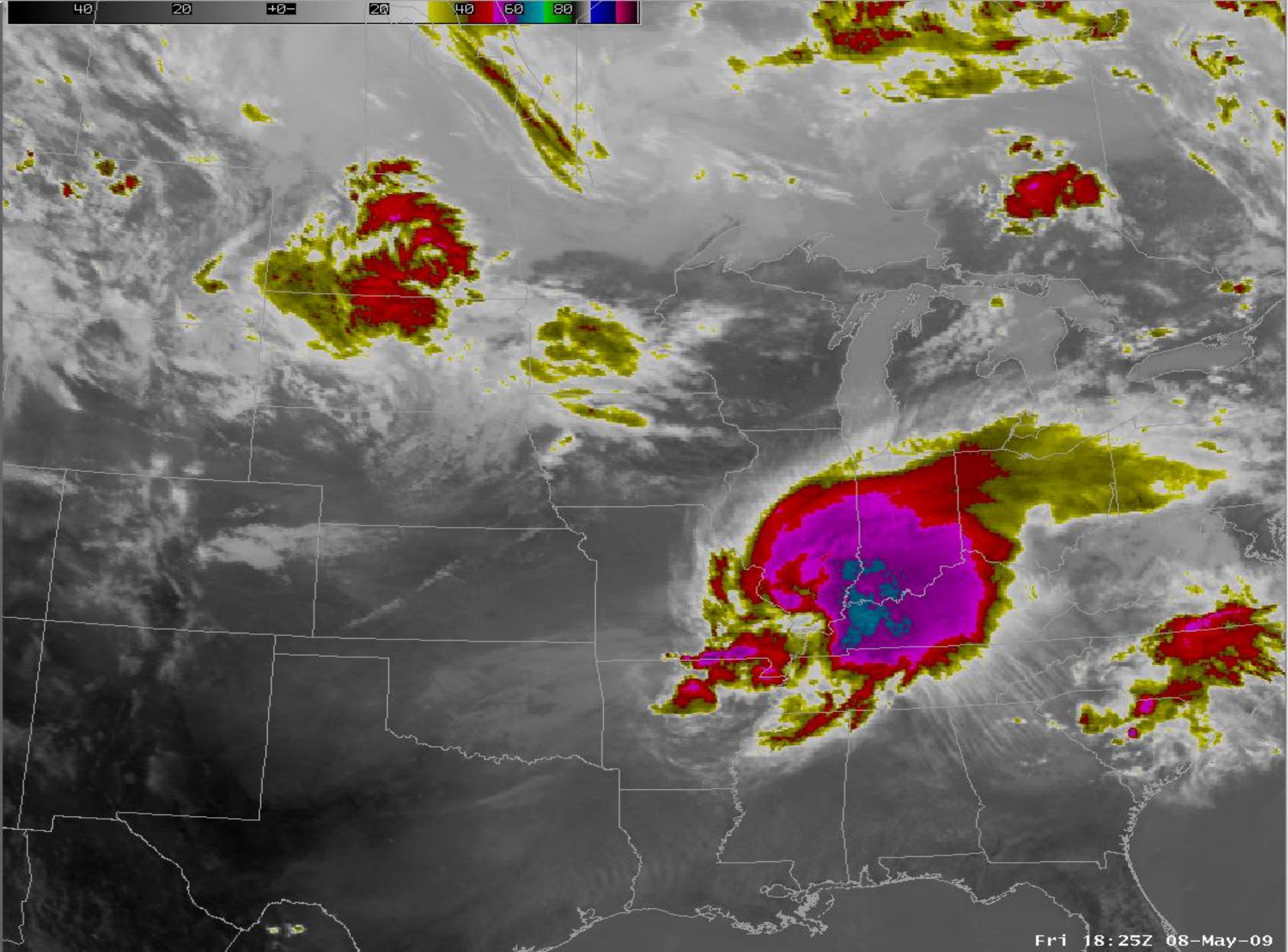


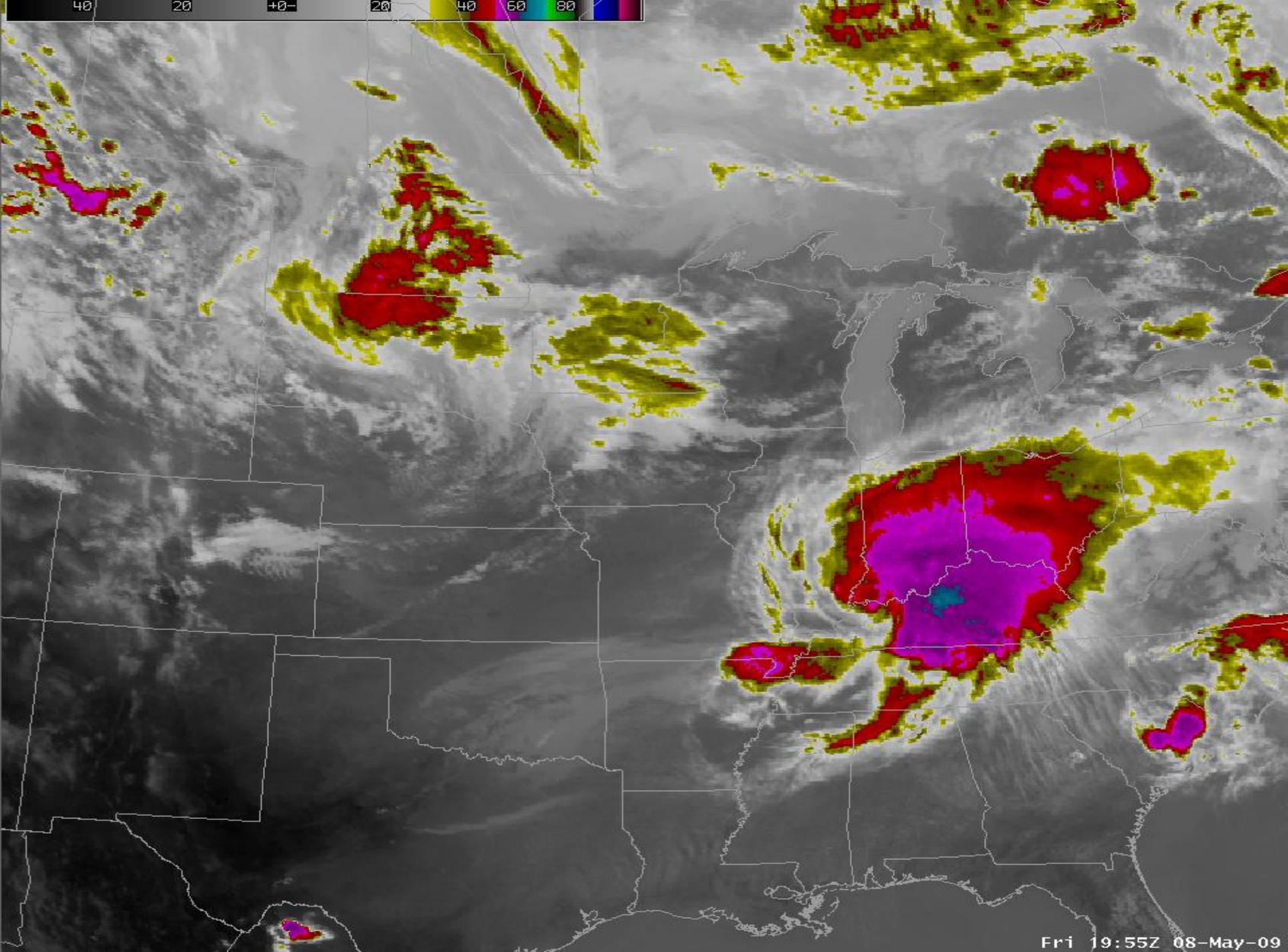




