

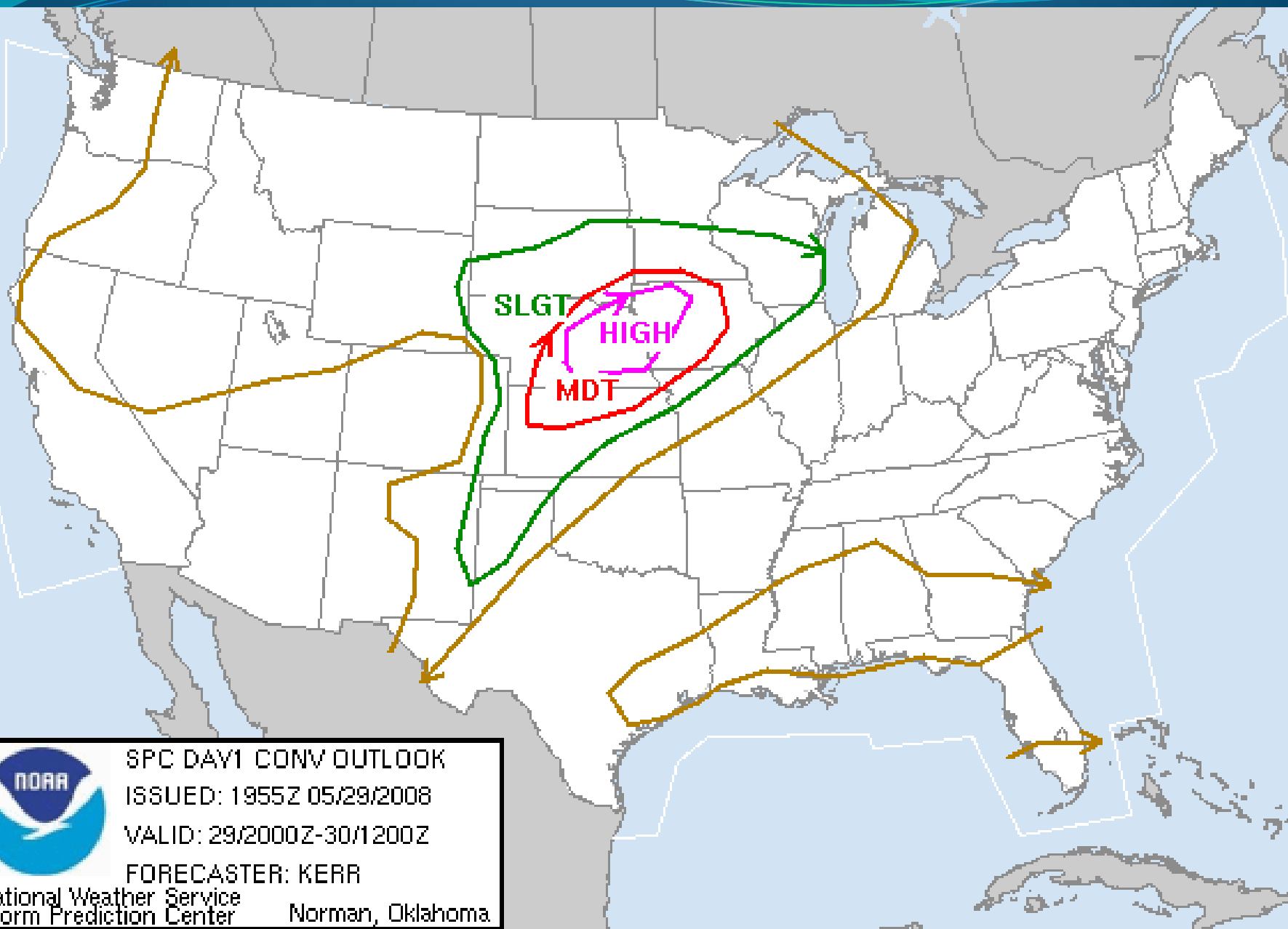


***THE DOWNFALL OF CONVECTIVE INHIBITION
IN THE SIG-TOR PARAMETER DURING THE
MAY 29TH 2008 TORNADO OUTBREAK***

RYAN PFANNKUCH & AARON JOHNSON
WFO HASTINGS NE

Photo courtesy of William T. Hark Photography

REVIEW OF MAY 29 2008



SPC DAY1 CONV OUTLOOK

ISSUED: 1955Z 05/29/2008

VALID: 29/2000Z-30/1200Z

FORECASTER: KERR

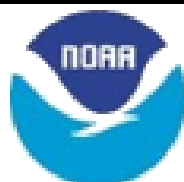
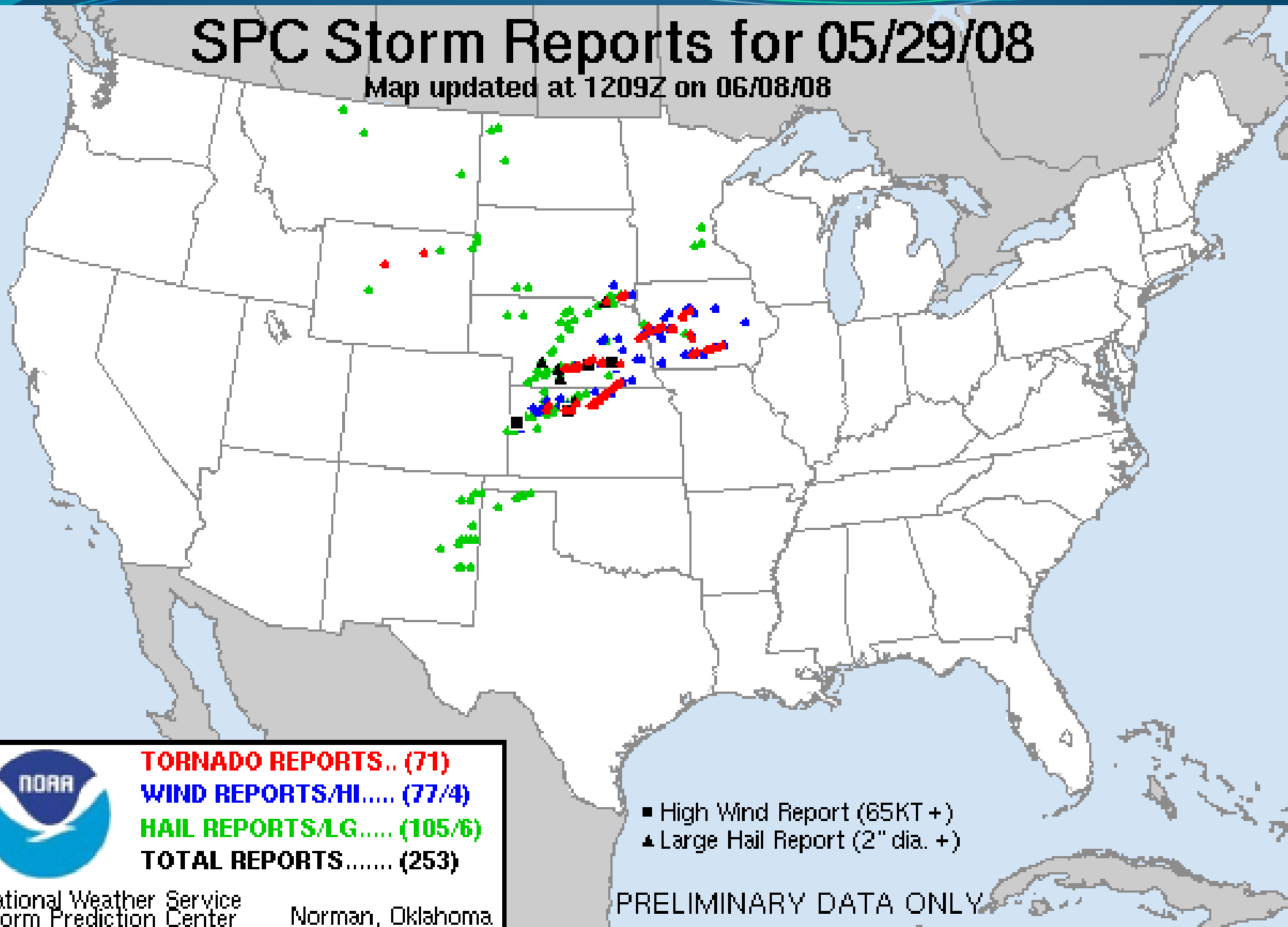
National Weather Service
Storm Prediction Center

Norman, Oklahoma

REVIEW OF MAY 29 2008

SPC Storm Reports for 05/29/08

Map updated at 1209Z on 06/08/08



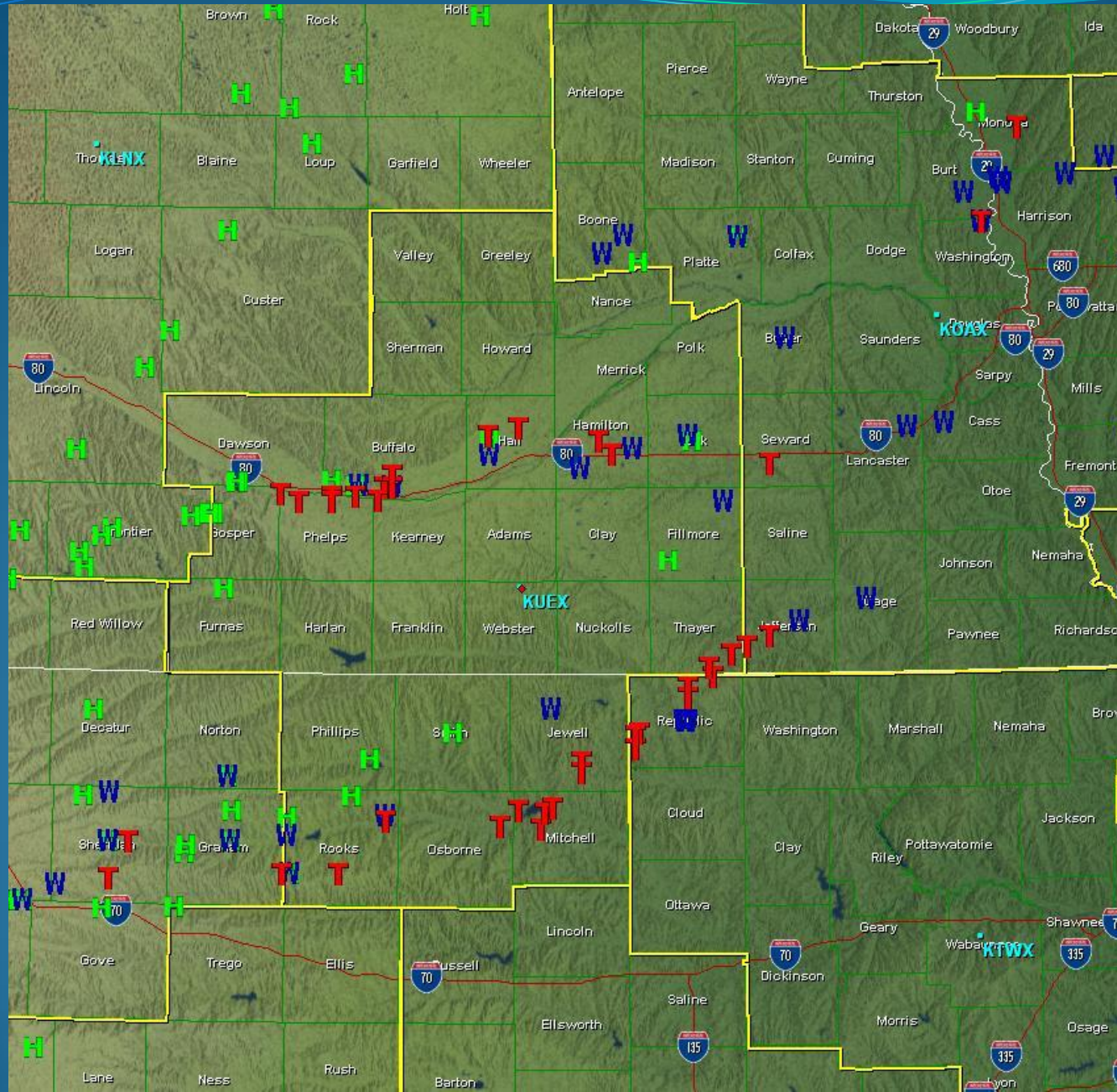
TORNADO REPORTS.. (71)
WIND REPORTS/HI..... (77/4)
HAIL REPORTS/LG..... (105/6)
TOTAL REPORTS..... (253)

- High Wind Report (65KT +)
- ▲ Large Hail Report (2" dia. +)

