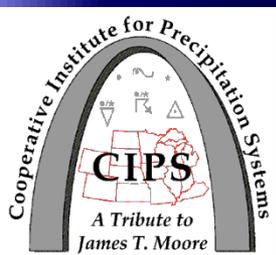


Composite Analysis of Cool-Season Severe Weather Outbreaks in the Lower Ohio Valley

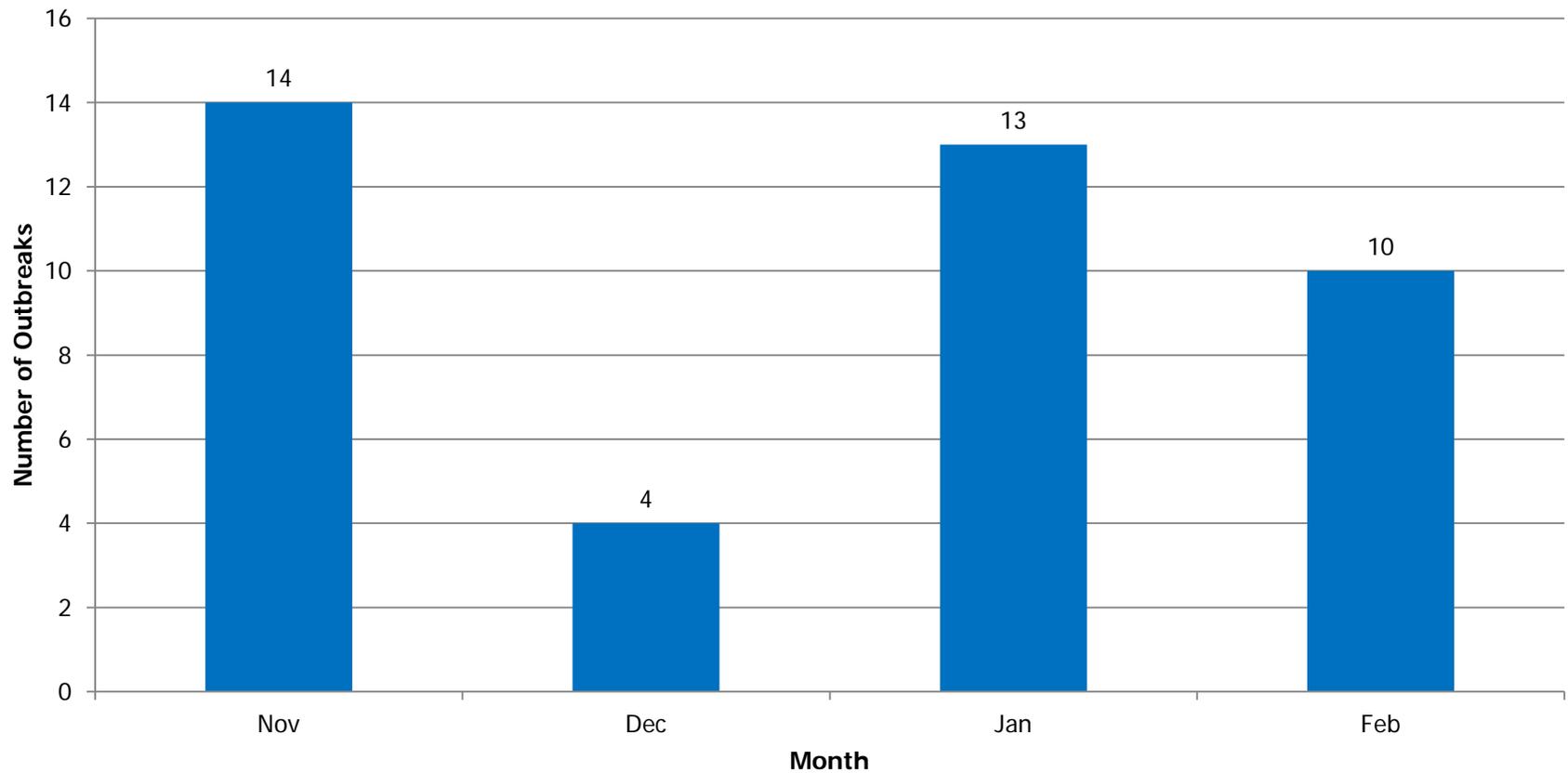
Saint Louis University; NWS Paducah; NWS Louisville



- Severe weather in Ohio Valley is most frequent in spring. Cool season (Nov-Feb) severe is uncommon, but can produce significant outbreaks
- Much of the severe results from squall lines (QLCSs) and some supercells which produce outbreaks of severe wind and tornadoes
- 29-year (1980-2008) climatology of cool season events in PAH and LMK forecast areas
- 96 events with at least 1 report (wind, tornado, or hail). Total reports in 96 cases: 1321 (wind=902, tornado=123, hail=296)
- An “outbreak” classified as an event with ≥ 6 reports; 41 out of 96 events. Total reports in 41 outbreaks: 1205 (wind=825, tornado=107, hail=273)
- 55 non-outbreaks – 116 reports (2 per case). 41 outbreaks – 1205 reports (29 per outbreak; >1 outbreak a season)