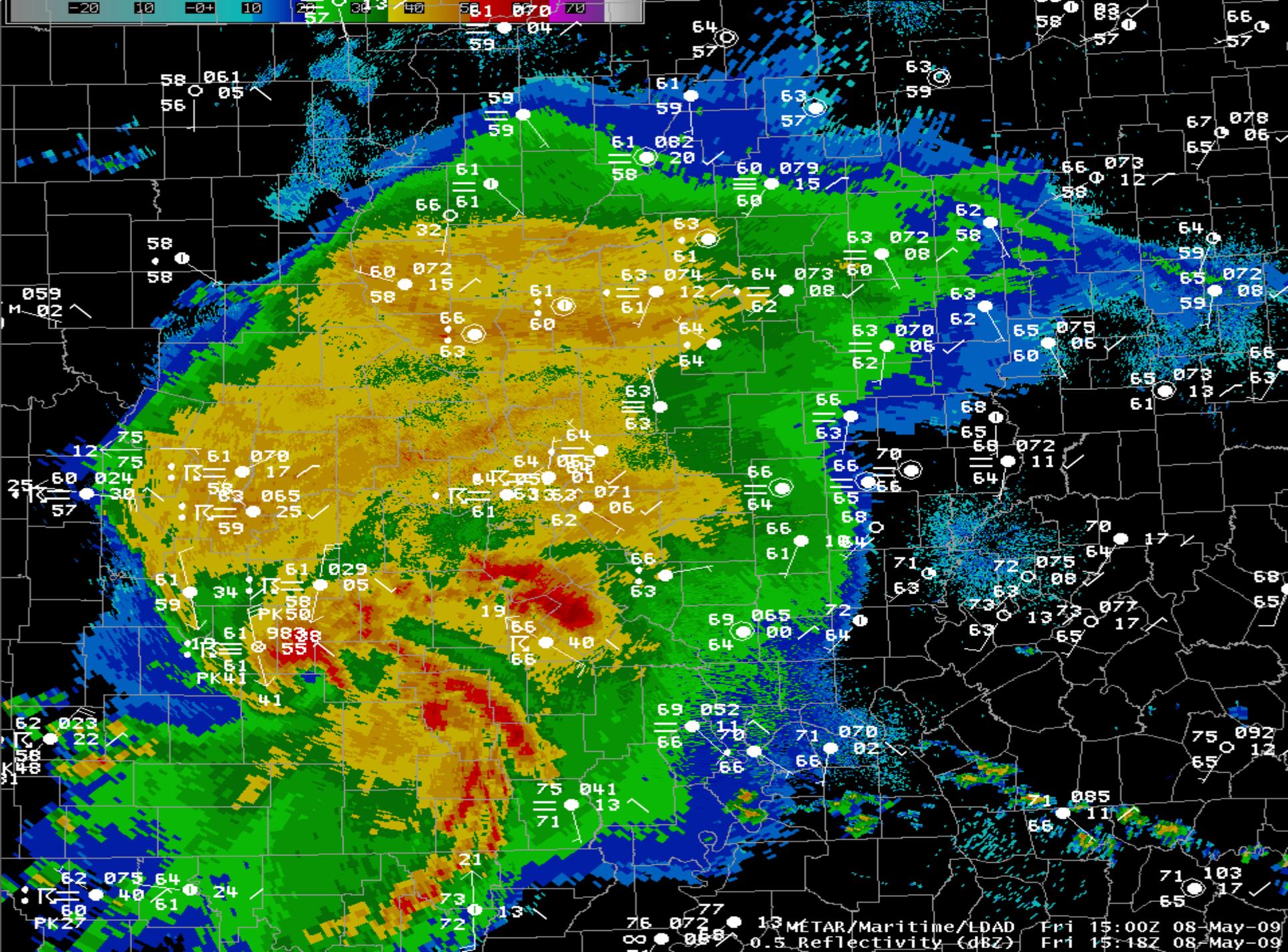


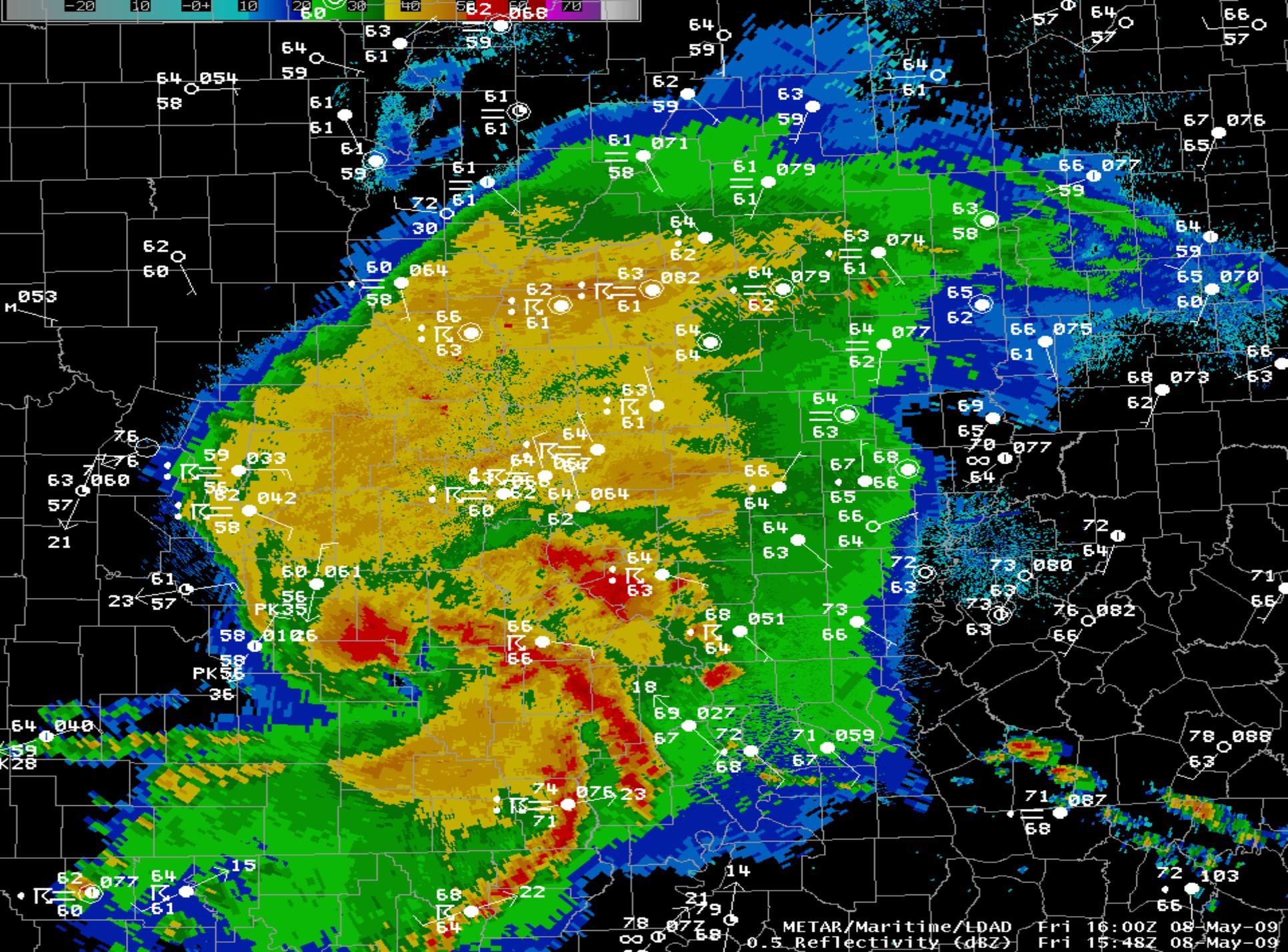
