

A Review of the February 5-6th 2008 Snowstorm Across Northeast and North Central Illinois

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The Winter of 2007-08 (WFO LOT CWA)

DECEMBER

- 1 Ice Storm
- 4 Heavy Snow
- 11 Ice Storm #2
- 15 Heavy Snow
- 23 Severe Thunderstorms
- 28 Heavy Snow

JANUARY

- 1 Heavy Snow
- 7 Boone Co. Tornado/Flooding
- 20 Arctic Outbreak
- 21 Heavy Snow
- 22 Wilmington Ice Jam Flooding
- 29 Blizzard Conditions
- 31 Heavy Snow

FEBRUARY

- 5 Heavy Rain/Flooding
- 6 Very Heavy Snow
- 15 Heavy Rain/Flooding
- 21 Heavy Lake Effect Snow
- 26 Snow (RFD ties
DEC-FEB snow record)
- 29 RFD breaks DEC-FEB
snow record)

MARCH

- 21 Heavy Snow

Recent Rockford, IL seasonal snowfall

1997-98	14.8
1998-99	25.9
1999-00	33.6
2000-01	39.4
2001-02	26.7
2002-03	18.3
2003-04	17.2
2004-05	32.2
2005-06	26.6
2006-07	37.5
2007-08	72.9*

***2nd all time
greatest**

Snowstorm of February 5th-6th

State Looks for "Snow" Disaster Aid from Federal Government Watch

Reported by: Katie Crowther
Tuesday, Feb 26, 2008 @09:36pm CST

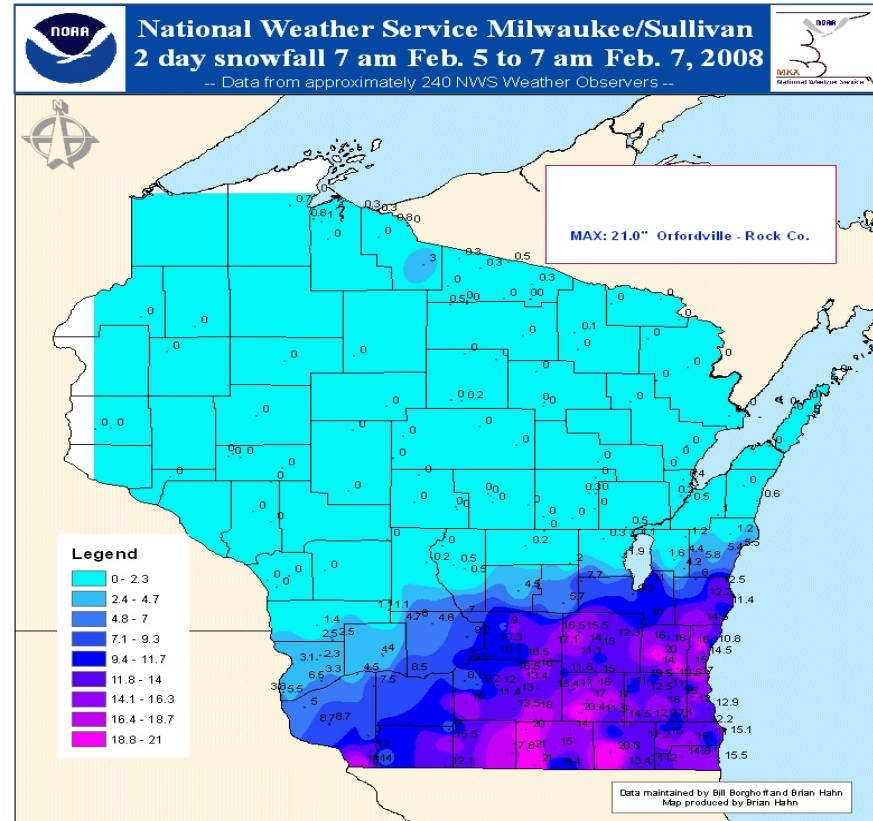
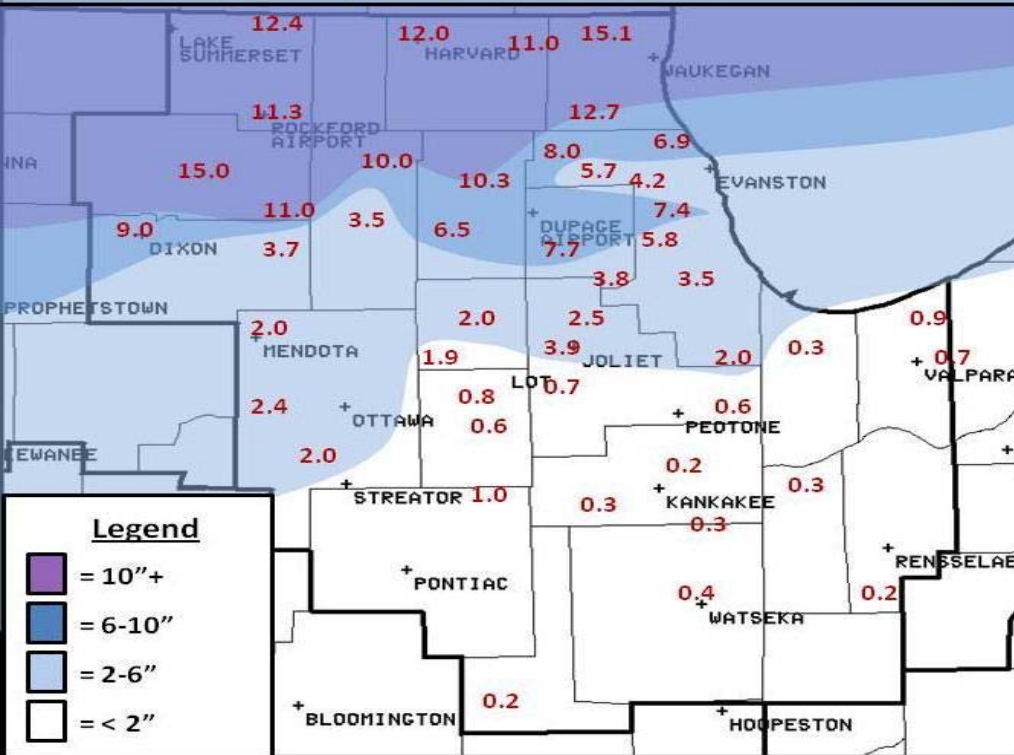


For the first time since 1979, Rockford matched its record snowfall for the months of December, January and February, with 63.4 inches. And that means it's matching the record costs that go with it. But help from the federal government might soon be on its way.

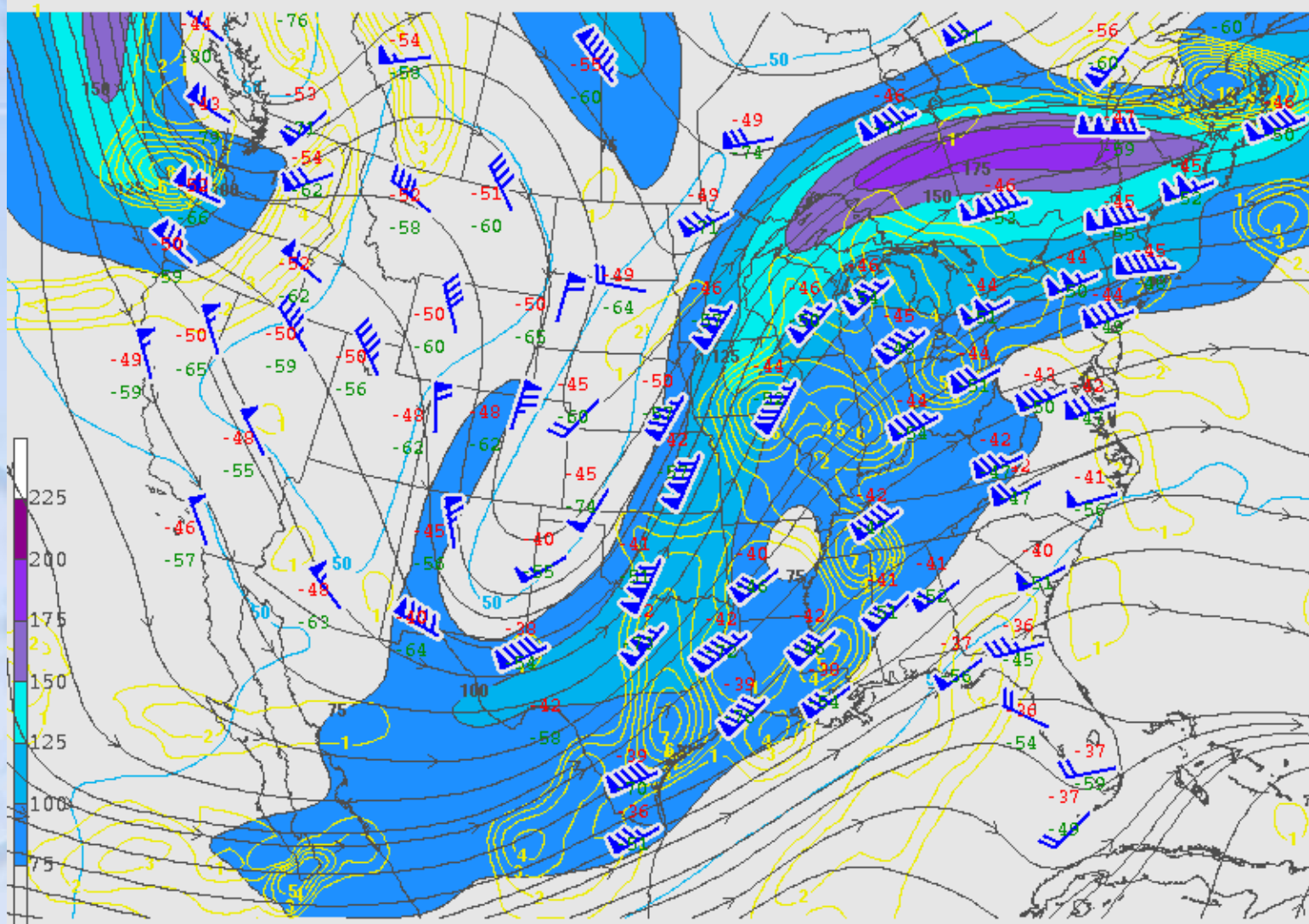
Illinois Governor Rod Blagojevich has declared eight

Costs for Winnebago County High way Department Dec-Feb
\$880,000 for salt.
\$80,000 for salt-mixing materials.
\$900,000 for overtime labor costs.