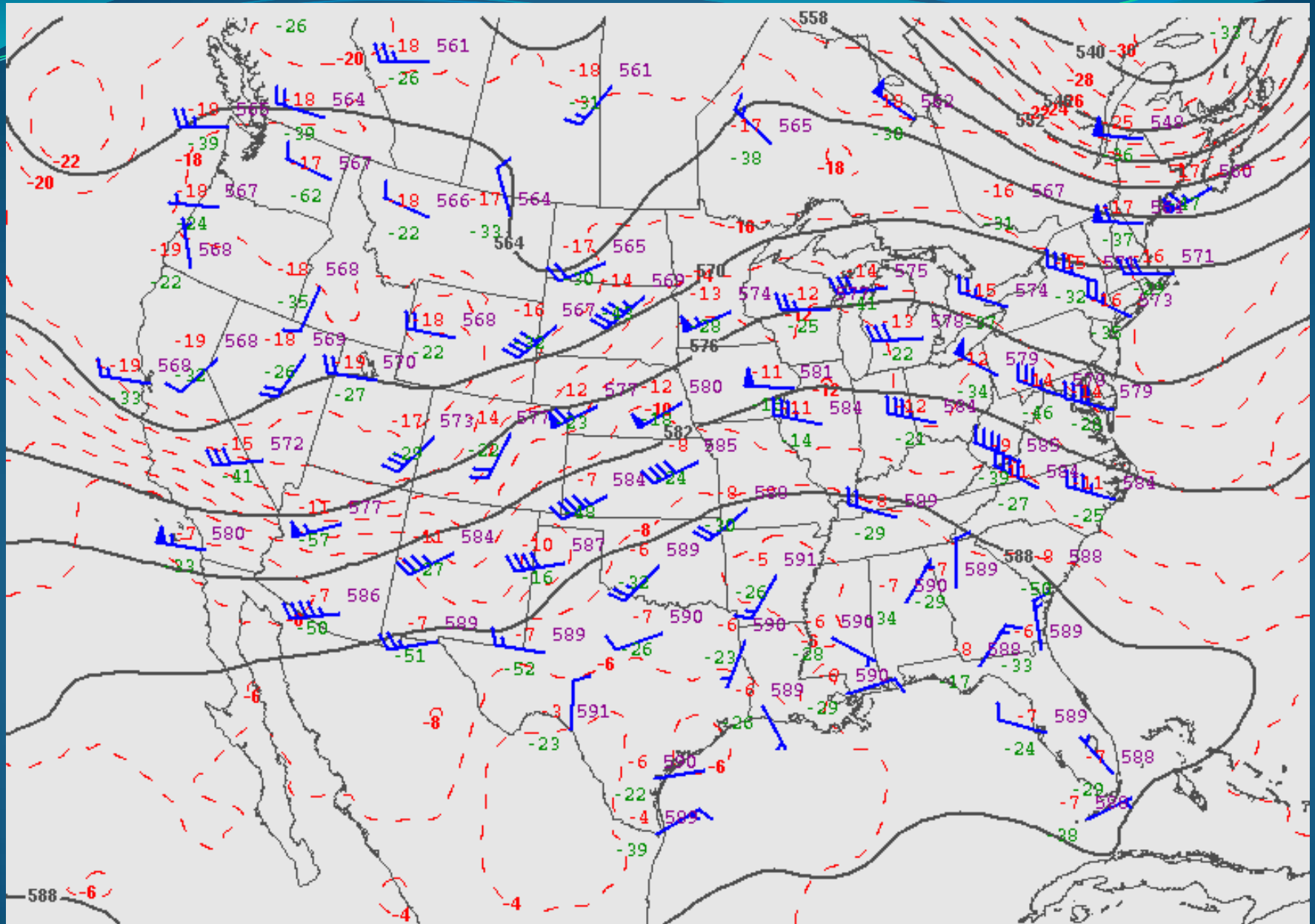
National Weather Service
Storm Prediction Center
Norman, Oklahoma

PRELIMINARY DATA ONLY

REVIEW OF MAY 29 2008

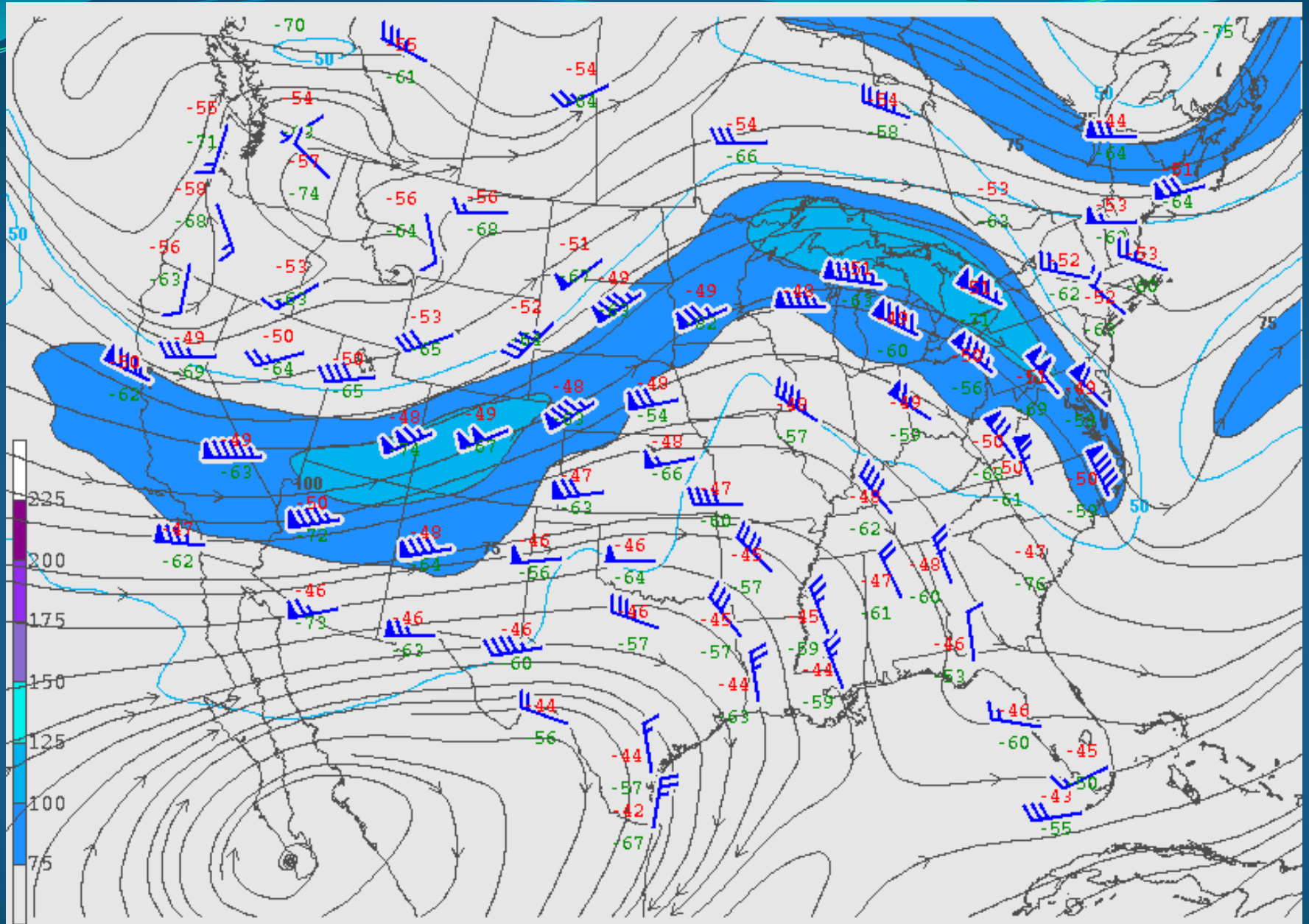


REVIEW OF MAY 29 2008



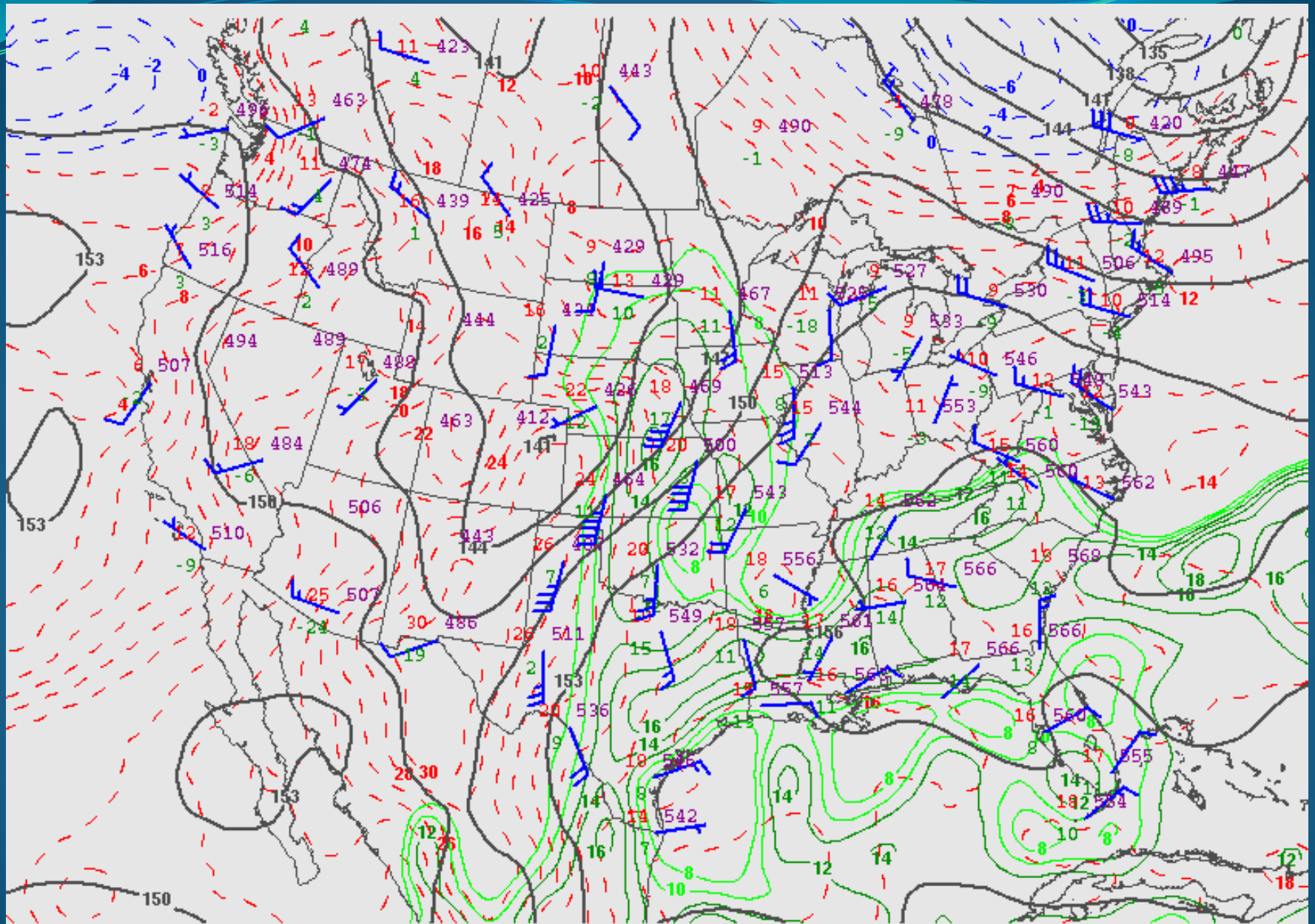
080530/0000 500 MB UA OBS, HGHTS, and TEMPS

