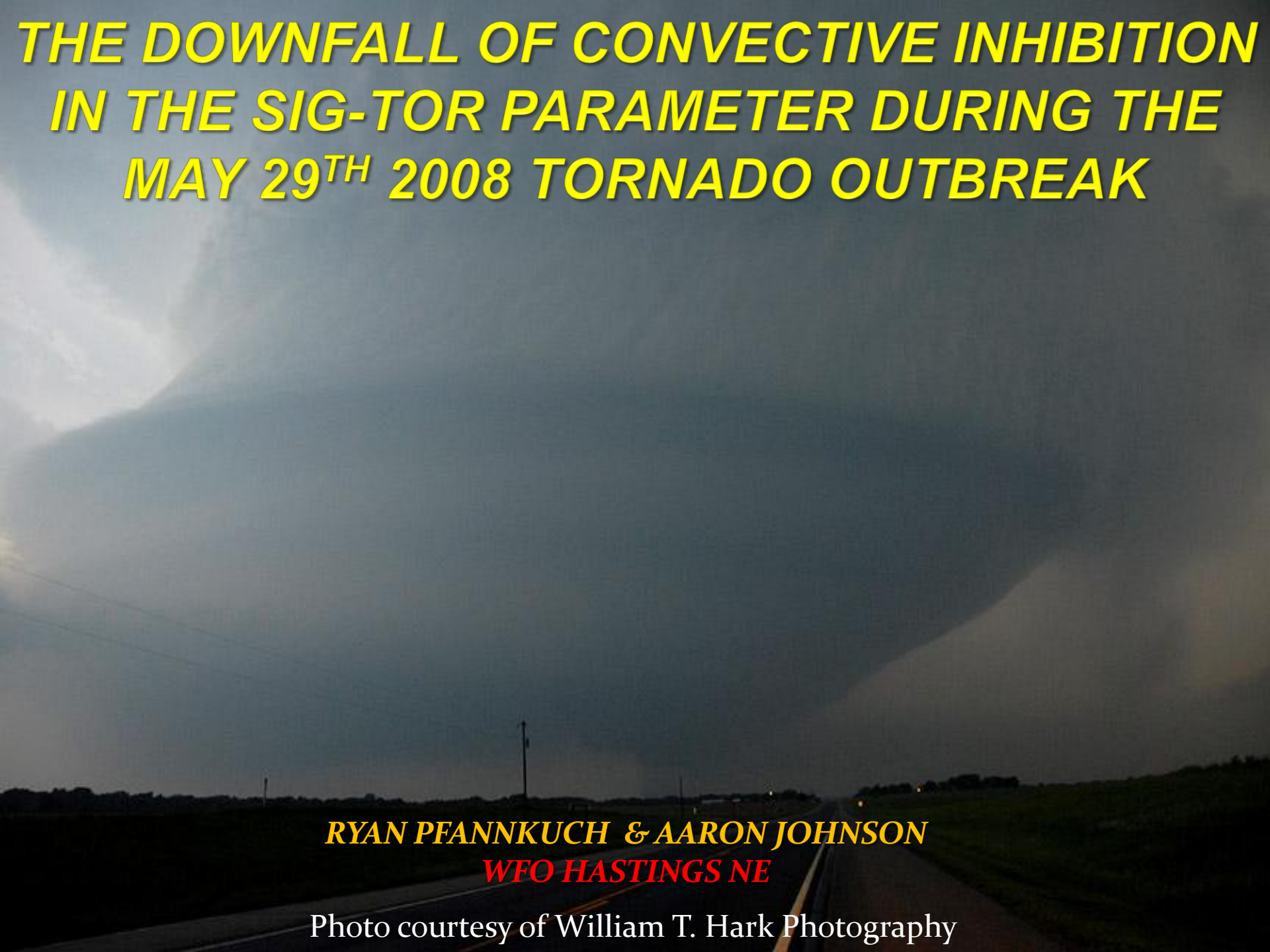
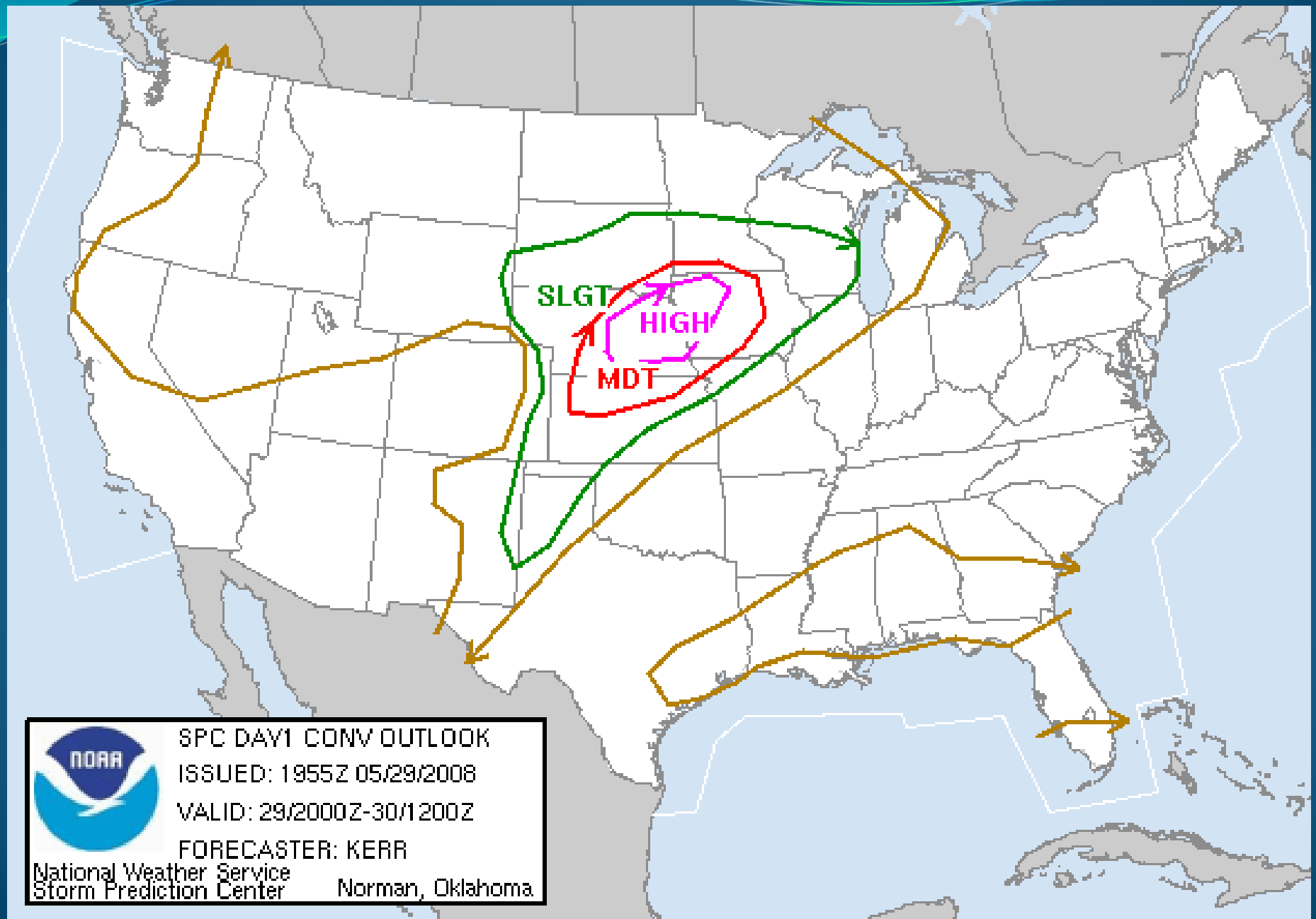
THE DOWNFALL OF CONVECTIVE INHIBITION IN THE SIG-TOR PARAMETER DURING THE MAY 29TH 2008 TORNADO OUTBREAK



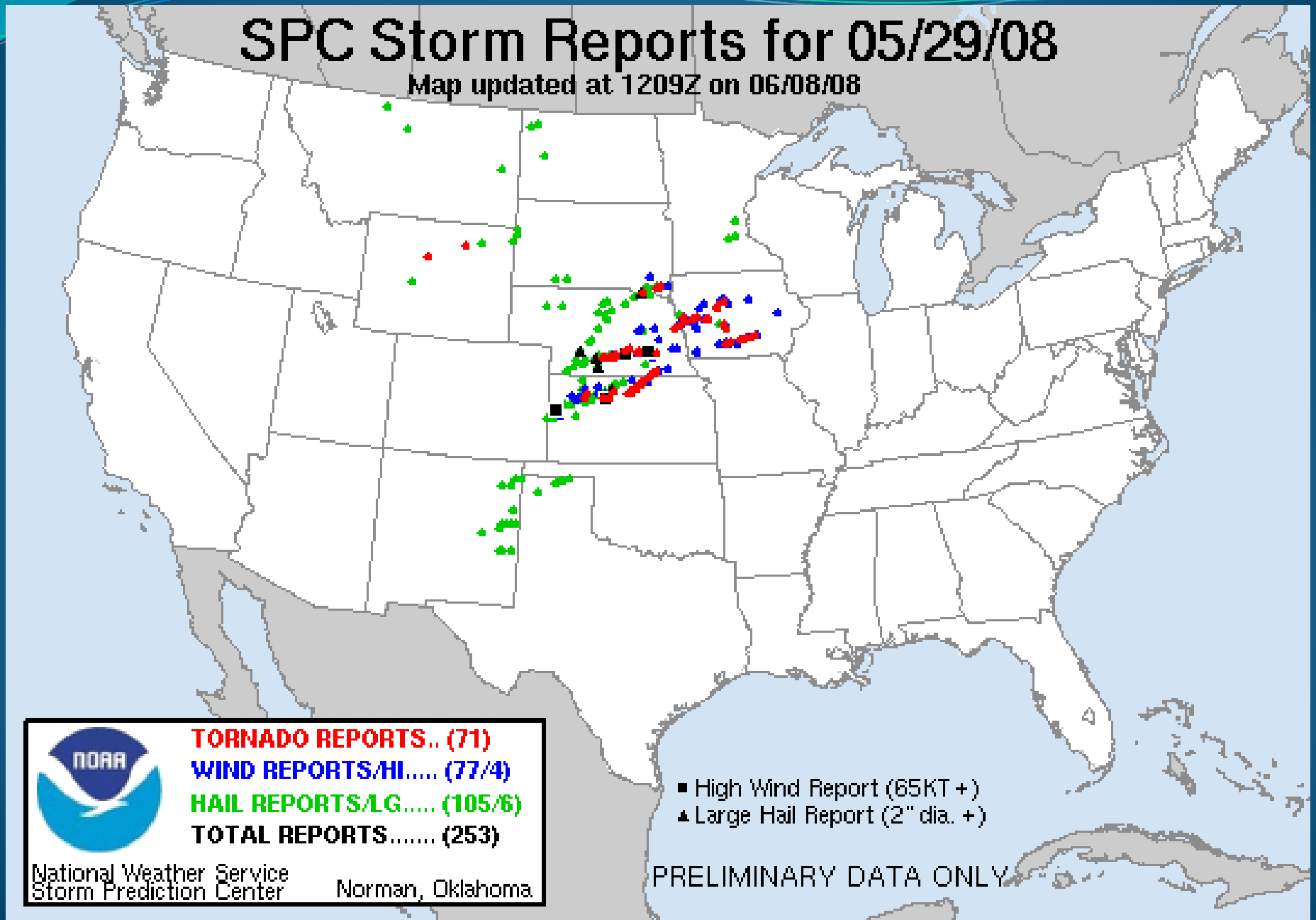
RYAN PFANNKUCH & AARON JOHNSON
WFO HASTINGS NE