February 5-6th Snowstorm



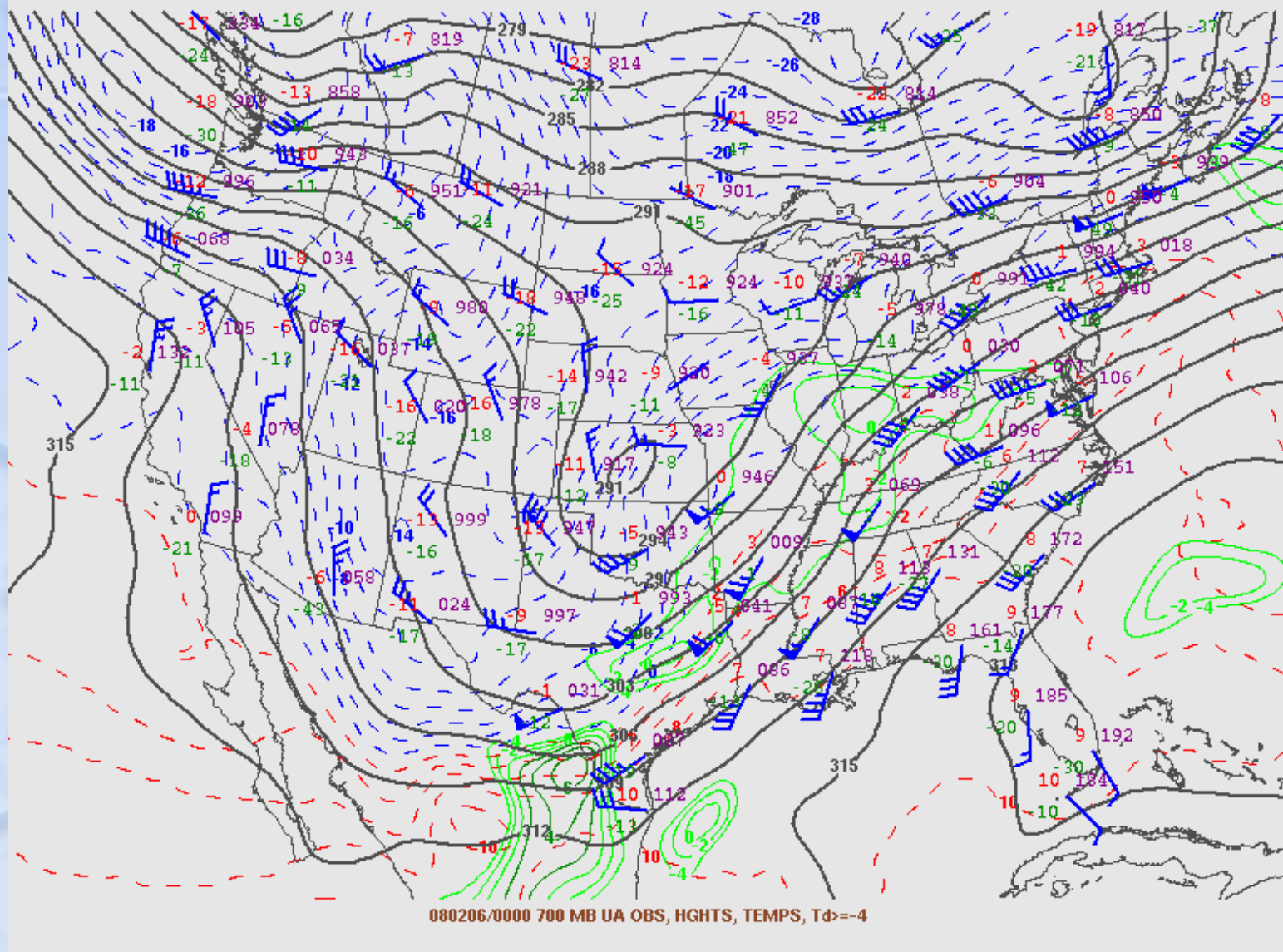
SYNOPTIC OVERVIEW



080206/0000 300 MB UA OBS, ISOTACHS, STREAMLINES, DIVERGENCE

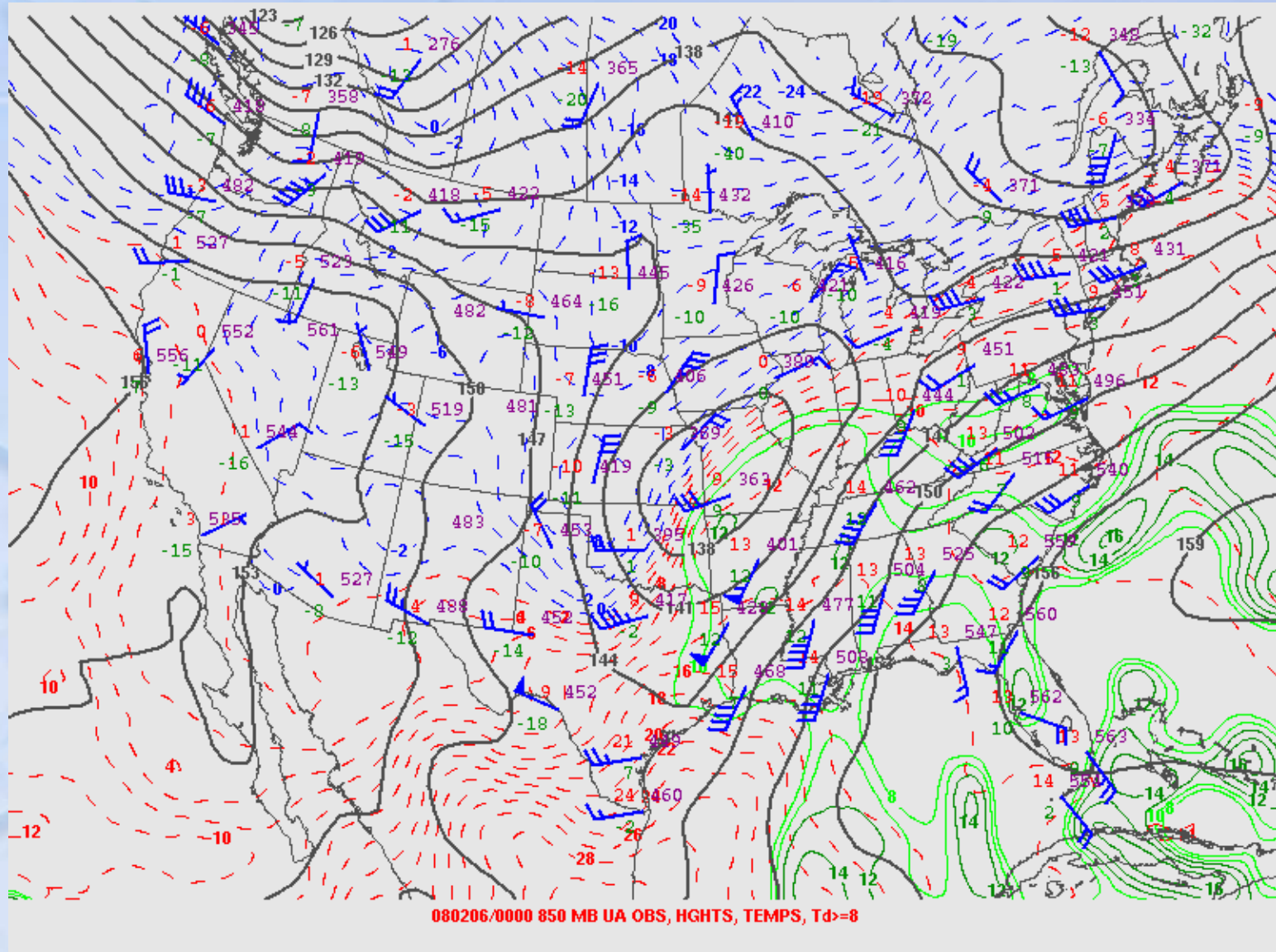
300 hPa 00Z/Feb06

SYNOPTIC OVERVIEW



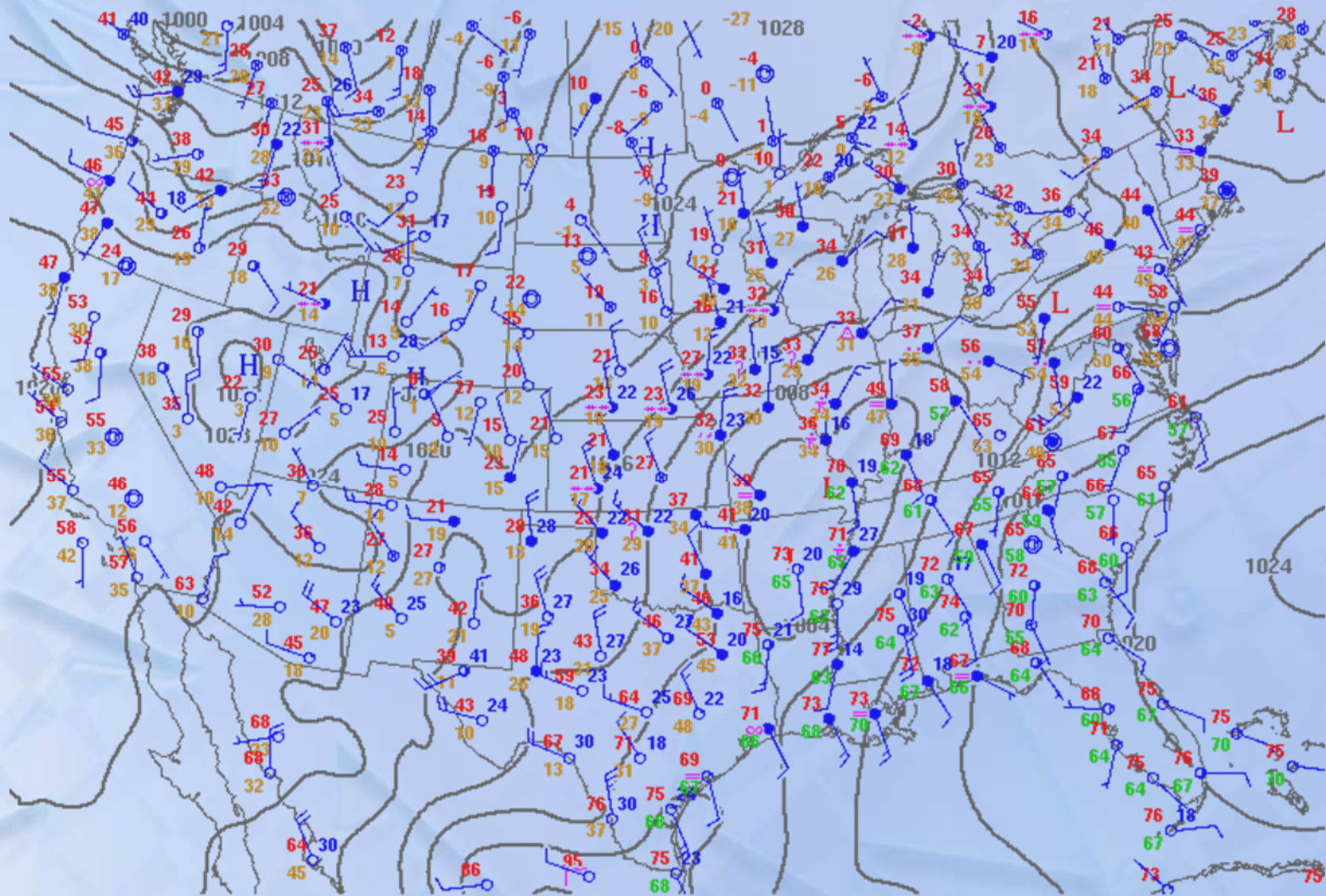