Cool-Season Severe Weather Outbreaks in PAH & LMK 1980-2008

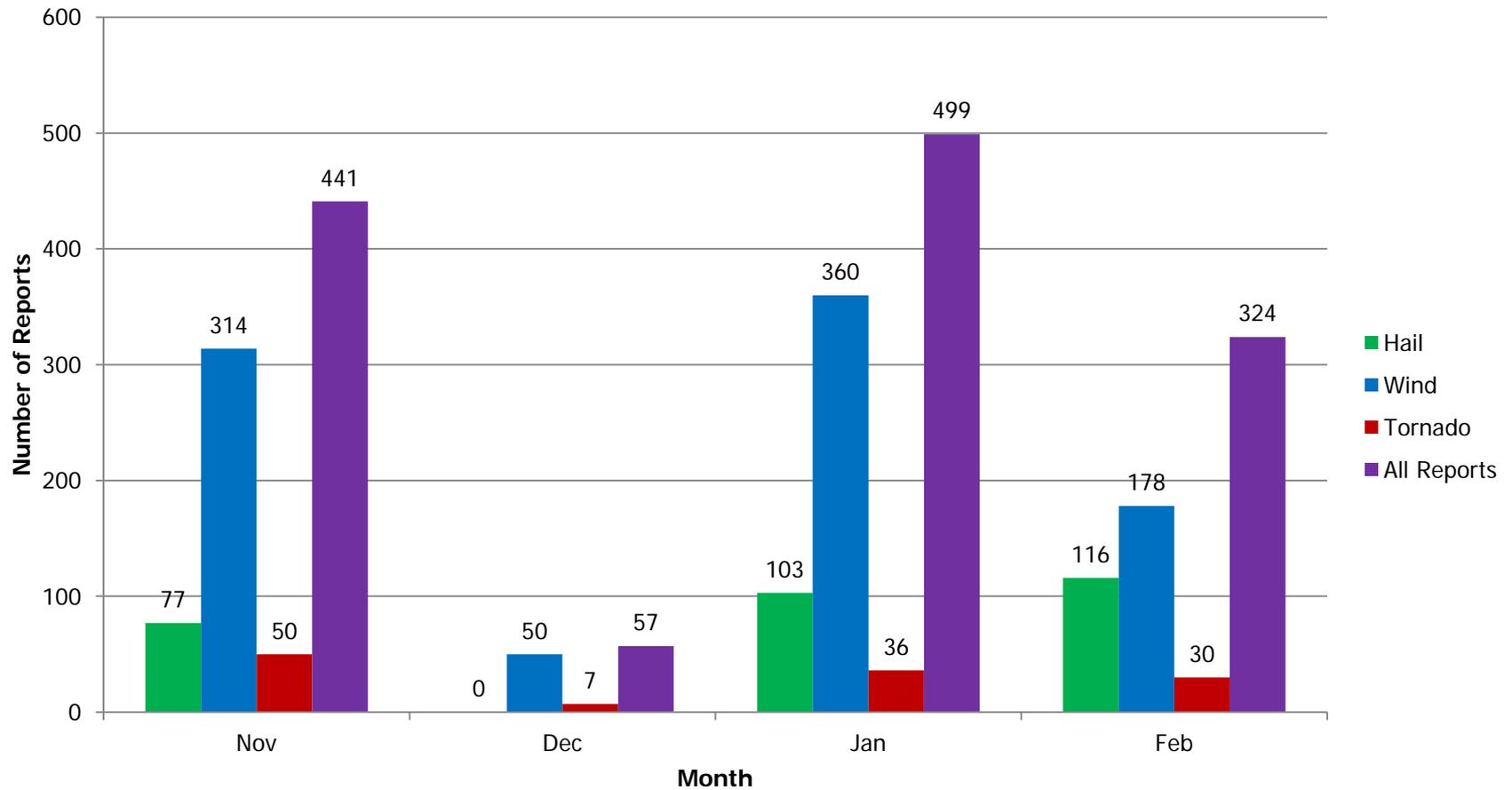
n = 41



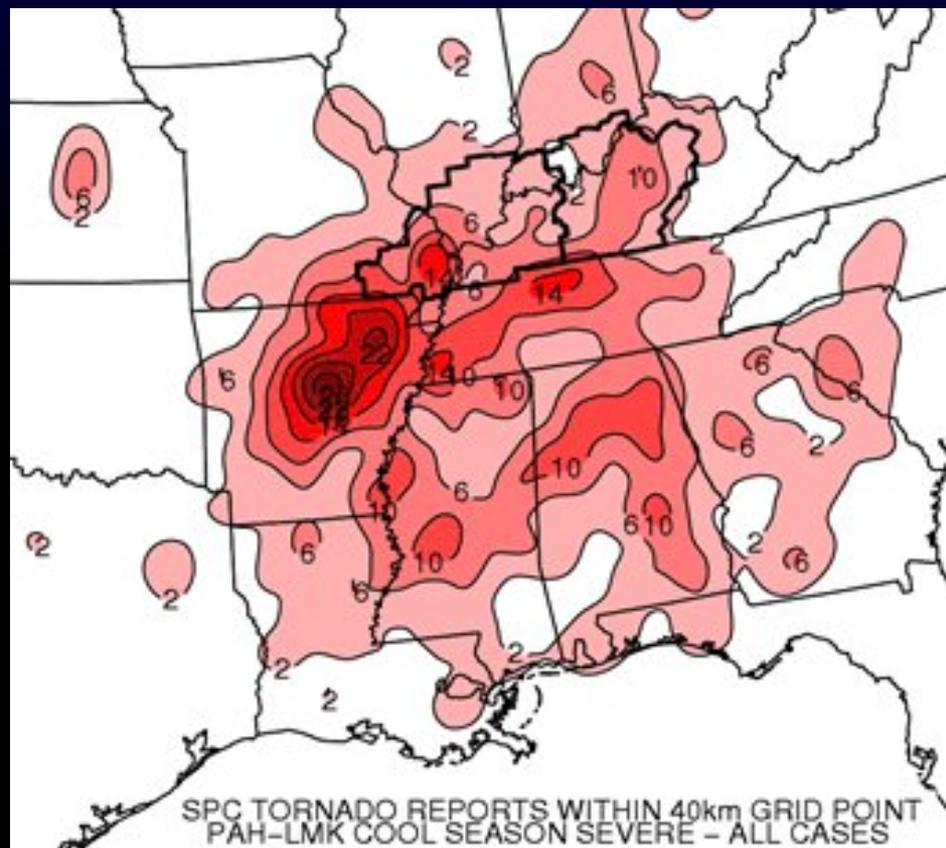
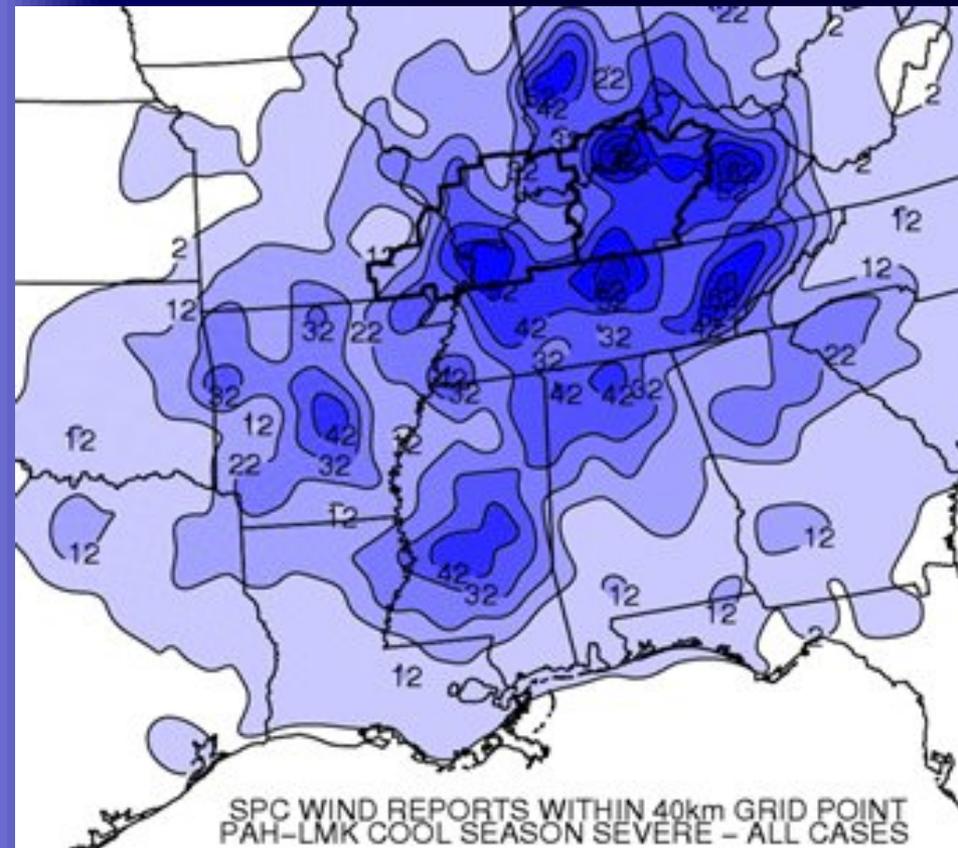


Monthly Comparison – Number of Severe Reports

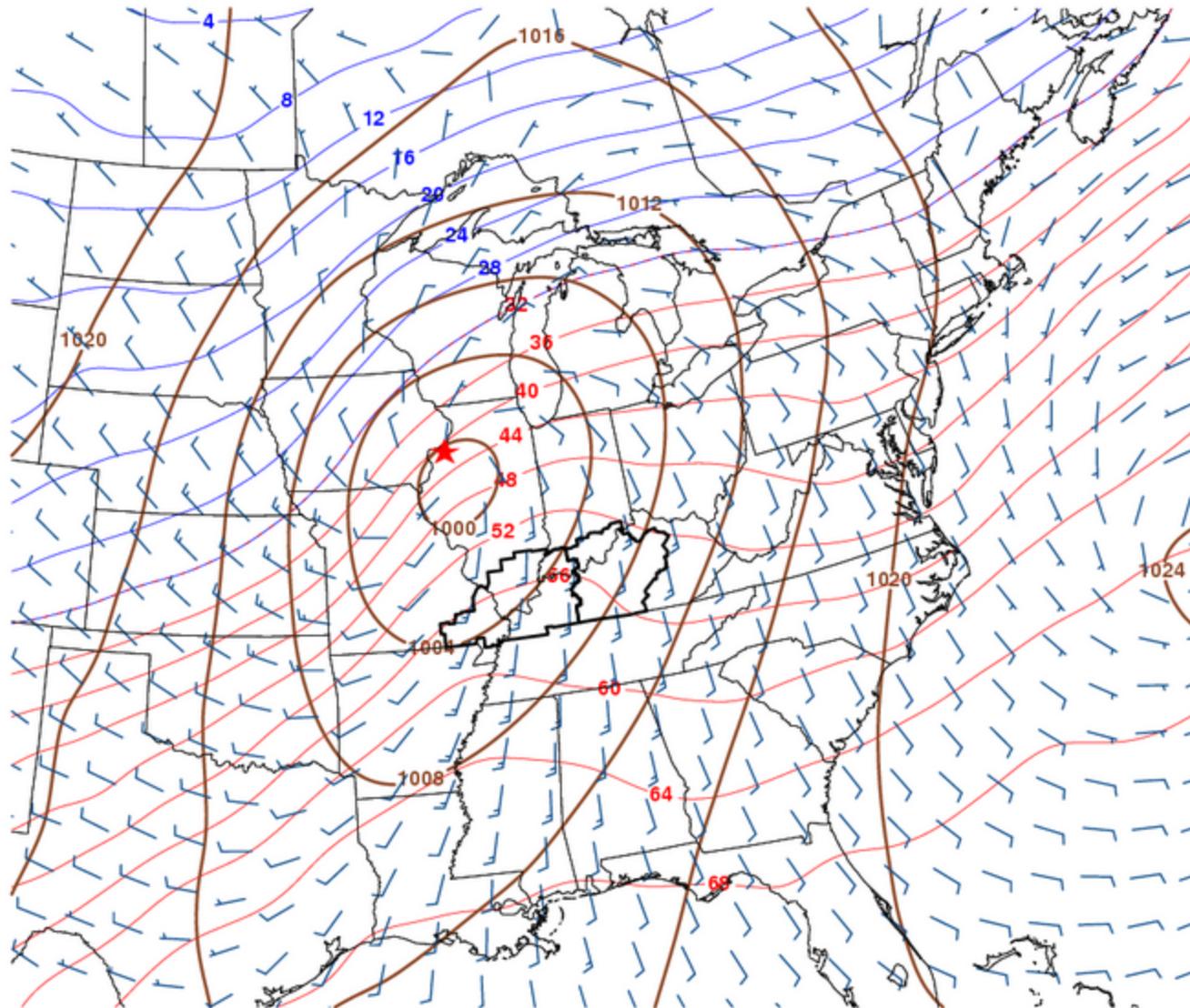
Cool-Season Severe Reports for PAH & LMK Cases