Photo courtesy of William T. Hark Photography

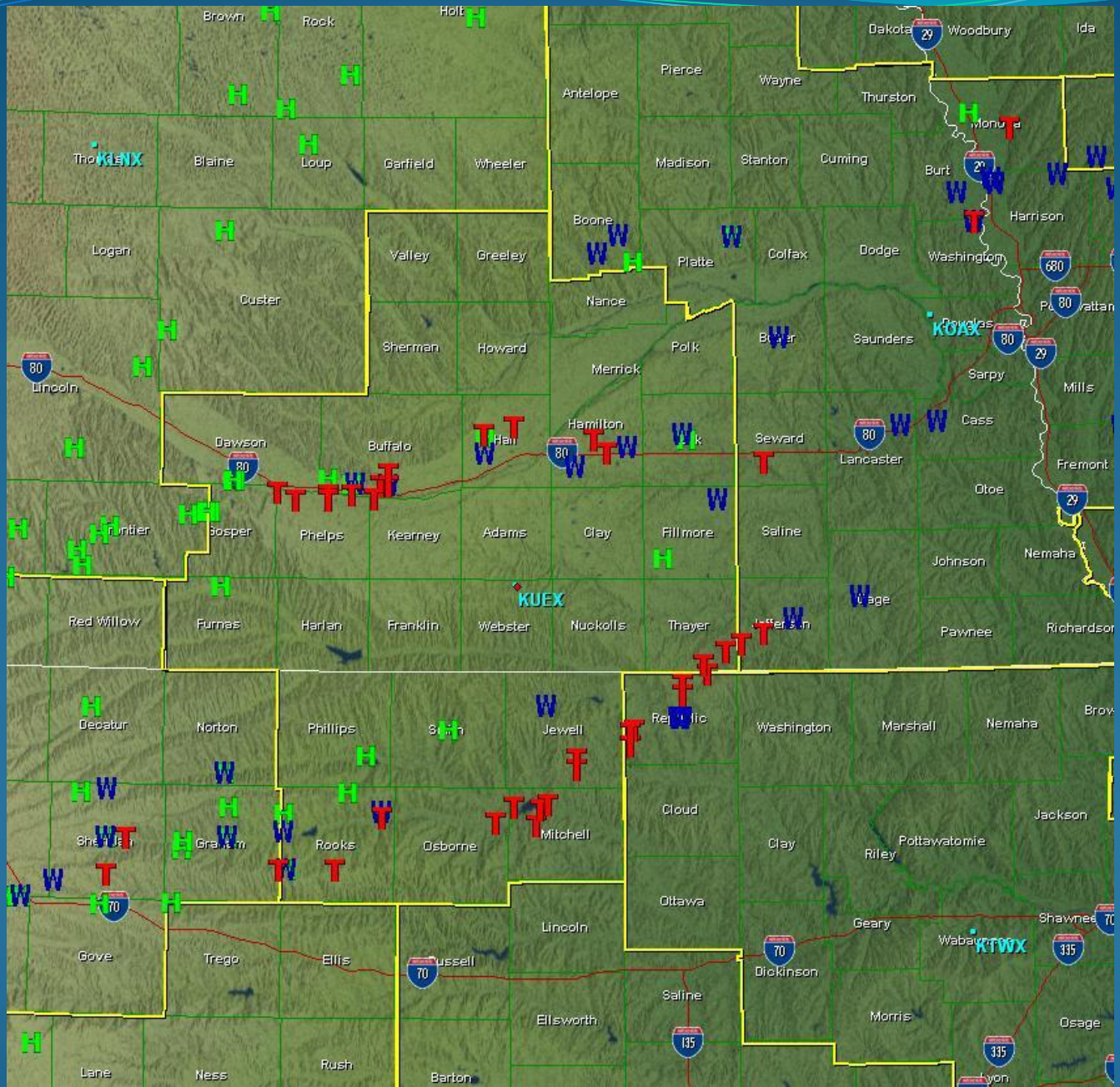
REVIEW OF MAY 29 2008



REVIEW OF MAY 29 2008



REVIEW OF MAY 29 2008



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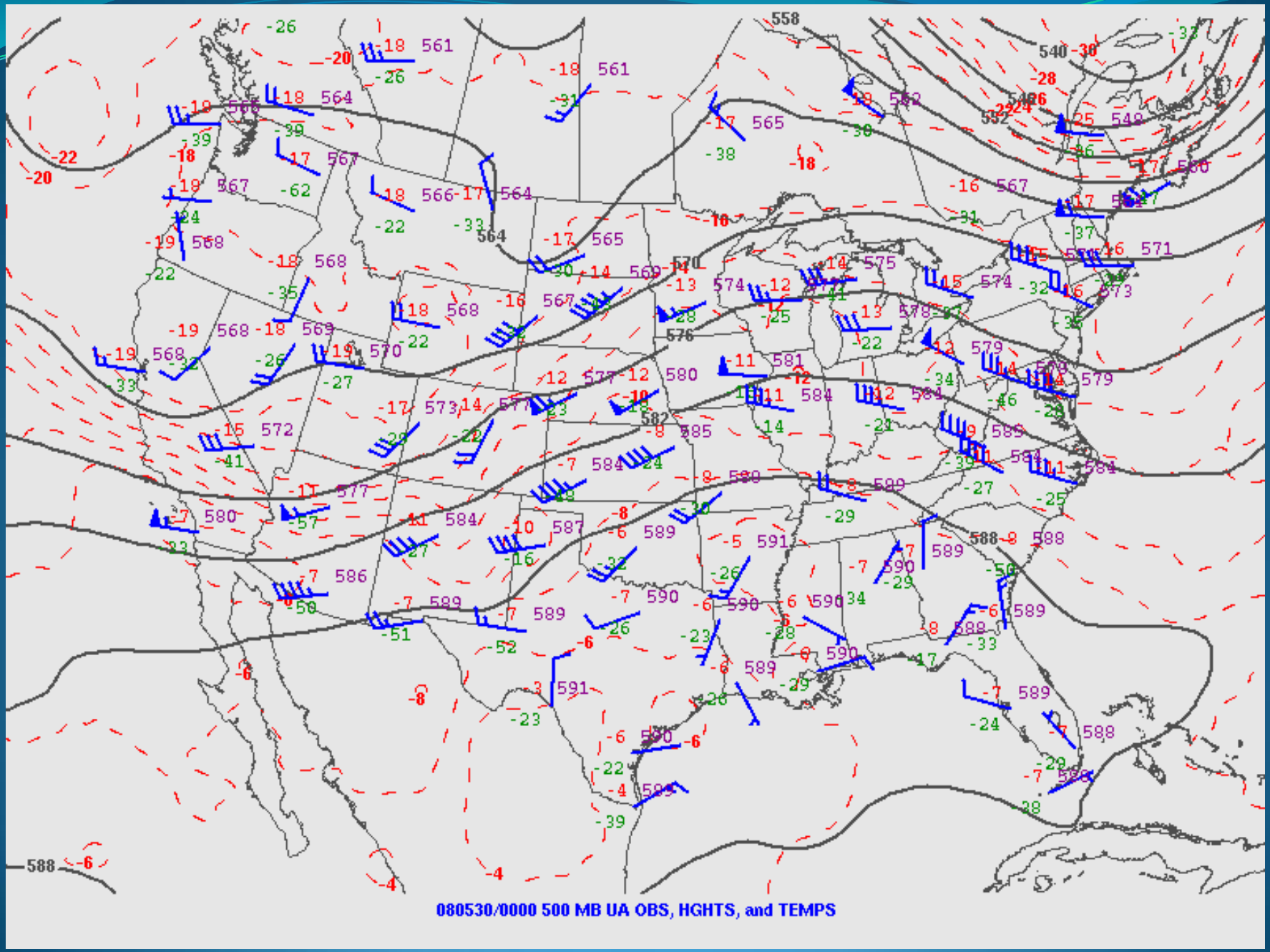
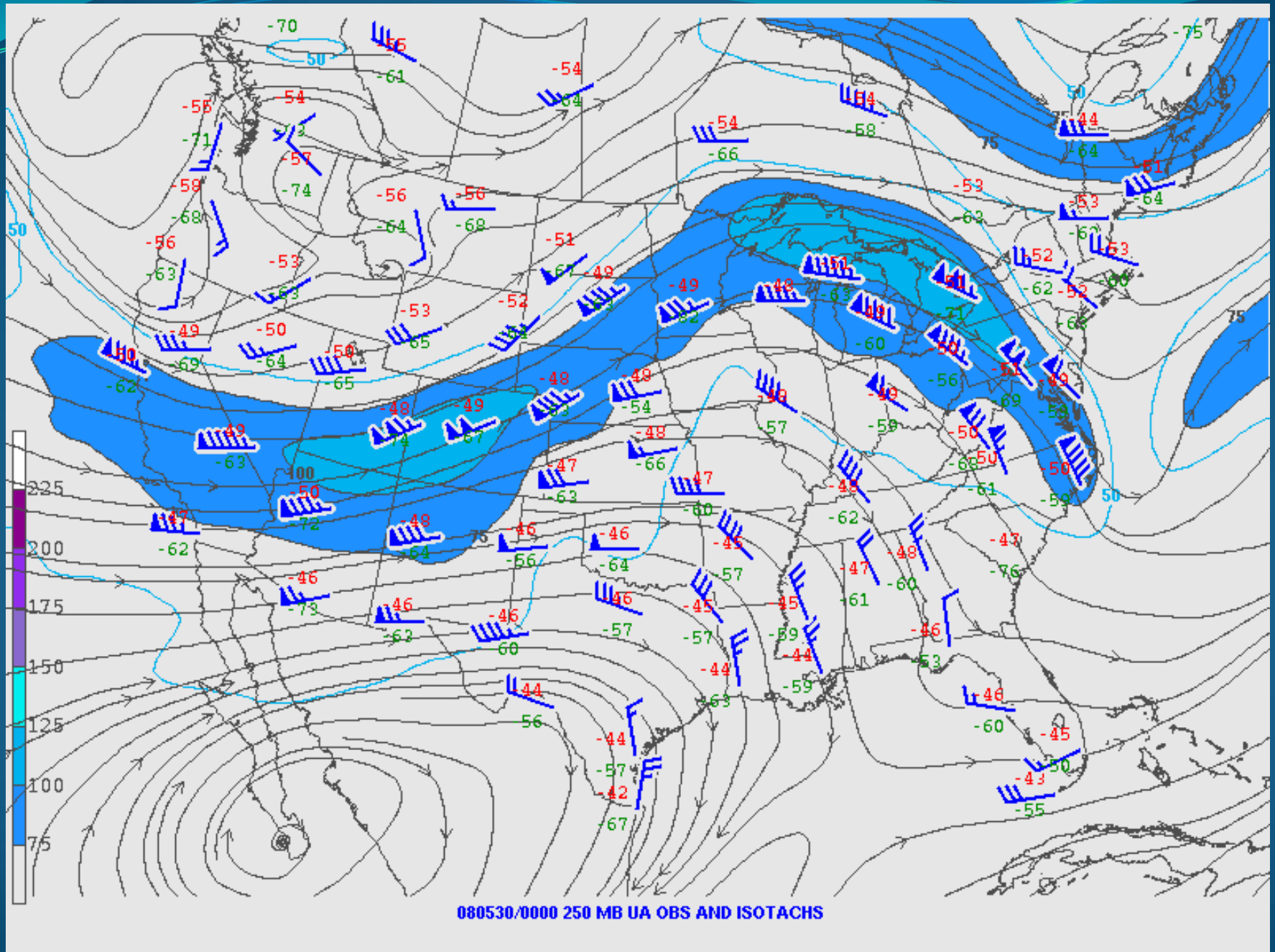


REVIEW OF MAY 29 2008



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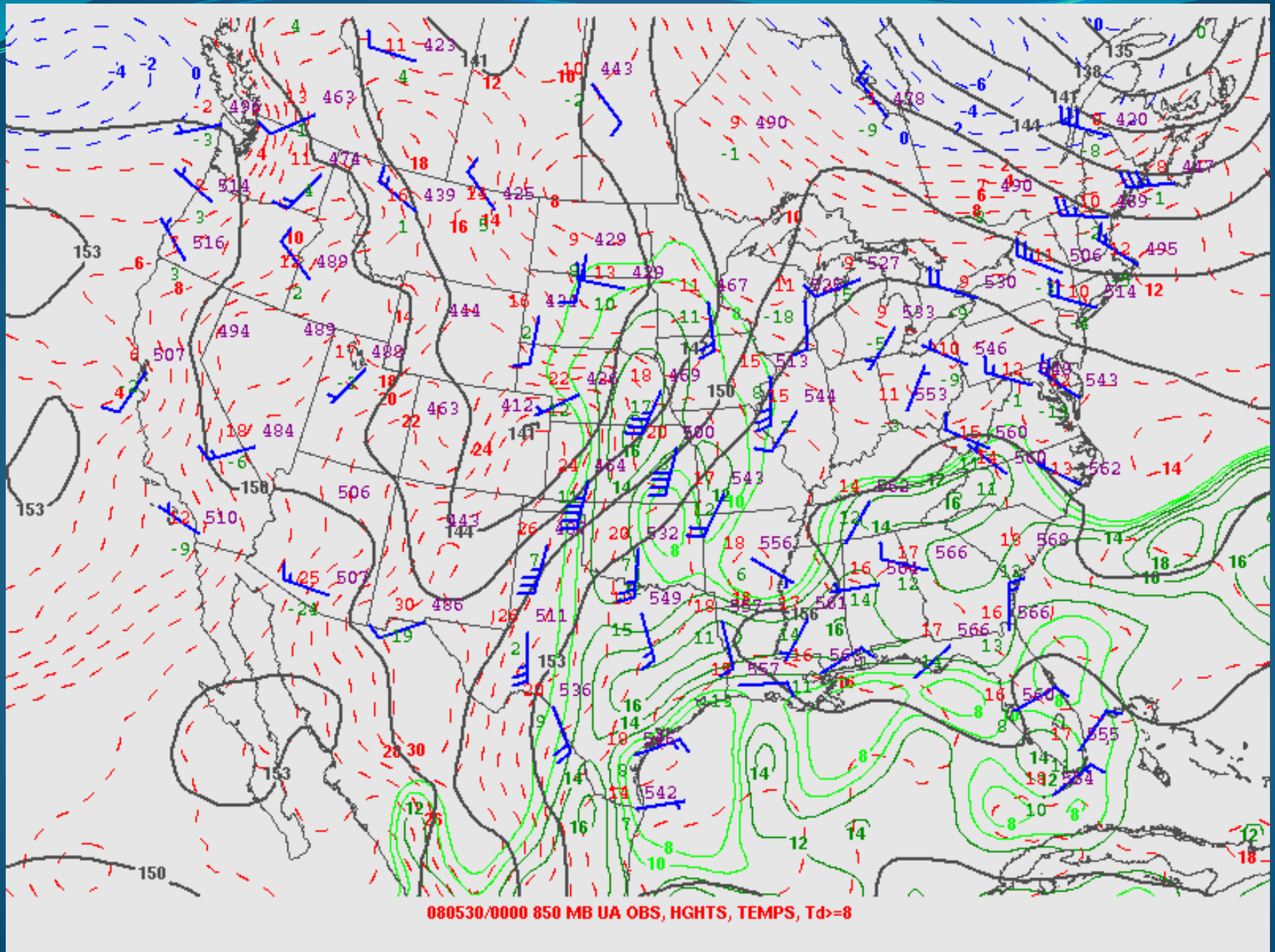

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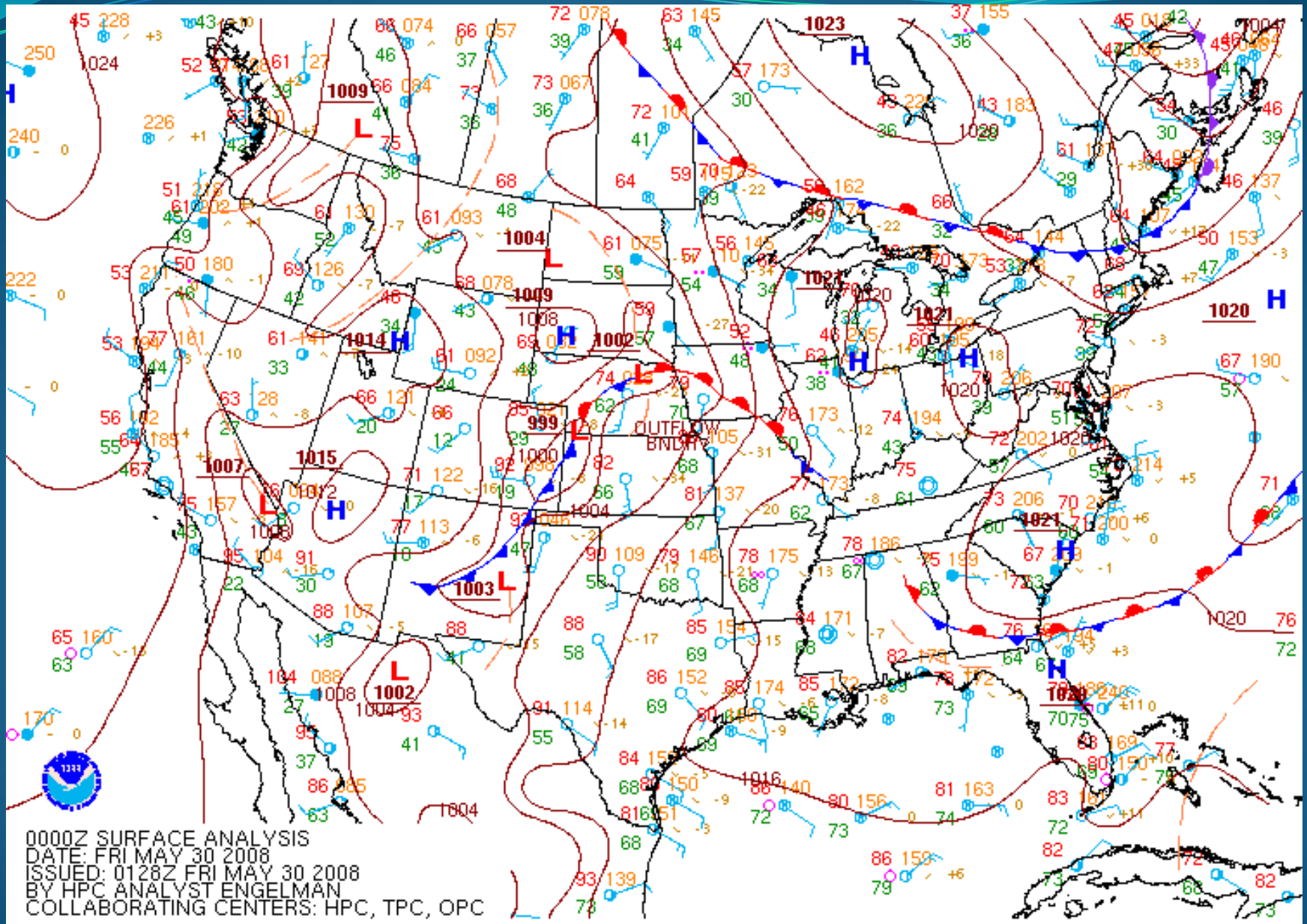