700 hPa 00Z/Feb06

SYNOPTIC OVERVIEW



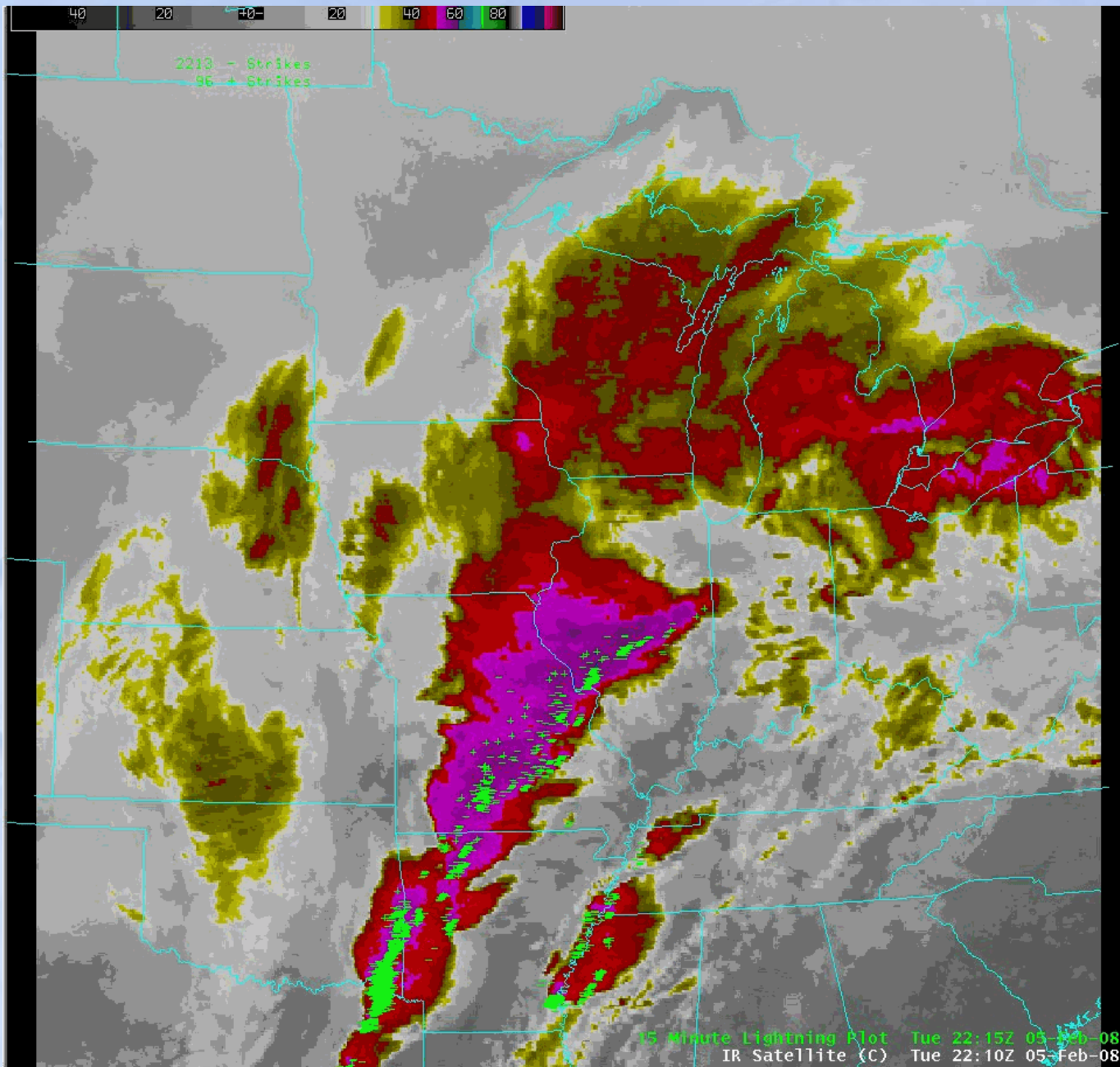
850 hPa 00Z/Feb06

SYNOPTIC OVERVIEW



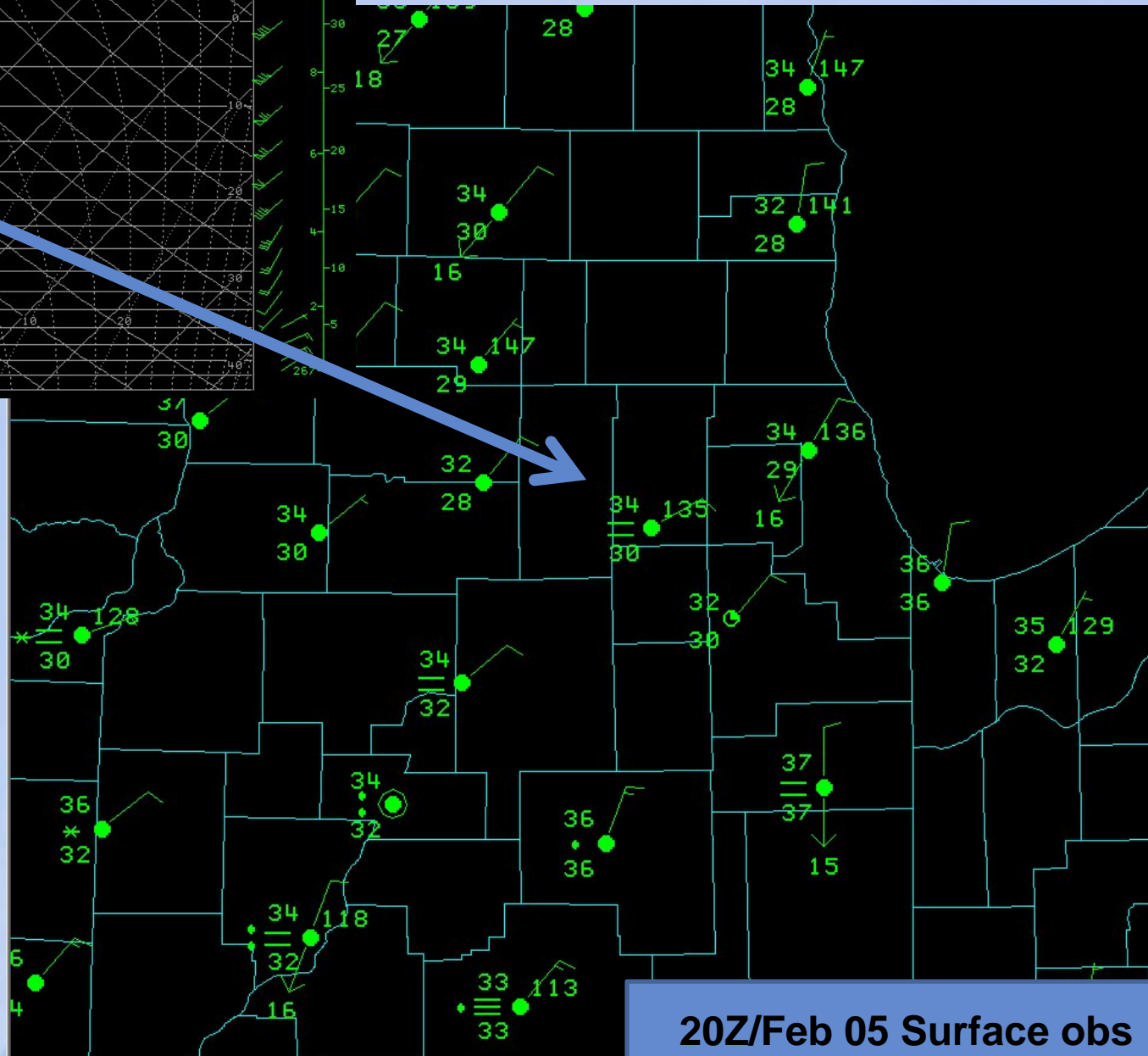
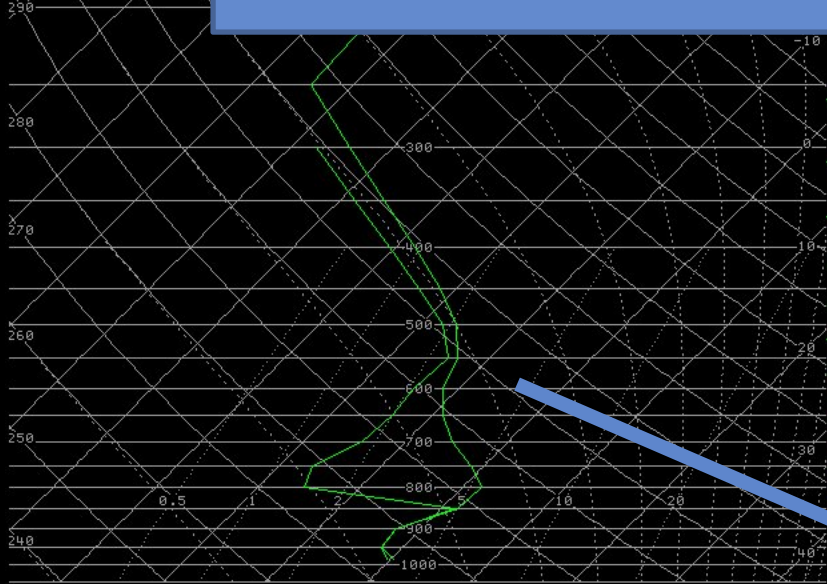
080206/0000 Surface, OA Pressure and Obs
Weather, Temp, Dwpt, Gusts