REVIEW OF MAY 29 2008



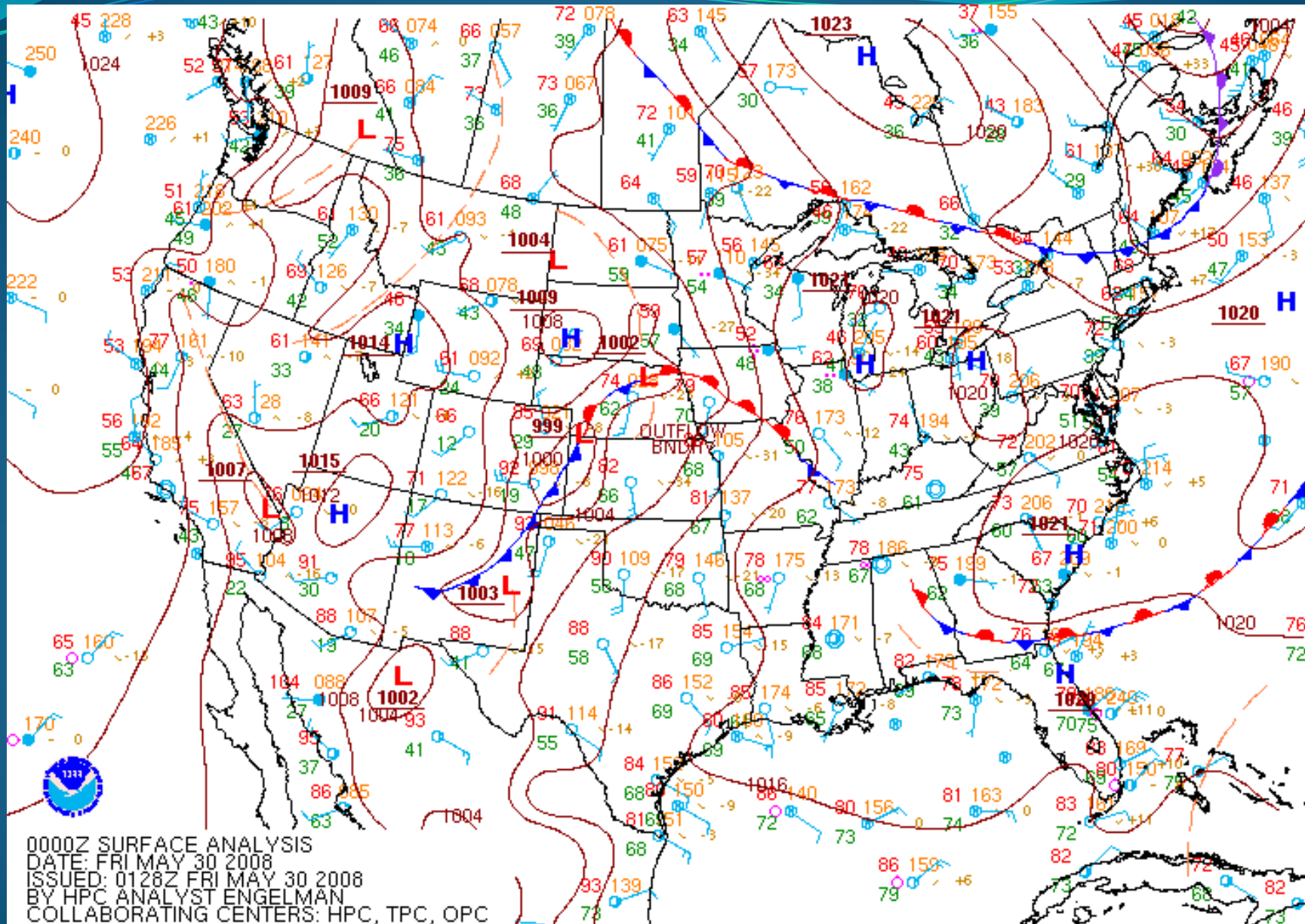
080530/0000 250 MB UA OBS AND ISOTACHS

REVIEW OF MAY 29 2008



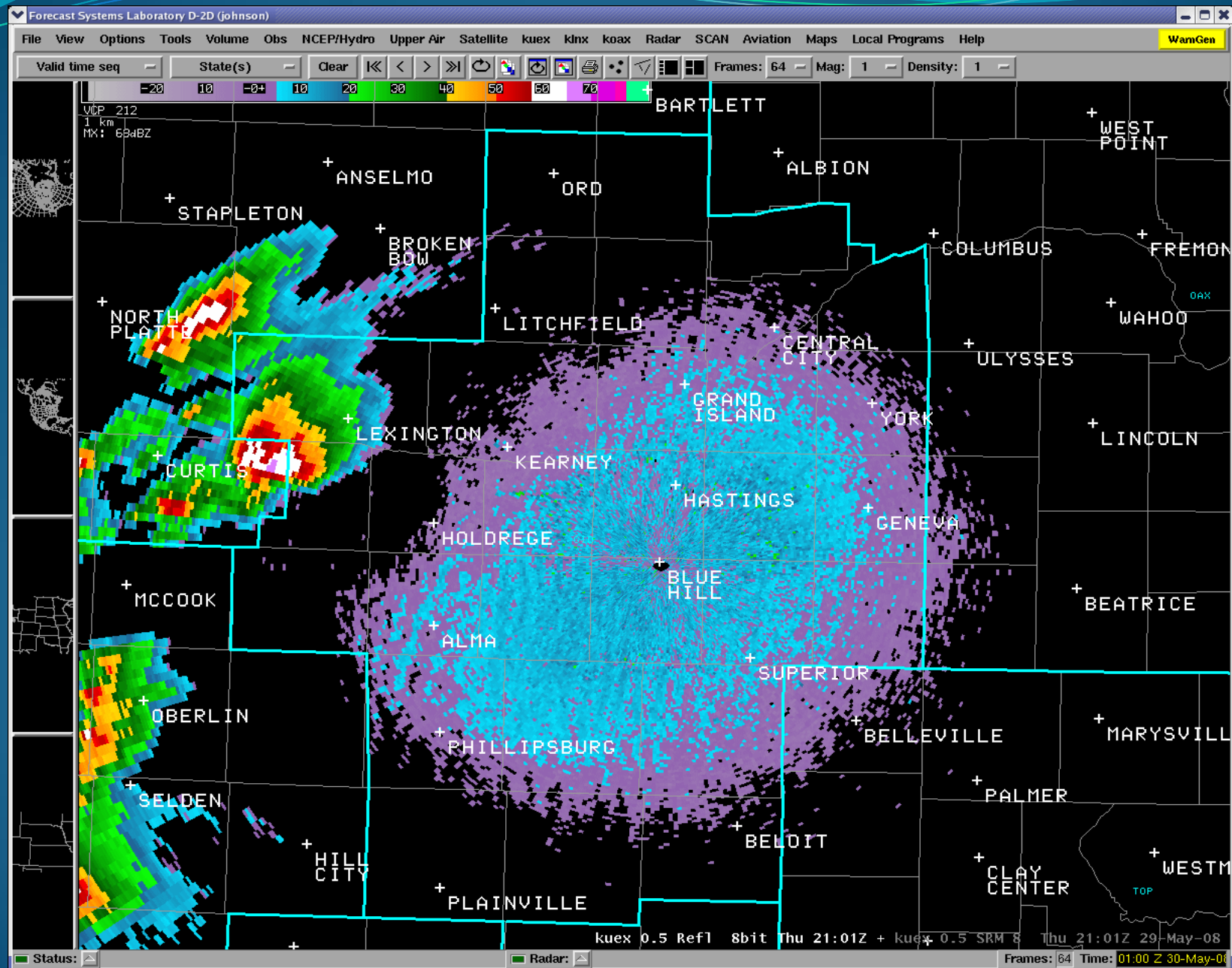
080530/0000 850 MB UA OBS, HGHTS, TEMPS, Td>=8

REVIEW OF MAY 29 2008

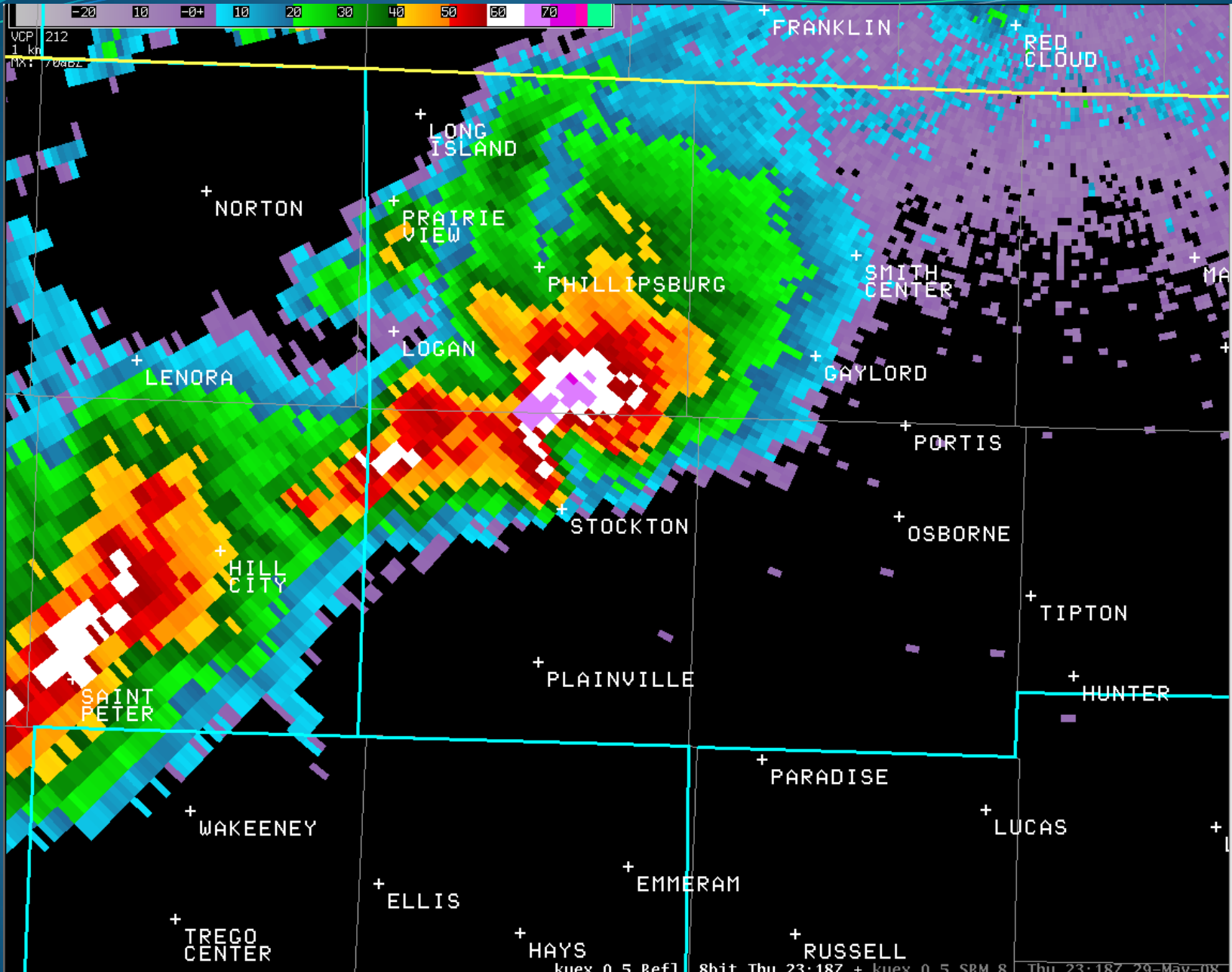


0000Z SURFACE ANALYSIS
DATE: FRI MAY 30 2008
ISSUED: 0128Z FRI MAY 30 2008
BY HPC ANALYST ENGELMAN
COLLABORATING CENTERS: HPC, TPC, OPC