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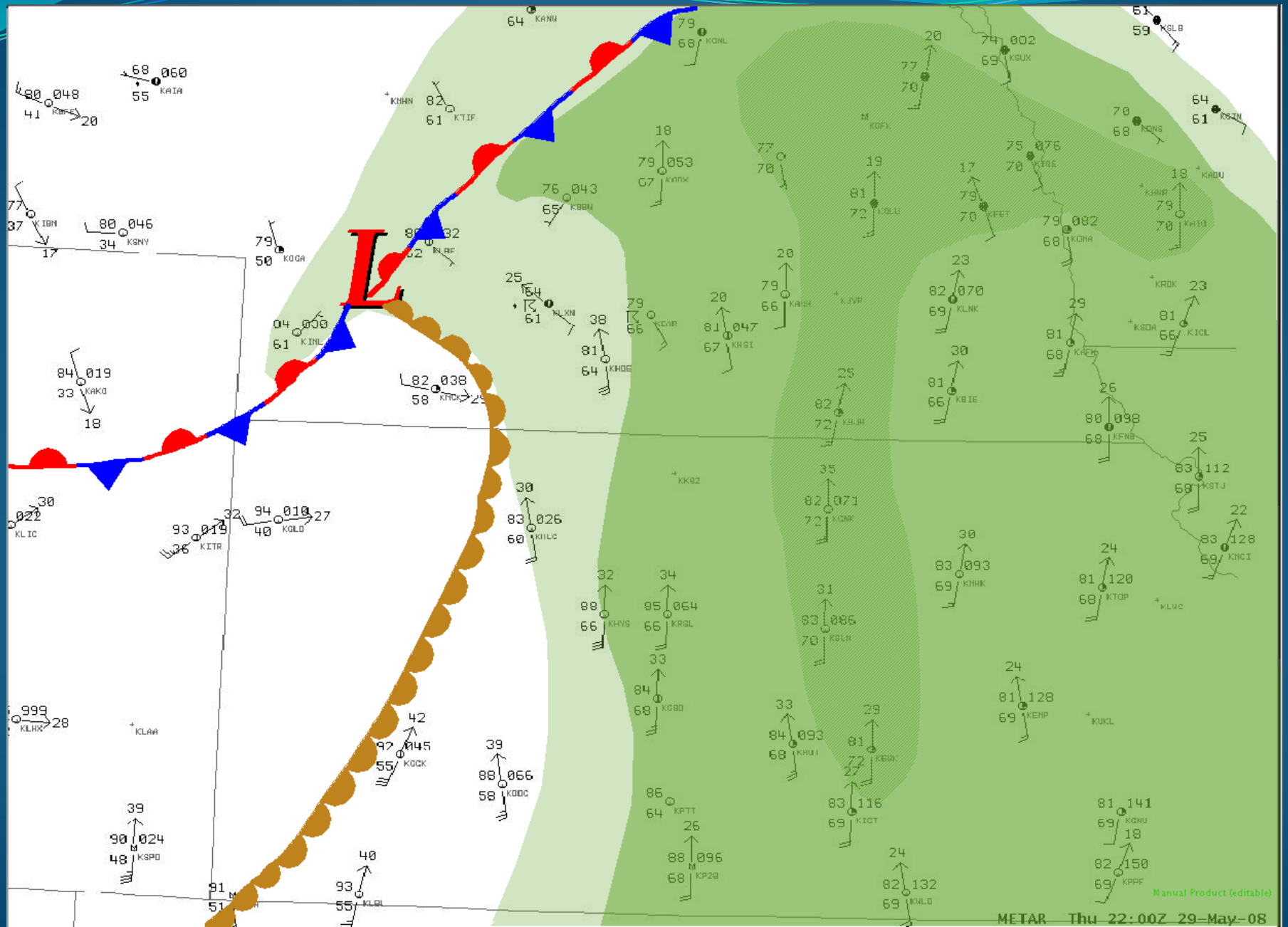

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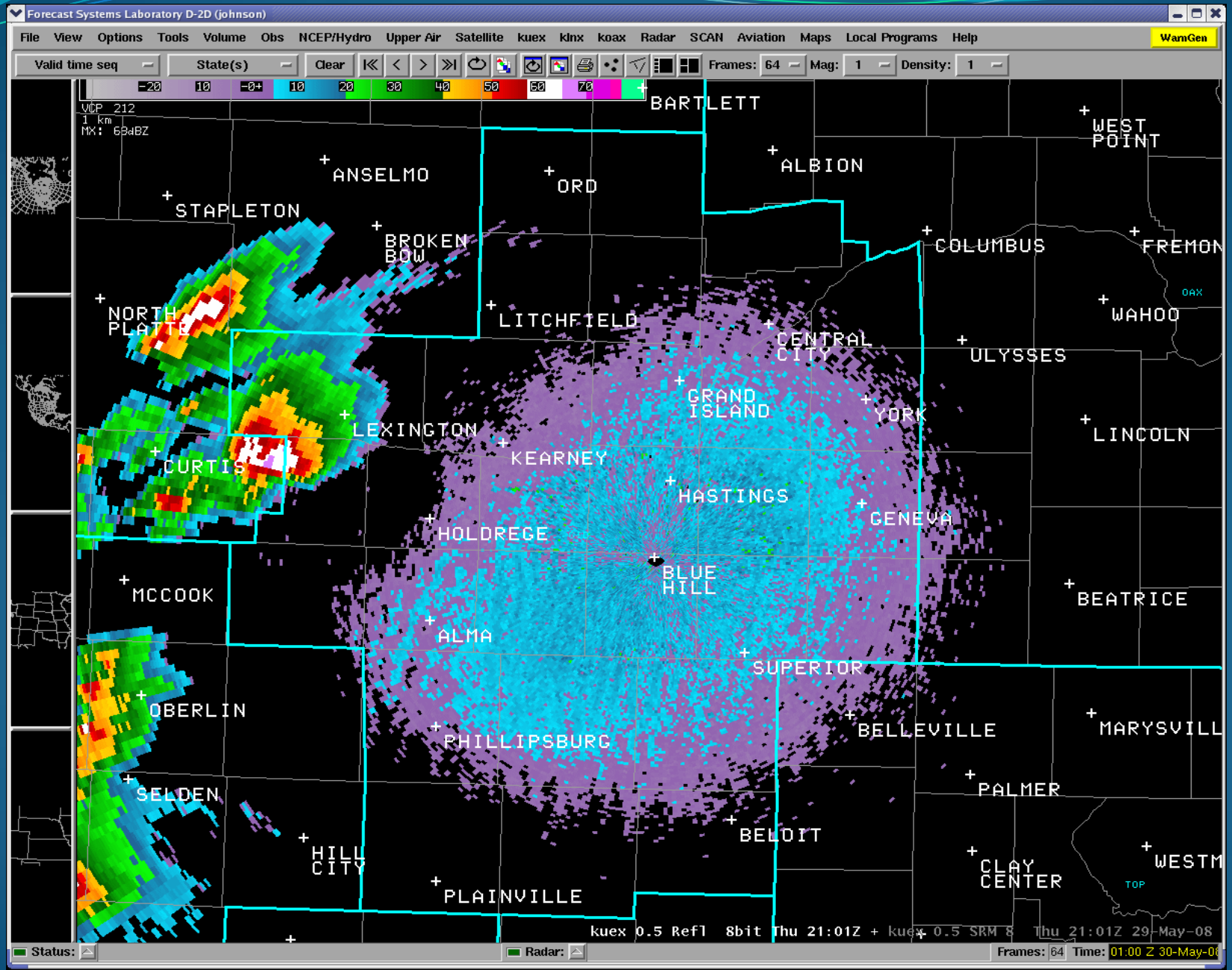
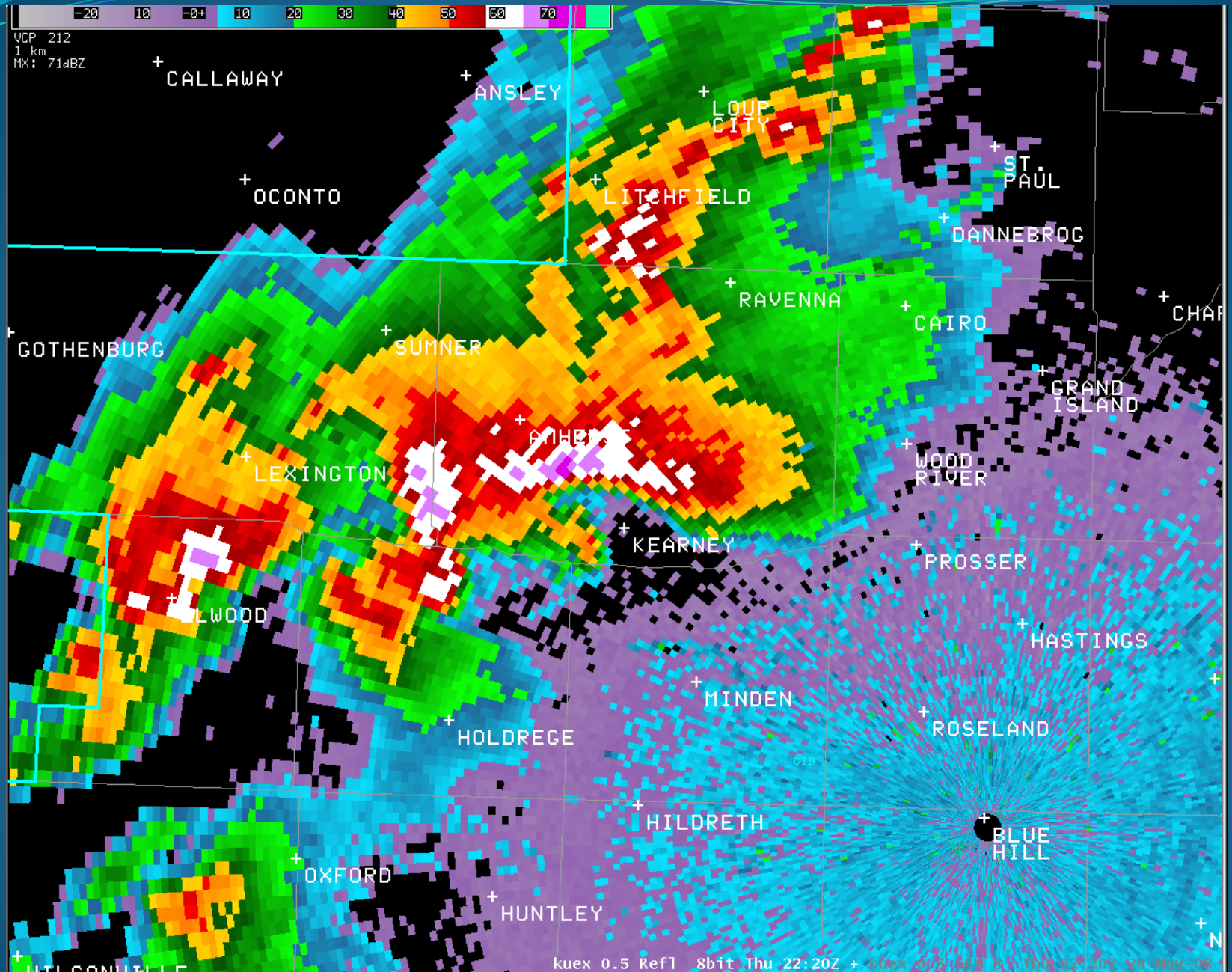
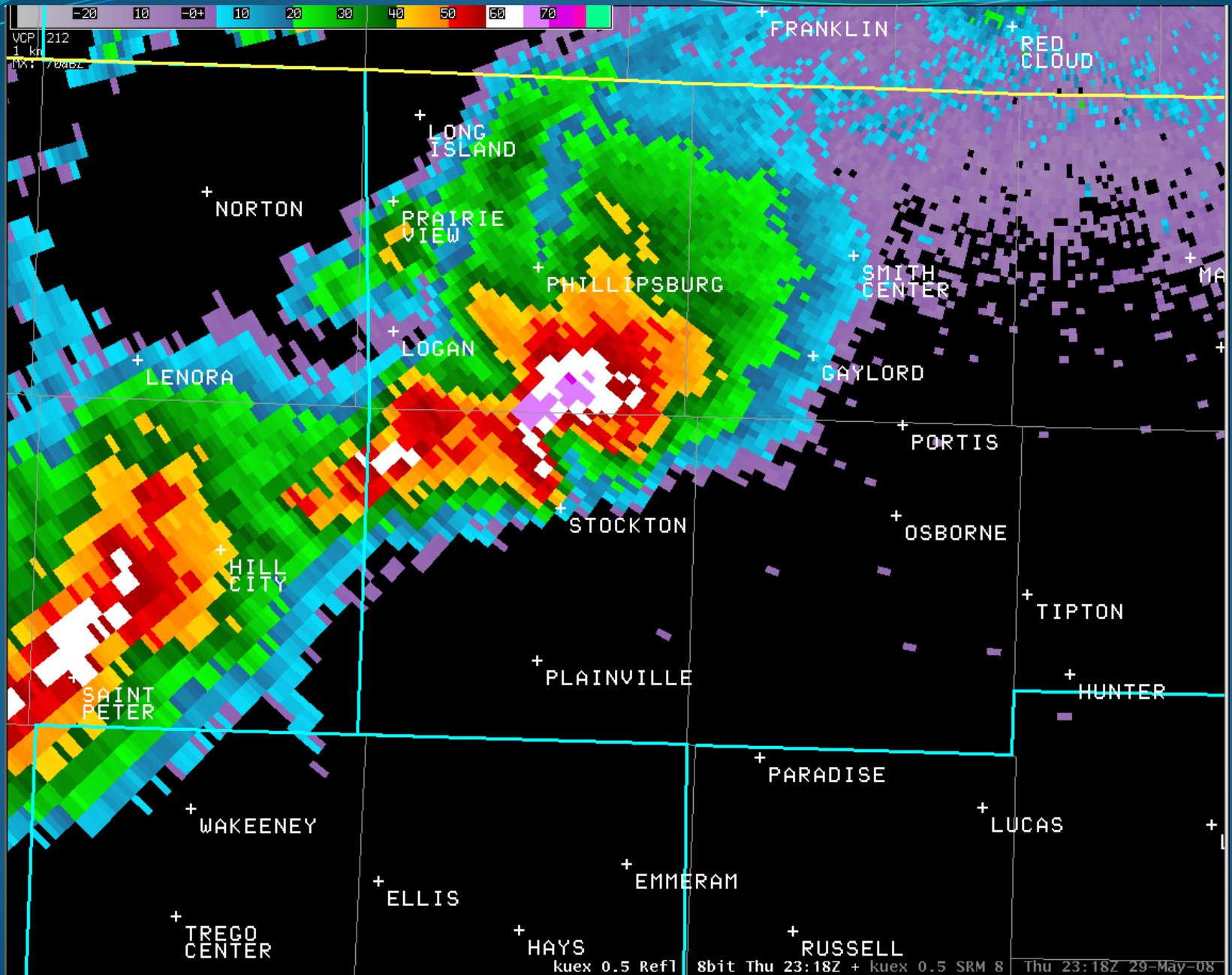