Wind and Tornado Reports for PAH & LMK Cases

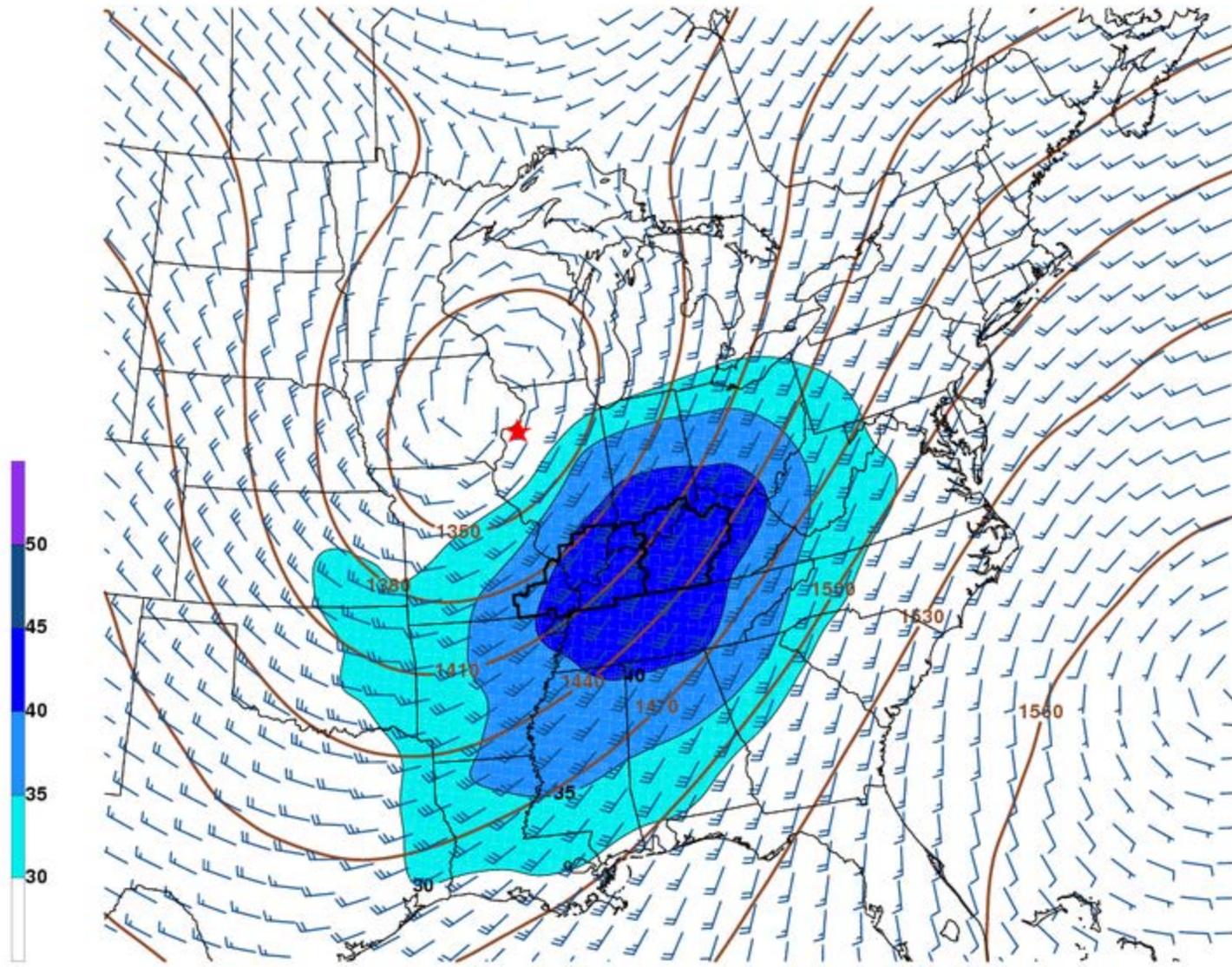


Mean PMSL, 10m Winds, and 2m Temperature at t=0h



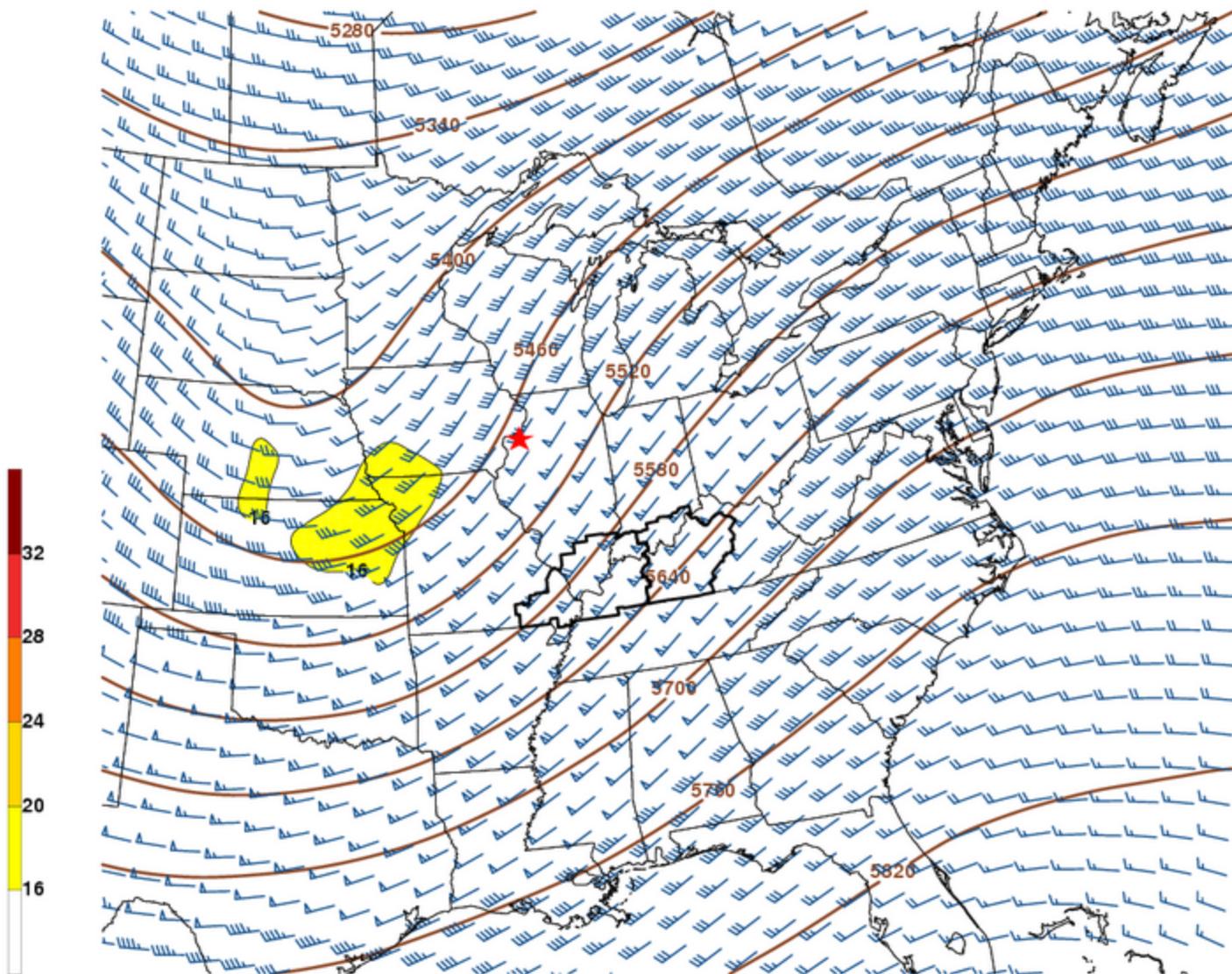
MEAN PMSL [mb], 10m WND [kts], and 2m TEMPERATURE [F] at t=0h

Mean 850mb Heights and Isotachs at t=0h



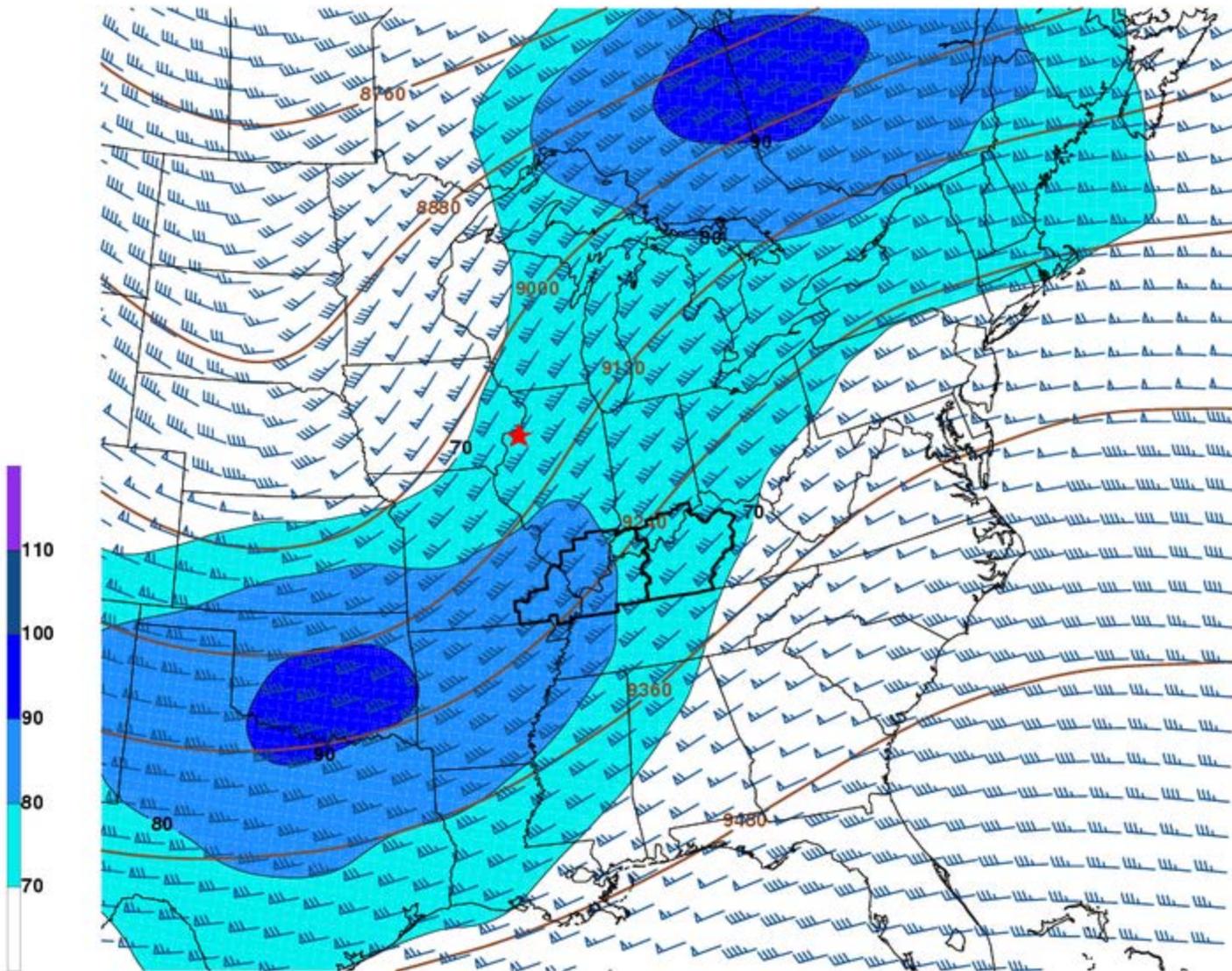
MEAN 850mb HGHT [m] and ISOTACHS [kts] at t=0h

Mean 500mb Heights and Vorticity at t=0h



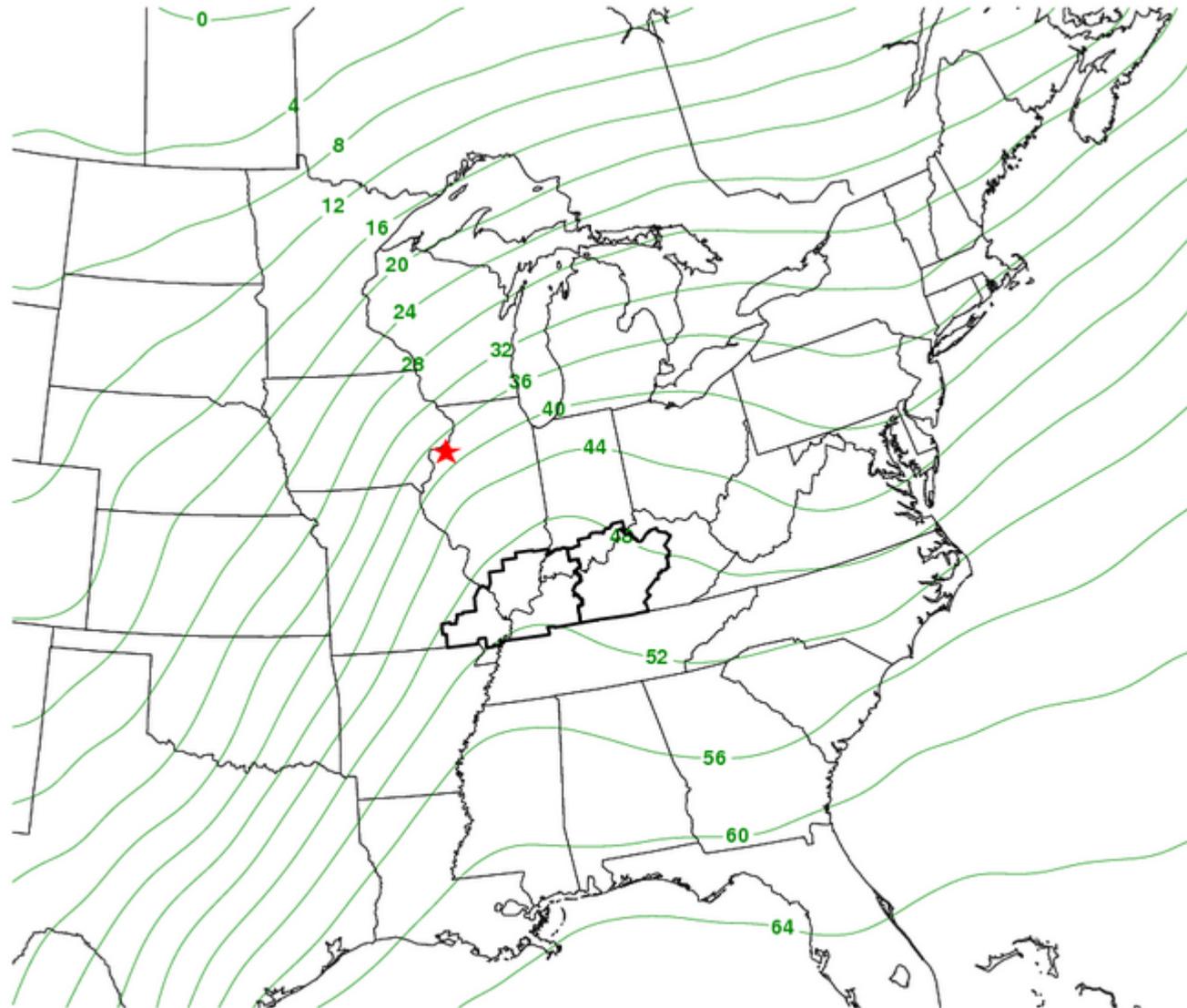
MEAN 500mb HGHT [m] and VORTICITY [s-1] at t=0h