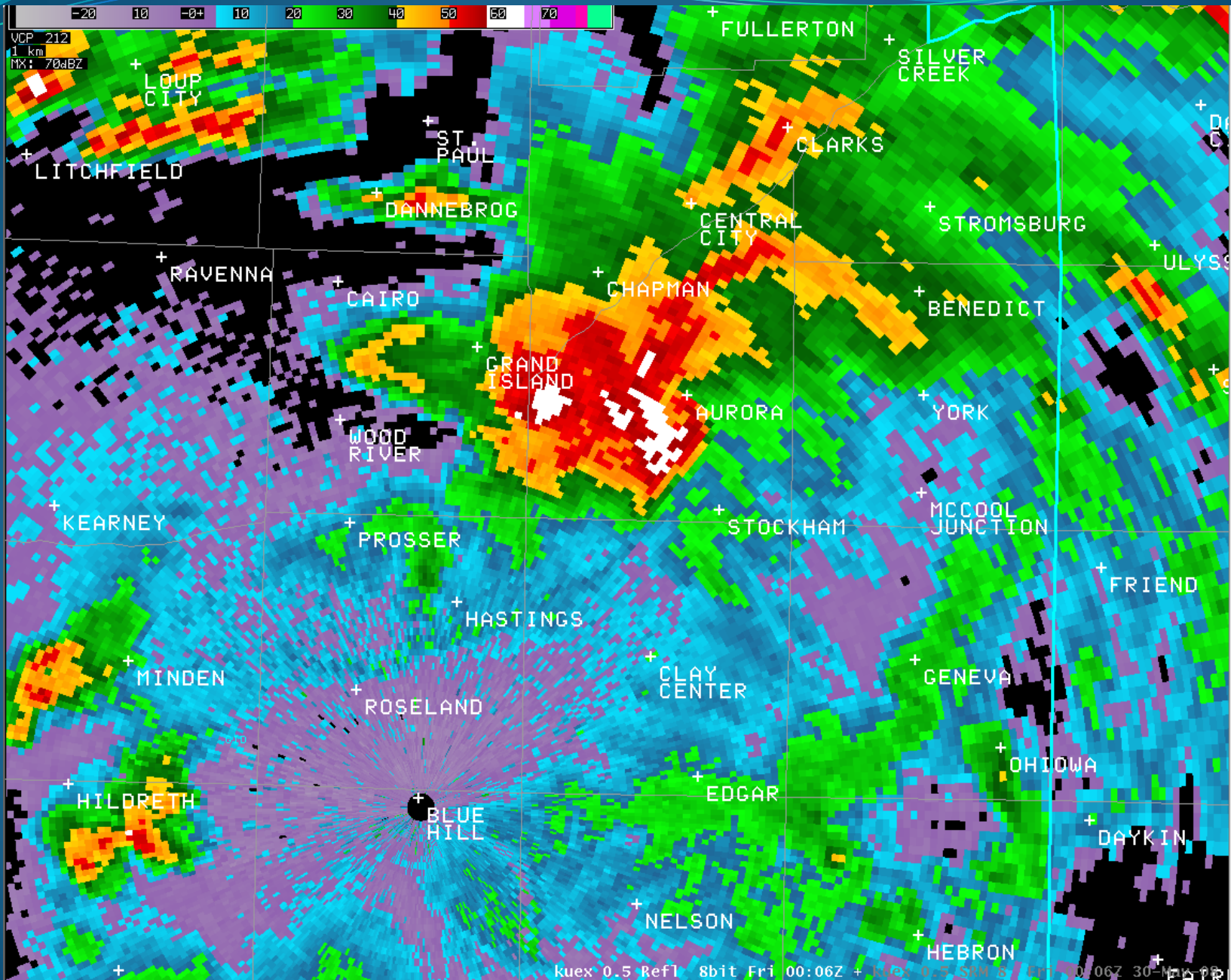
REVIEW OF MAY 29 2008



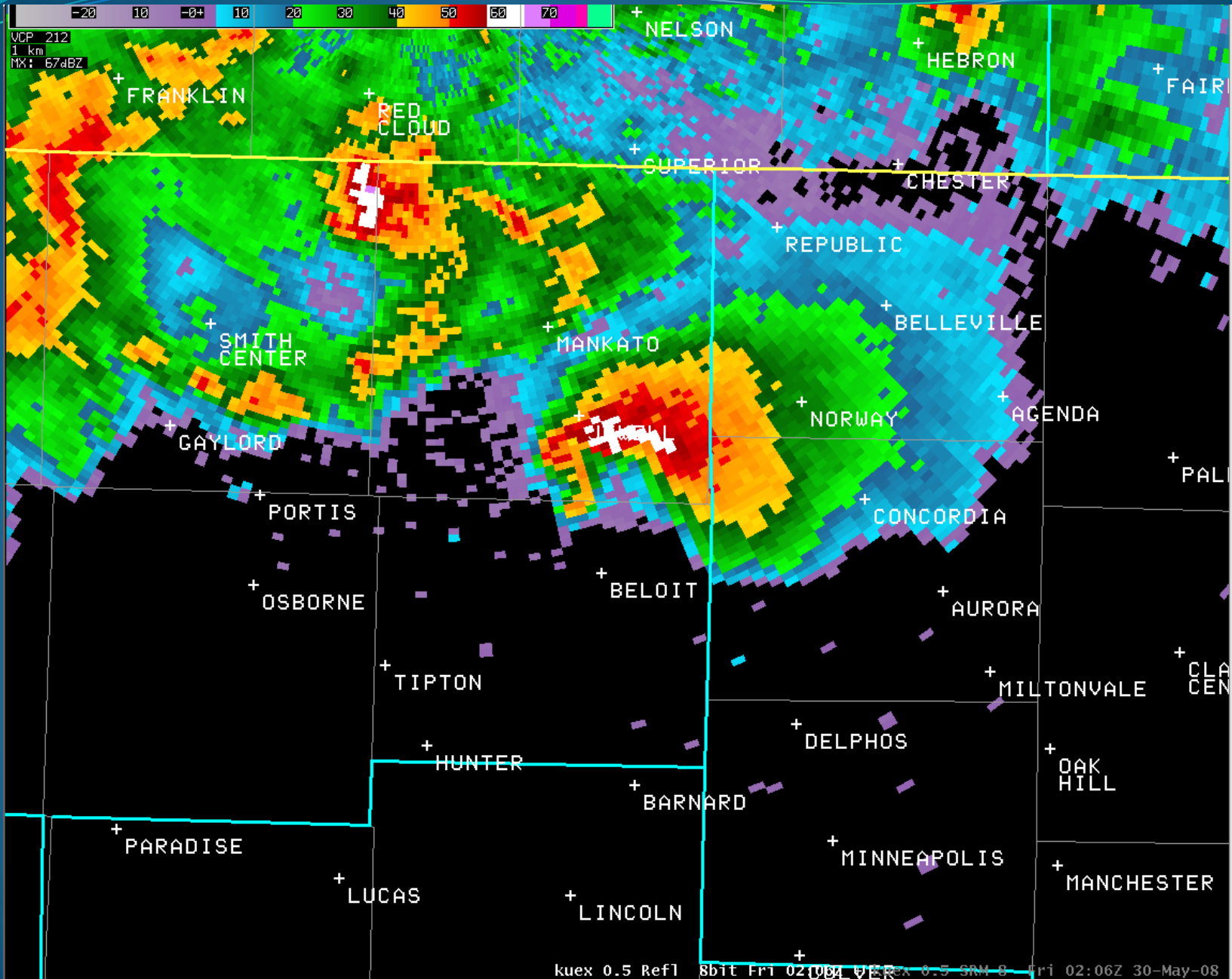
WOODSTON EF1 TORNADO



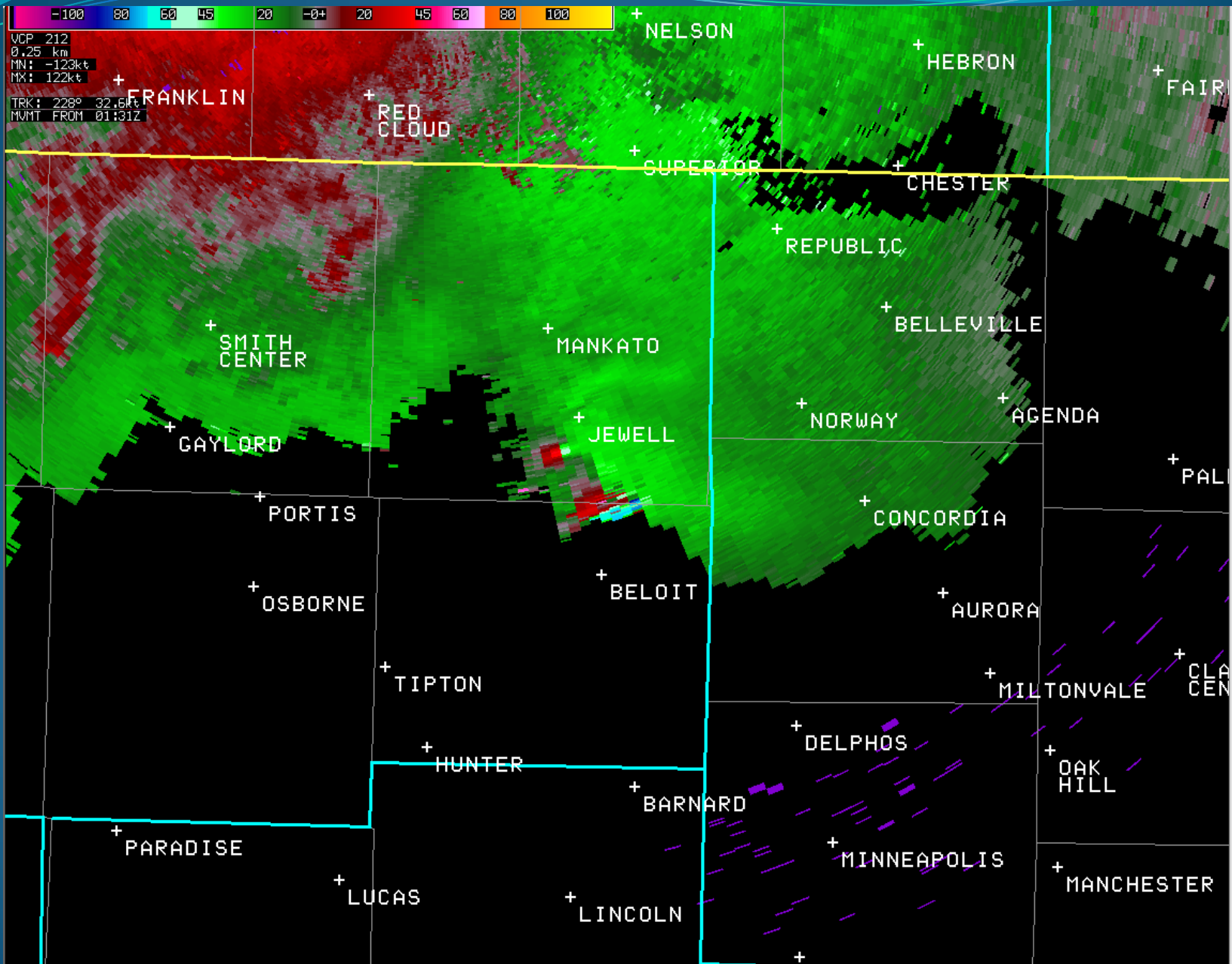
AURORA EF2 TORNADO



JEWELL AND GLEN ELDER EF3 TORNADO

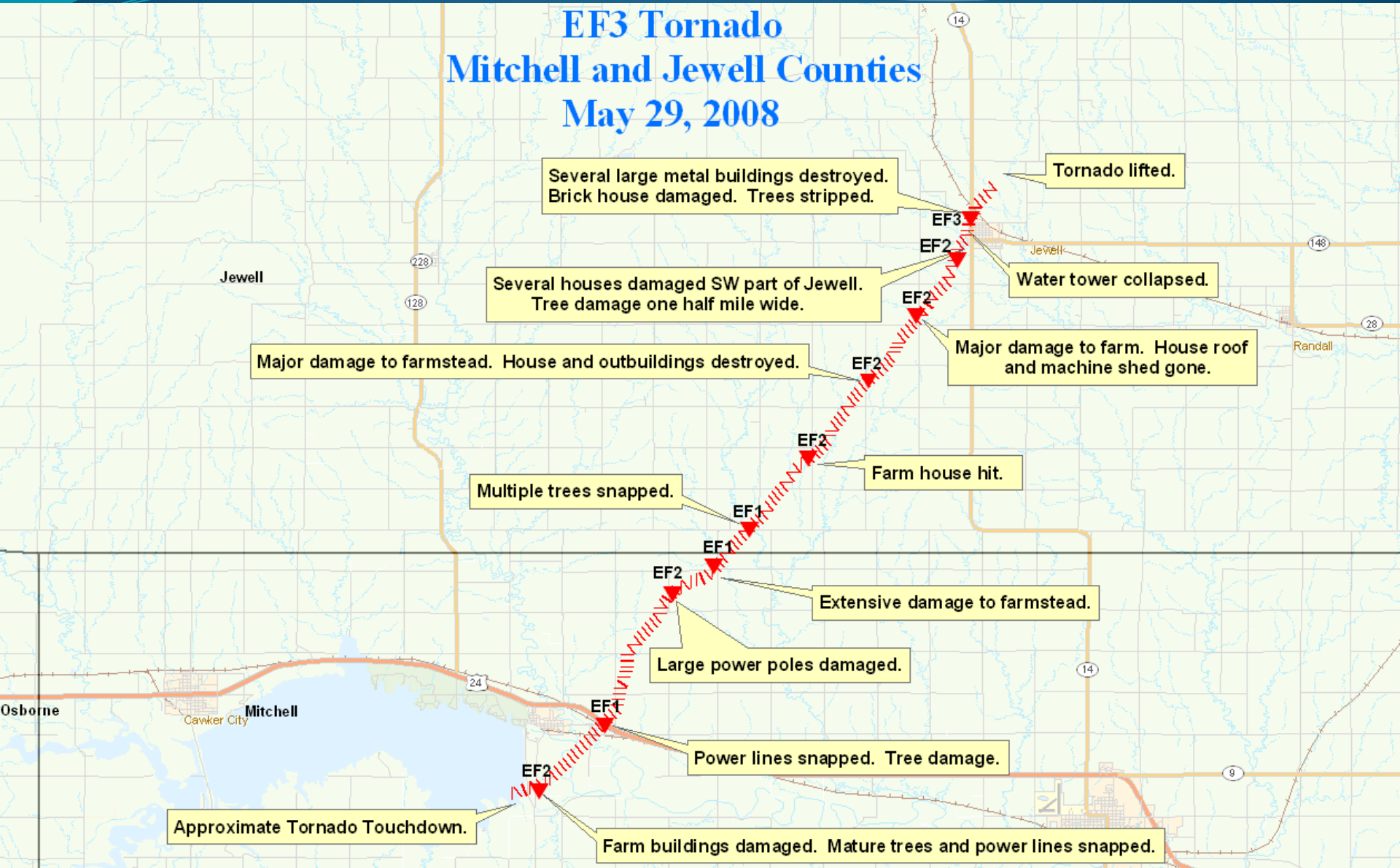


JEWELL AND GLEN ELDER EF3 TORNADO



JEWELL AND GLEN ELDER EF3 TORNADO

EF3 Tornado Mitchell and Jewell Counties May 29, 2008



JEWELL AND GLEN ELDER SUPERCELL



Photo courtesy of Christopher Collura

JEWELL AND GLEN ELDER WEDGE



Photo courtesy of Christopher Collura



Jewell City Water Tower



Jewell Co



West side of Jewell



Jewell Co



Jewell Co



Glen Elder

SUMMARY OF MAY 29TH

- ***Numerous reports of Tornadoes - 33***
- ***6 communities hit by Tornadoes across south central NE and north central KS***
 - ***Kearney EF2***
 - ***Aurora EF2***
 - ***Woodston EF1***
 - ***Jewell/Glen Elder EF3***
 - ***Hubbell EF1***