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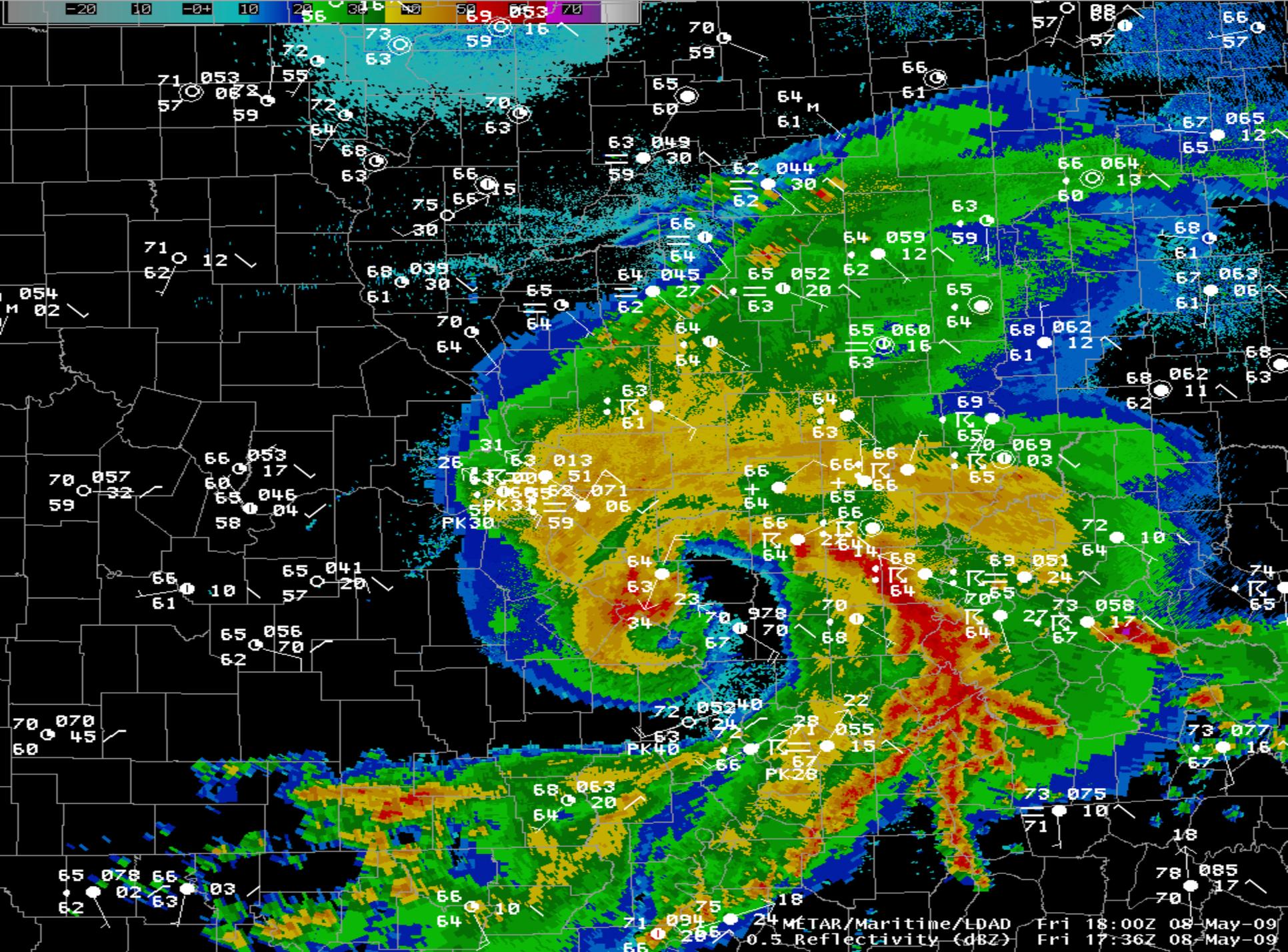