Sfc. analysis 00Z/Feb06

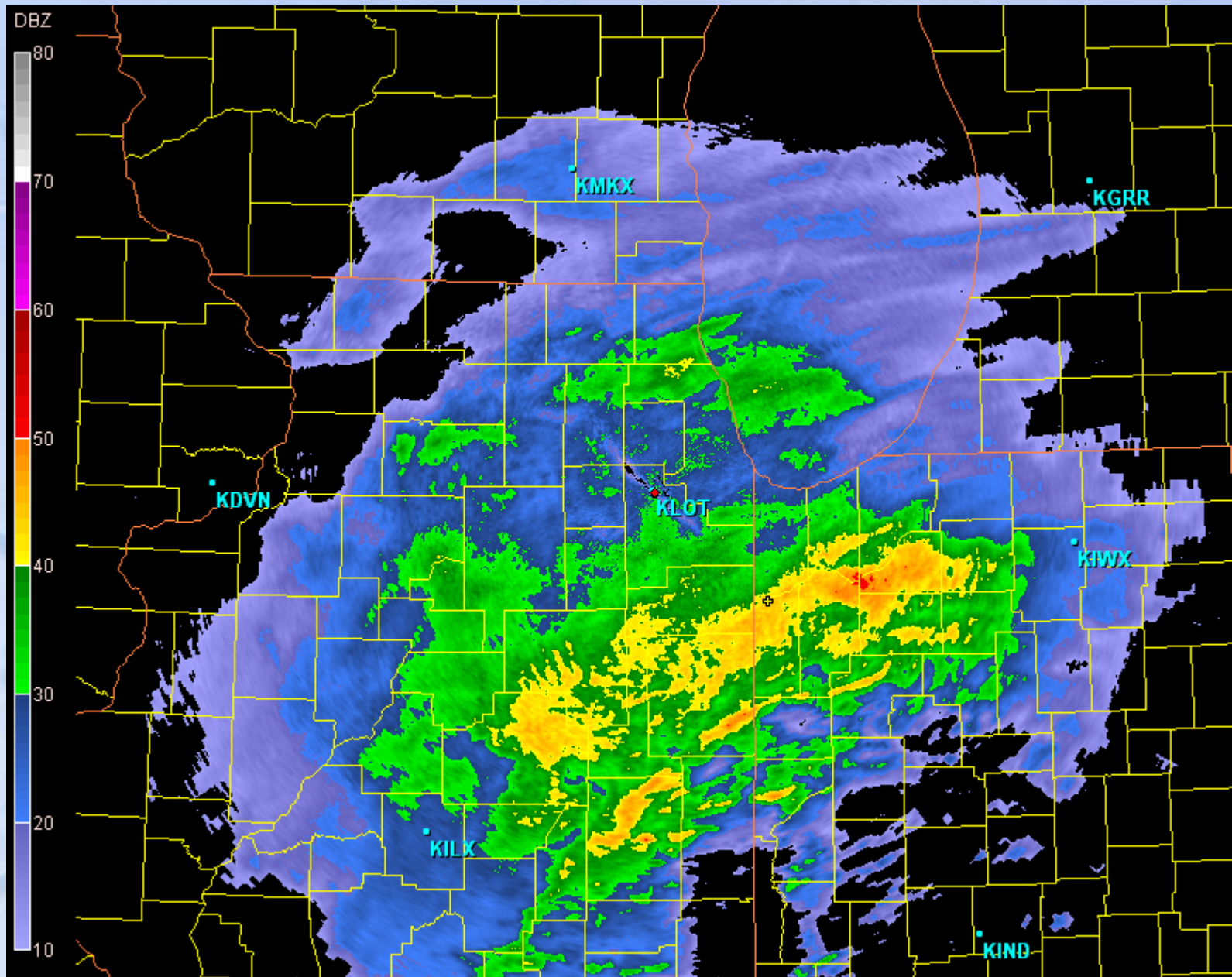


IR Satellite Imagery 2210-2310Z Feb05

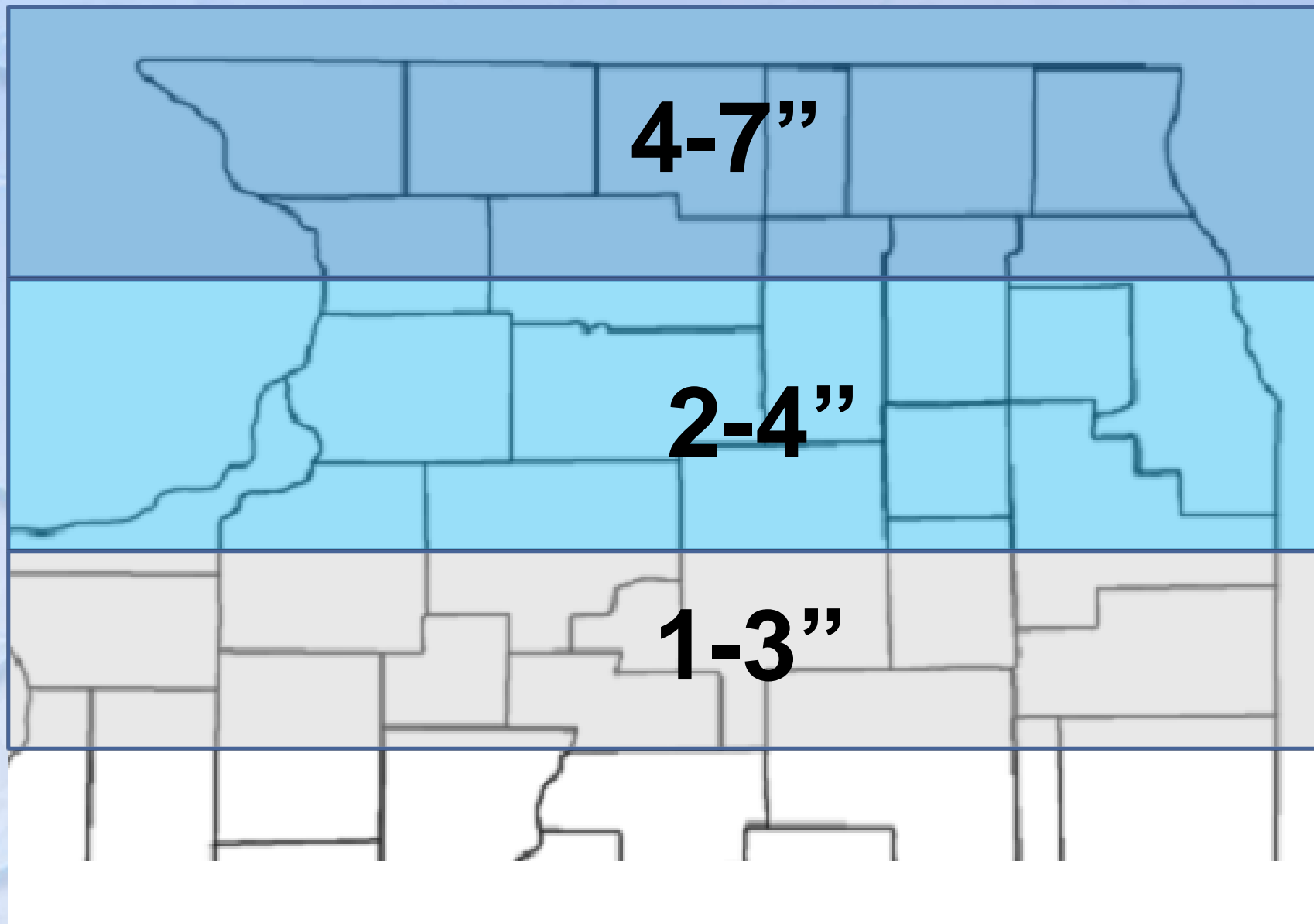
21Z/Feb 05 00hr RUC sounding



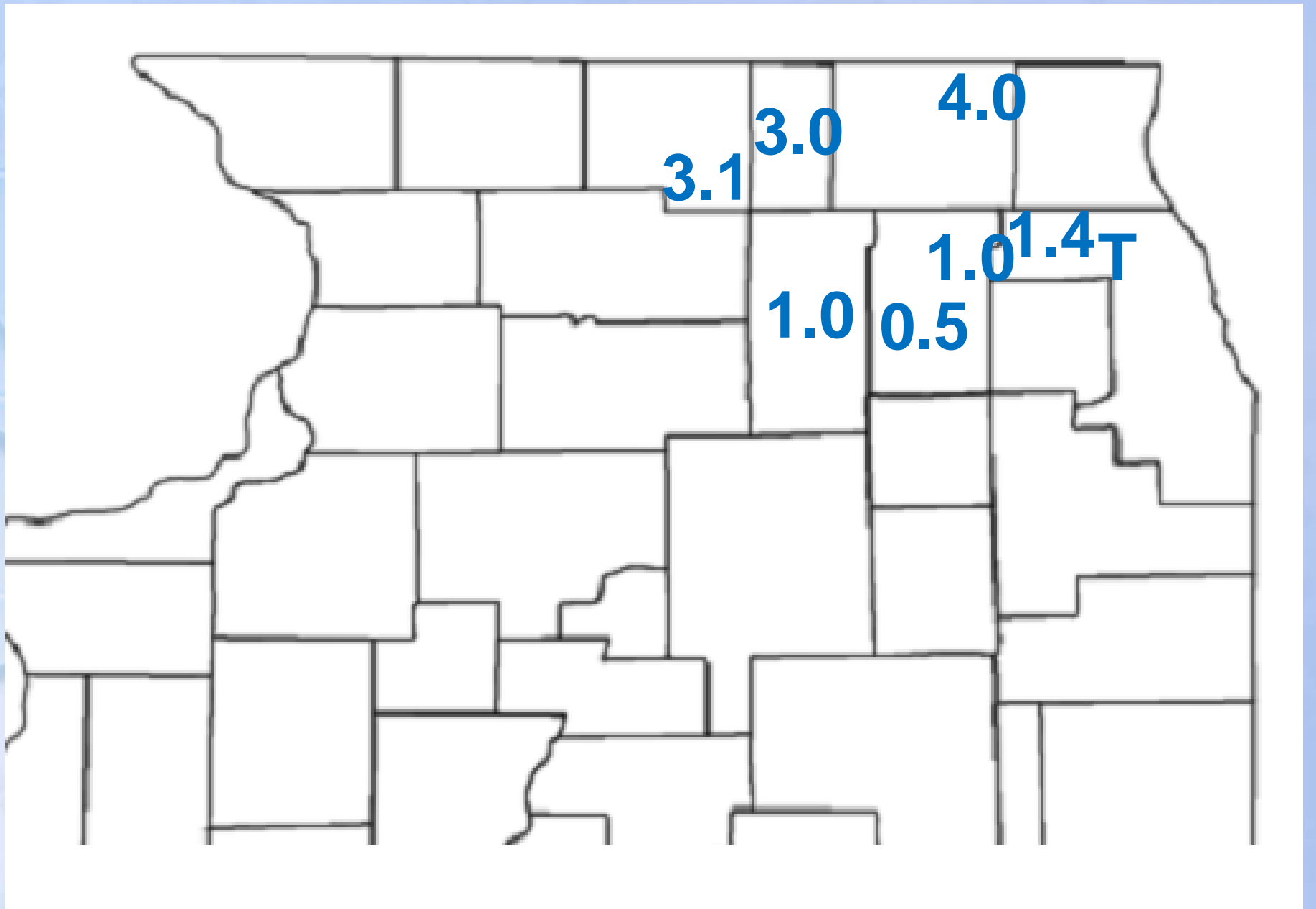