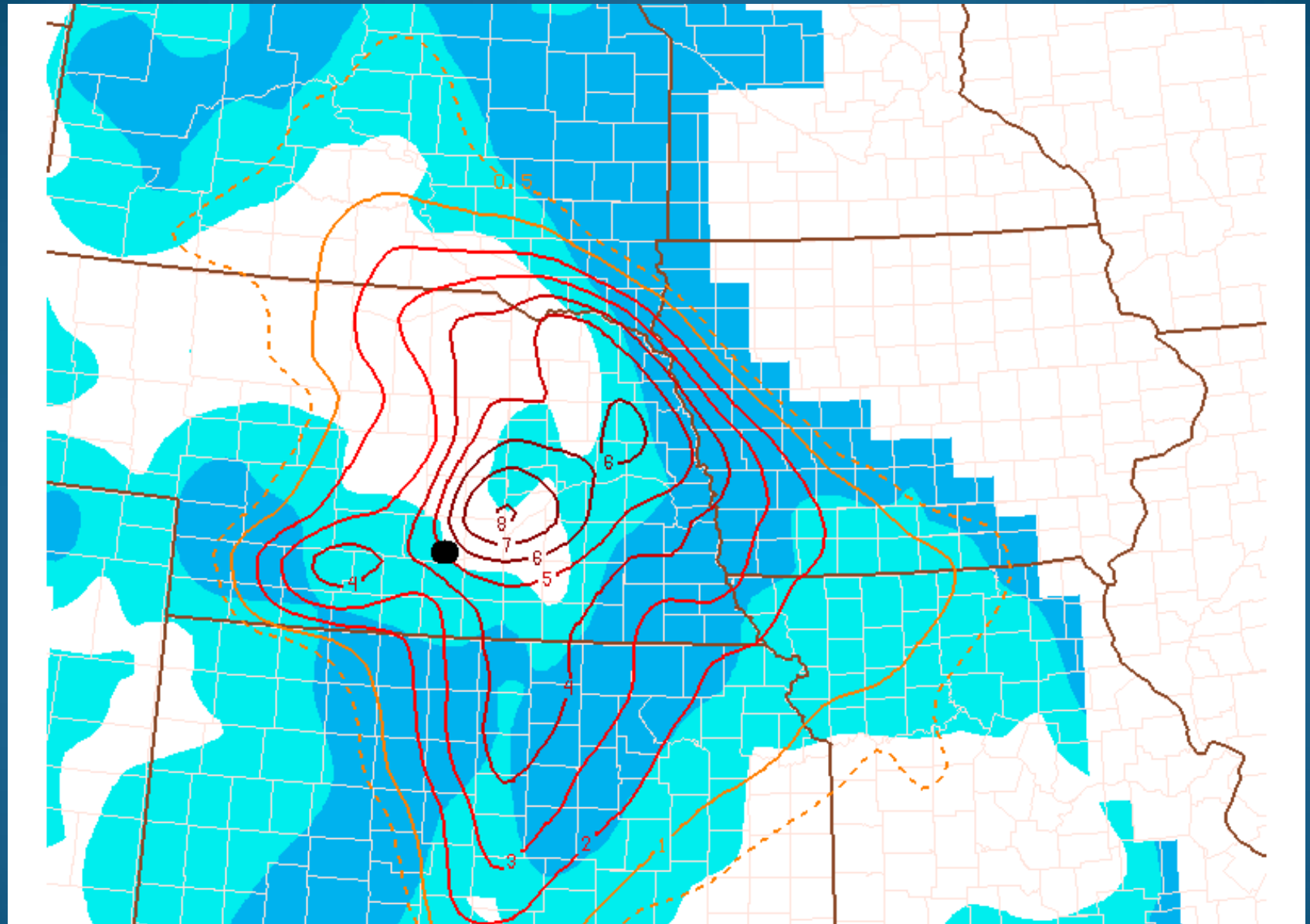
POST EVENT REVIEW

- *SPC Mesoscale Analysis archive along with local WFO Model/Observed data archive were reviewed for this event with some interesting findings:*
 - ❖ *Most Individual and Combined Parameters appeared nominal for a Tornadic Event*
 - ❖ *However, a large discrepancy was found between the effective layer Significant Tornado Parameter (STP) and the fixed layer STP found on the SPC Mesoscale Analysis web page*

FIXED VS EFFECTIVE LAYER STP

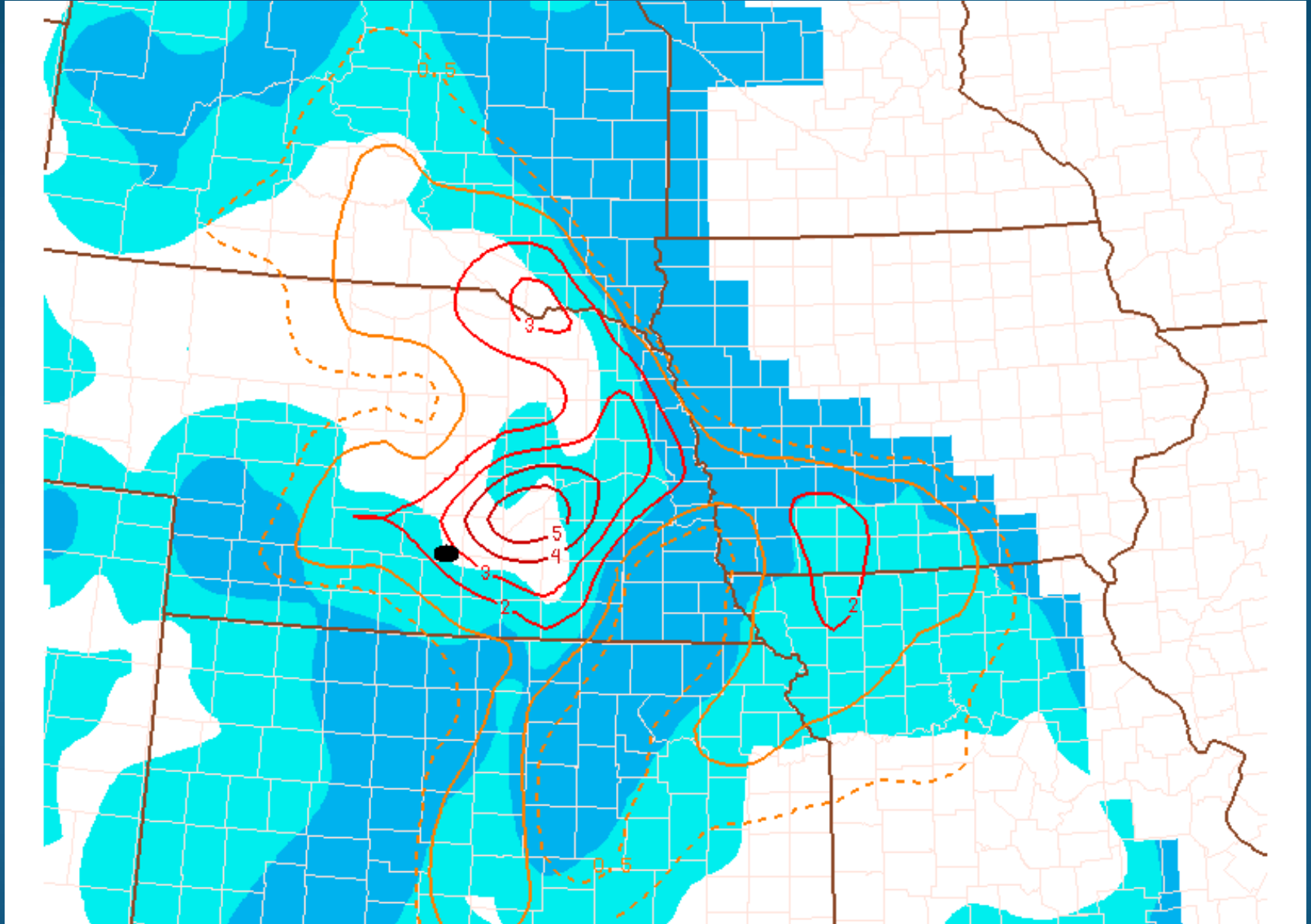
- *Review of Fixed Layer and Effective Layer STP values from SPC Mesoscale Analysis page valid at:*
 - ❖ *22Z (Kearney Tornado time)*
 - ❖ *00Z (Woodston/Aurora Tornado Time)*
 - ❖ *02Z (Glen Elder/Jewell Tornado Time)*
 - ❖ *03Z (Hubbell Tornado Time)*

FIXED LAYER STP AT 22Z (KEARNEY TOR)



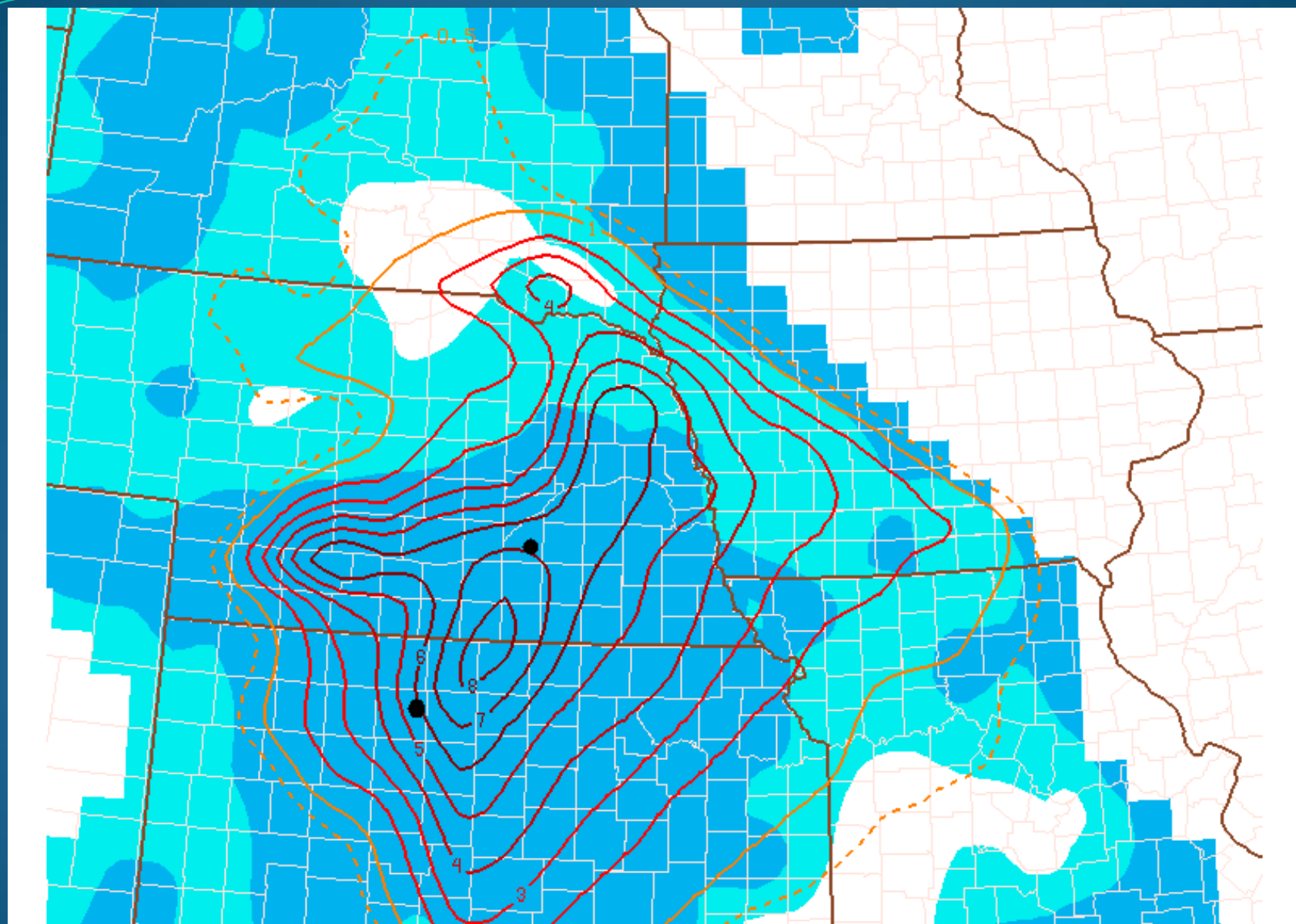
080529/2200 Significant Tornado Parameter (fixed layer) and MLCIN (J/kg, shaded at 25 and 100)

EFFECTIVE LAYER STP AT 22Z (KEARNEY TOR)



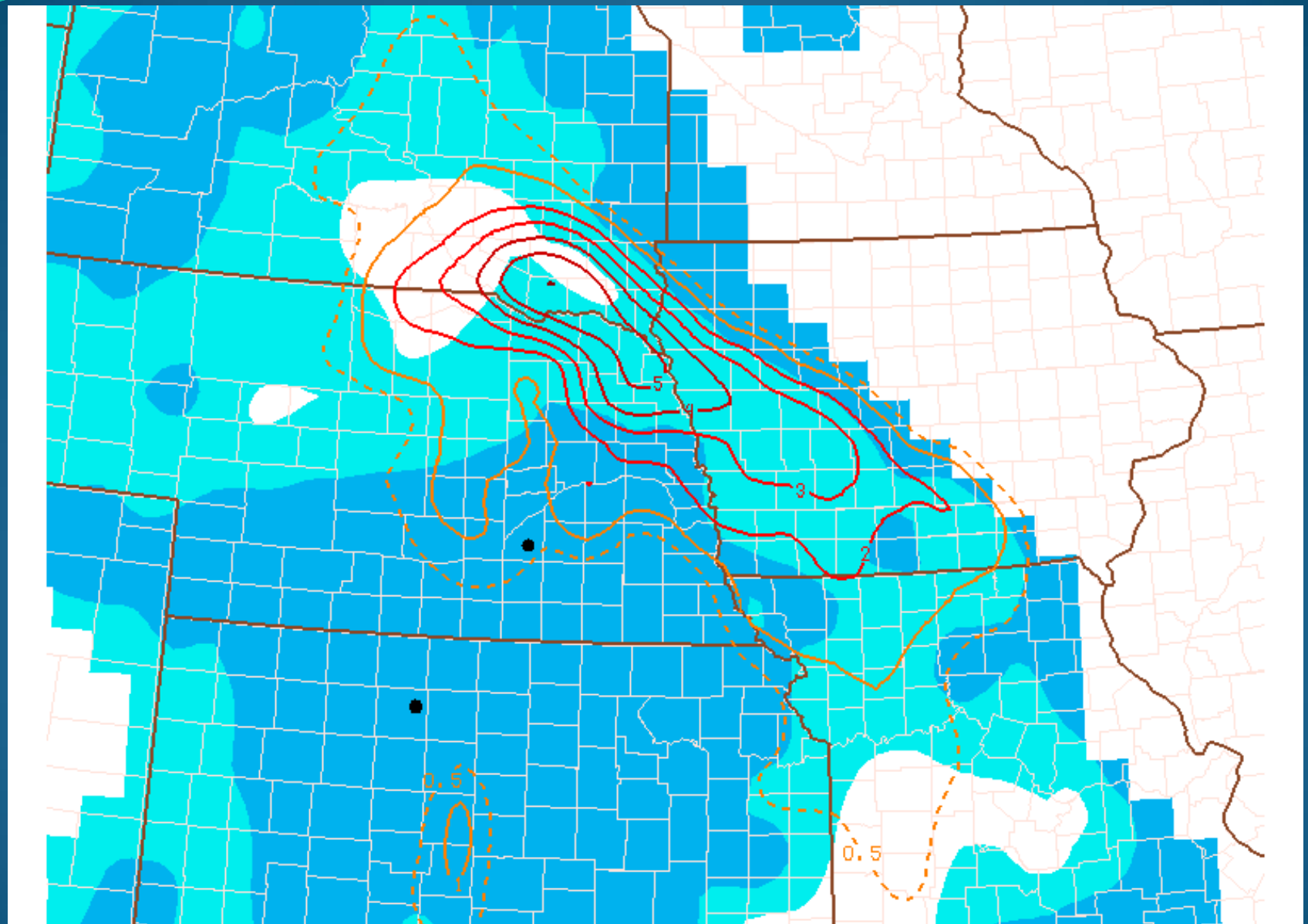
080529/2200 Significant Tornado Parameter (eff layer) and MLCIN (J/kg, shaded at 25 and 100)