Mean 300mb Heights and Isotachs at t=0h



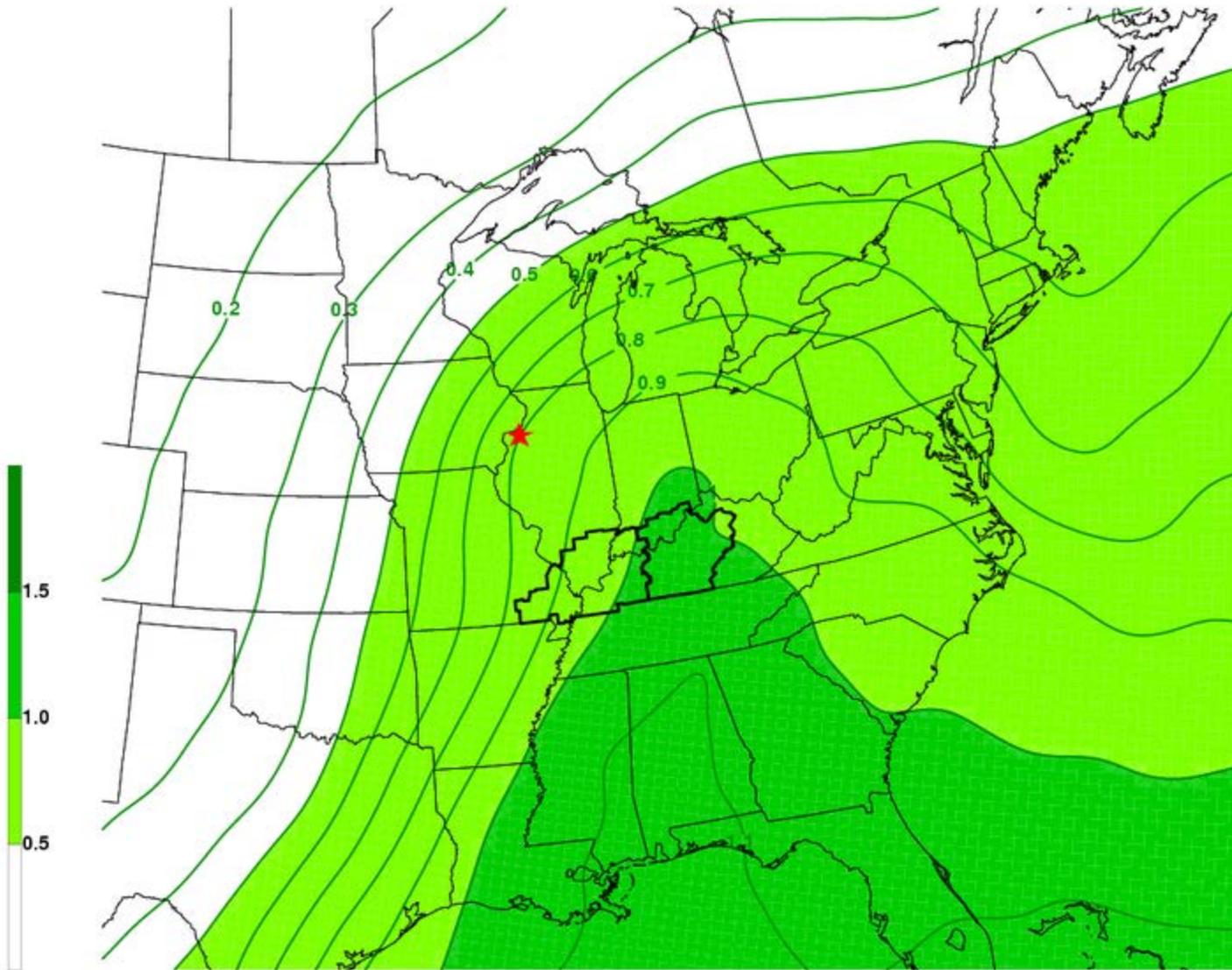
MEAN 300mb HGHT [m] and ISOTACHS [kts] at t=0h