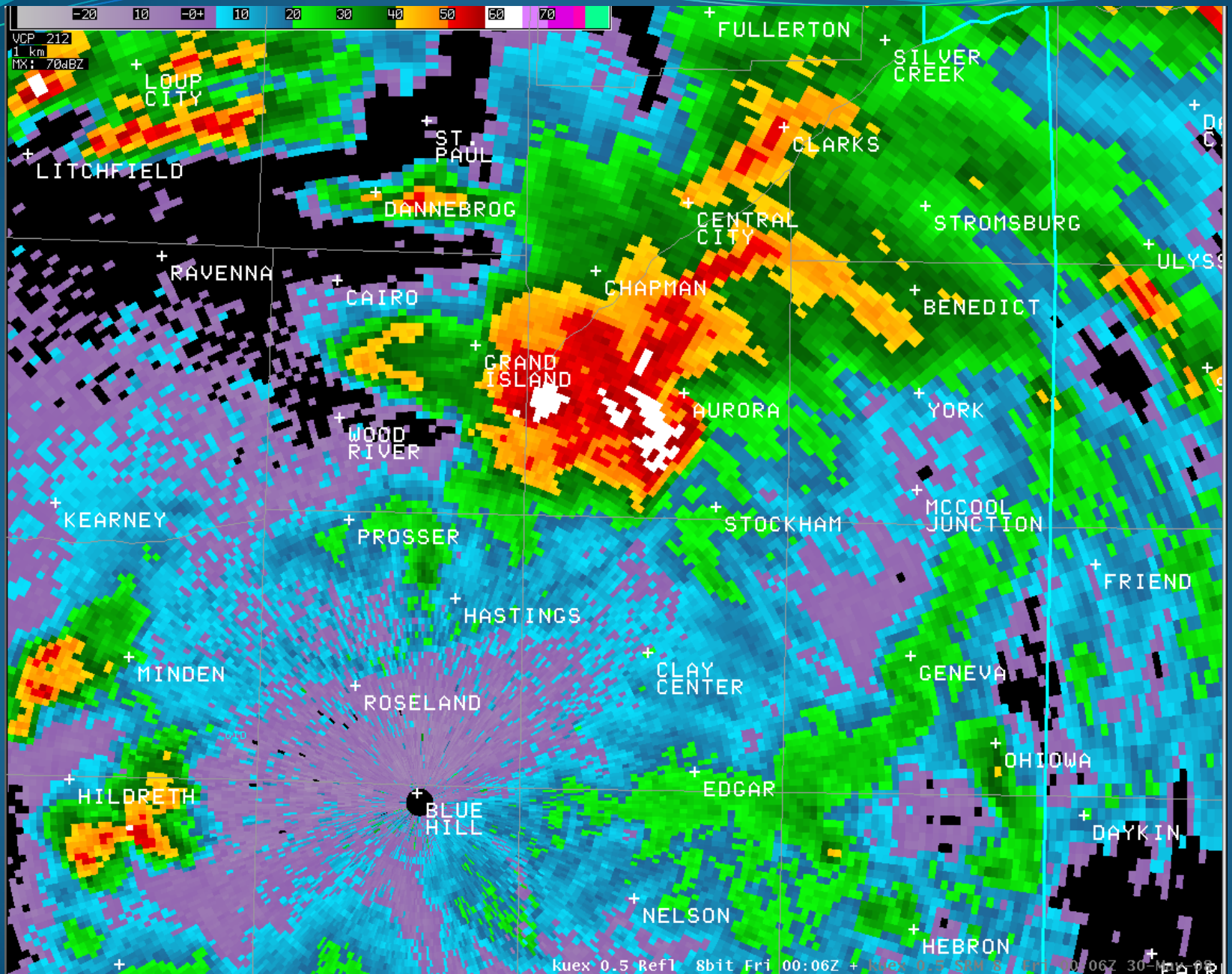
KEARNEY EF2 TORNADO



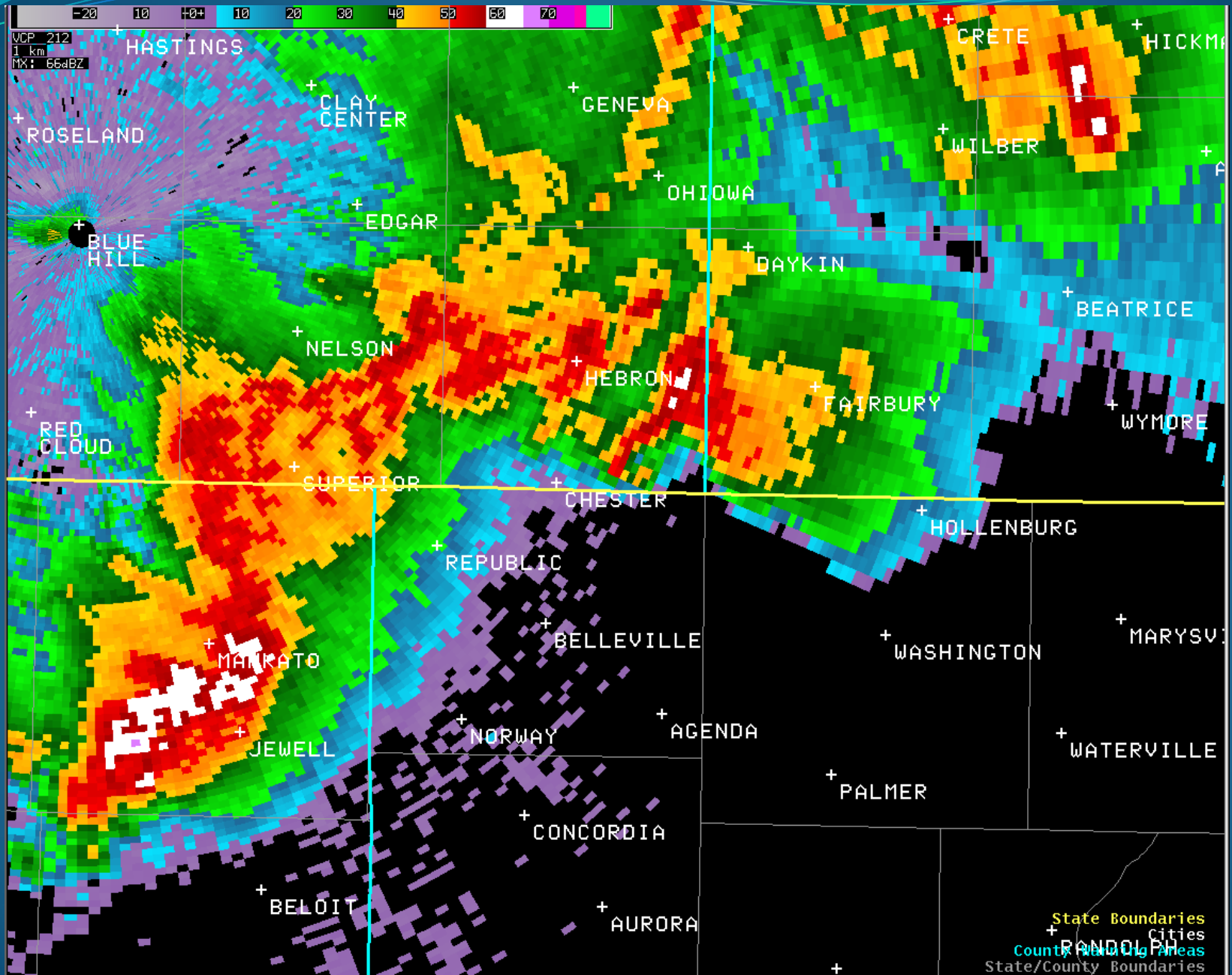
WOODSTON EF1 TORNADO



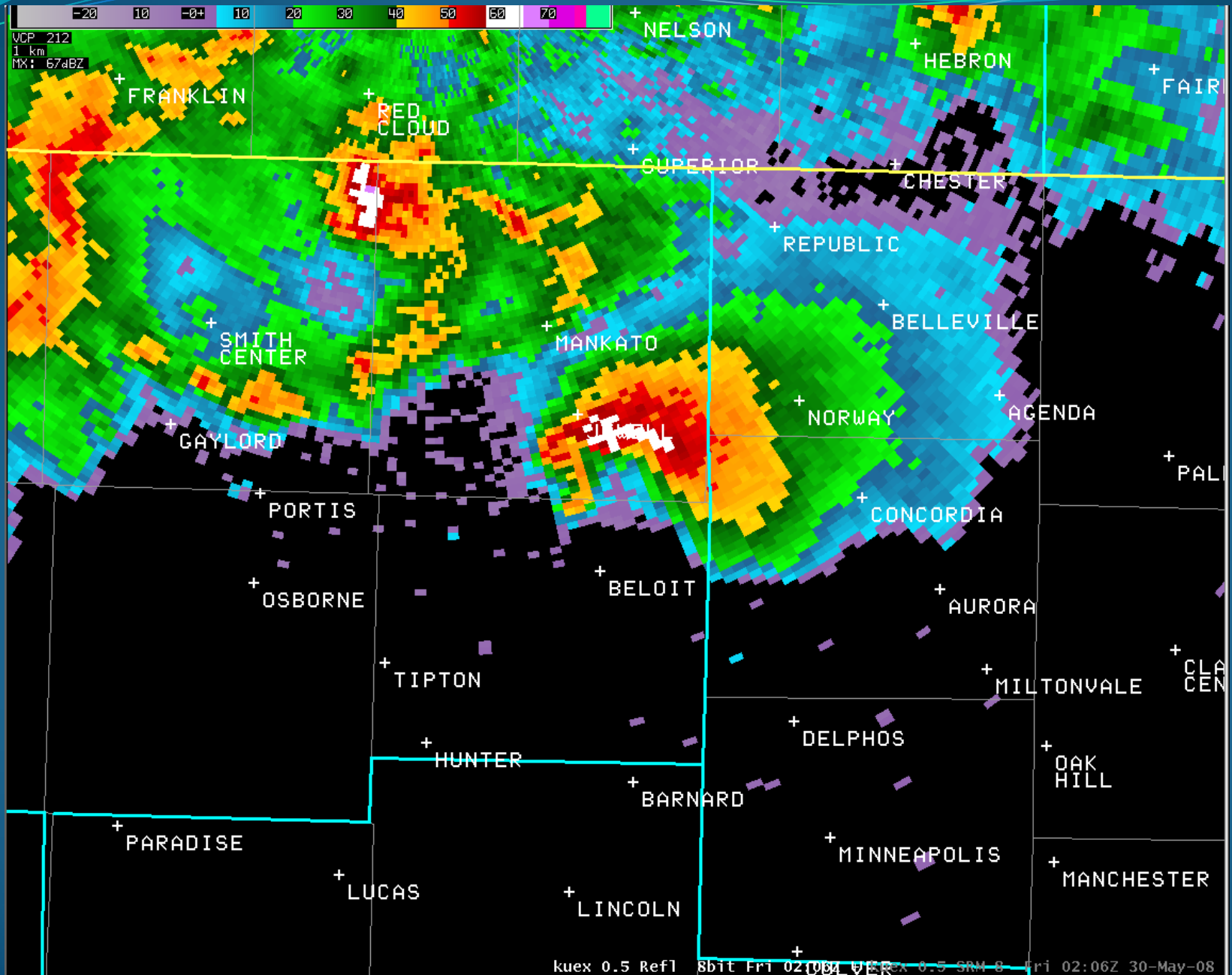
AURORA EF2 TORNADO



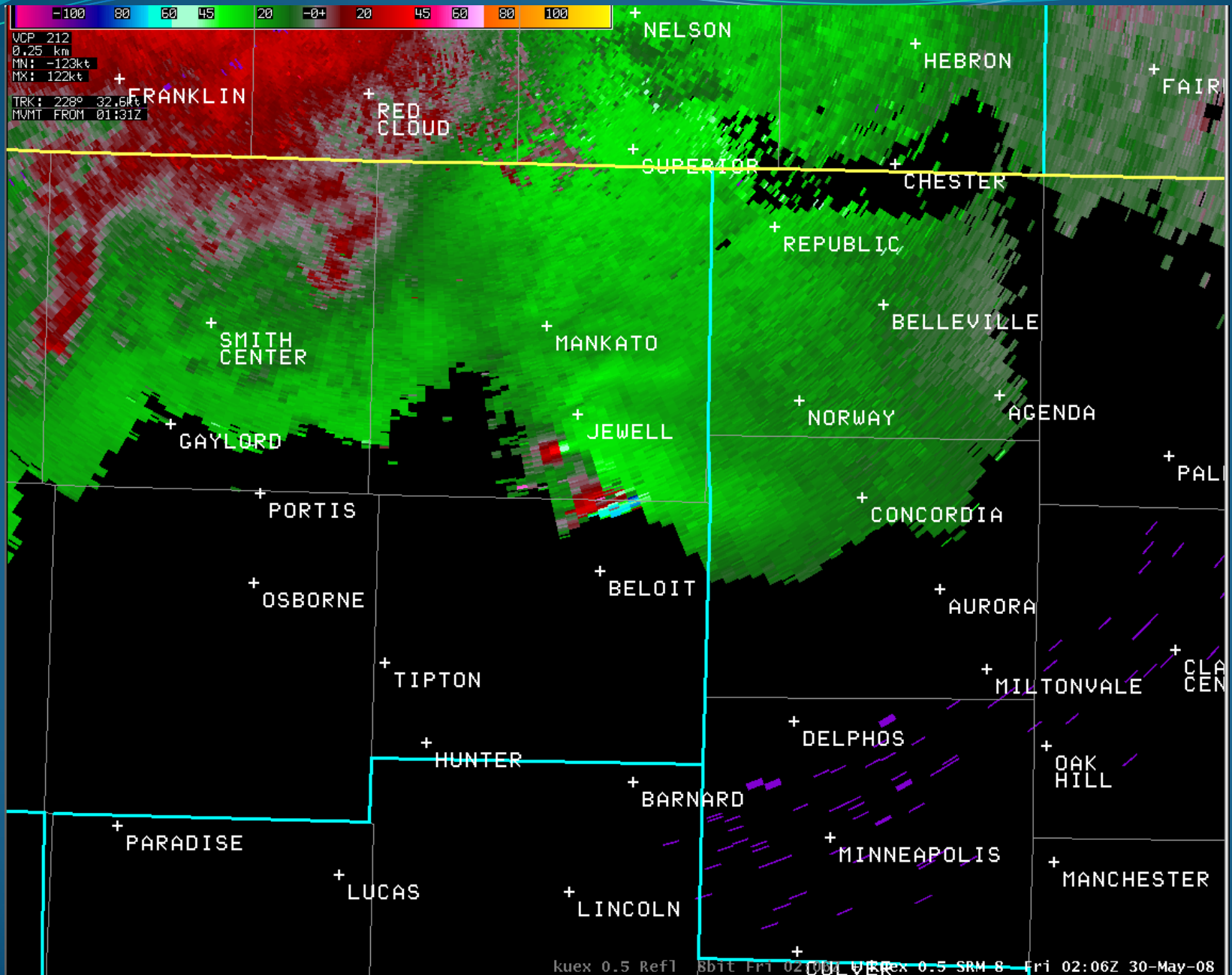
HUBBELL EF1 TORNADO



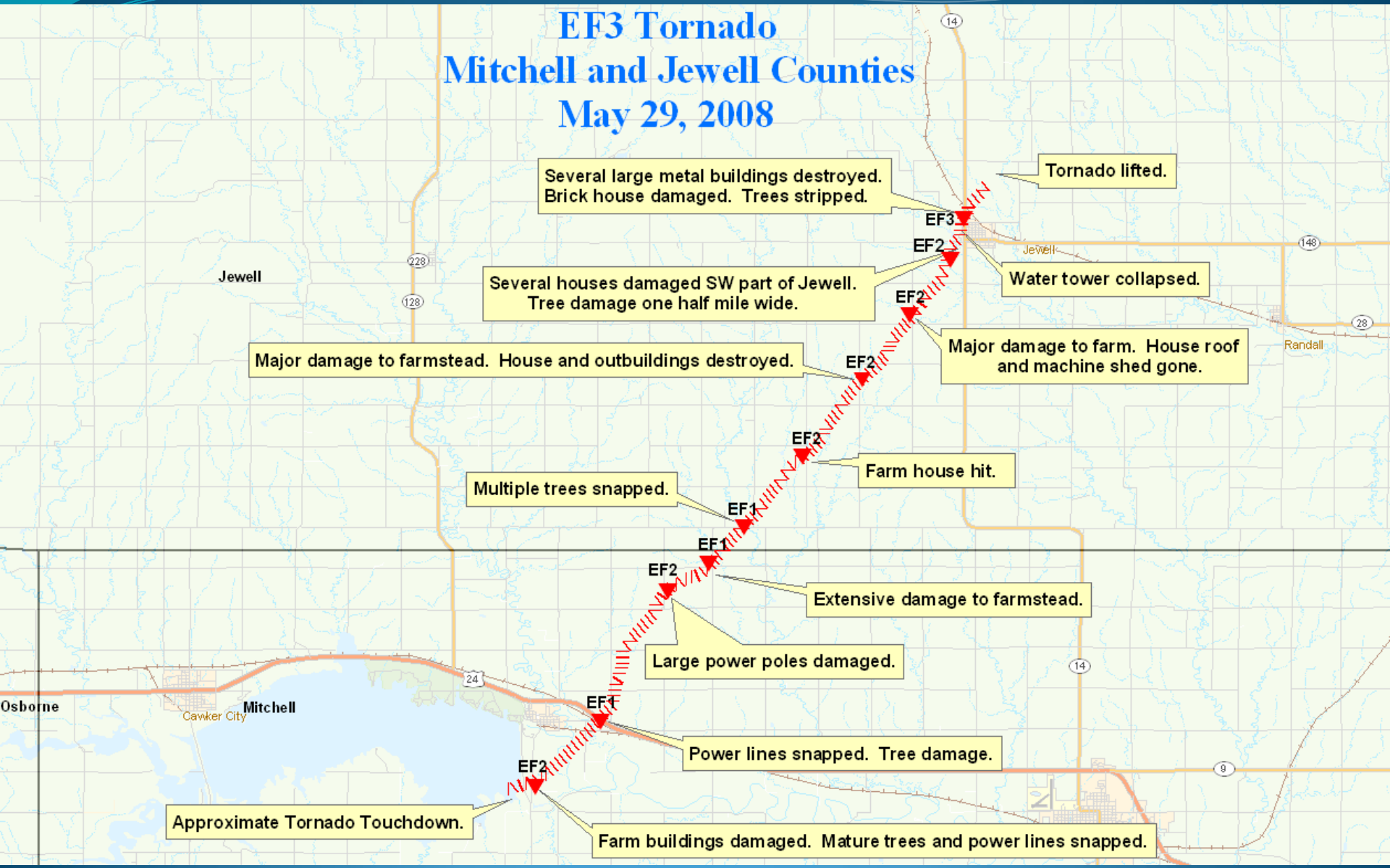
JEWELL AND GLEN ELDER EF3 TORNADO



JEWELL AND GLEN ELDER EF3 TORNADO



JEWELL AND GLEN ELDER EF3 TORNADO



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

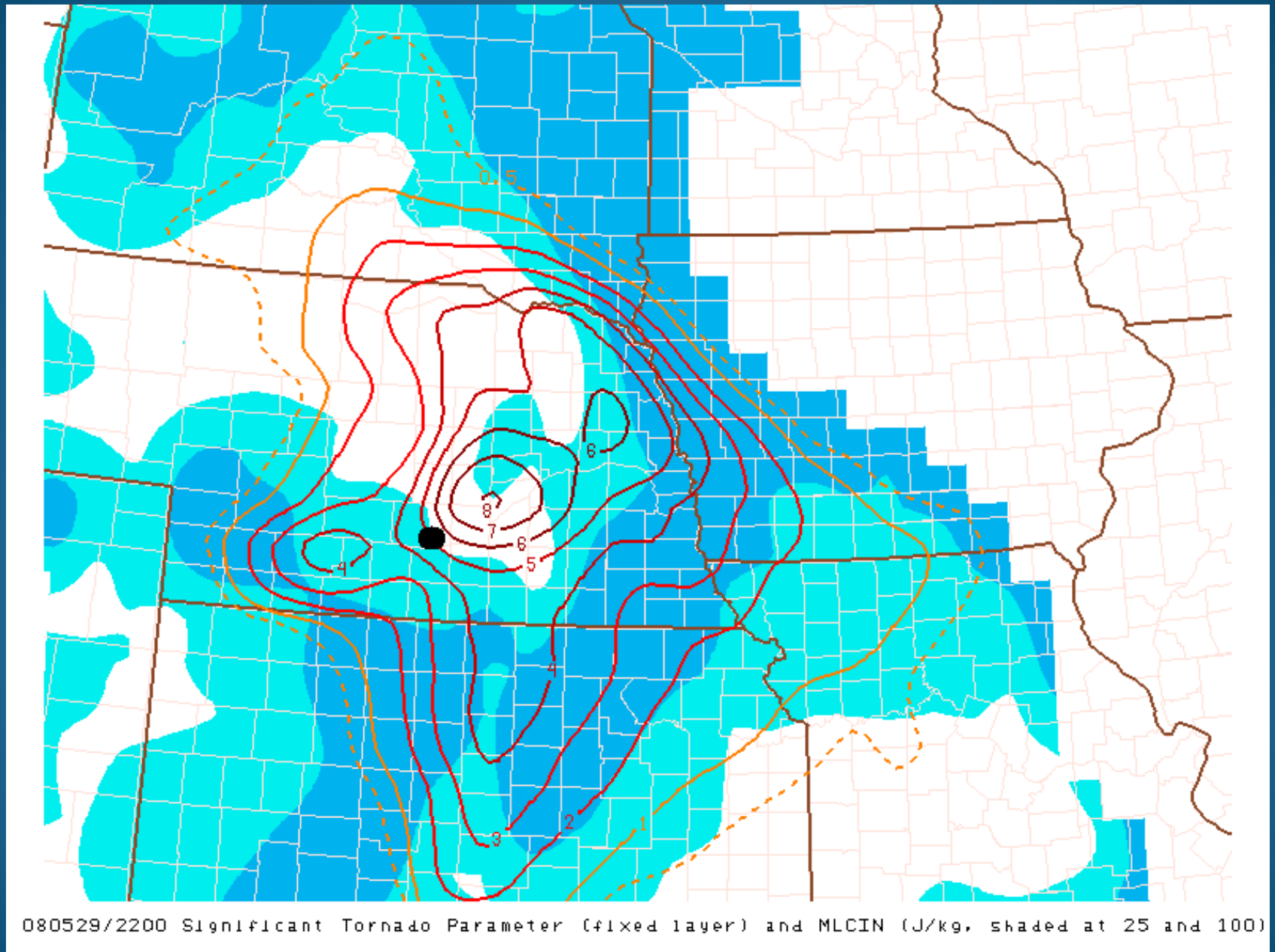