FIXED LAYER STP AT 00Z (WOODSTON & AURORA TOR)



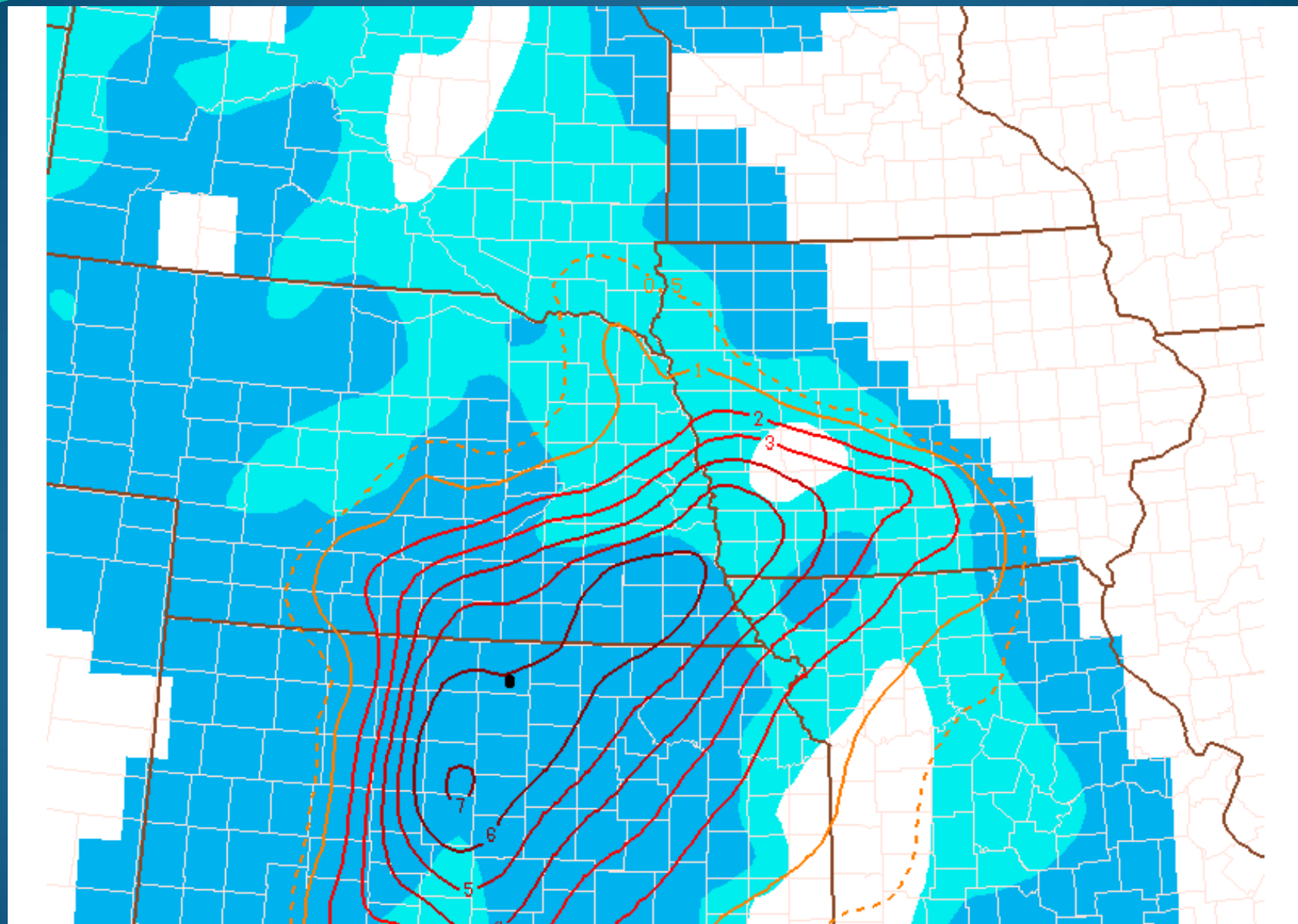
080530/0000 Significant Tornado Parameter (fixed layer) and MLCIN (J/kg, shaded at 25 and 100)

EFFECTIVE LAYER STP AT 00Z (WOODSTON & AURORA TOR)



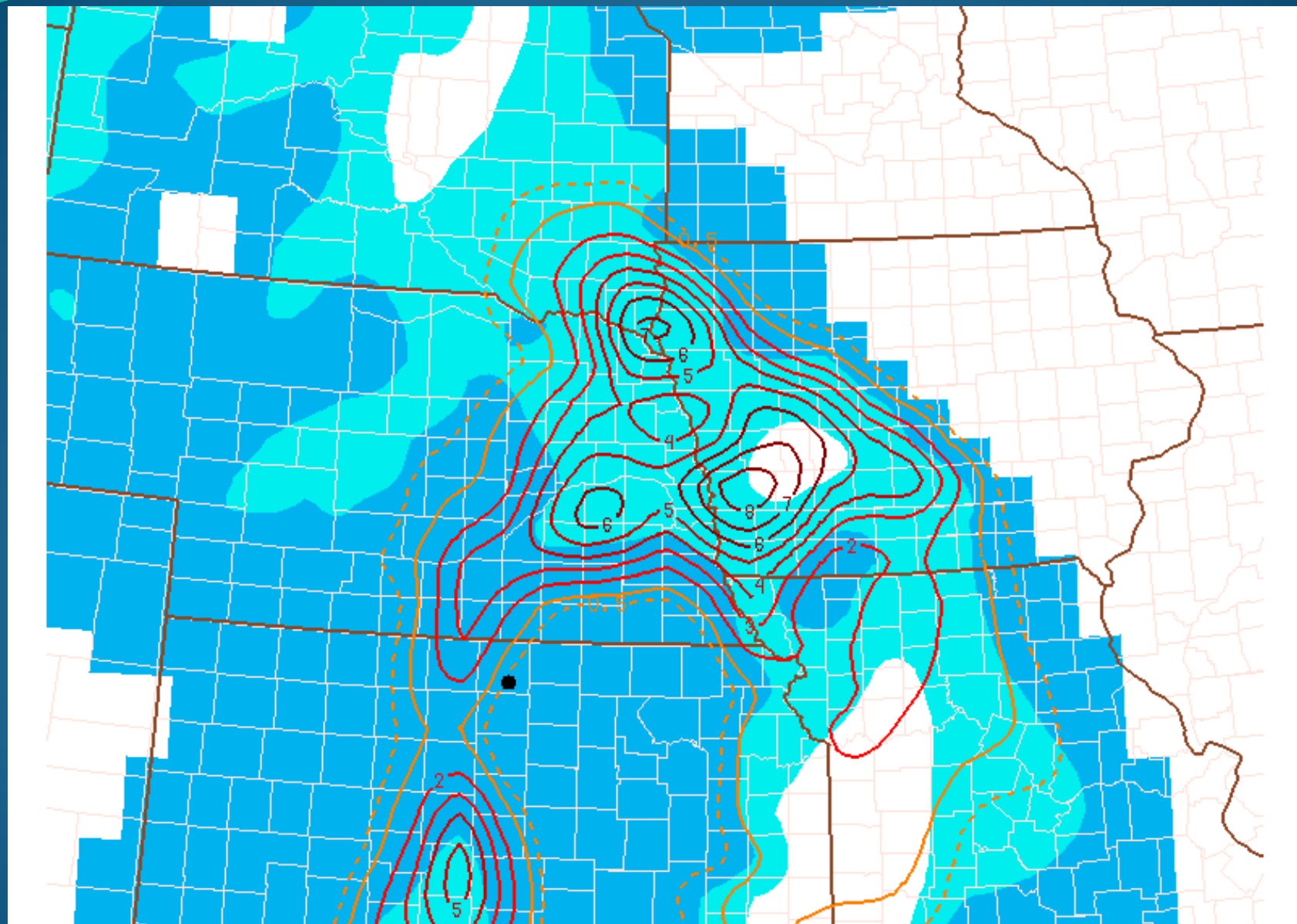
080530/0000 Significant Tornado Parameter (eff layer) and MLCIN (J/kg, shaded at 25 and 100)

FIXED LAYER STP AT 02Z (GLEN ELDER/JEWELL TOR)



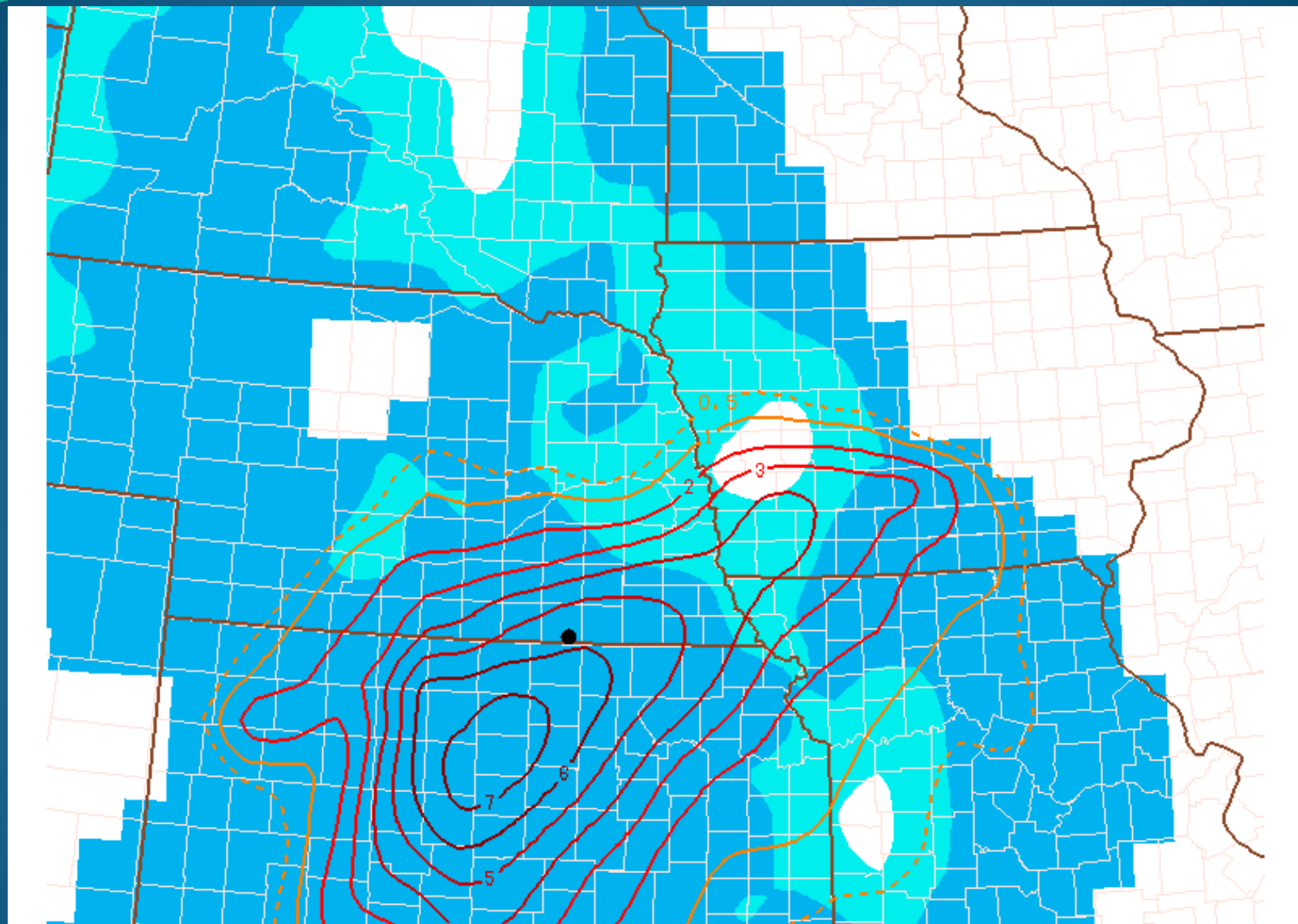
080530/0200 Significant Tornado Parameter (fixed layer) and MLCIN (J/kg, shaded at 25 and 100)