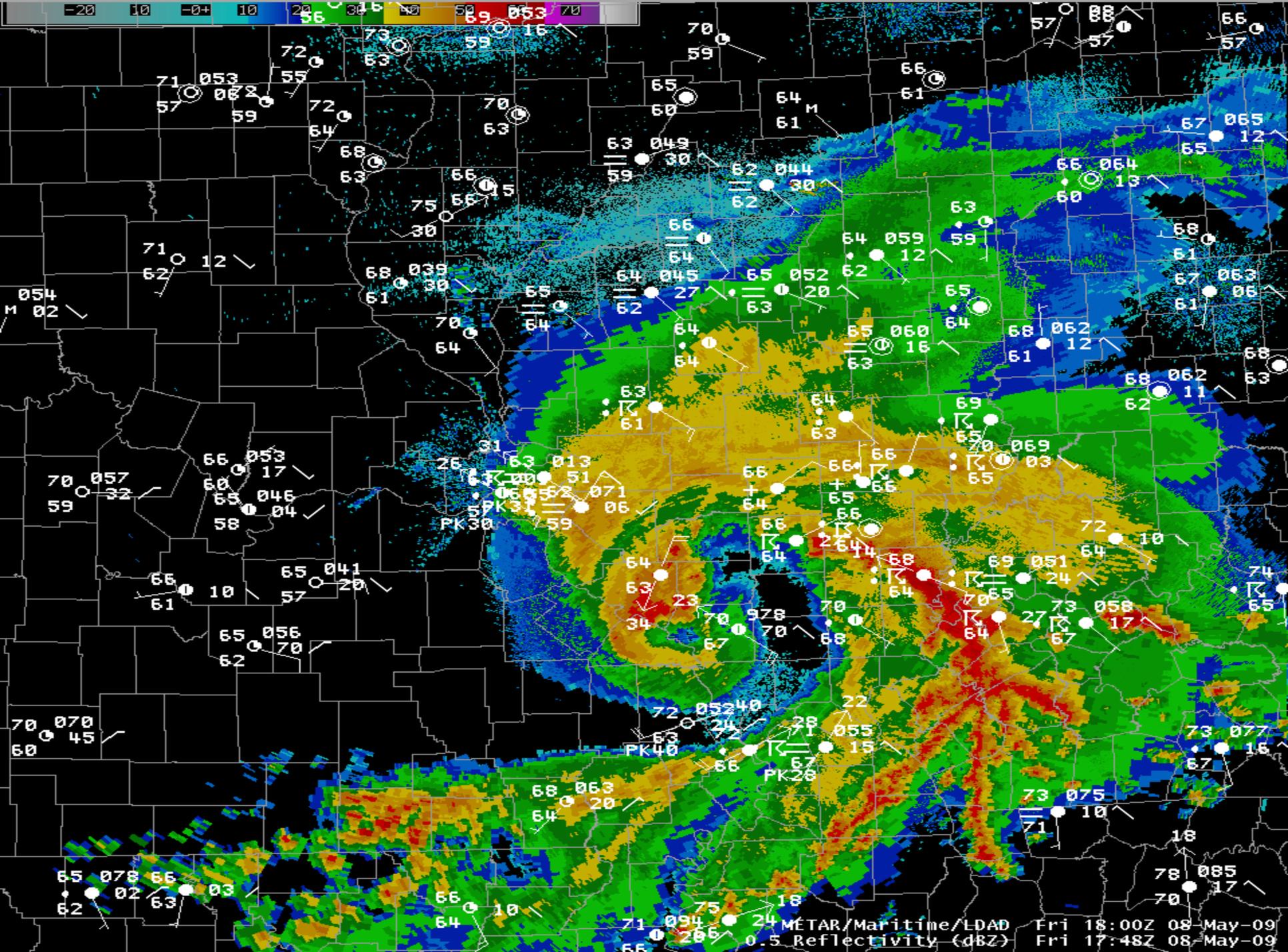
Fri 19:55Z 08-May-09





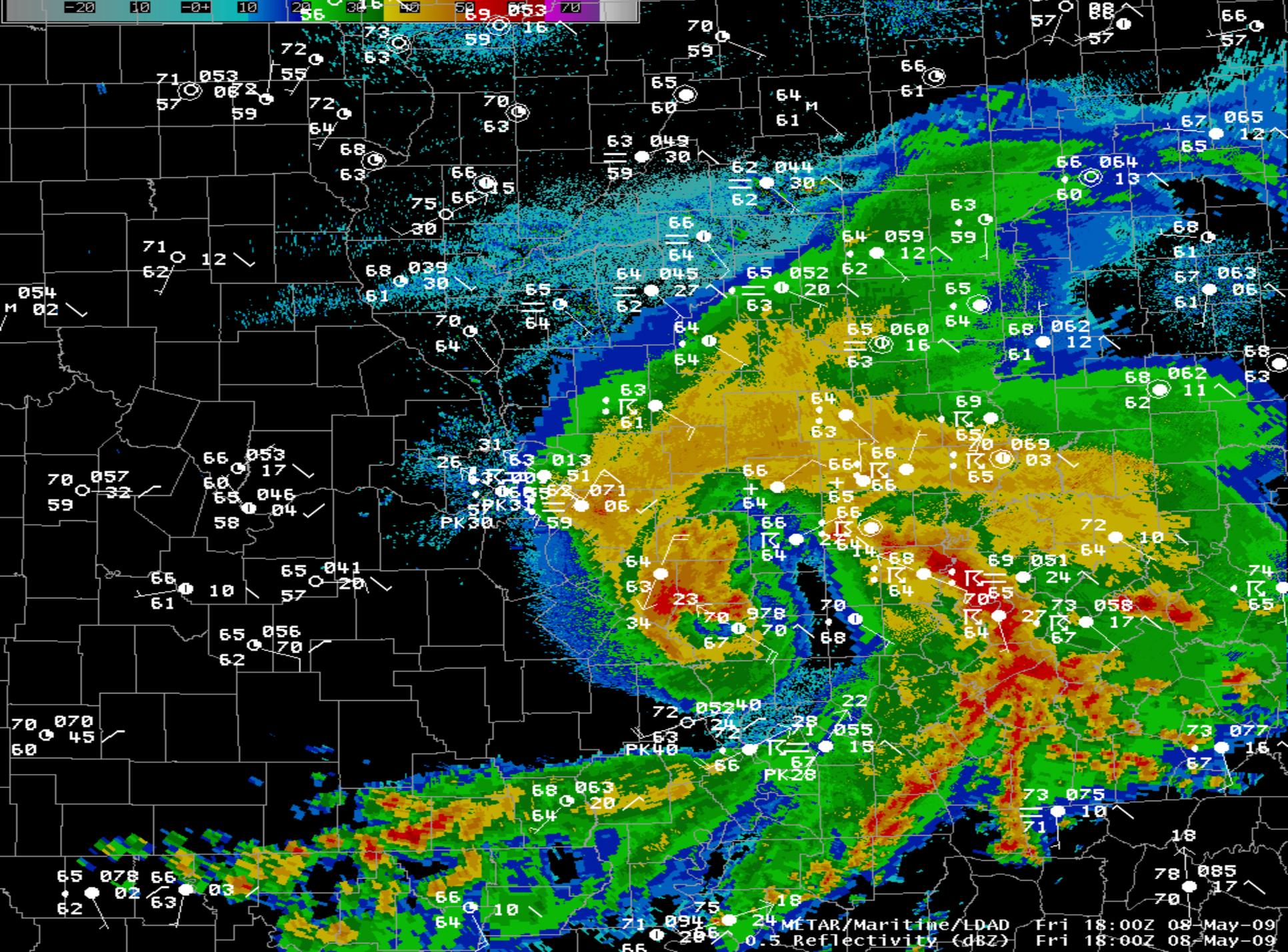


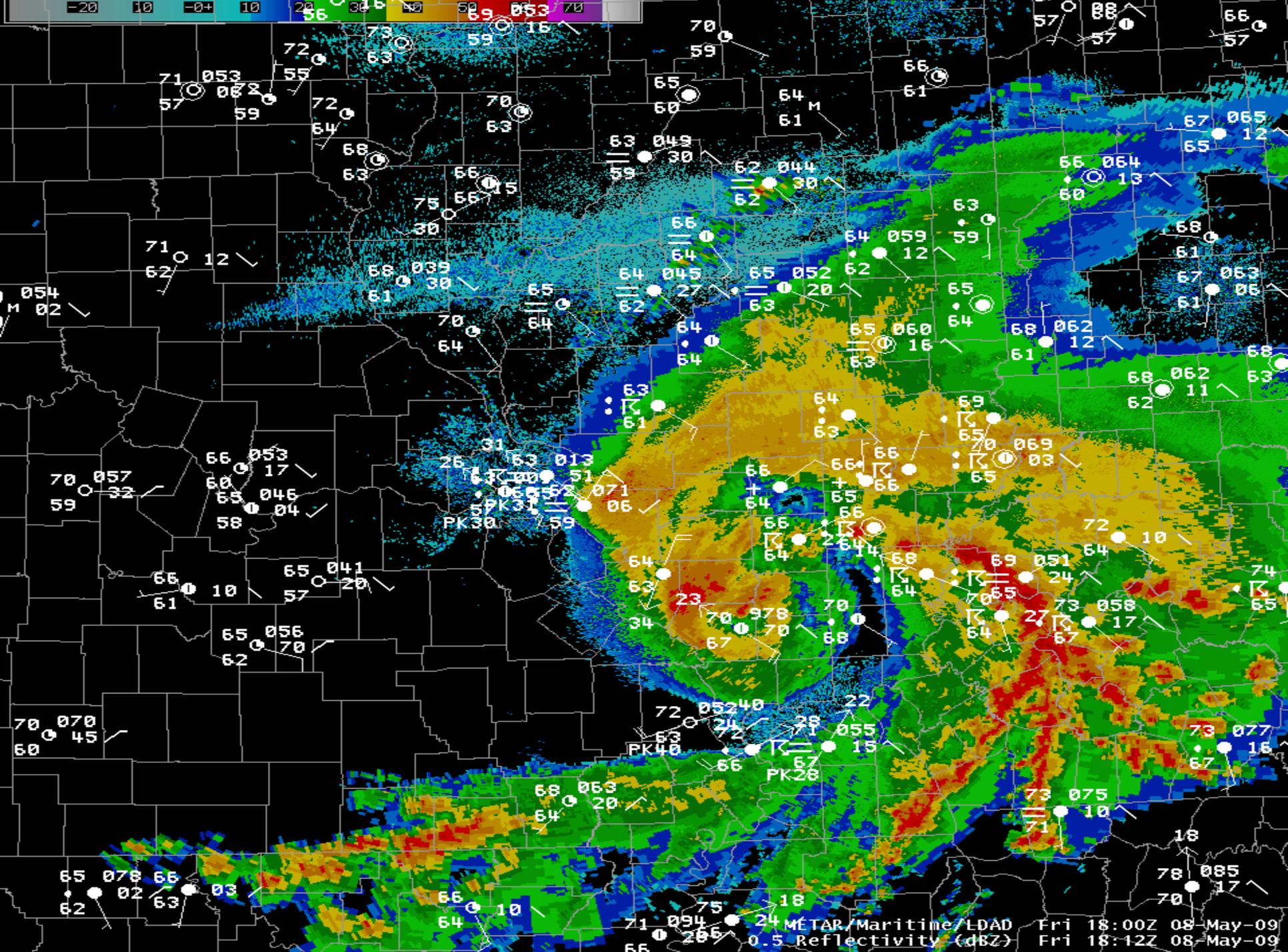
24 METAR/Maritime/LDAD Fri 18:00Z 08-May-09
0.5 Reflectivity (dBZ) Fri 17:36Z 08-May-09