20Z/Feb 05 Surface obs



KLOT 0.5 base reflectivity 2200Z-0200Z Feb05-06



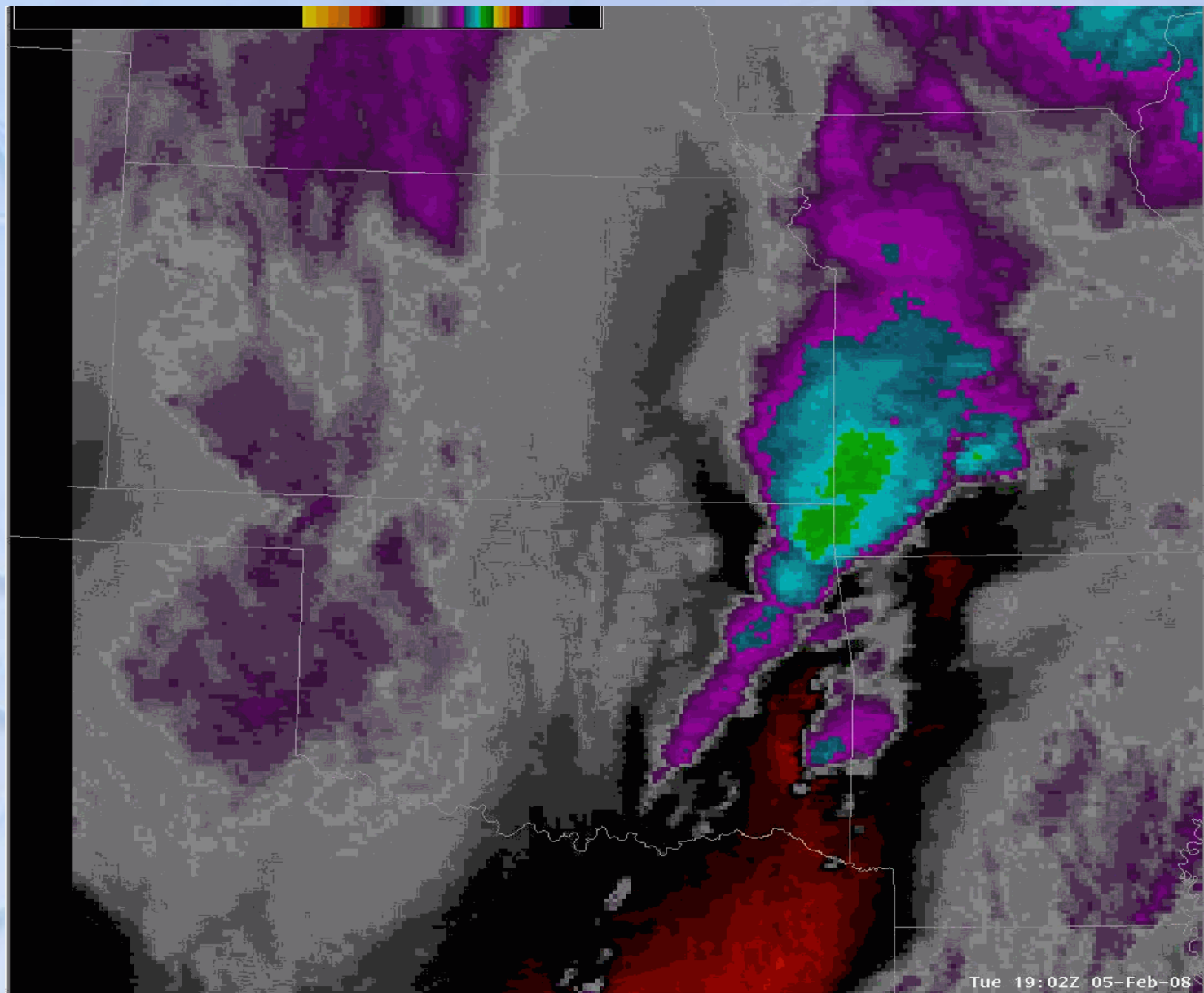
Forecast snowfall amounts for afternoon and night of Feb 05