EFFECTIVE LAYER STP AT 02Z (GLEN ELDER/JEWELL TOR)



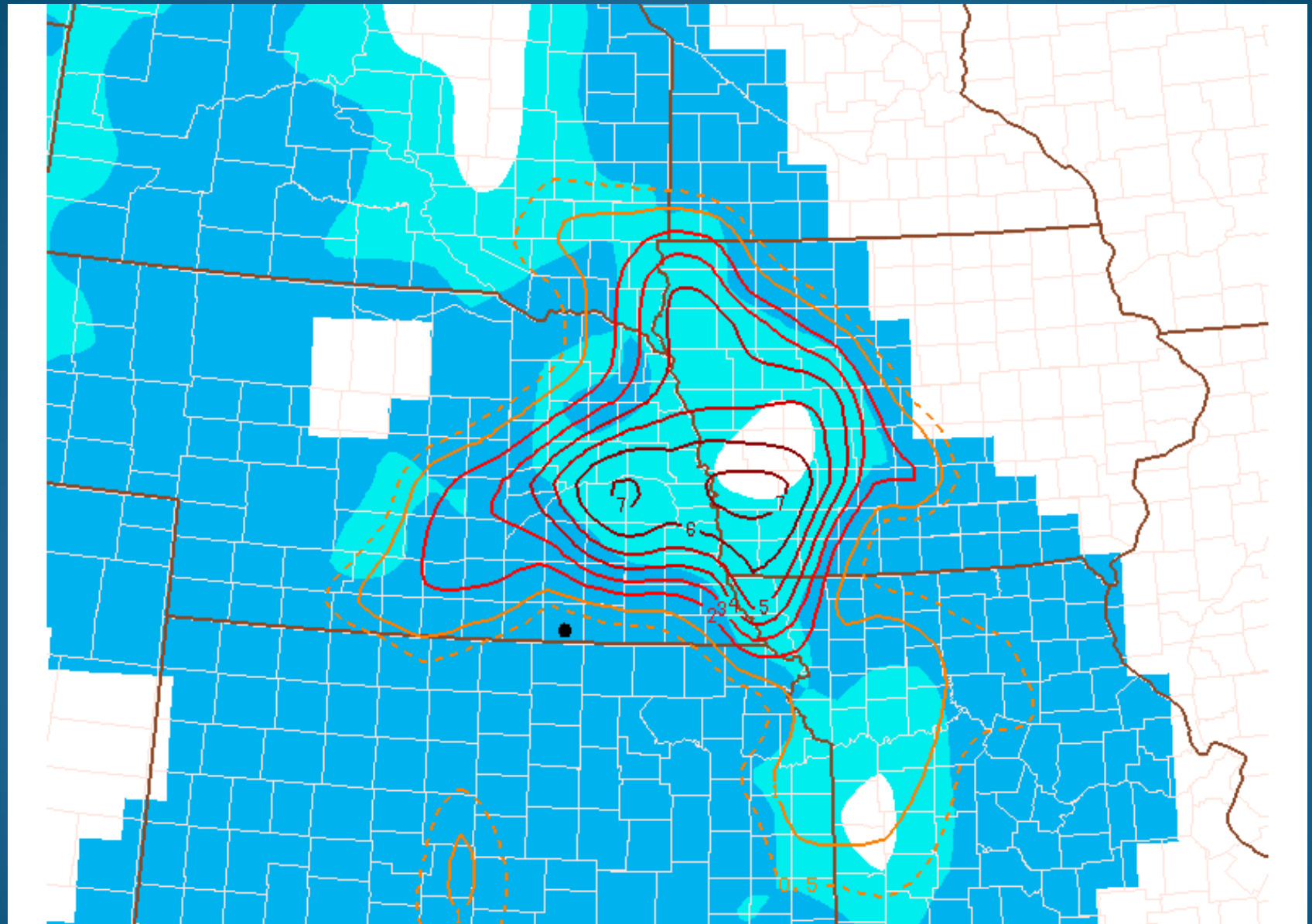
080530/0200 Significant Tornado Parameter (eff layer) and MLCIN (J/kg, shaded at 25 and 100)

FIXED LAYER STP AT 03Z (HUBBELL TOR)



080530/0300 Significant Tornado Parameter (fixed layer) and MLCIN (J/kg, shaded at 25 and 100)

EFFECTIVE LAYER STP AT 03Z (HUBBELL TOR)



080530/0300 Significant Tornado Parameter (eff layer) and MLCIN (J/kg, shaded at 25 and 100)

FIXED AND EFFECTIVE LAYER STP FORMULA UTILIZED IN SPC MESOSCALE ANALYSIS PAGE

- ***Fixed Layer STP:***

- $$\text{STP} = (\text{sbCAPE}/1500 \text{ J kg}^{-1}) * ((2000-\text{sbLCL})/1500 \text{ m})$$
$$* (\text{SRH}_1/100 \text{ m}^2 \text{ s}^{-2}) * (6\text{BWD}/20 \text{ m s}^{-1})$$

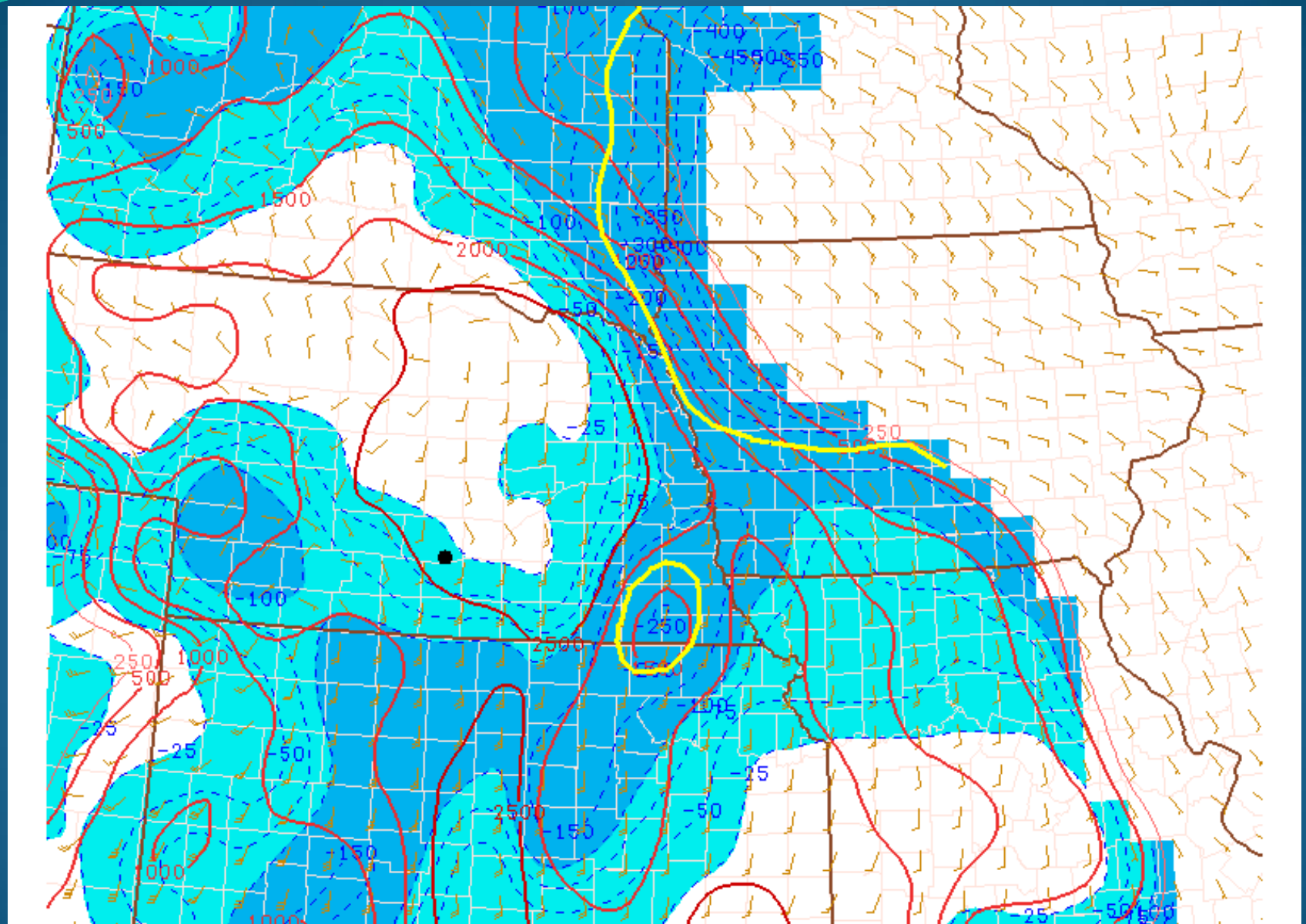
- ***Effective Layer STP:***

- $$\text{STP} = (\text{mlCAPE}/1500 \text{ J kg}^{-1}) * ((2000-\text{mlLCL})/1500 \text{ m}) *$$
$$(\text{ESRH}/150 \text{ m}^2 \text{ s}^{-2}) * (\text{EBWD}/20 \text{ m s}^{-1}) *$$
$$((200+\text{mlCIN})/150 \text{ J kg}^{-1})$$

HOW DOES CIN CHANGE THE EFFECTIVE LAYER STP VALUE???

- $CIN = -125 \text{ J/kg}$:
 - STP value decreased by $1/2$
- $CIN = -150 \text{ J/kg}$:
 - STP value decreased by $2/3$
- $CIN \leq -200 \text{ J/kg}$:
 - STP value = 0

ML CIN AT 22Z (KEARNEY TOR)

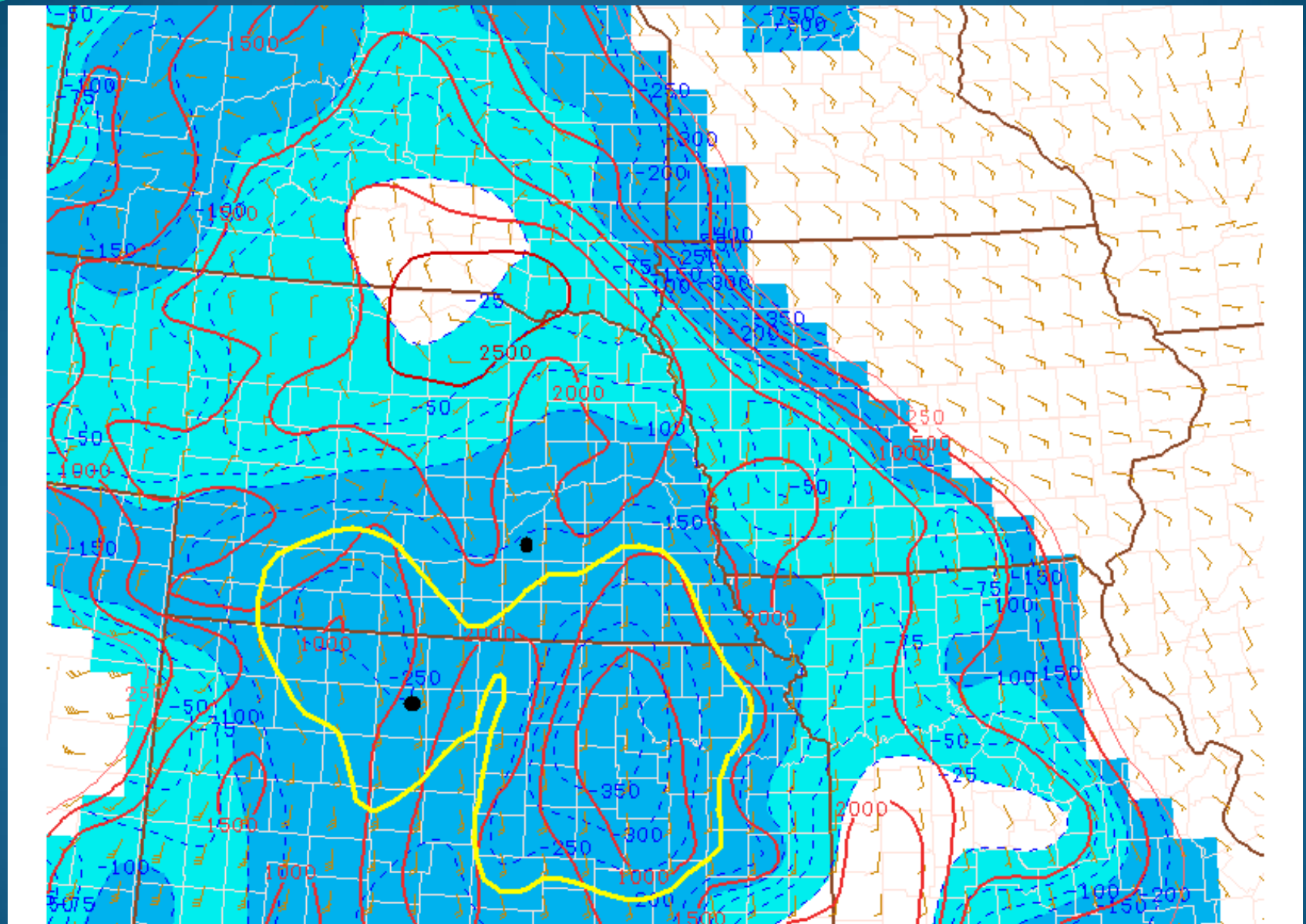


25

100

080529/2200 MLCAPE (contour) and MLCIN (J/kg, shaded)