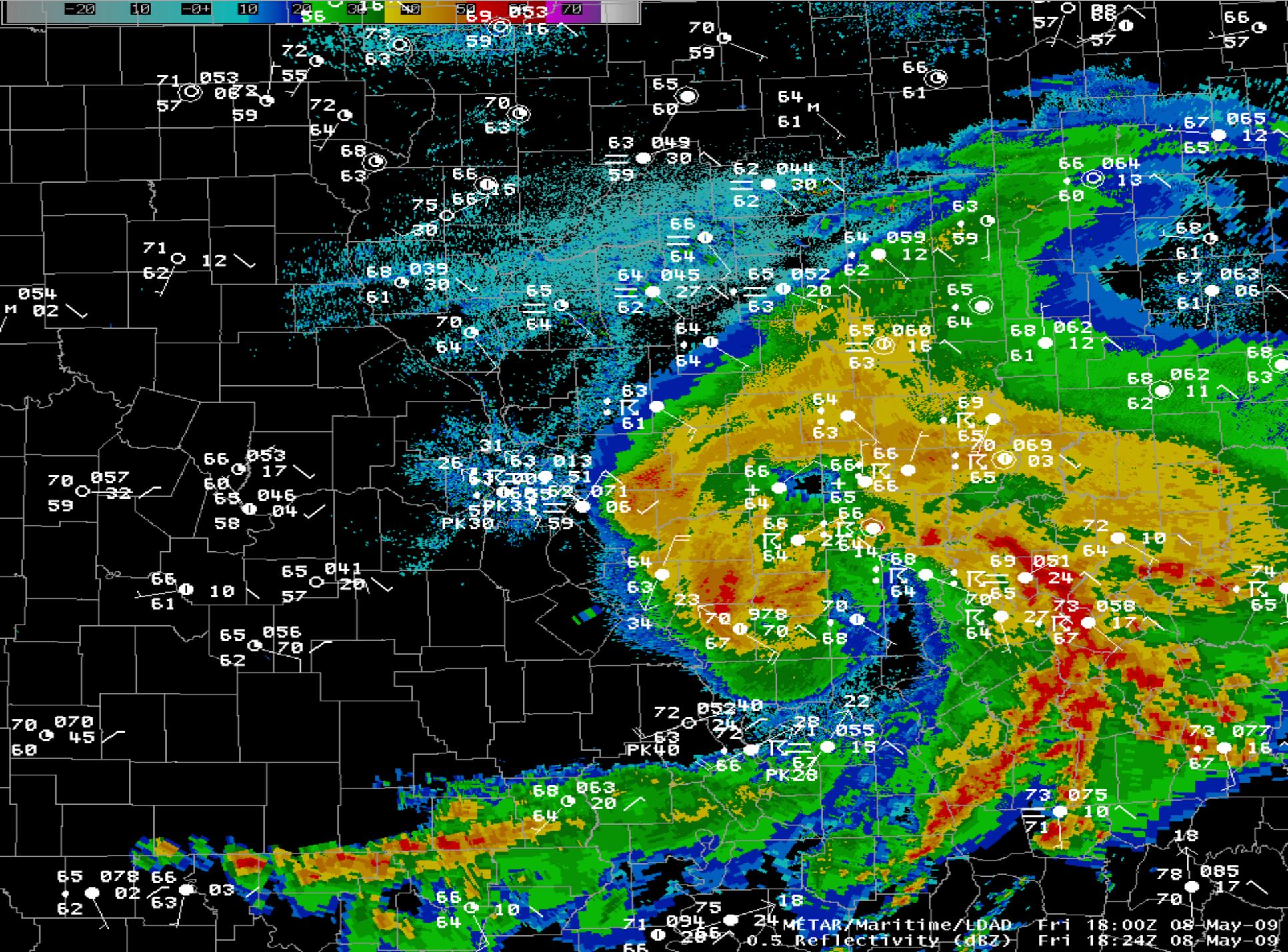


-20 10 -0+ 10 20 30 40 50 60 70

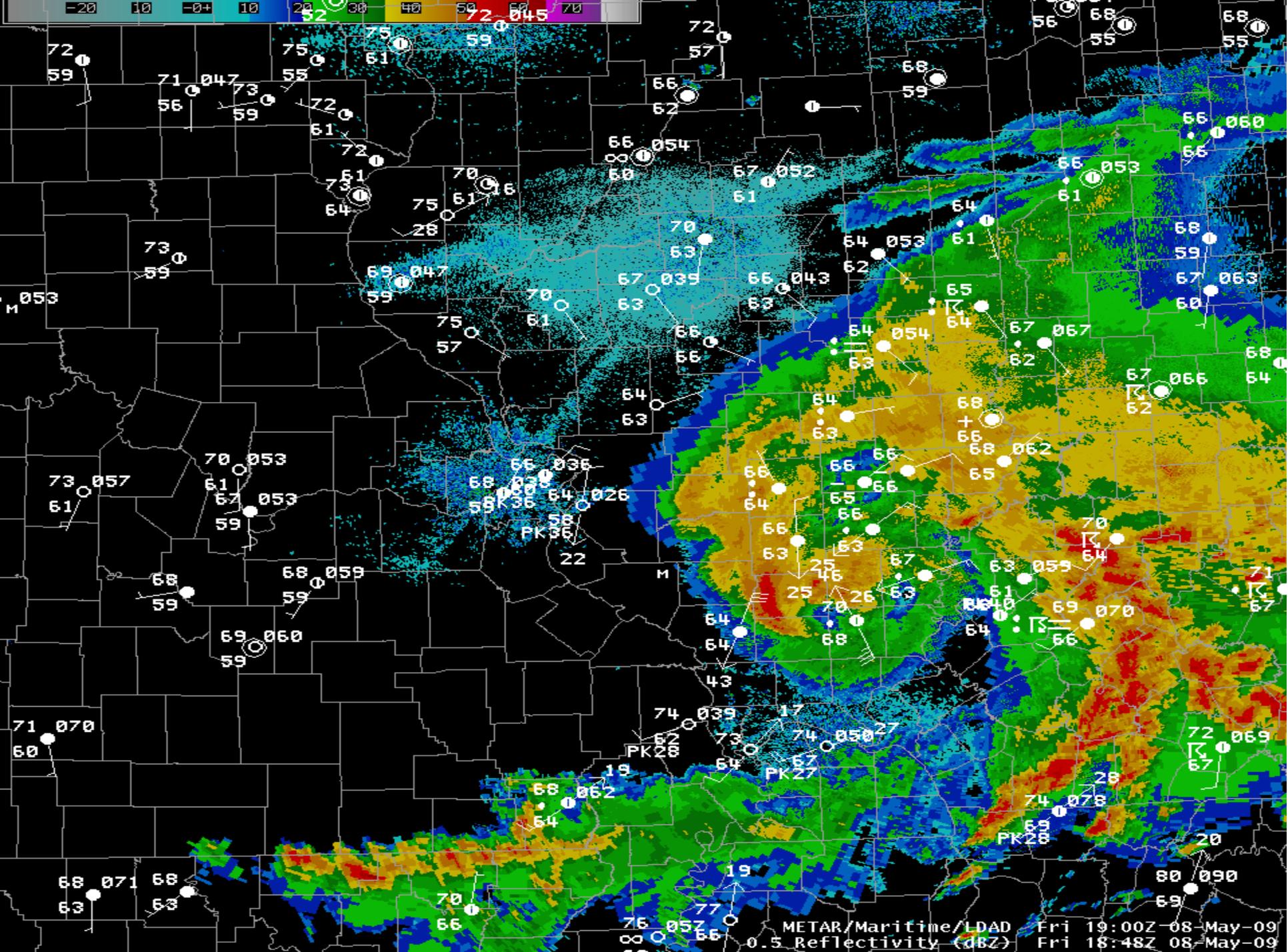
MÉTAR/Maritime/LDAD Fri 18:00Z 08-May-09
0.5 Reflectivity (dBZ) Fri 17:48Z 08-May-09