- *SPC Mesoscale Analayis archive along with local WFO Model/Observed data archive were reviewed for this event with some interesting findings:*
  - *Most Individual and Combined Parameters appeared nominal for a Tornadic Event*
  - *However, a large discrepancy was found between the effective layer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

FIXED VS EFFECTIVE LAYER STP

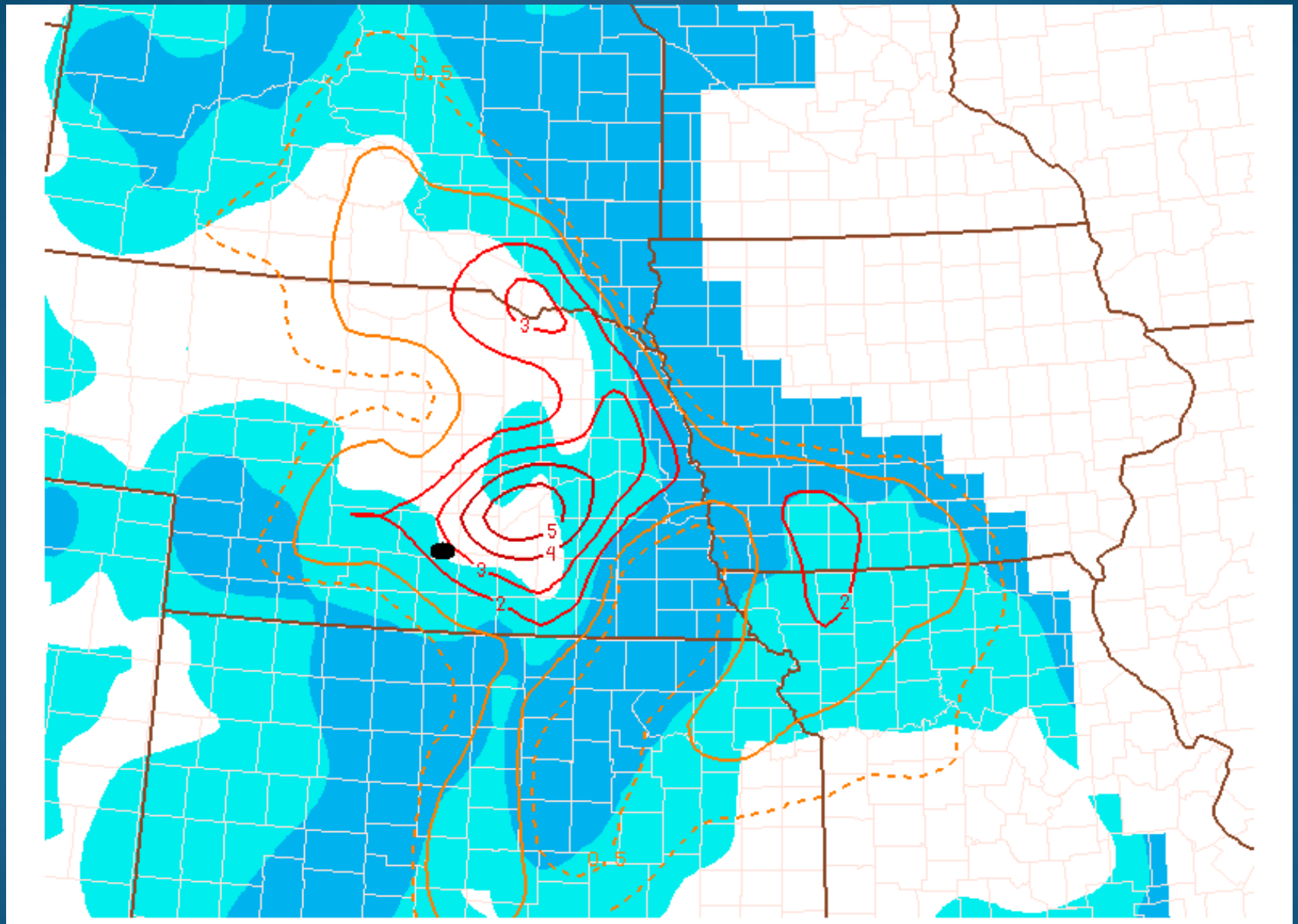
- *Review of Fixed Layer and Effective Layer STP values from SPC Mesoscale Analysis page valid at:*