ML CIN AT 00Z (WOODSTON & AURORA TOR)

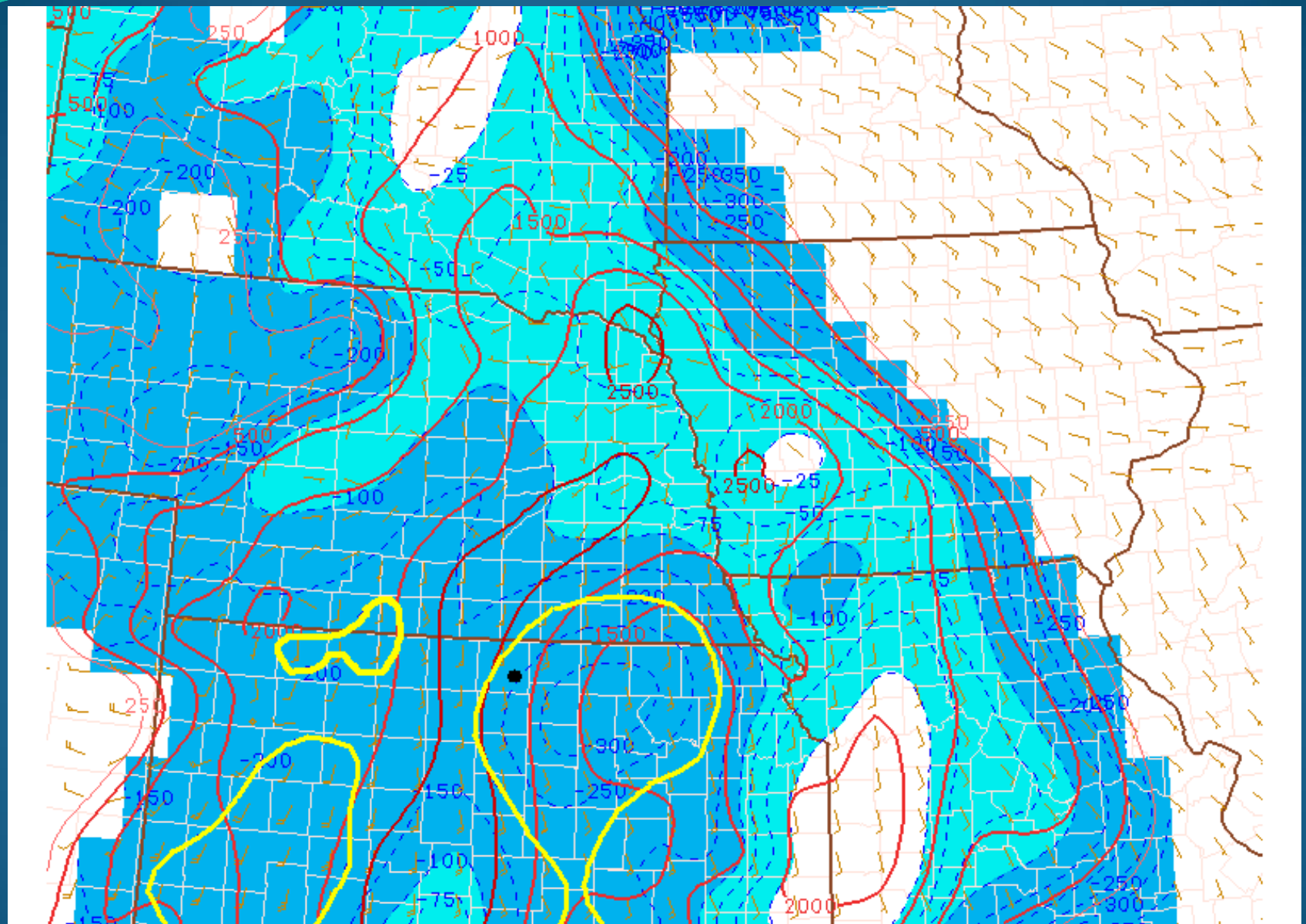


25

100

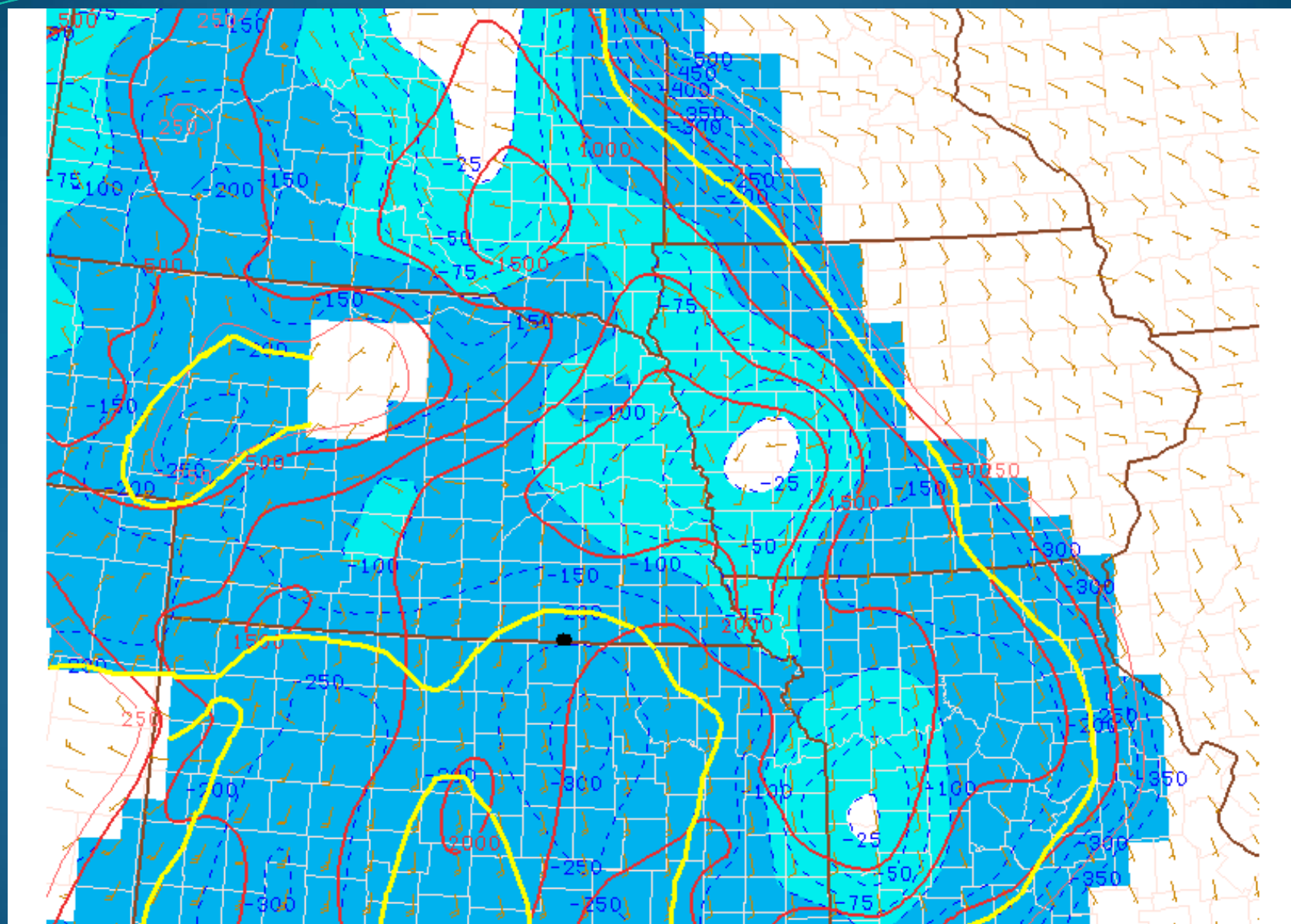
080530/0000 MLCAPE (contour) and MLCIN (J/kg, shaded)

ML CIN AT 02Z (GLEN ELDER/JEWELL TOR)



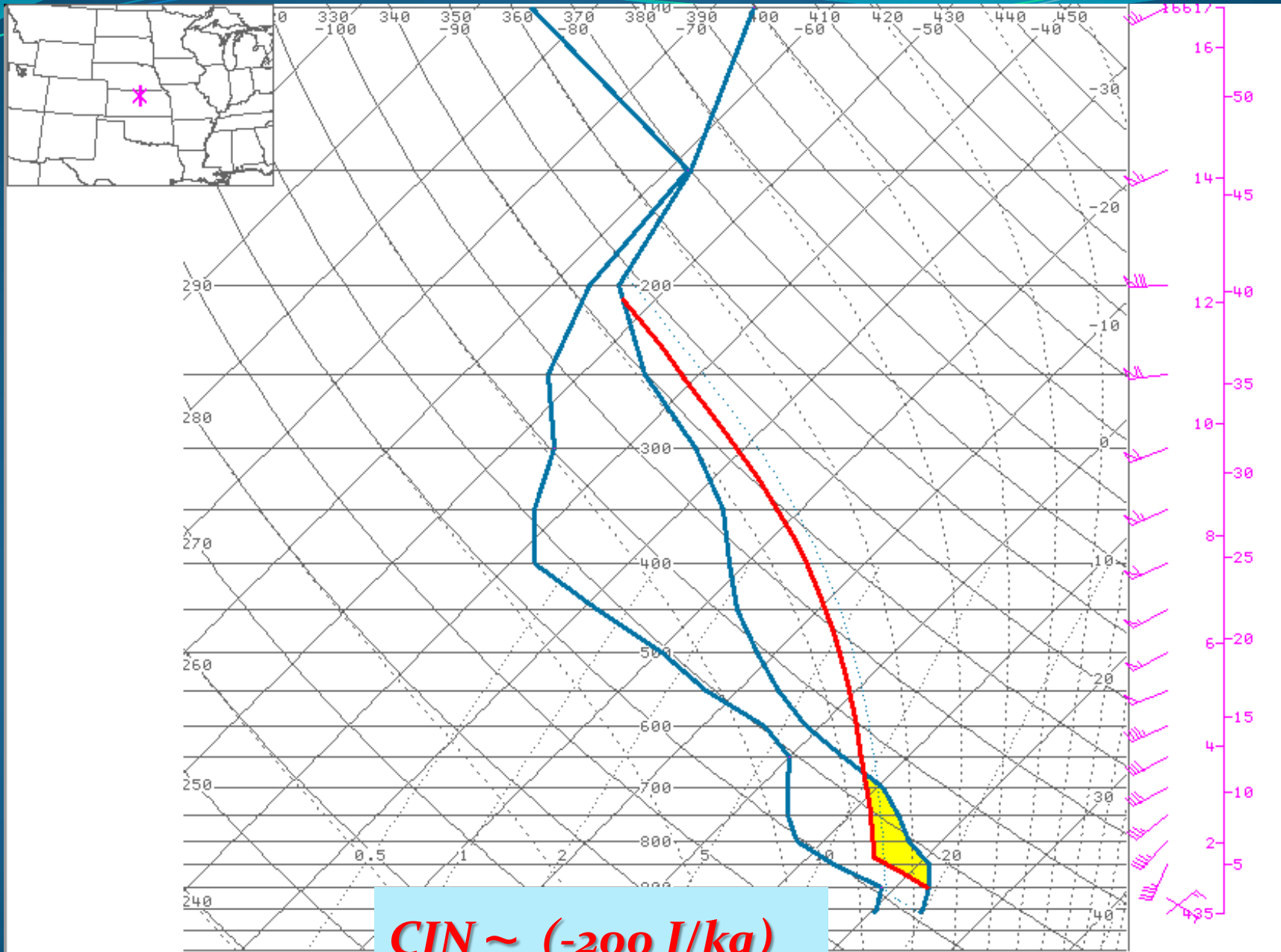
25 100 080530/0200 MLCAPE (contour) and MLCIN (J/kg, shaded)

ML CIN AT 03Z (HUBBELLTOR)



25 100 080530/0300 MLCAPE (contour) and MLCIN (J/kg, shaded)

LAPS SOUNDING AT 02Z (GLEN ELDER/JEWELL)



IS IT SINFULLY IMPORTANT TO INCLUDE CIN IN THE EFFECTIVE LAYER STP FORMULA?

- *Effective Layer STP:*

- $$\text{STP} = (\text{mlCAPE}/1500 \text{ J kg}^{-1}) * ((2000-\text{mlLCL})/1500 \text{ m}) * (\text{ESRH}/150 \text{ m}^2 \text{ s}^{-2}) * (\text{EBWD}/20 \text{ m s}^{-1}) * ((200+\text{mlCIN})/150 \text{ J kg}^{-1})$$

IS IT SINFULLY IMPORTANT TO INCLUDE CIN IN THE EFFECTIVE LAYER STP FORMULA?

- *Effective Layer STP:*

- $$\text{STP} = (\text{mlCAPE}/1500 \text{ J kg}^{-1}) * ((2000 - \text{mlLCL})/1500 \text{ m}) * (\text{ESRH}/150 \text{ m}^2 \text{ s}^{-2}) * (\text{EBWD}/20 \text{ m s}^{-1})$$

SUMMARY

- *Fixed layer STP correctly identified areas that resulted in significant tornado(s)*
- *Effective layer STP failed in most cases due to CIN values being near or below (-200 J/kg) threshold found in the SPC equation*
- *RECOMMENDATION: The CIN value utilized in the effective layer STP, should either be increased significantly or eliminated, resulting in a higher probability of detection, similar to the fixed layer STP*



QUESTIONS?

Photo courtesy of Christopher Collura