Snowfall amounts for afternoon and night of Feb05

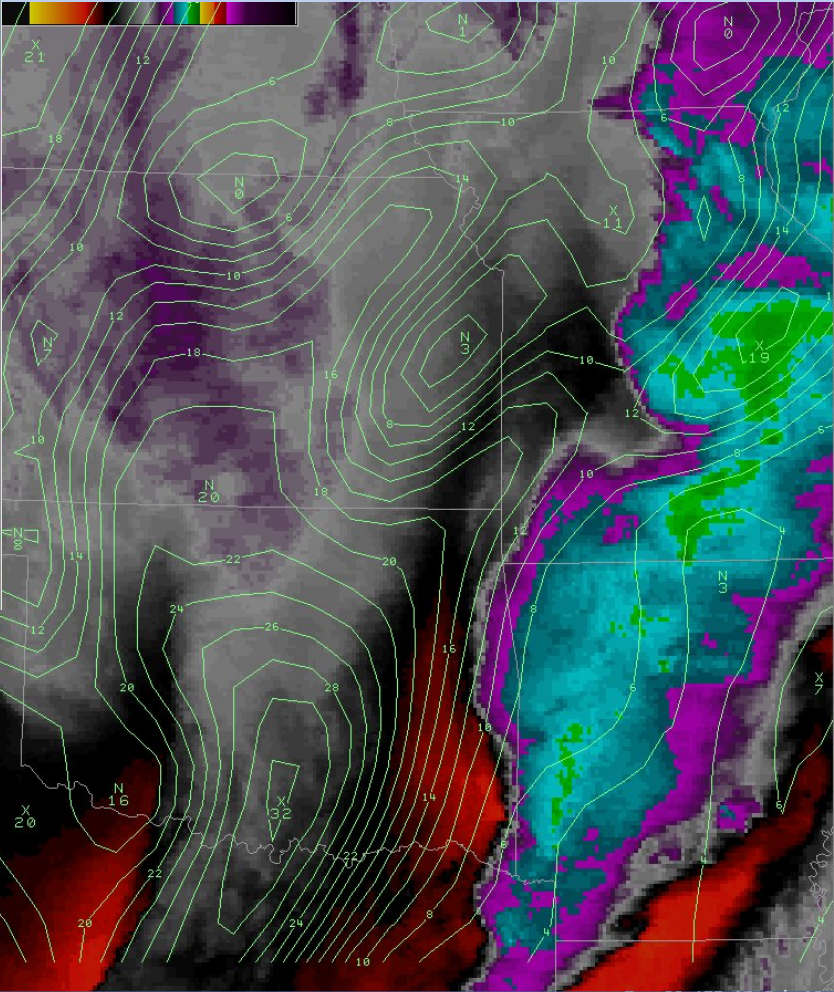
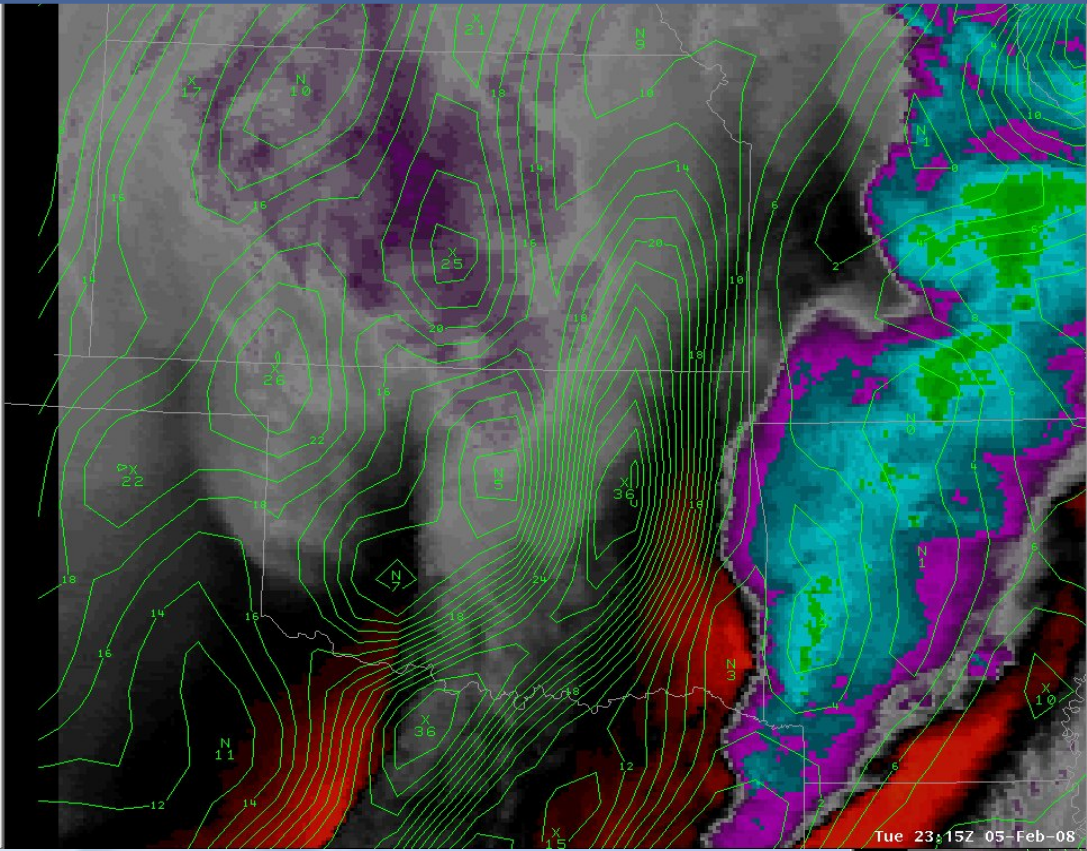
WHAT WENT WRONG????

- After initial burst of snow in the early evening, snow changes back to rain across much of northeast and north central Illinois
- Second phase of storm (deformation forcing) would produce most significant snowfall
- What were mesoscale and synoptic factors that acted to enhance snowfall during the day on February 6th? (10 to 20 inches storm total across far northern Illinois and southern Wisconsin)



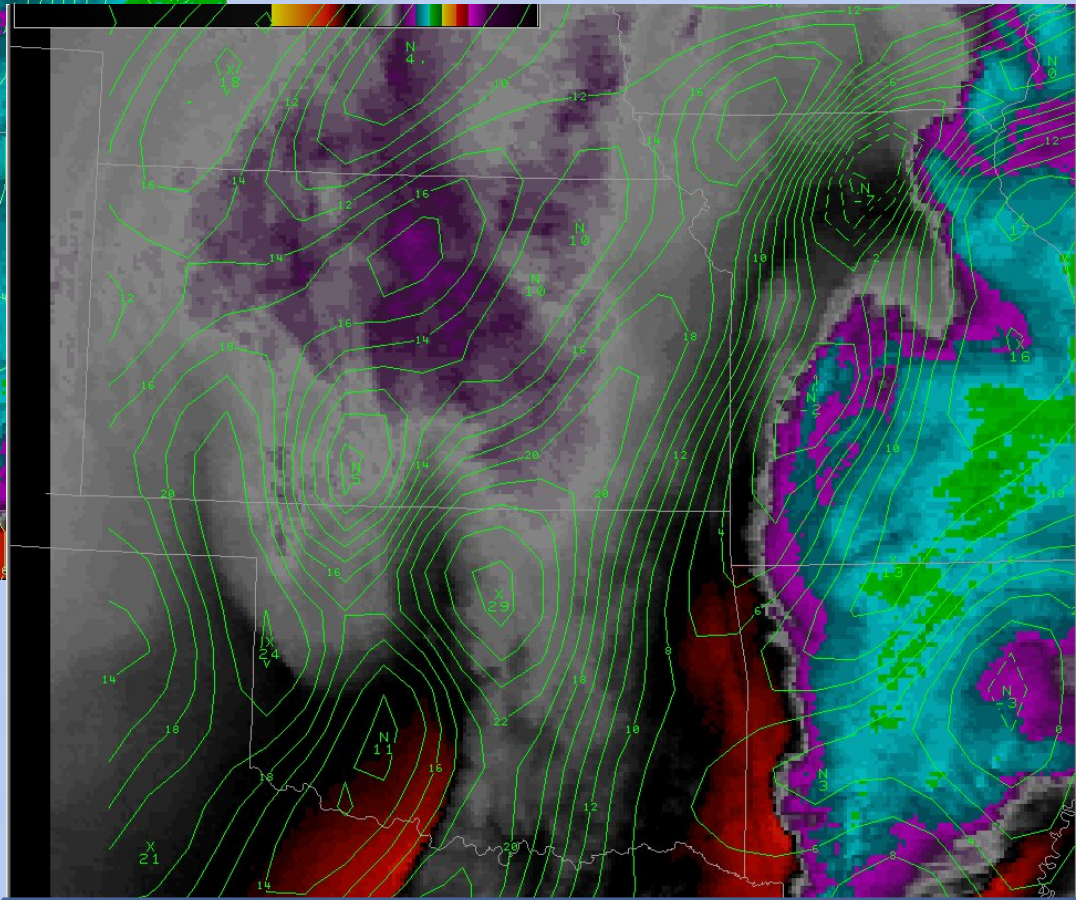
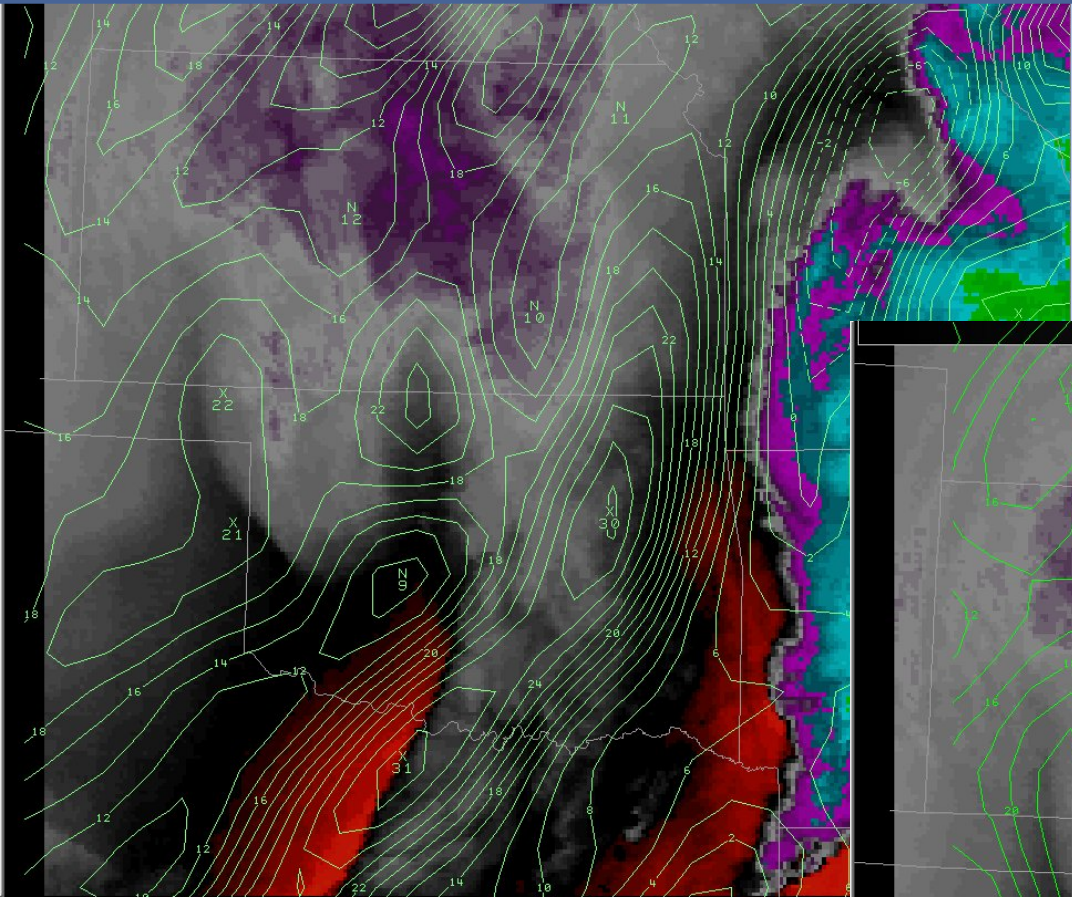
Water vapor loop 19Z-23Z Feb05