  - 22Z (Kearney Tornado time)
  - 00Z (Woodston/Aurora Tornado Time)
  - 02Z (Glen Elder/Jewell Tornado Time)
  - 03Z (Hubbell Tornado Time)

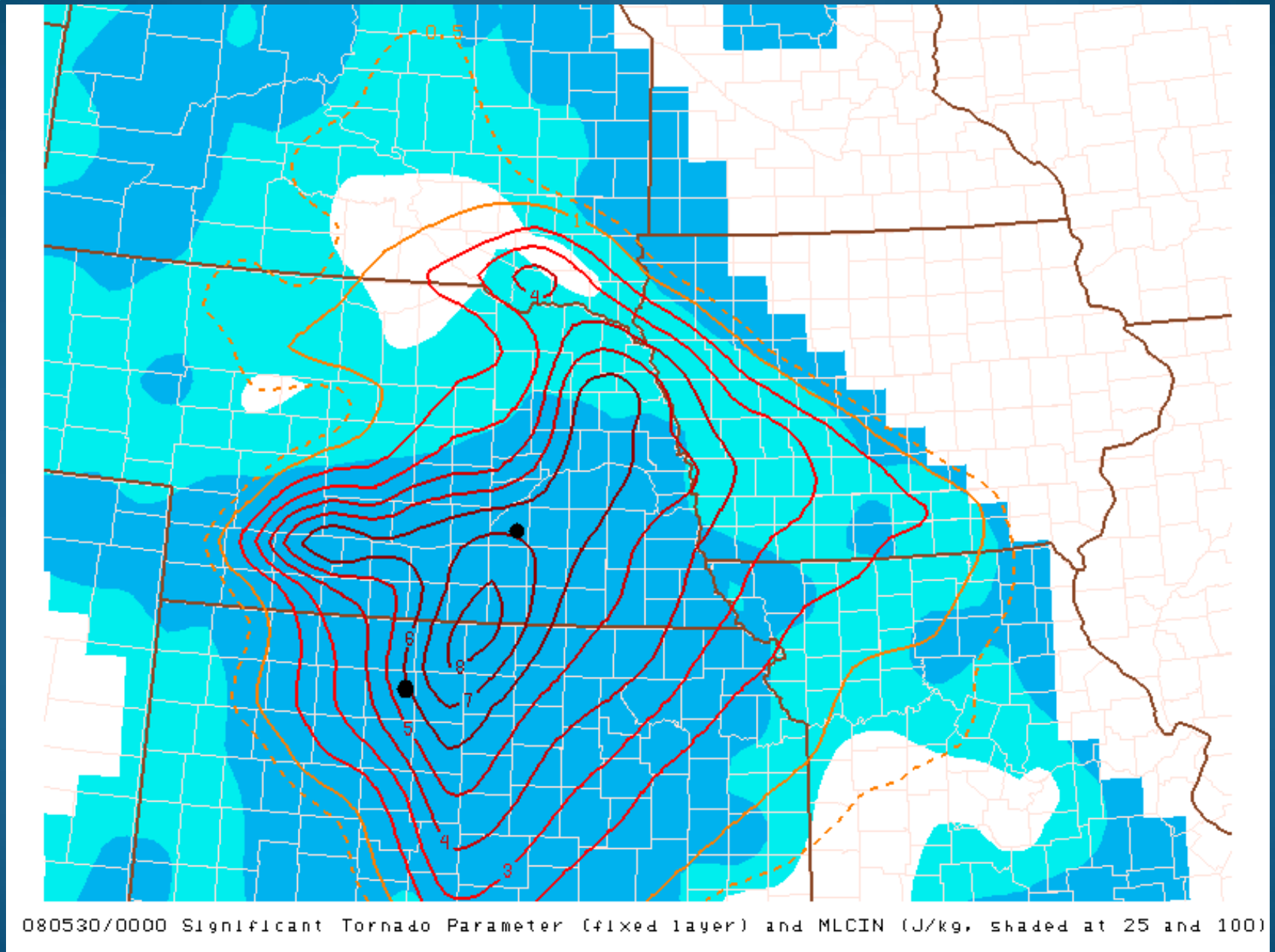
FIXED LAYER STP AT 22Z (KEARNEY TOR)



EFFECTIVE LAYER STP AT 22Z (KEARNEY TOR)

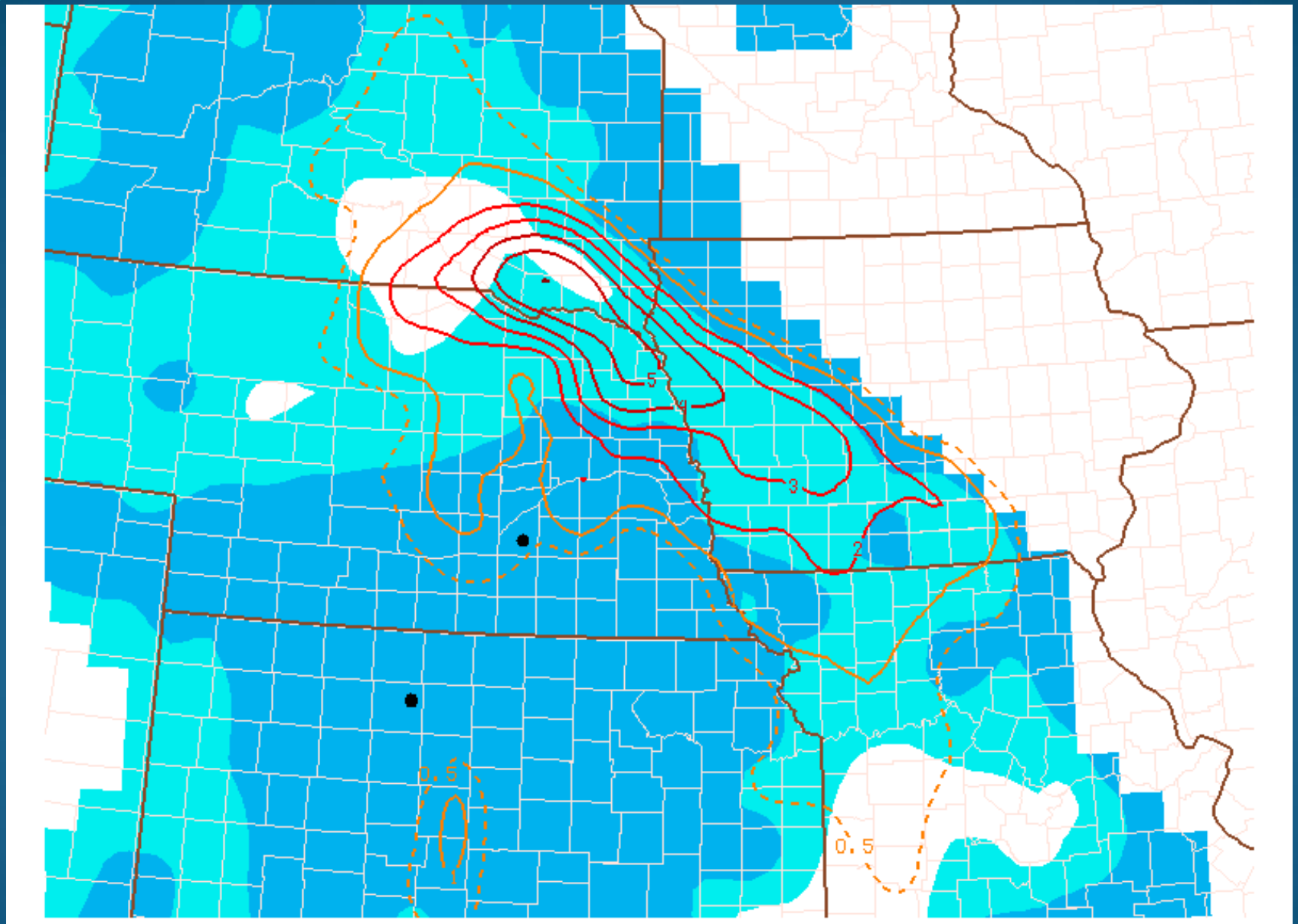


FIXED LAYER STP AT 00Z (WOODSTON & AURORA TOR)



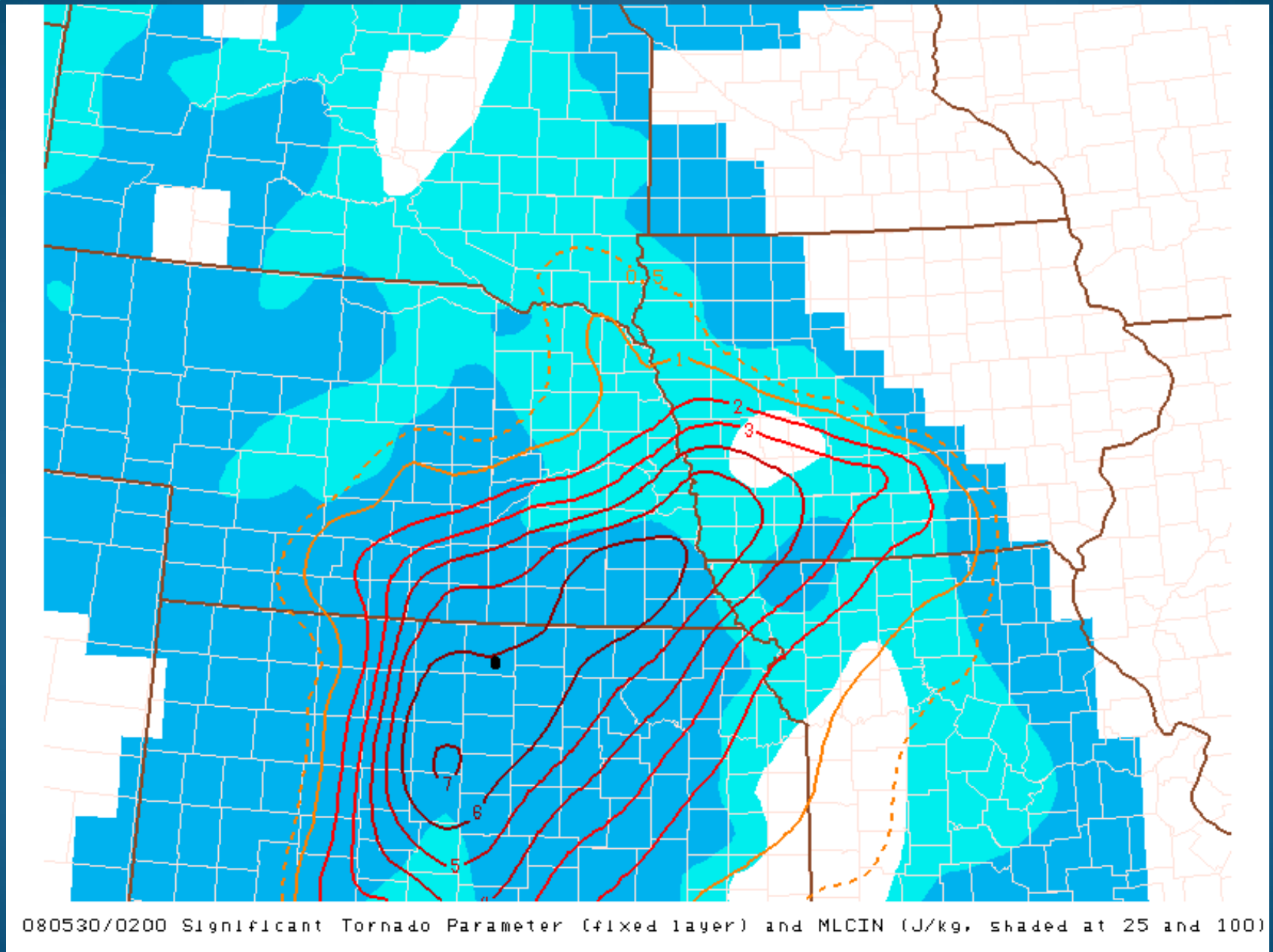
080530/0000 Significant Tornado Parameter (fixed layer) and MLCIN (J/kg, shaded at 25 and 100)

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



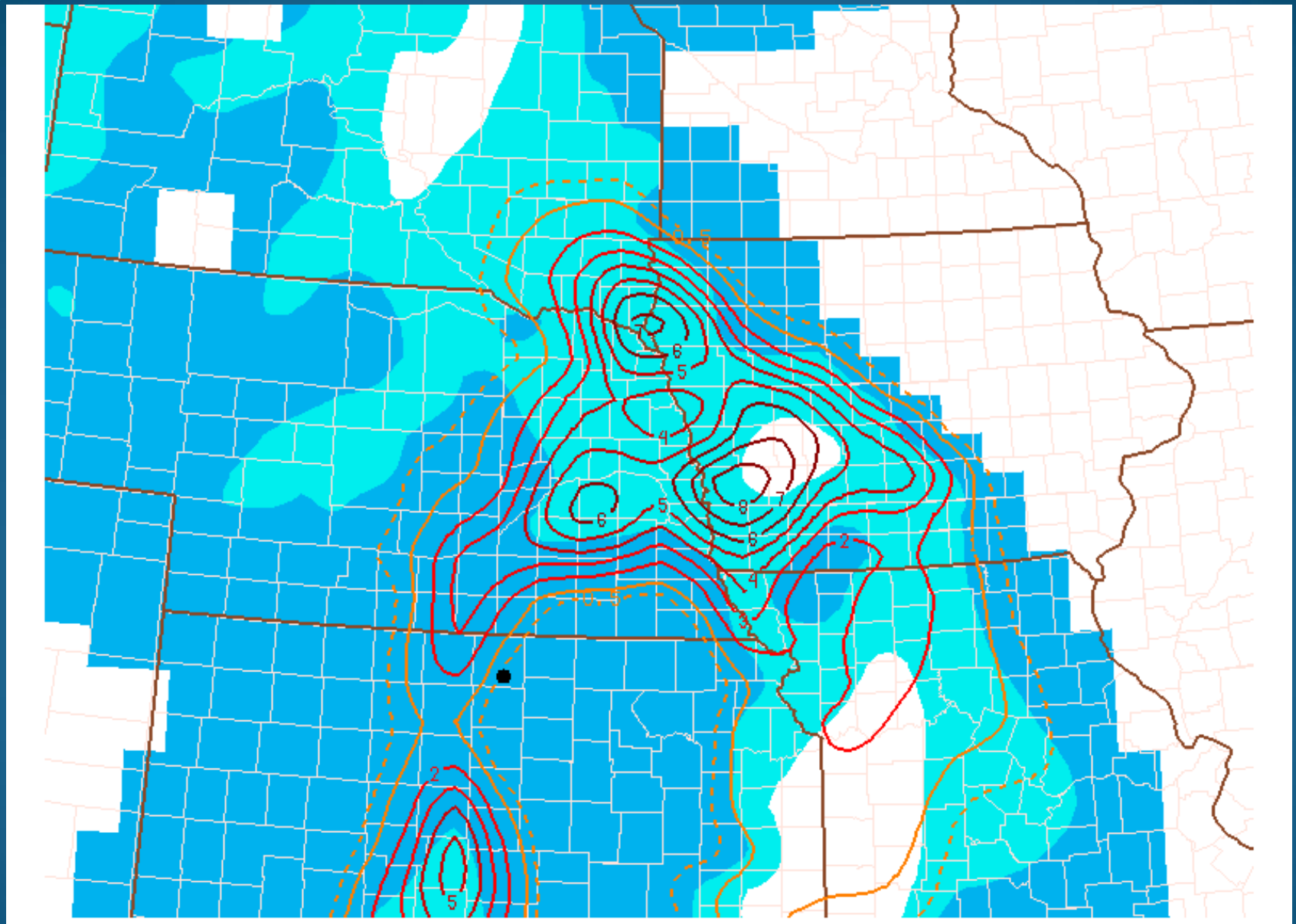
080530/0000 Significant Tornado Parameter (eff layer) and MLCIN (J/kg, shaded at 25 and 100)