Mean 2m Dewpoint at t=0h



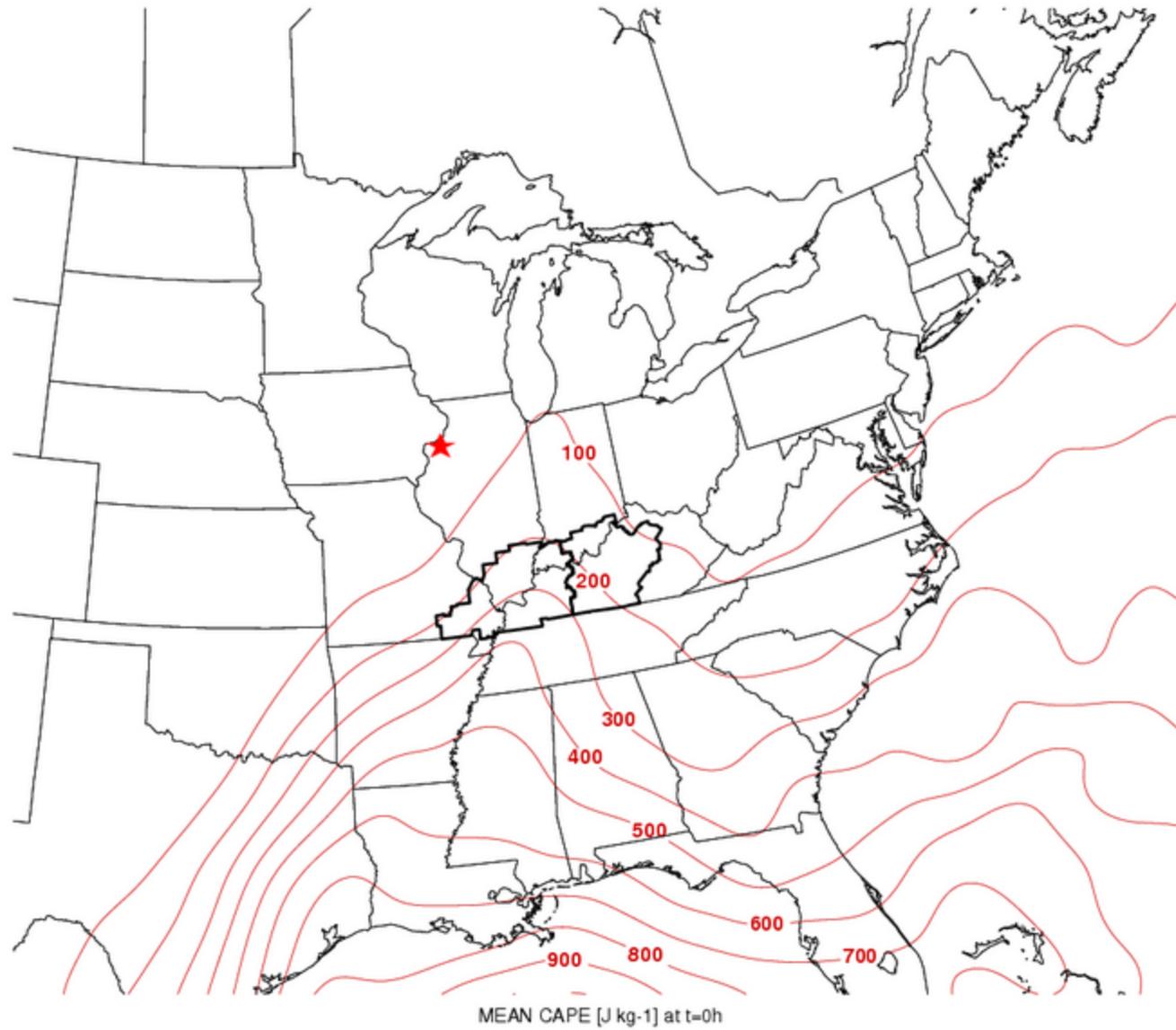
MEAN 2m DEWPOINT [F] at t=0h

Mean Precipitable Water at t=0h

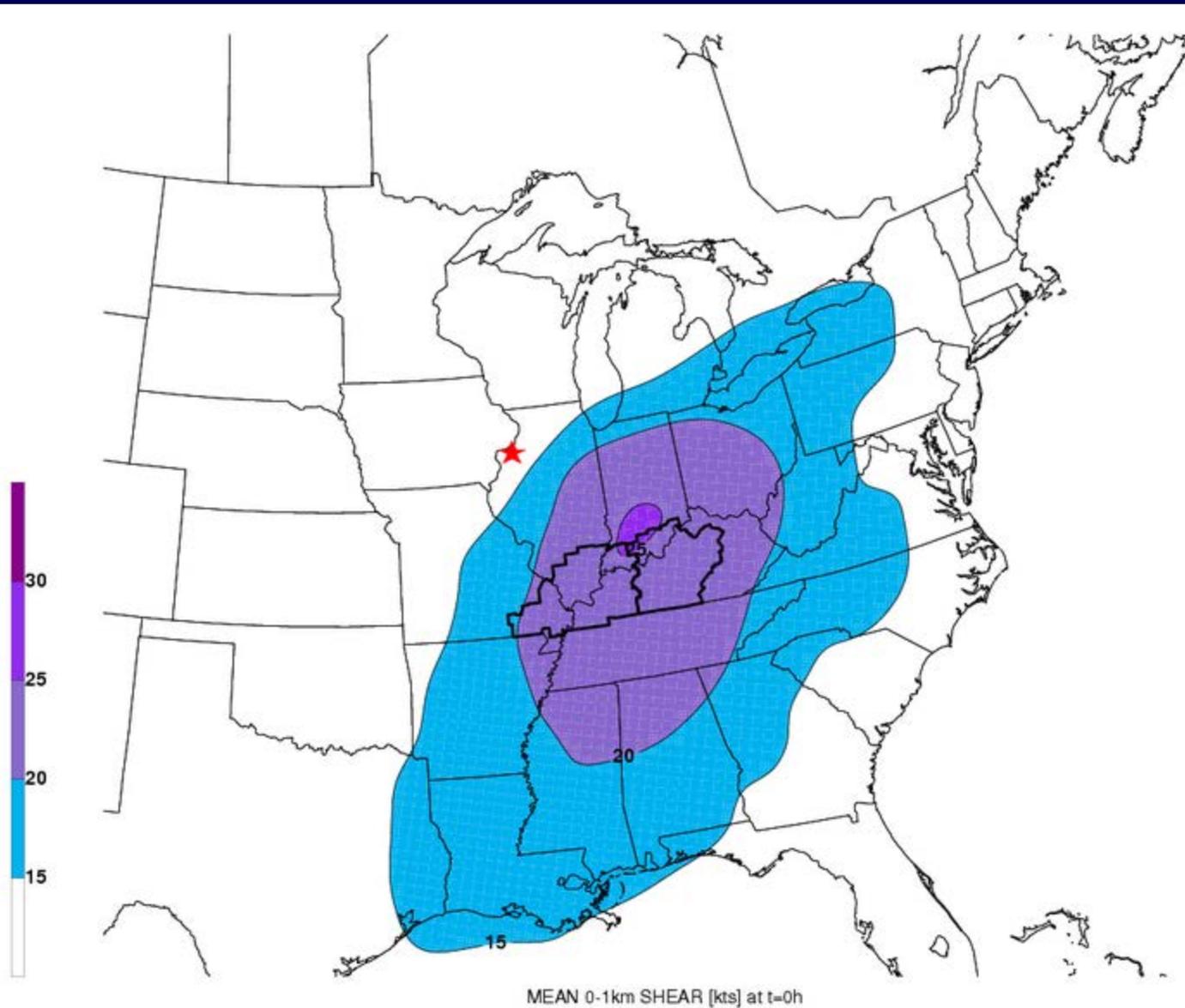


MEAN PRECIPITABLE WATER [in] at t=0h

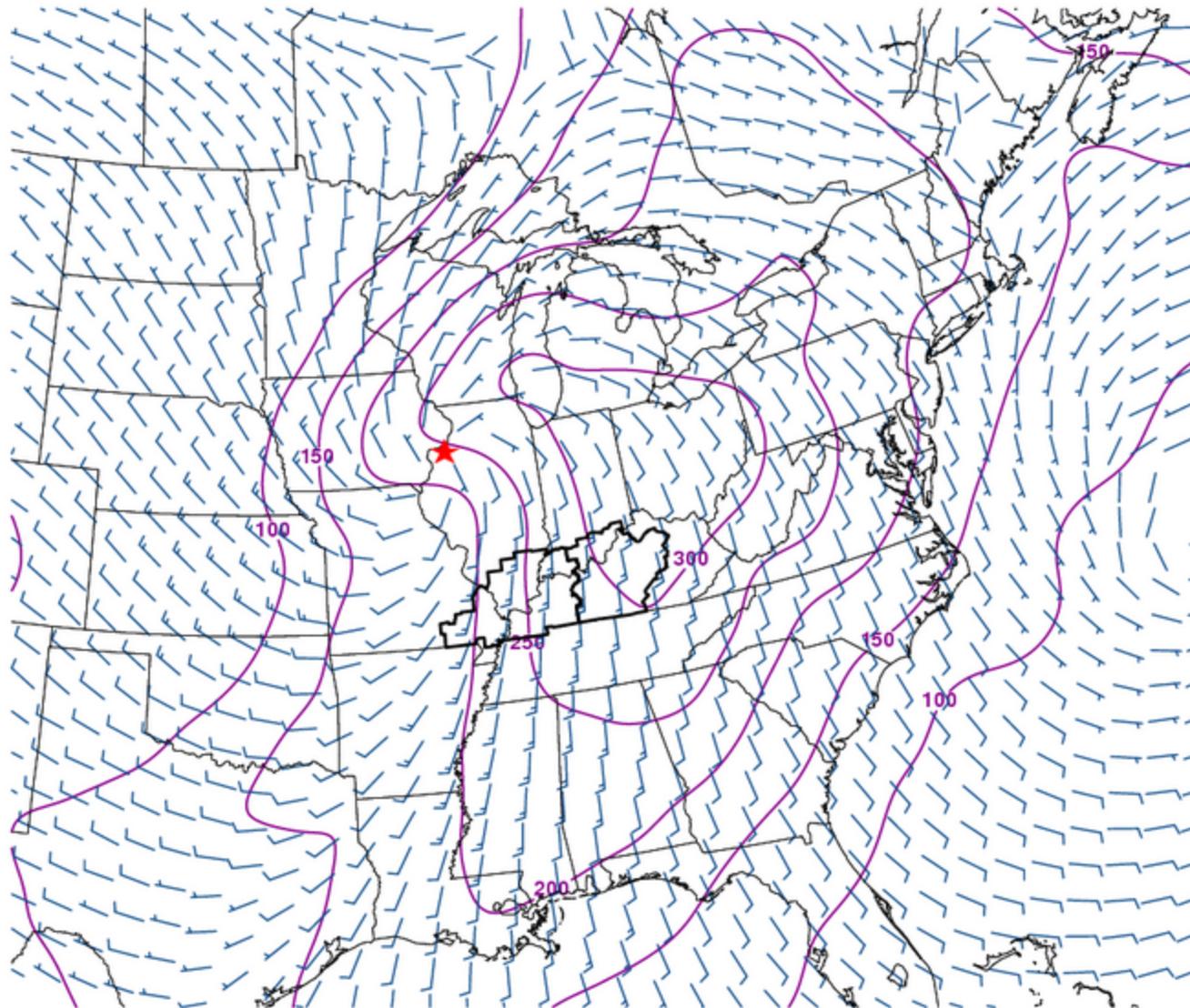
Mean CAPE at t=0h



Mean 0-1km Speed Shear at t=0h



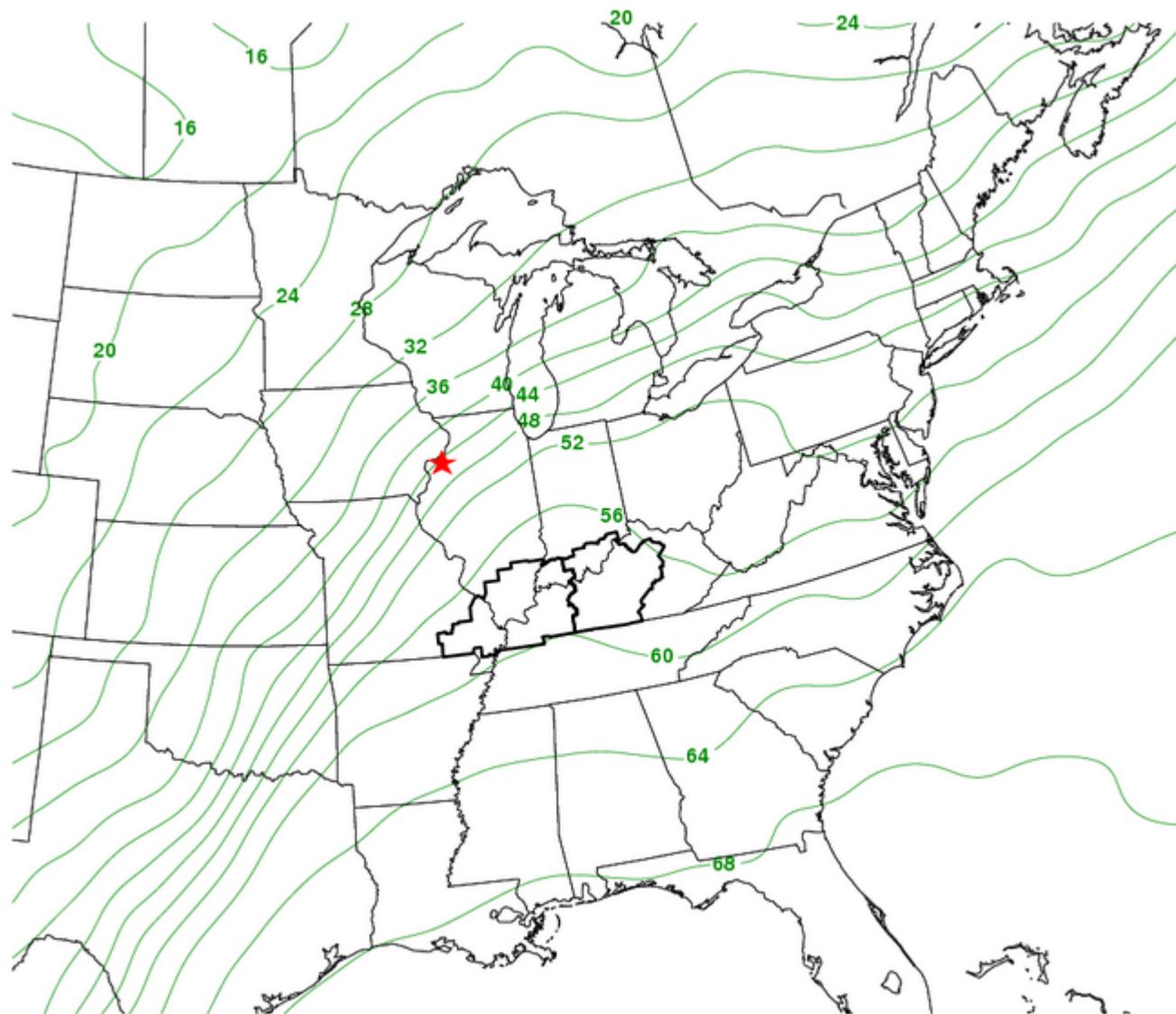
Mean 0-3km SRH and 10m Winds at t=0h



MEAN 0-3km SRH [$m^2 s^{-2}$] and 10m WND [kts] at t=0h

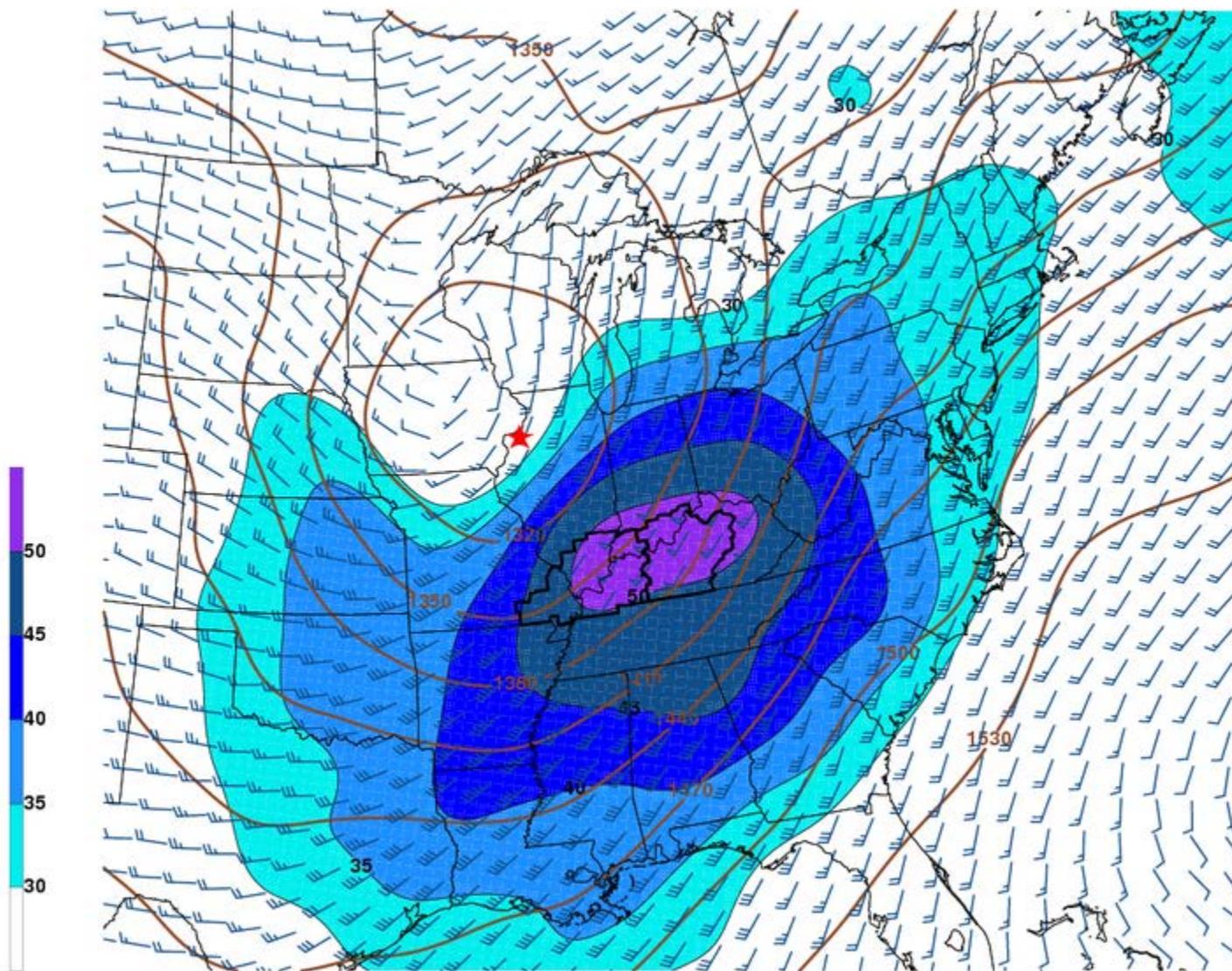
- **Percentile composites** were generated for low-end (25th percentile) and high-end (75th percentile) values
- 25th percentile = 75% of cases have values exceeding those shown
- 75th percentile = 25% of cases have values exceeding those shown
- **Probability composites** show the % of cases exceeding a certain threshold (i.e., % of cases that had 0-1km speed shear >30 kts) for each time interval