12Z NAM 12-hr fcst 500 hPa vorticity
(valid 00Z/Feb 06 and water vapor ~ 00Z/Feb 06)

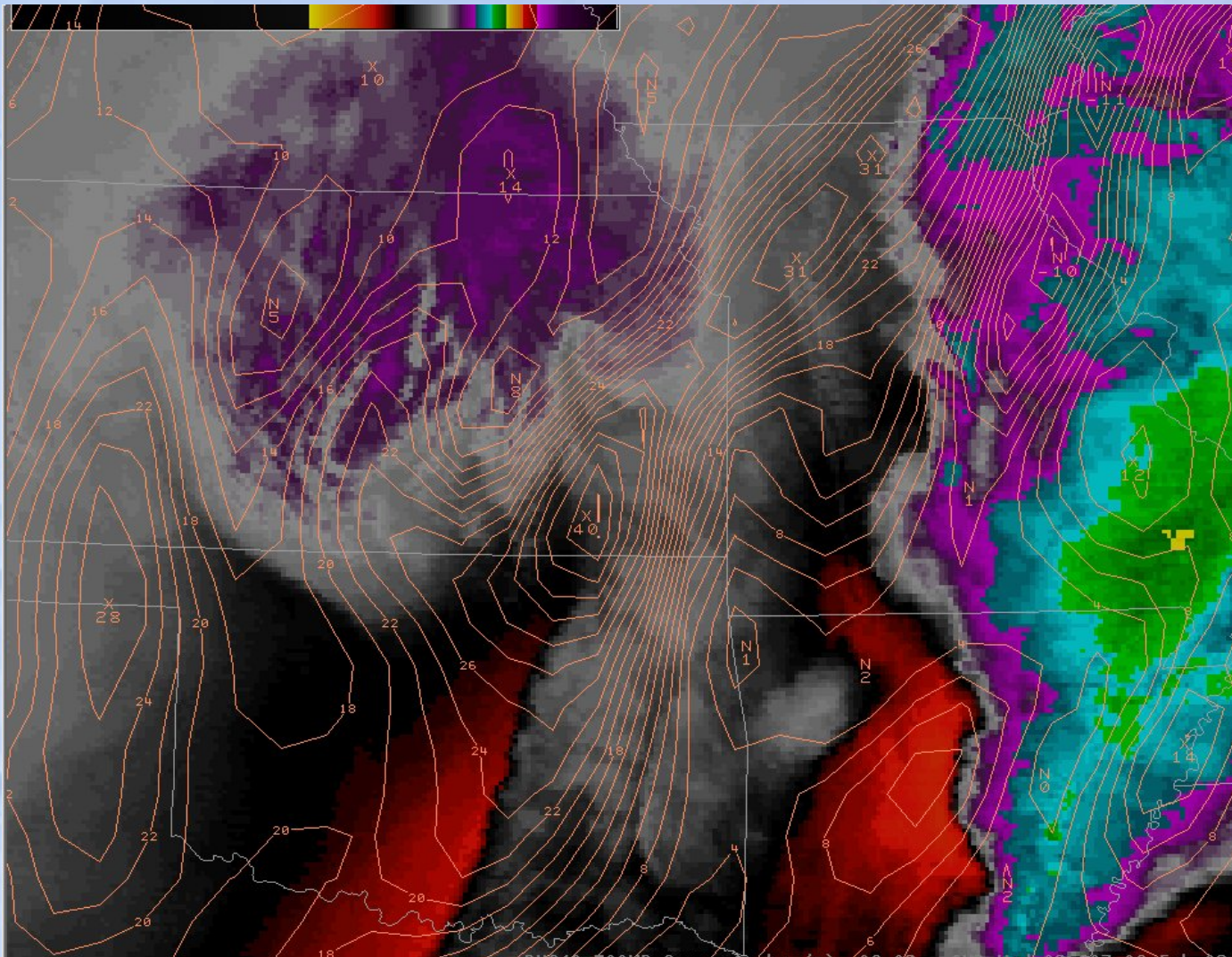


12Z GFS 12-hr fcst 500 hPa vorticity
(valid 00Z/Feb 06 ad water vapor ~ 00Z/Feb 06)

**00Z NAM 00-hr fcst 500 hPa vorticity
(valid 00Z/Feb 06 and water vapor ~ 00Z/Feb 06)**



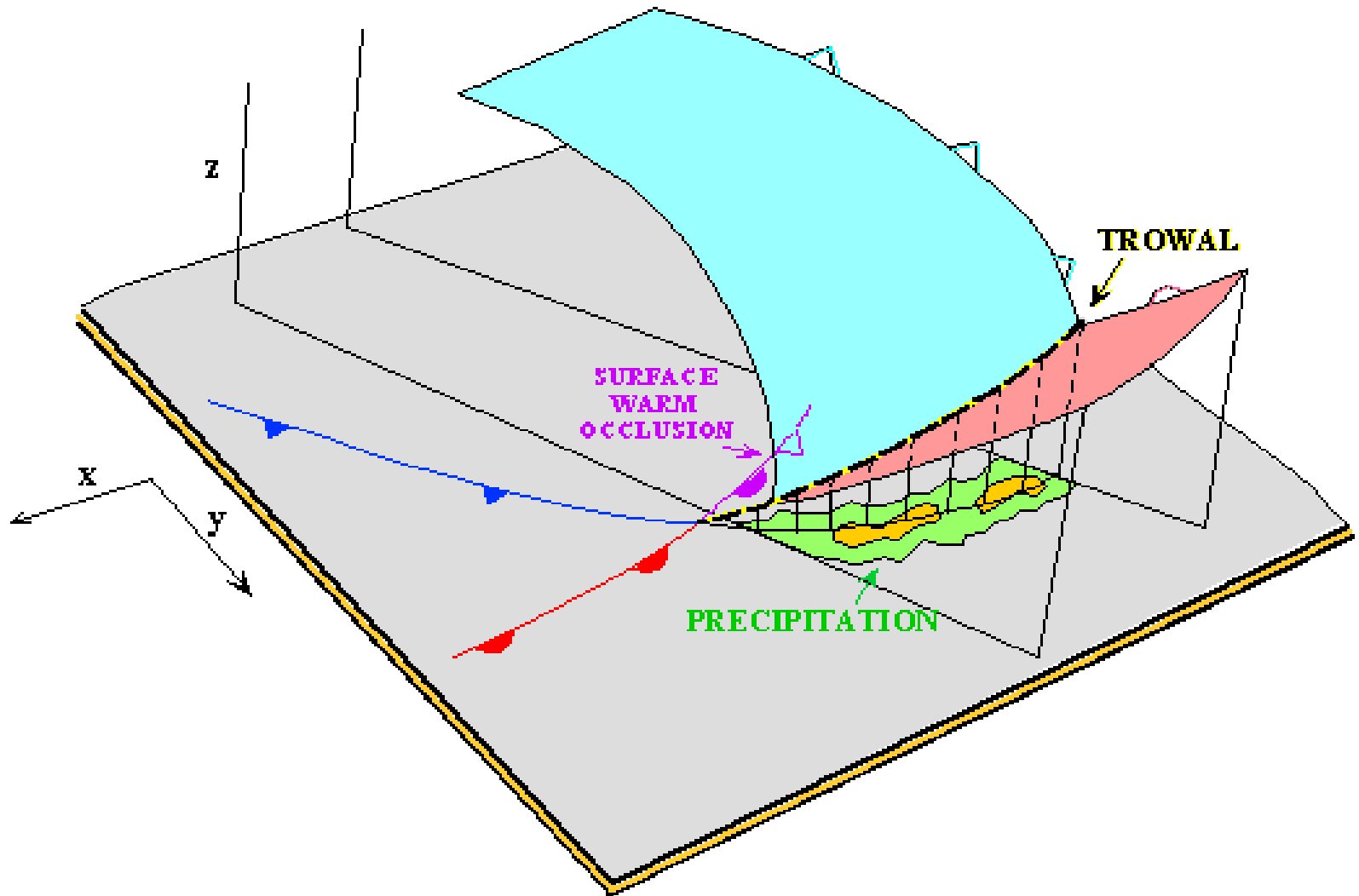
**00Z GFS 00-hr fcst 500 hPa vorticity
(valid 00Z/Feb 06 and water vapor ~ 00Z/Feb 06)**



00Z RUC 3-hr forecast 500 hPa vorticity (valid 03Z/Feb06)

WHAT WENT WRONG????