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

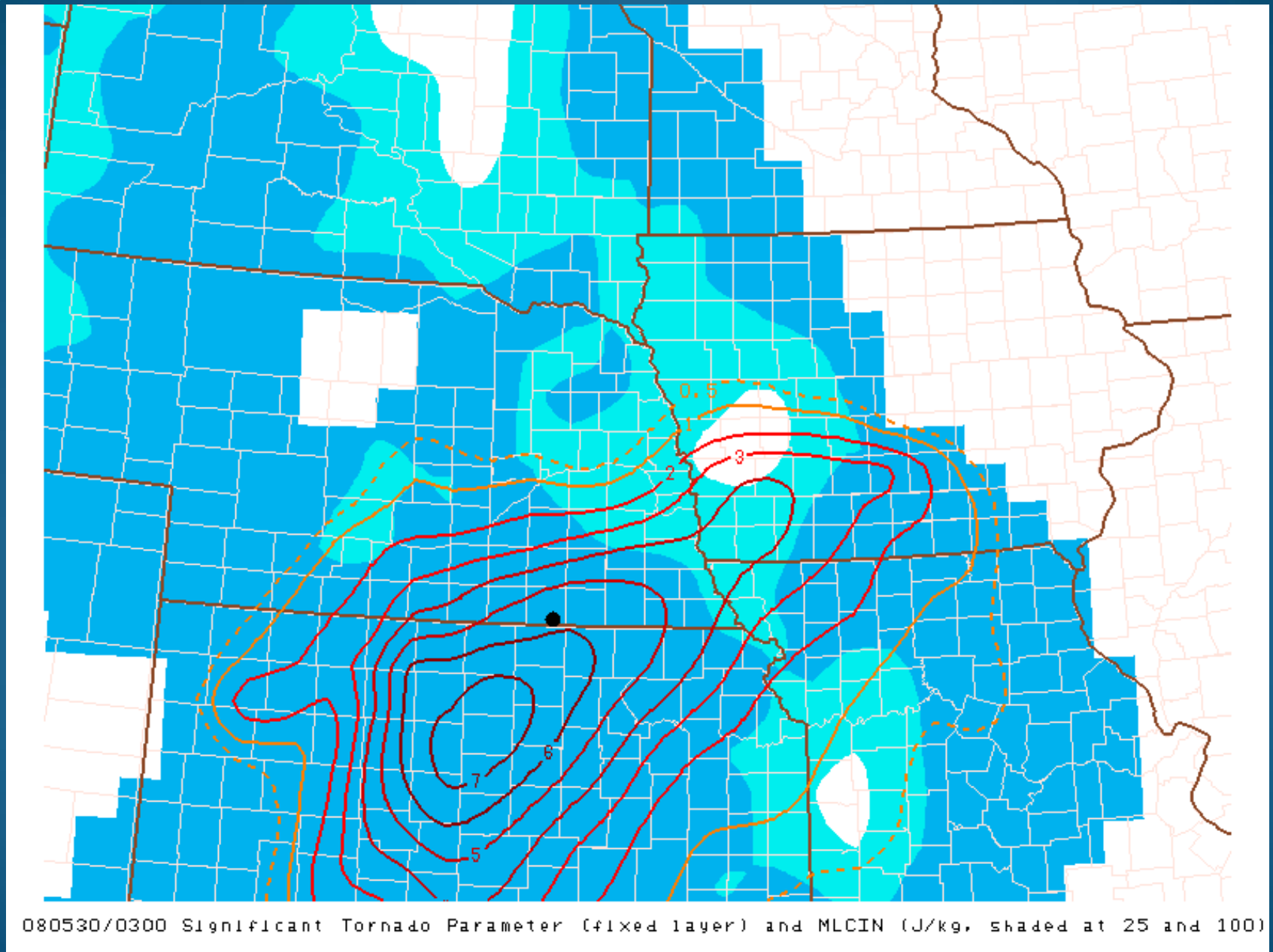


080530/0200 Significant Tornado Parameter (fixed layer) and MLCIN (J/kg, shaded at 25 and 100)

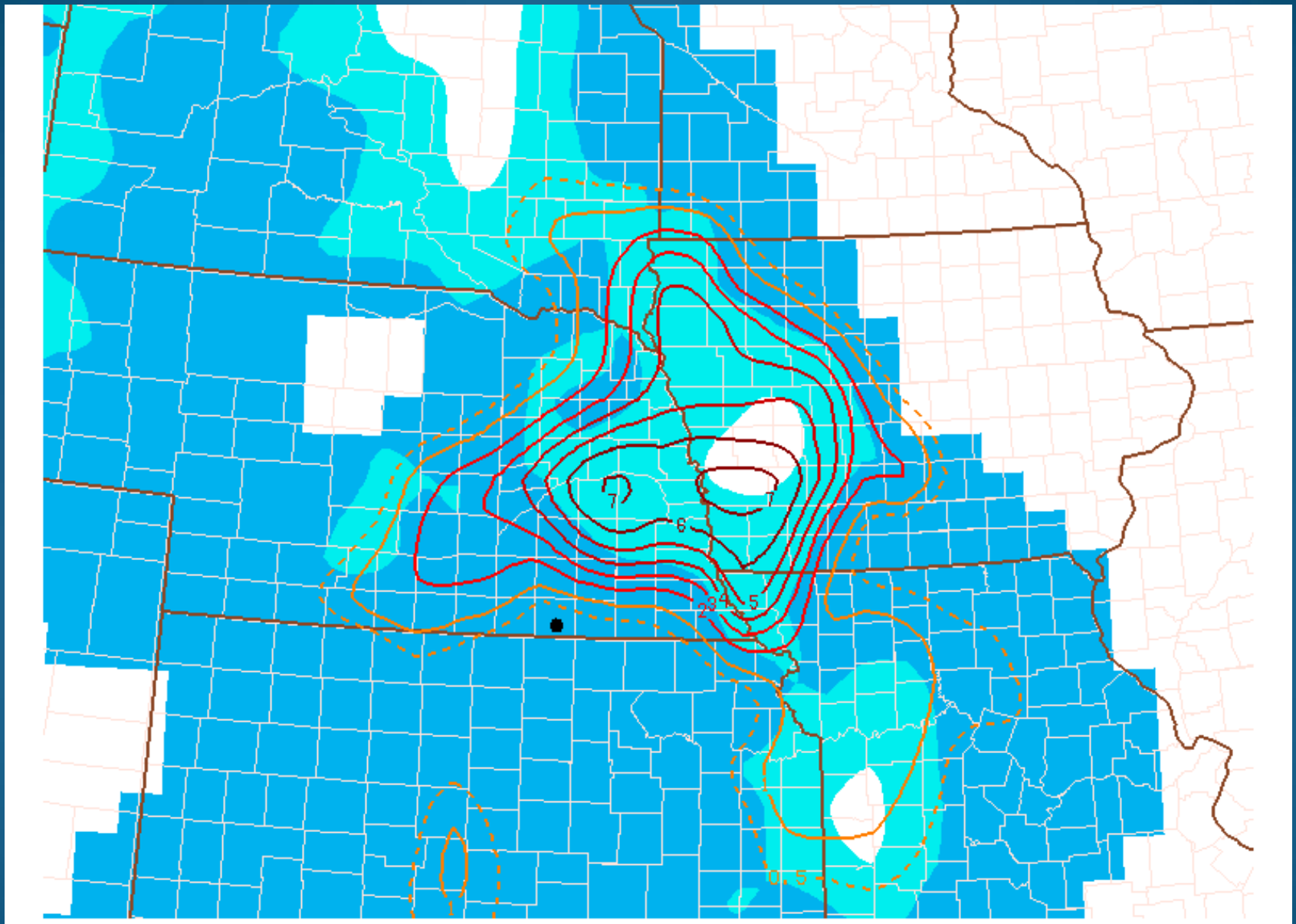
EFFECTIVE LAYER STP AT 02Z (GLEN ELDER/JEWELL TOR)



FIXED LAYER STP AT 03Z (HUBBELL TOR)



EFFECTIVE LAYER STP AT 03Z (HUBBELL TOR)



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

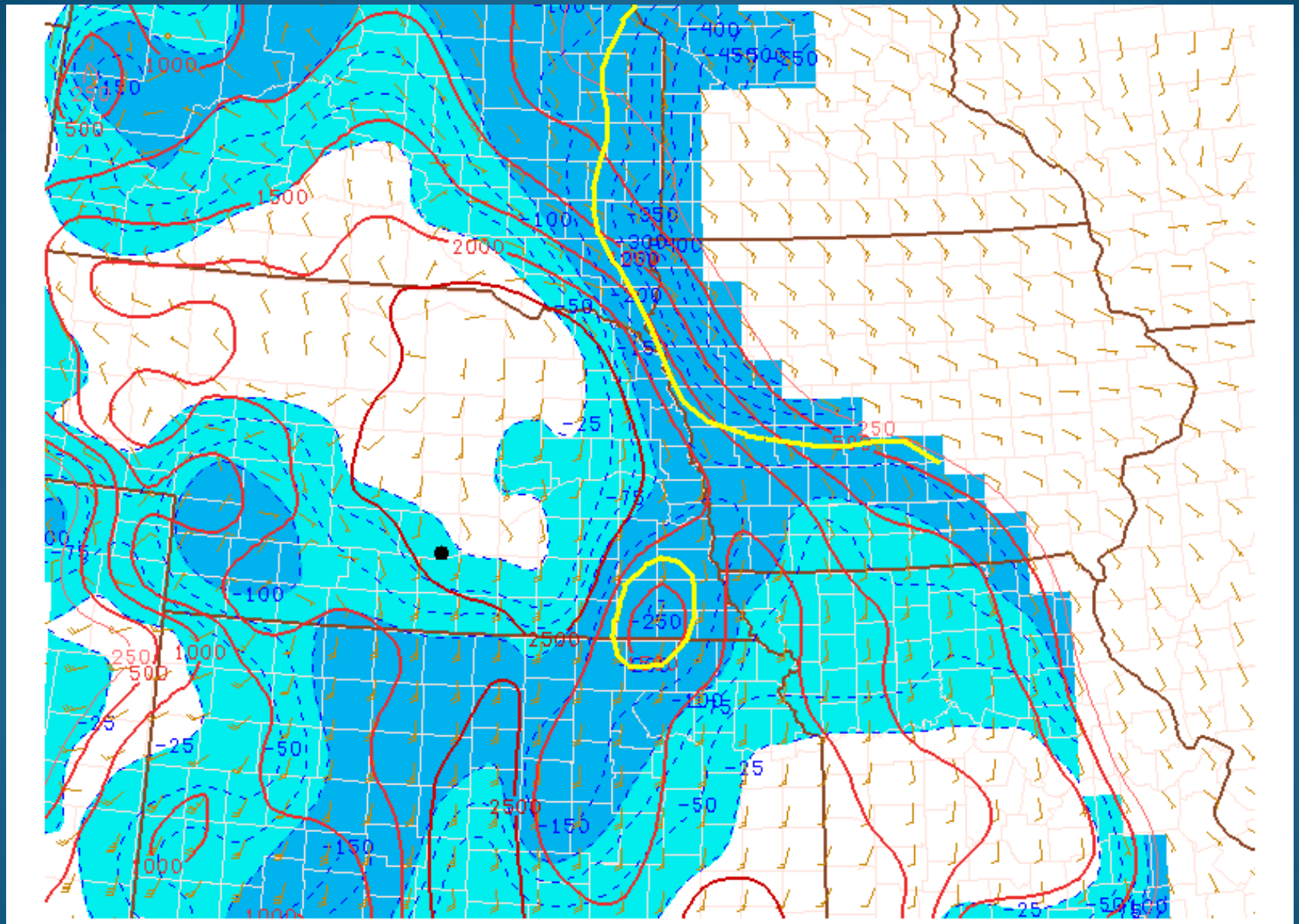
- ***Fixed Layer STP:***
  - STP = (sbCAPE/1500 J kg^{-1}) * ((2000-sbLCL)/1500 m) * (SRH1/100 m^2 s^{-2}) * (6BWD/20 m s^{-1})