75th Percentile 2m Dewpoint at t=0h



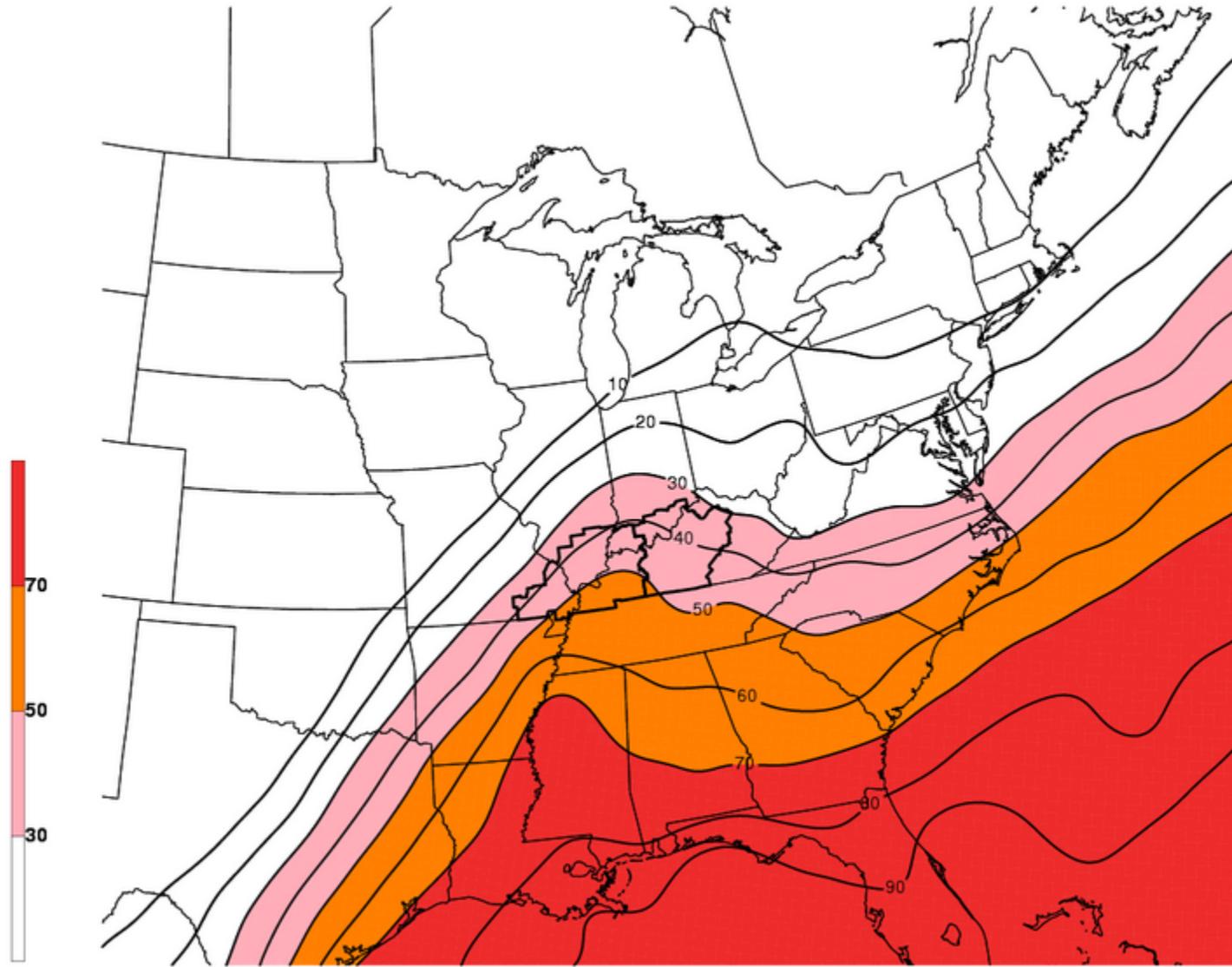
75TH PERCENTILE DEWPOINT [F] at t=0h

75th Percentile 850mb Heights and Isotachs at t=0h



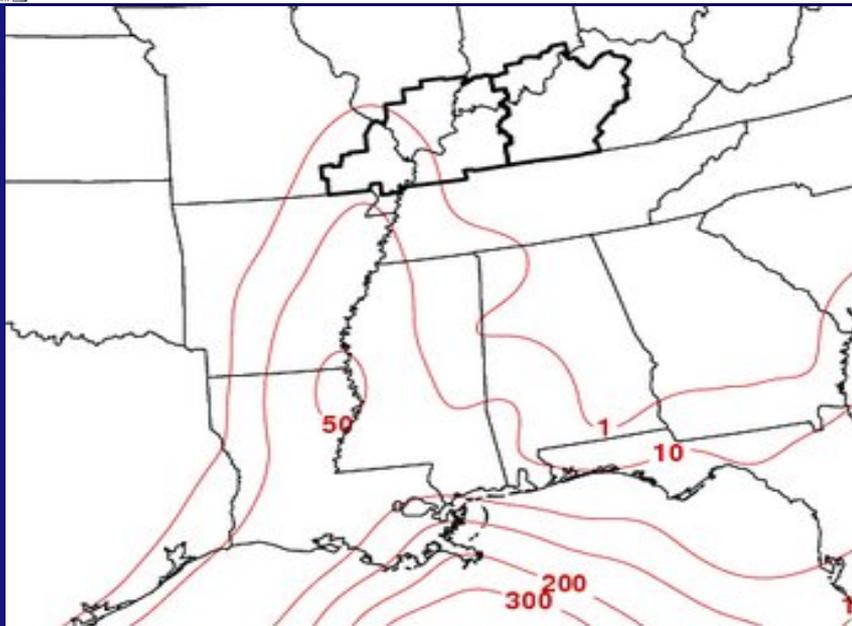
75TH PERCENTILE 850mb HGHT [m] and ISOTACHS [kts] at t=0h

Probability of 2m Dewpoint > 55 F at t=0h

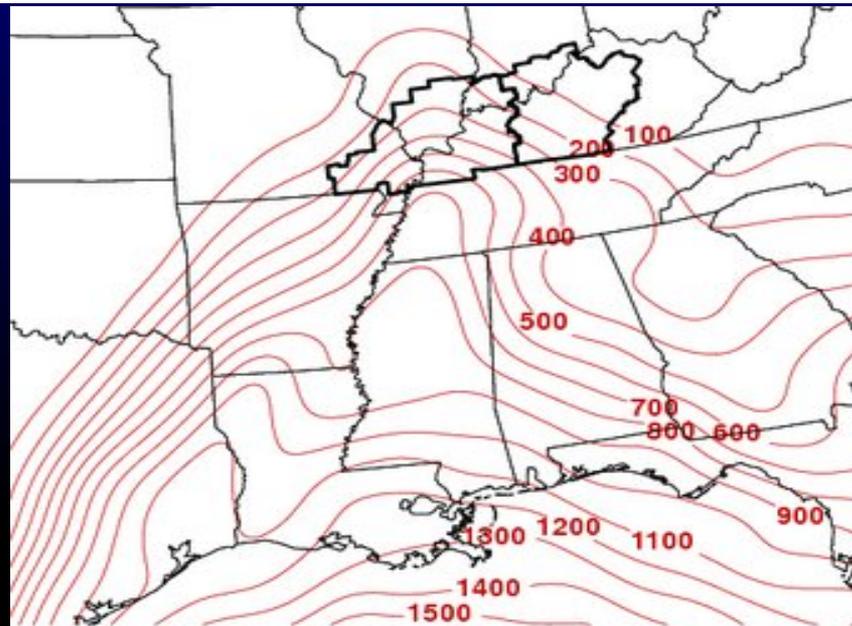


PROBABILITY 2m DEWPOINT >55 F at t=0h

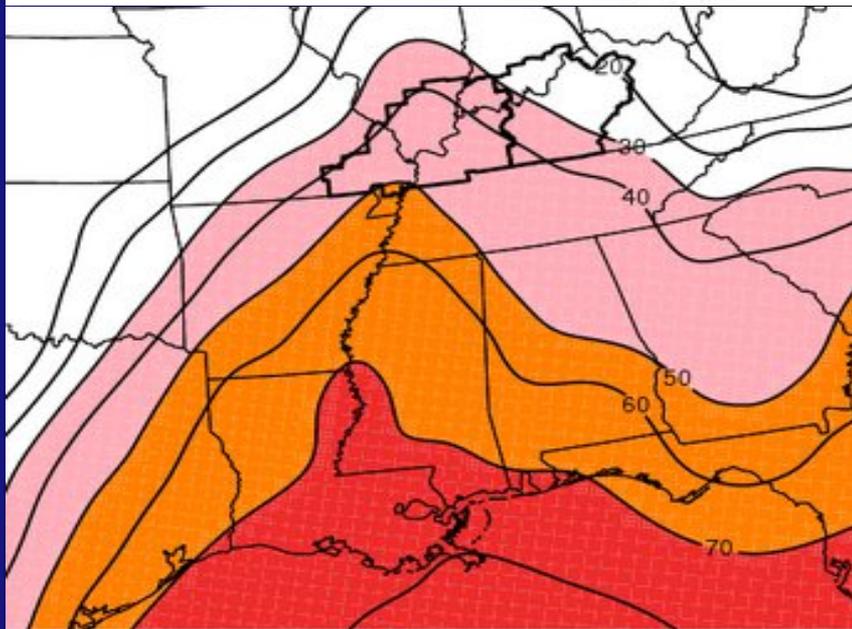
25th/75th Percentile CAPE; Prob of CAPE > 100 & 500 J/kg at t=0h