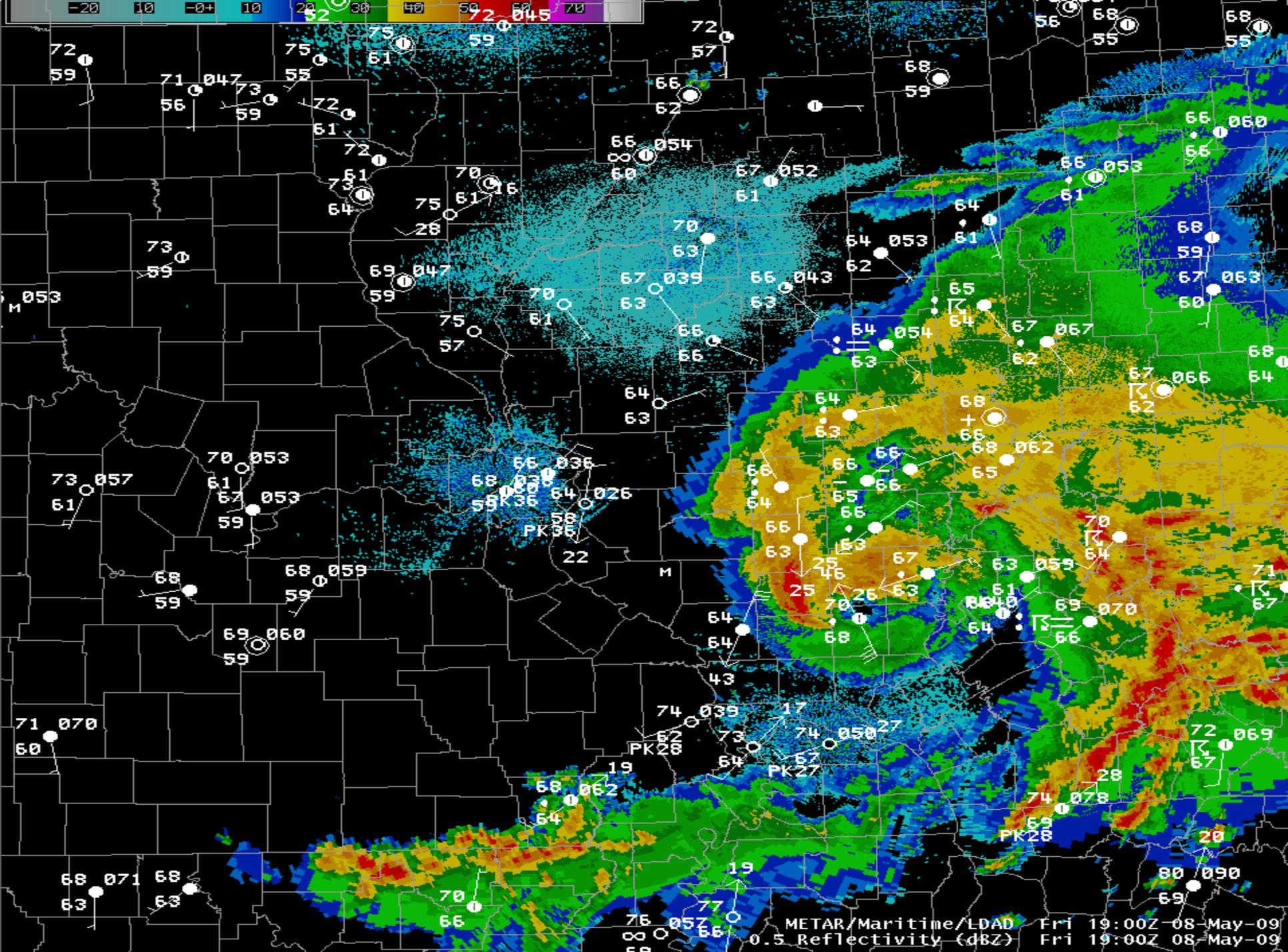


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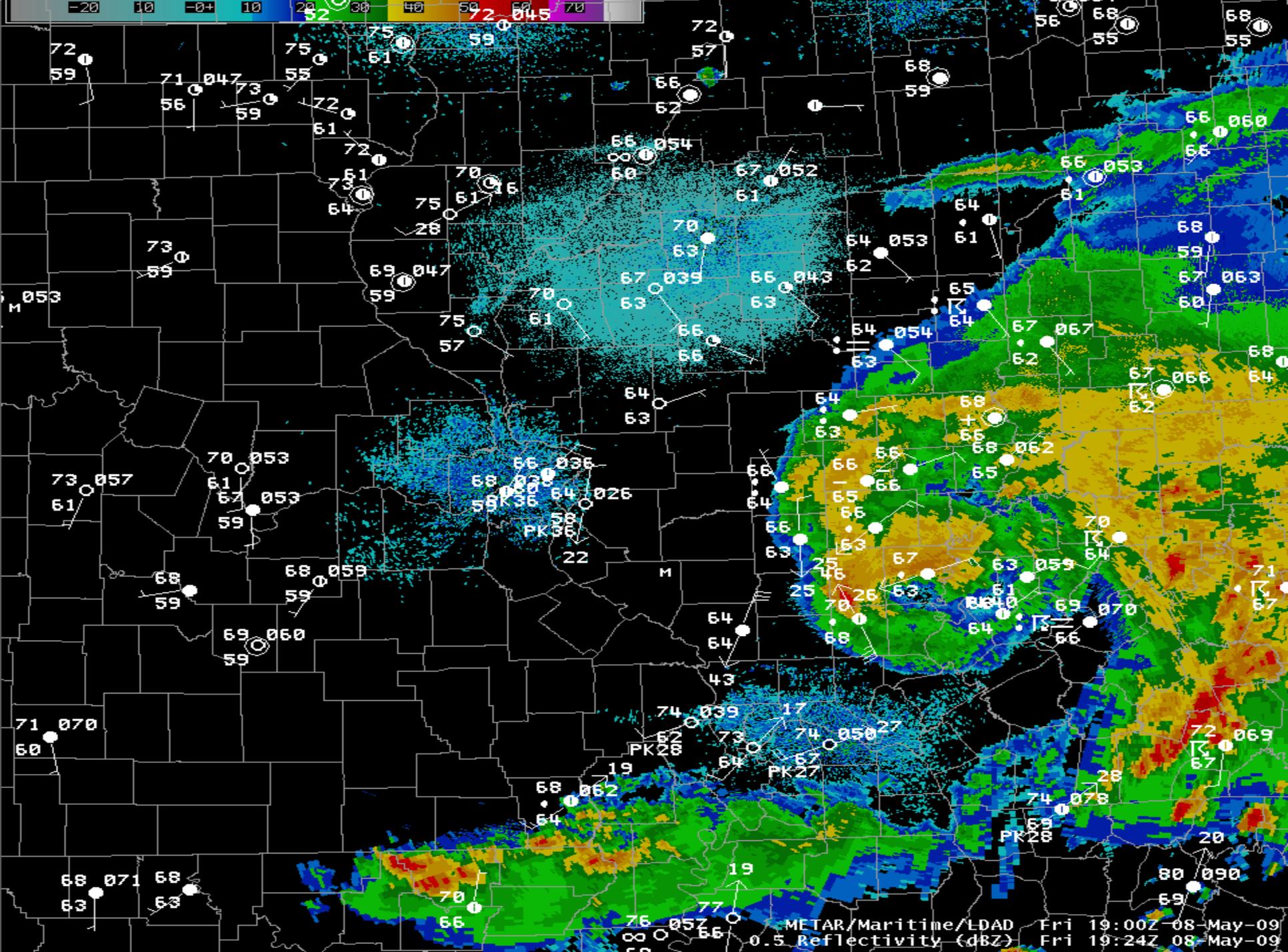
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