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

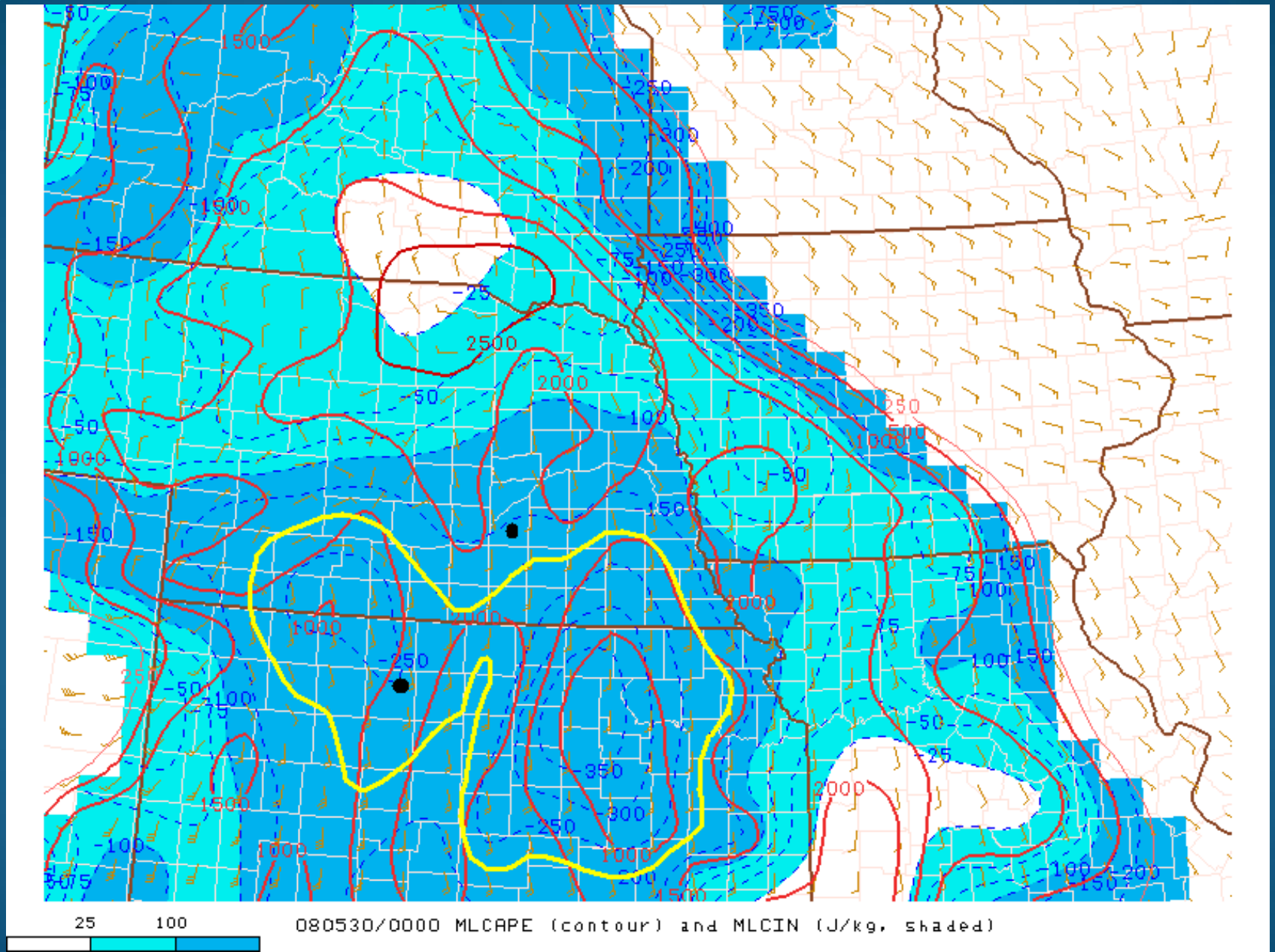
HOW DOES CIN CHANGE THE EFFECTIVE LAYER STP VALUE???

- CIN = -125 J/kg:
  - STP value decreased by 1/2
- CIN = -150 J/kg:
  - STP value decreased by 2/3
- CIN <= -200 J/kg:
  - STP value = 0

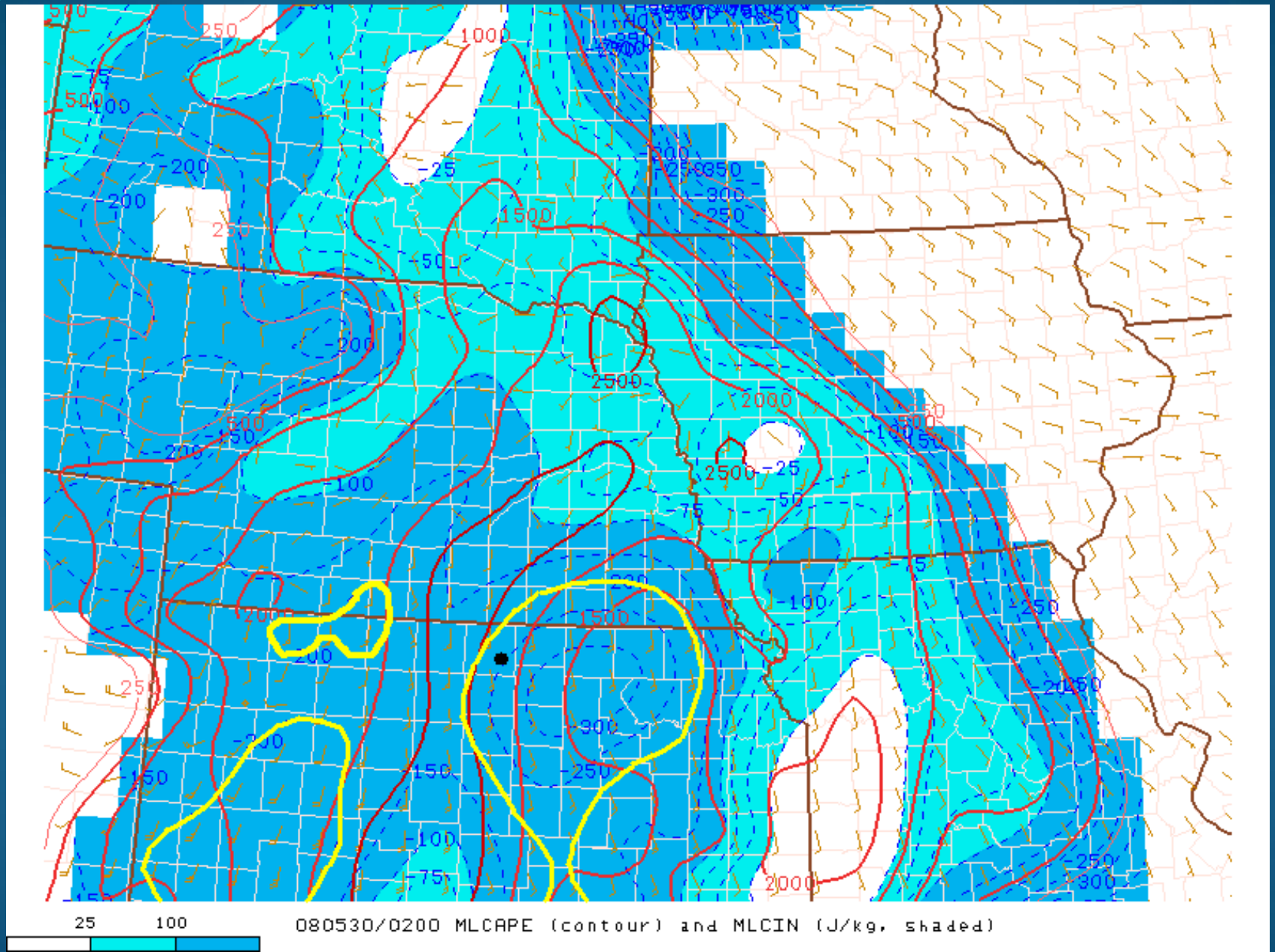
ML CIN AT 22Z (KEARNEY TOR)



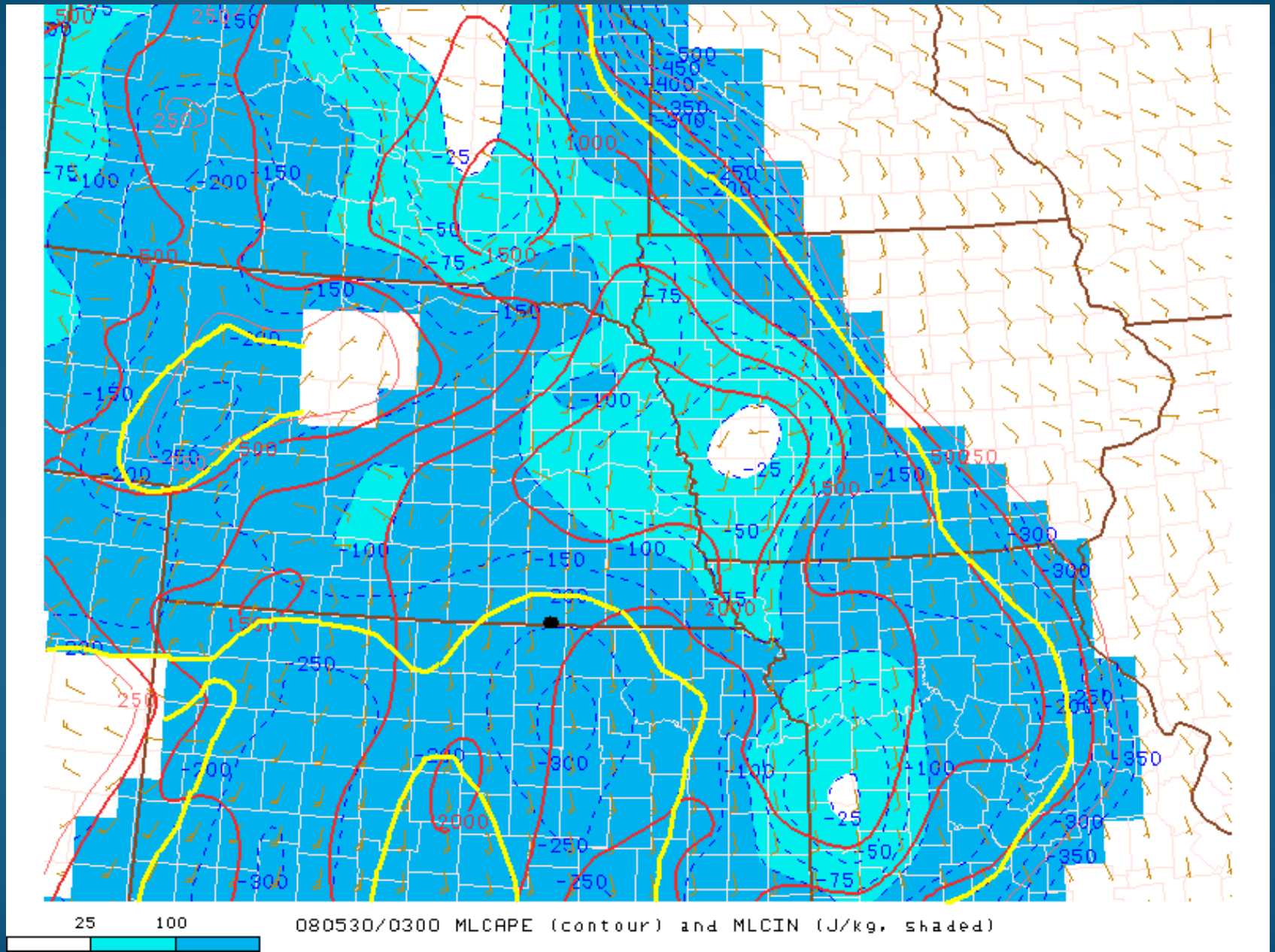
ML CIN AT 00Z (WOODSTON & AURORA TOR)



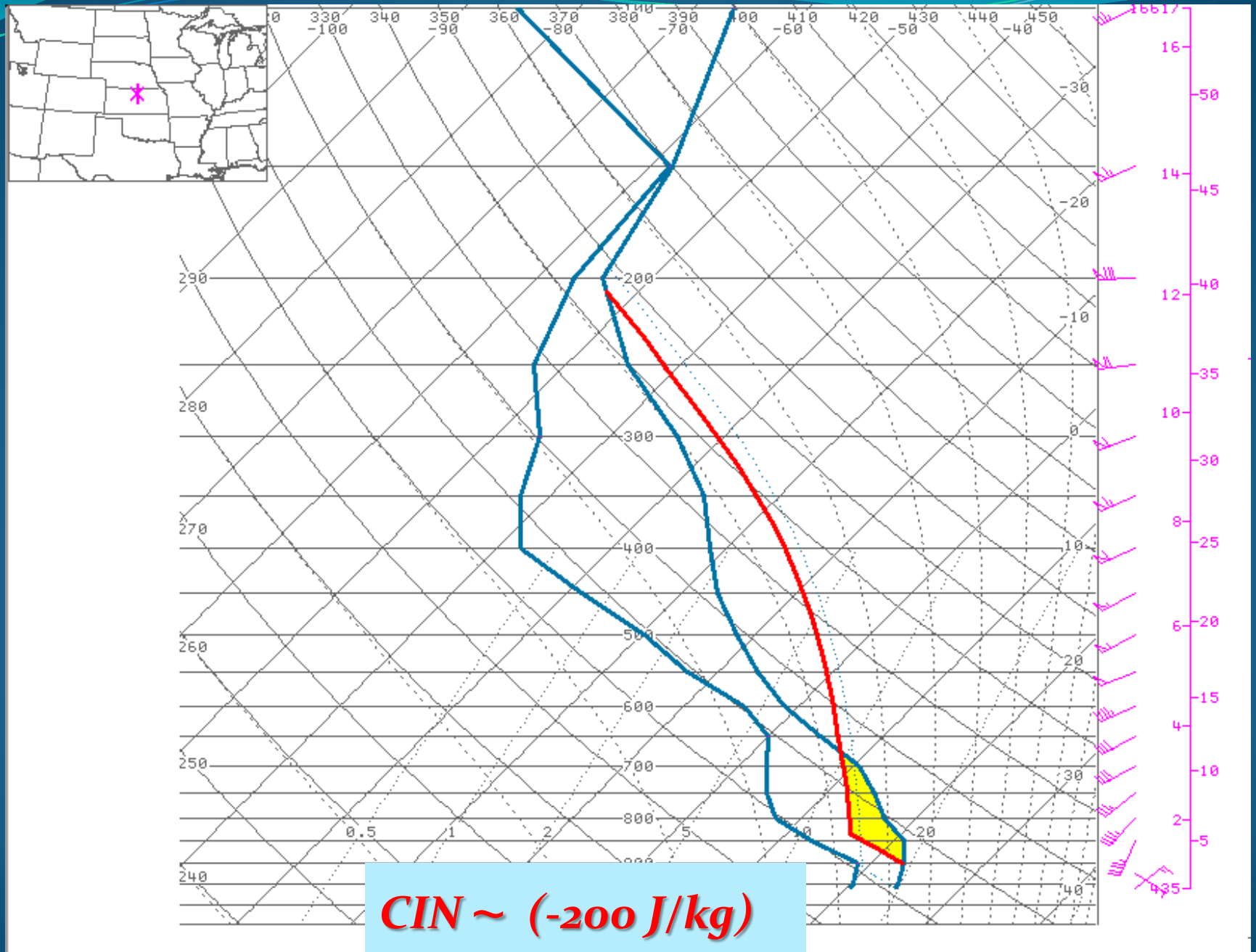
ML CIN AT 02Z (GLEN ELDER/JEWELL TOR)



ML CIN AT 03Z (HUBBELLTOR)



LAPS SOUNDING AT 02Z (GLEN ELDER/JEWELL)



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

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

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

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

Photo courtesy of Christopher Collura