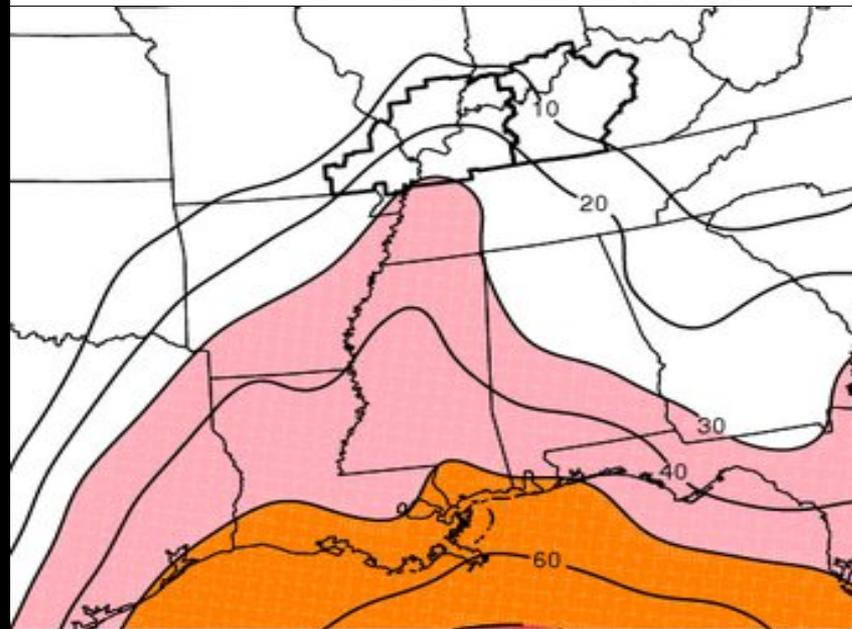
25TH PERCENTILE CAPE [J kg⁻¹] at t=0h



75TH PERCENTILE CAPE [J kg⁻¹] at t=0h

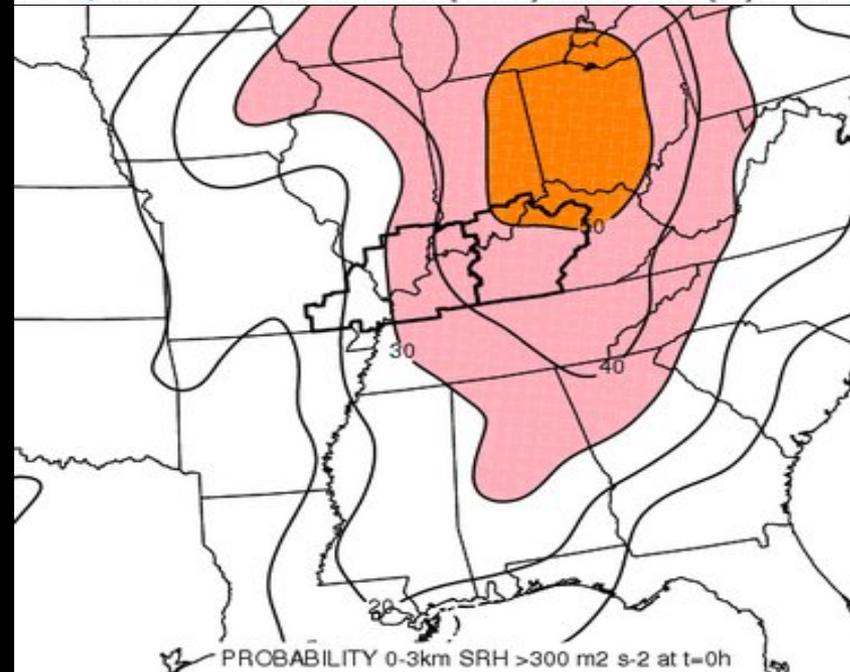
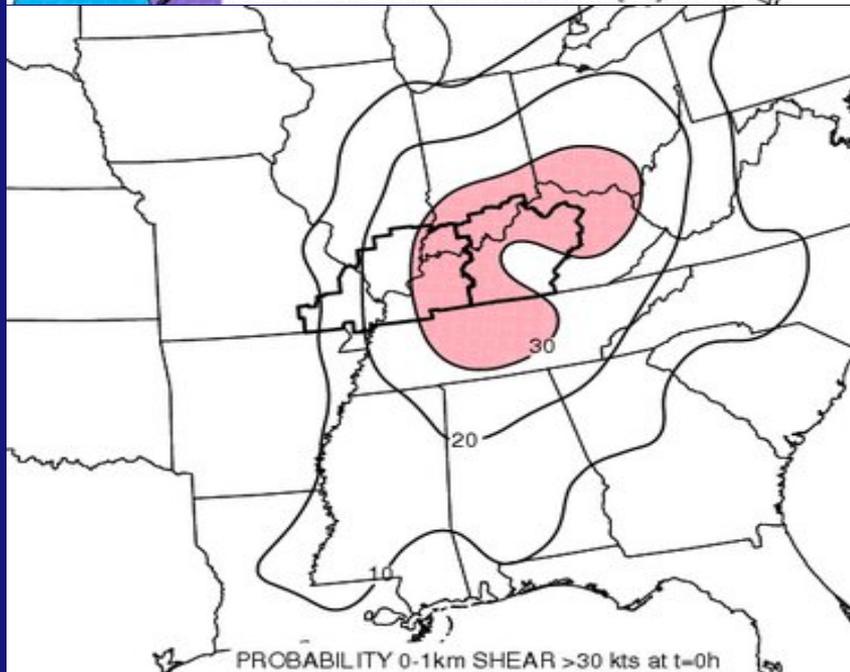
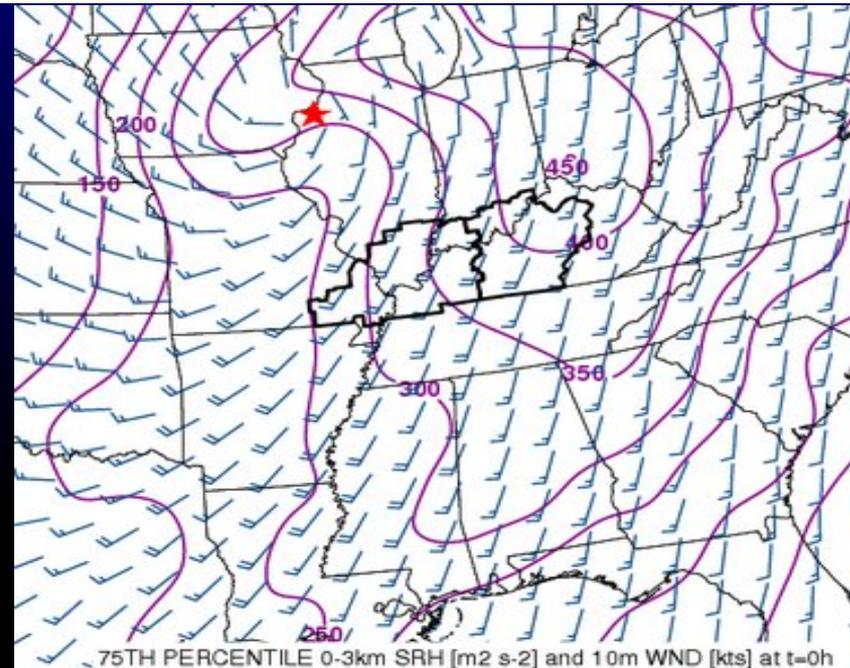
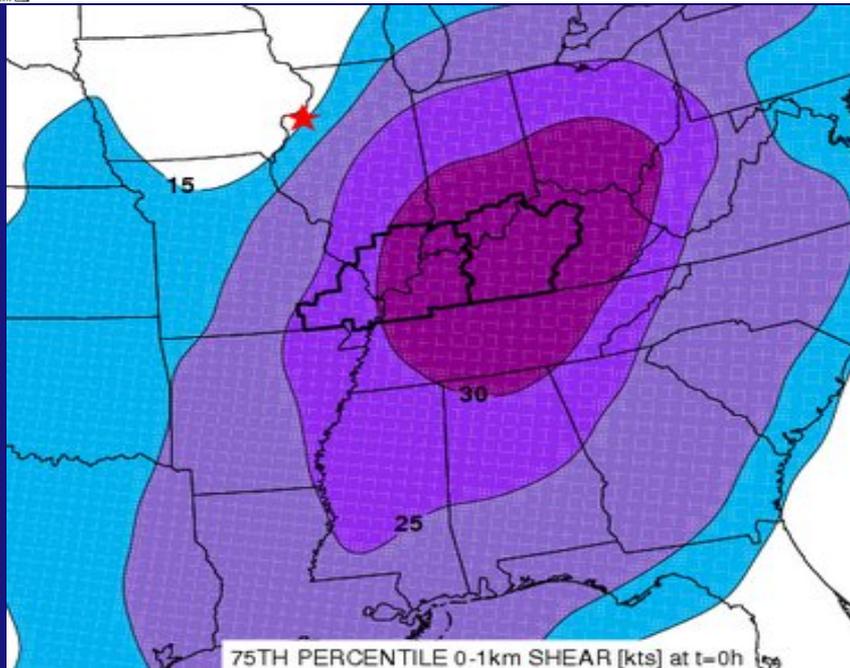