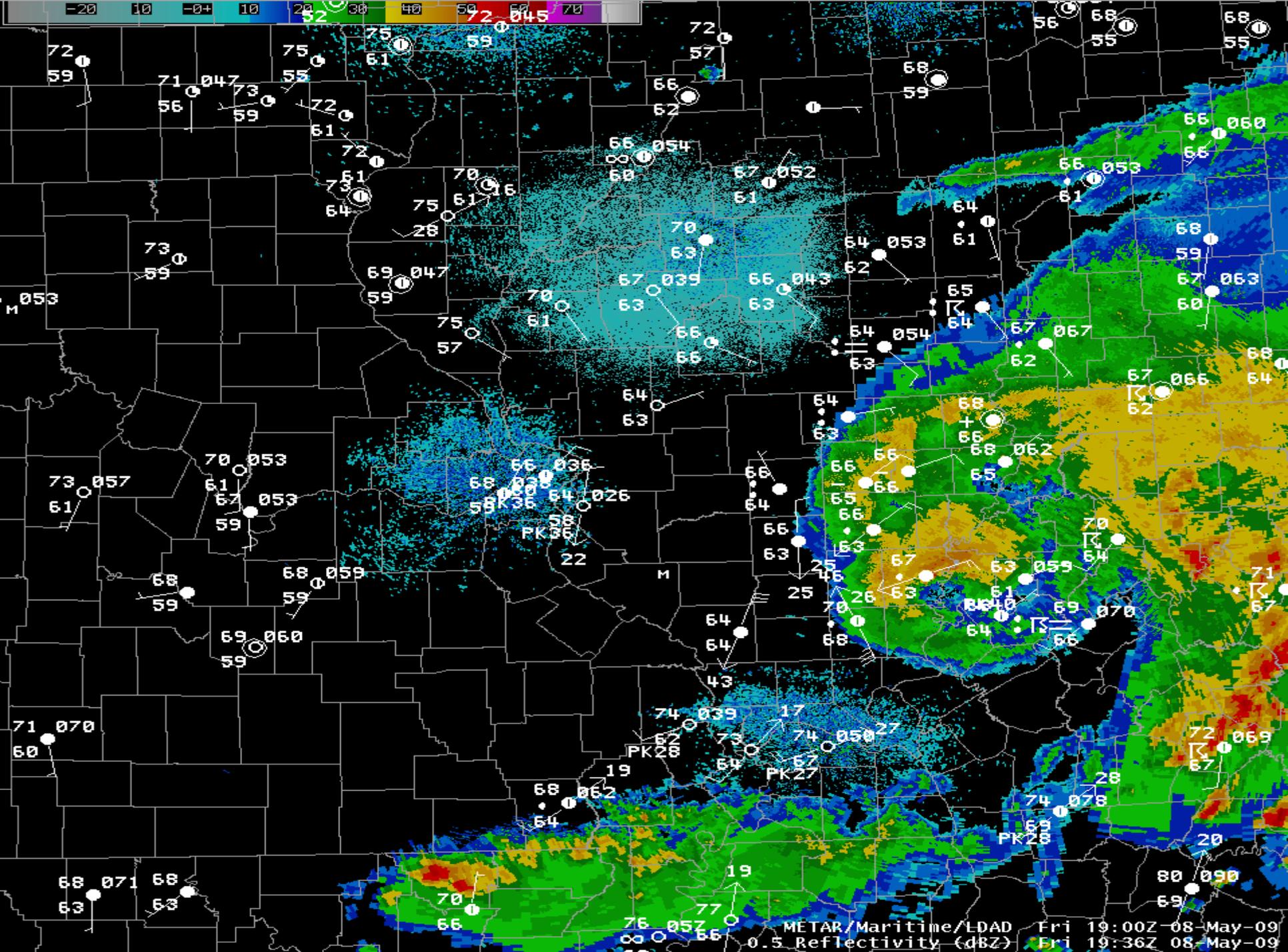
METAR/Maritime/LDAD 0.5 Reflectivity (dBZ) Fri 19:00Z 08-May-09
0.5 Reflectivity (dBZ) Fri 18:48Z 08-May-09