PROBABILITY CAPE >100 J kg⁻¹ at t=0h

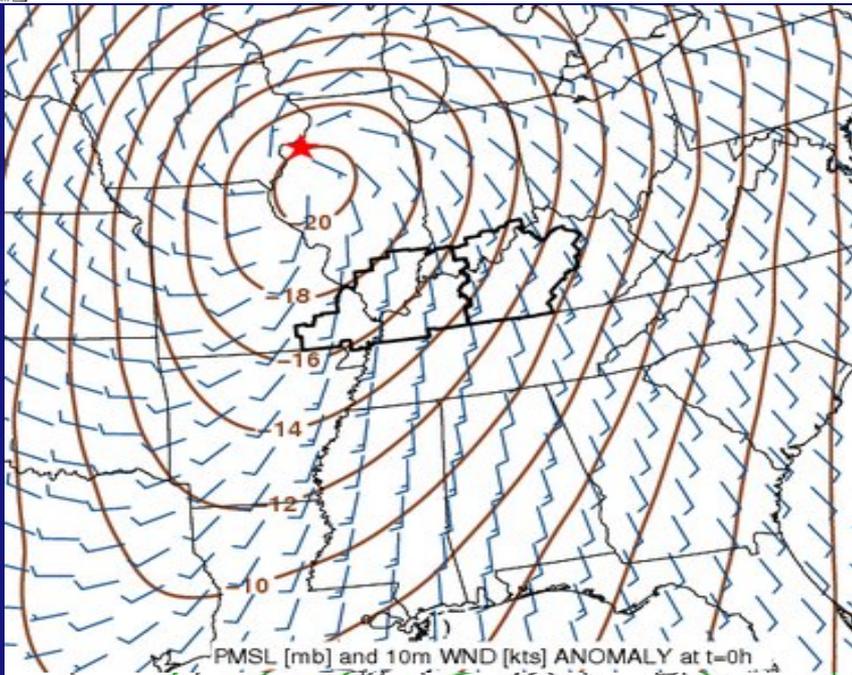


PROBABILITY CAPE >500 J kg⁻¹ at t=0h

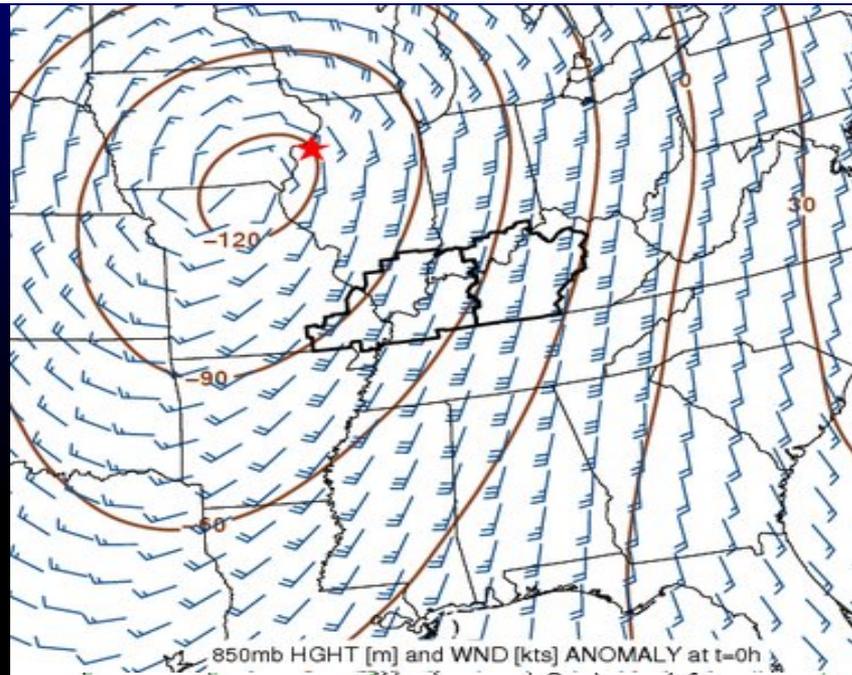
75th Percentile 0-1km Shear/0-3km SRH; Prob Shear/SRH at t=0h



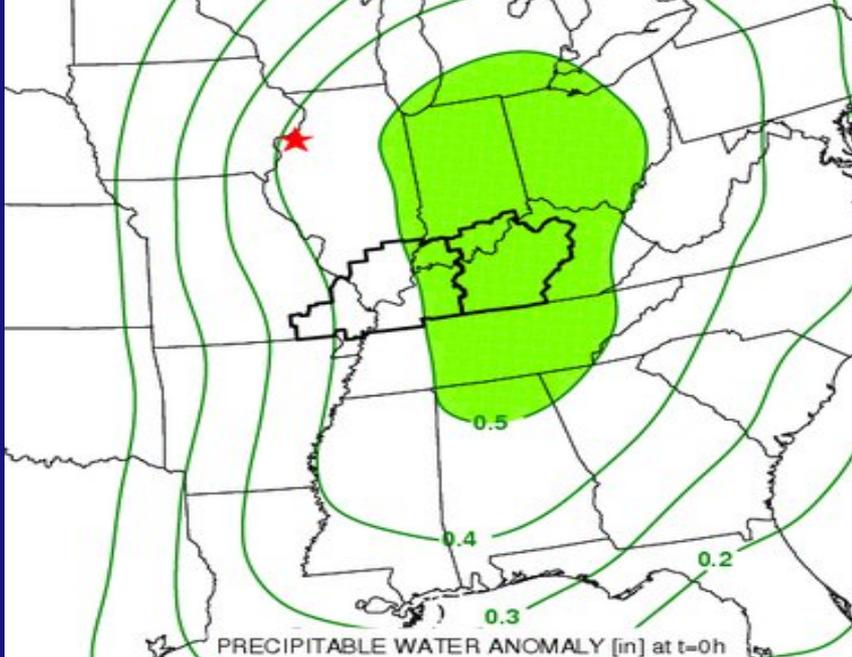
Anomalies – Sfc MSLP/Wind, 925 mb Td, 850 mb Ht/Wind, PW



MSLP [mb] and 10m WND [kts] ANOMALY at t=0h



850mb HGHT [m] and WND [kts] ANOMALY at t=0h

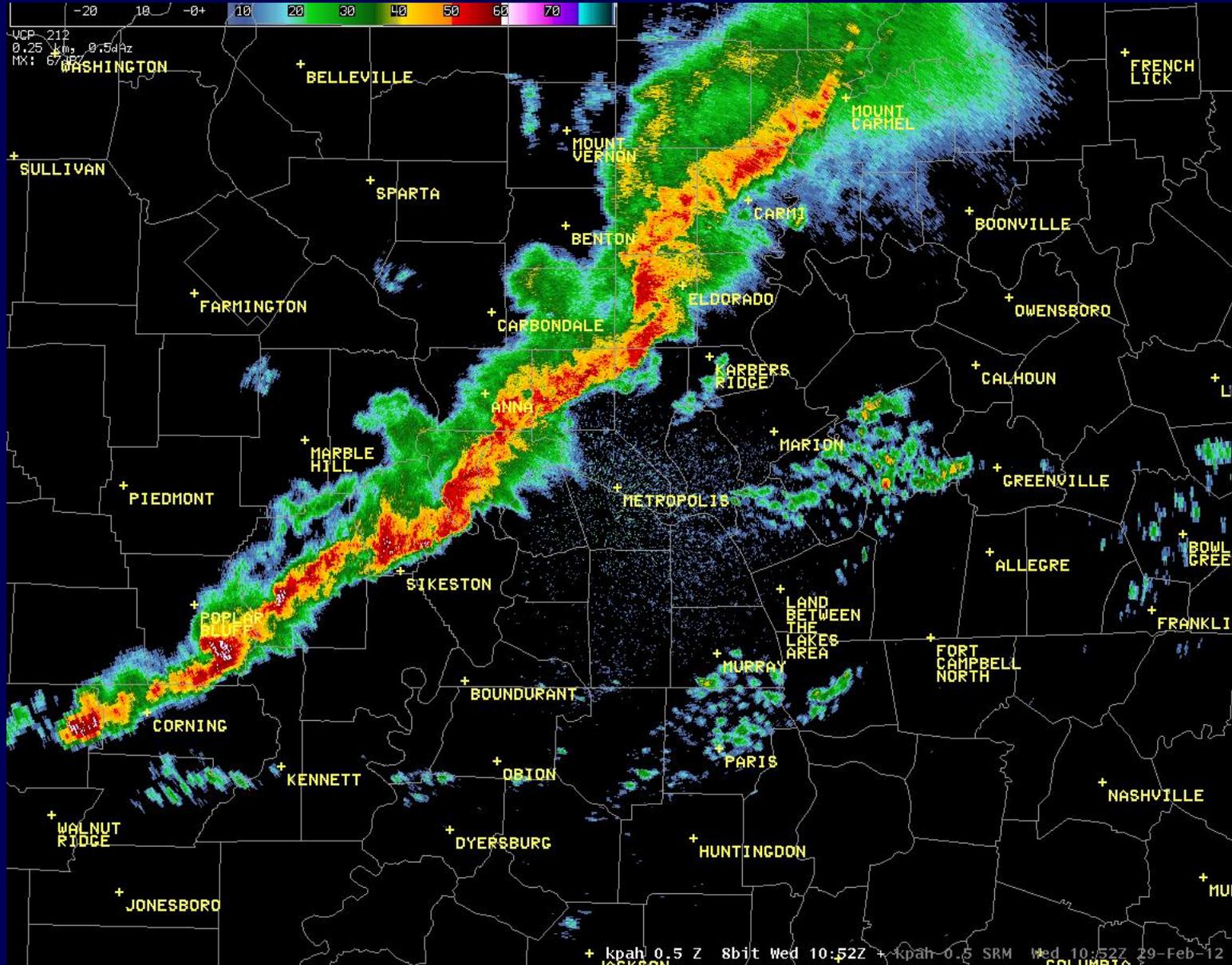


PRECIPITABLE WATER ANOMALY [in] at t=0h

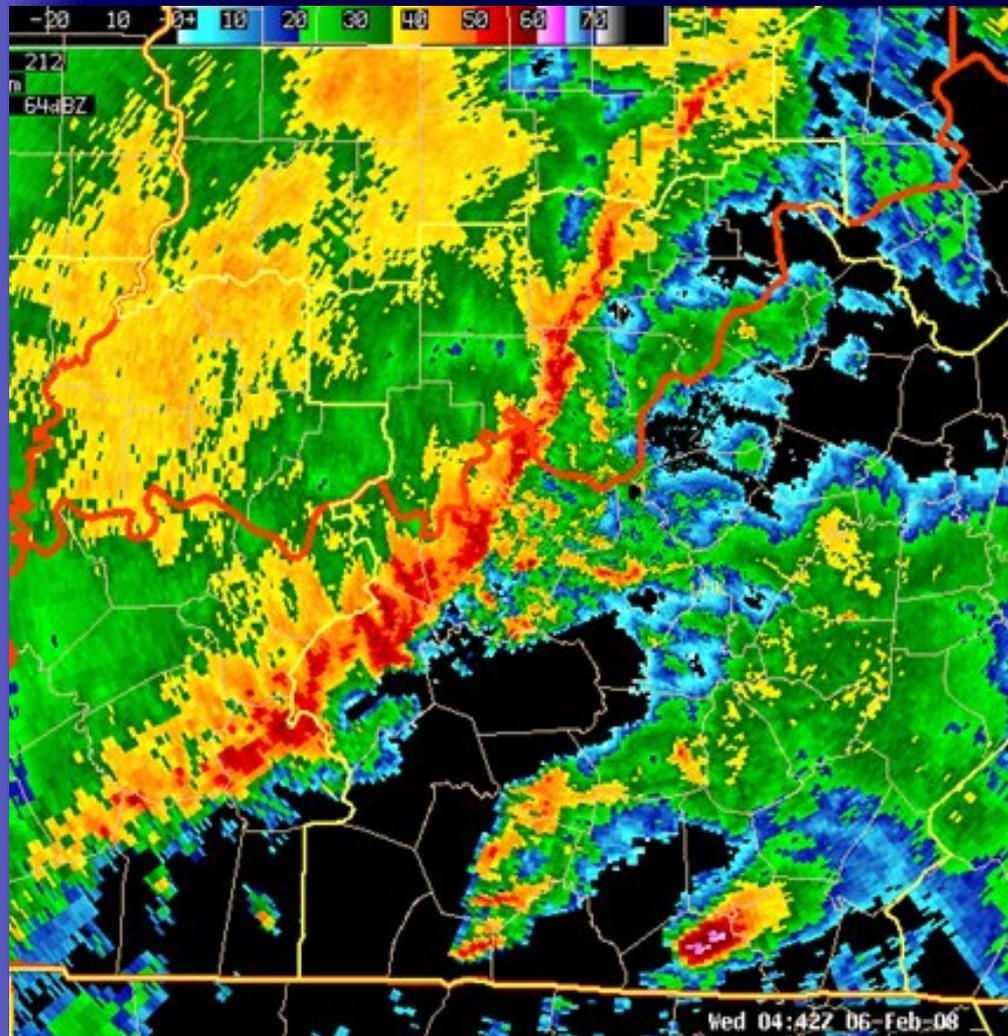


925mb DEWPOINT ANOMALY [F] at t=0h

February 29, 2012 QLCS/Tornado Event



February 5-6, 2008 QLCS and Supercell Tornado Outbreak



16 QLCS and 2 EF3 supercell tornadoes

Questions?