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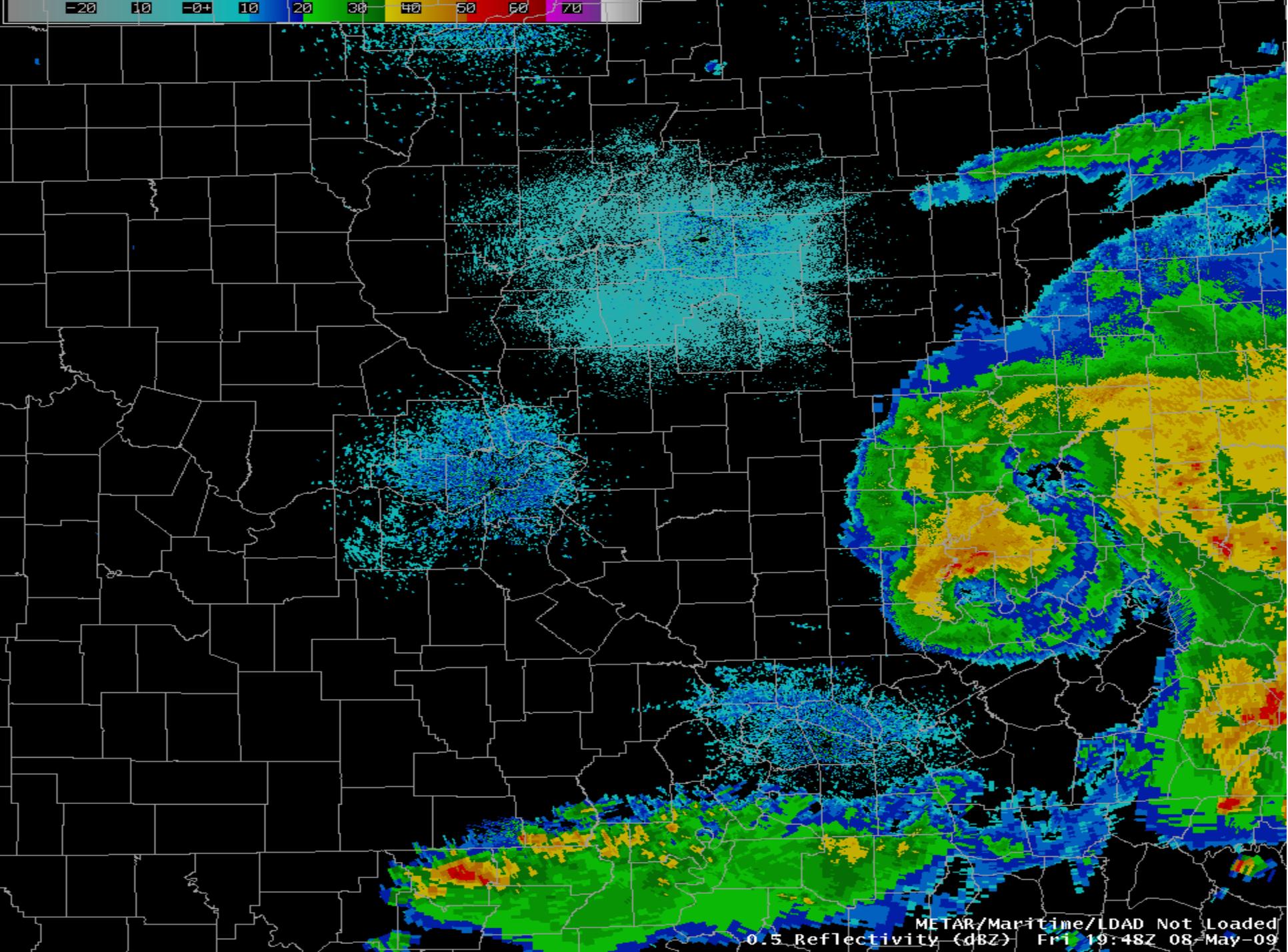
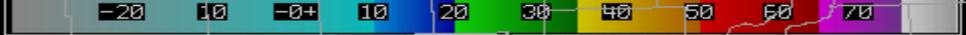
METAR/Maritime/LDAD Fri 19:00Z 08-May-09
0.5 Reflectivity (dBZ) Fri 19:00Z 08-May-09





-20 10 -0+ 10 20 30 40 50 60 70 80

METAR/Maritime/LDAD Fri 19:00Z 08-May-09
0.5 Reflectivity (dBZ) Fri 19:36Z 08-May-09



METAR/Maritime/LDAD Not Loaded
0.5 Reflectivity (dBZ) Fri 19:48Z 08 May-09

-Meteorologists from National Weather Services located in Paducah, KY and St. Louis, Missouri have determined that this has been the worst derecho forecasted in over a decade.

-68,000 people in southern IL left without power.

-Almost all roads in Carbondale, IL were closed due to the massive amounts of debris.

-Barack Obama declared Carbondale and surrounding communities under a major disaster area.



Conclusion

- This was an intense progressive derecho that generated widespread major wind damage.
 - All types of severe weather occurred; destructive winds, very large hail, and a considerable number of tornadoes.
 - Winds commonly ranged from 65-80 mph; isolated locations received gusts greater than 100 mph.
 - Main areas of impact were southeastern Kansas, southern Missouri, and southern Illinois.
- Reasoning for the development of this derecho was from a very high moisture content being transferred at the 850 mb level; NAM bulk shear magnitude was elevated.
- The strong tight circulation was inconclusive as to how it exactly evolved.

WORKS CITED

What was it that caused the May 8 windstorm?" National Weather Service - Central Region Headquarters Home Page. Paducah Kentucky National Weather Service. 20 July 2009
<<http://www.crh.noaa.gov/pah/?n=southildamage>>.

ABOUT DERECHOS. Storm Prediction Center. 13 July 2009
<<http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm>>.

Convective Outlook. Storm Prediction Center. 13 July 2009
<<http://www.spc.noaa.gov/products/outlook/archive/2009>>.

SIU observations. Champaign, IL: Bob Scott, 2009.