- Both the 12Z runs of the NAM and GFS significantly underestimated strength of vort max lifting northeast out of the southern Plains.
- What effect would this initialization error have on the synoptic and mesoscale factors contributing to heavy snowfall the following day?

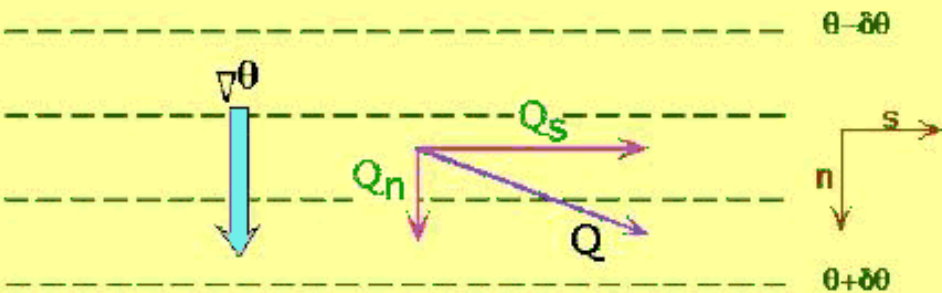


SCHEMATIC OF THE TROWAL CONCEPTUAL MODEL

Conceptual model of the TROugh of Warm air Aloft

Martin (1998)

Cold



Warm

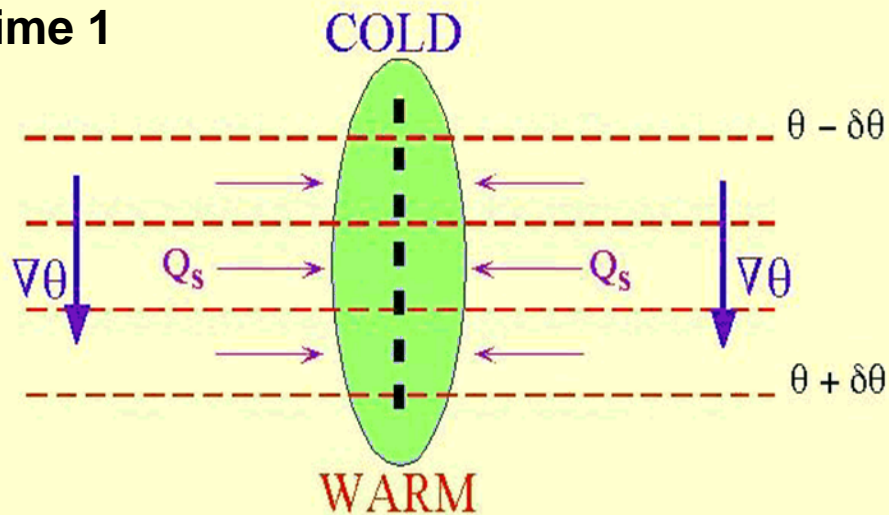
Strongly sloped isentropic surfaces in TROWAL airstream can aid in significant precipitation production.

Martin found that Q_s convergence is directly related with TROWAL development (synoptically forced).

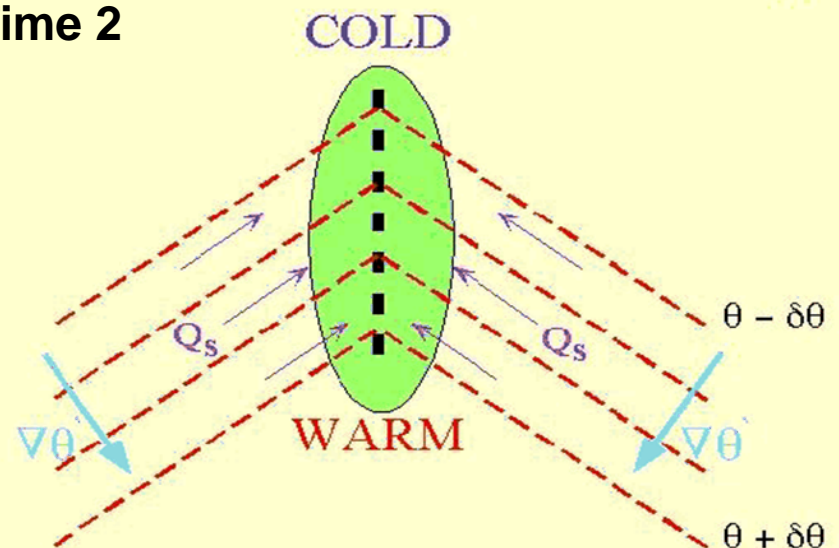
Q_n changes the magnitude of the temperature gradient

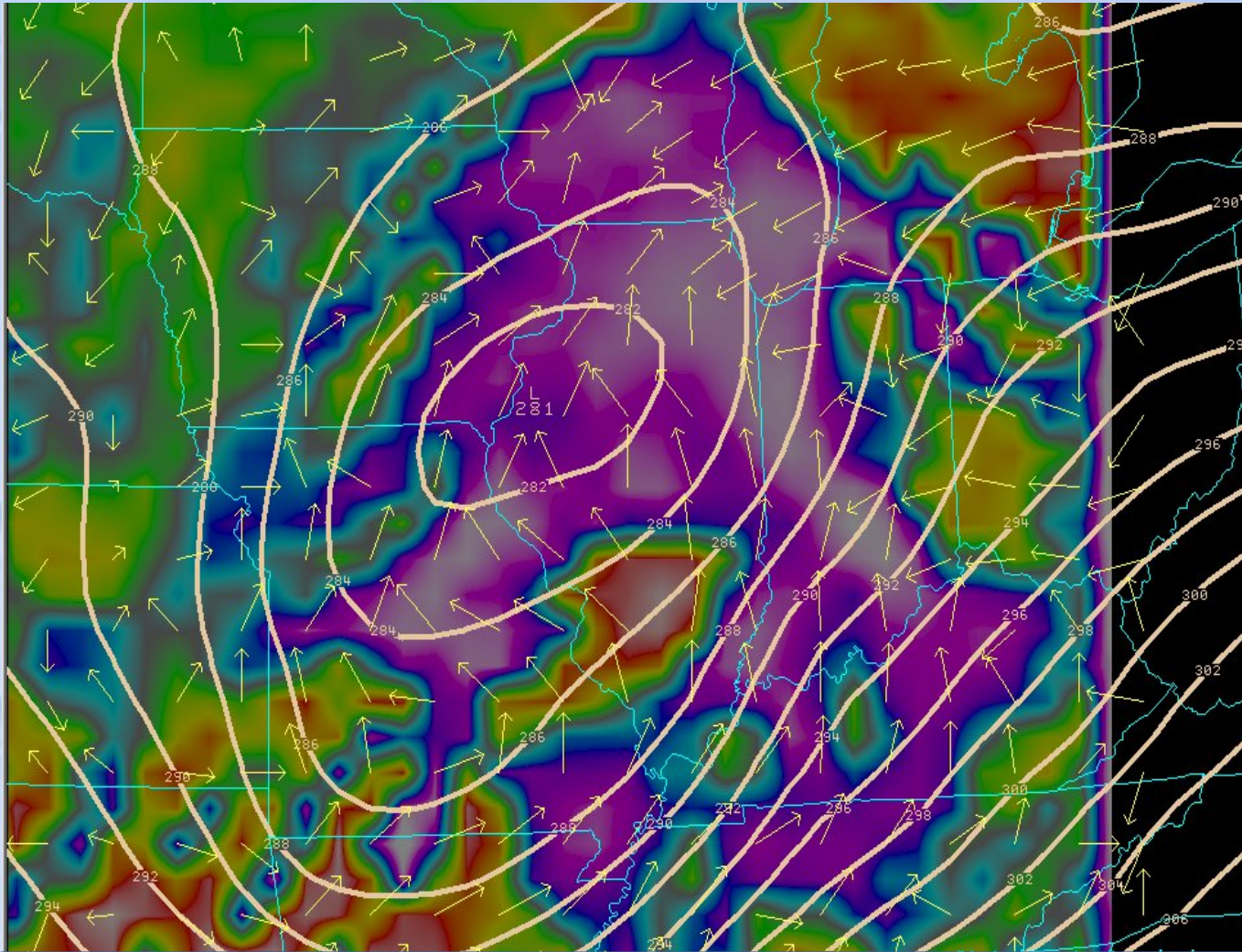
Q_s changes the direction of the temperature gradient

Time 1

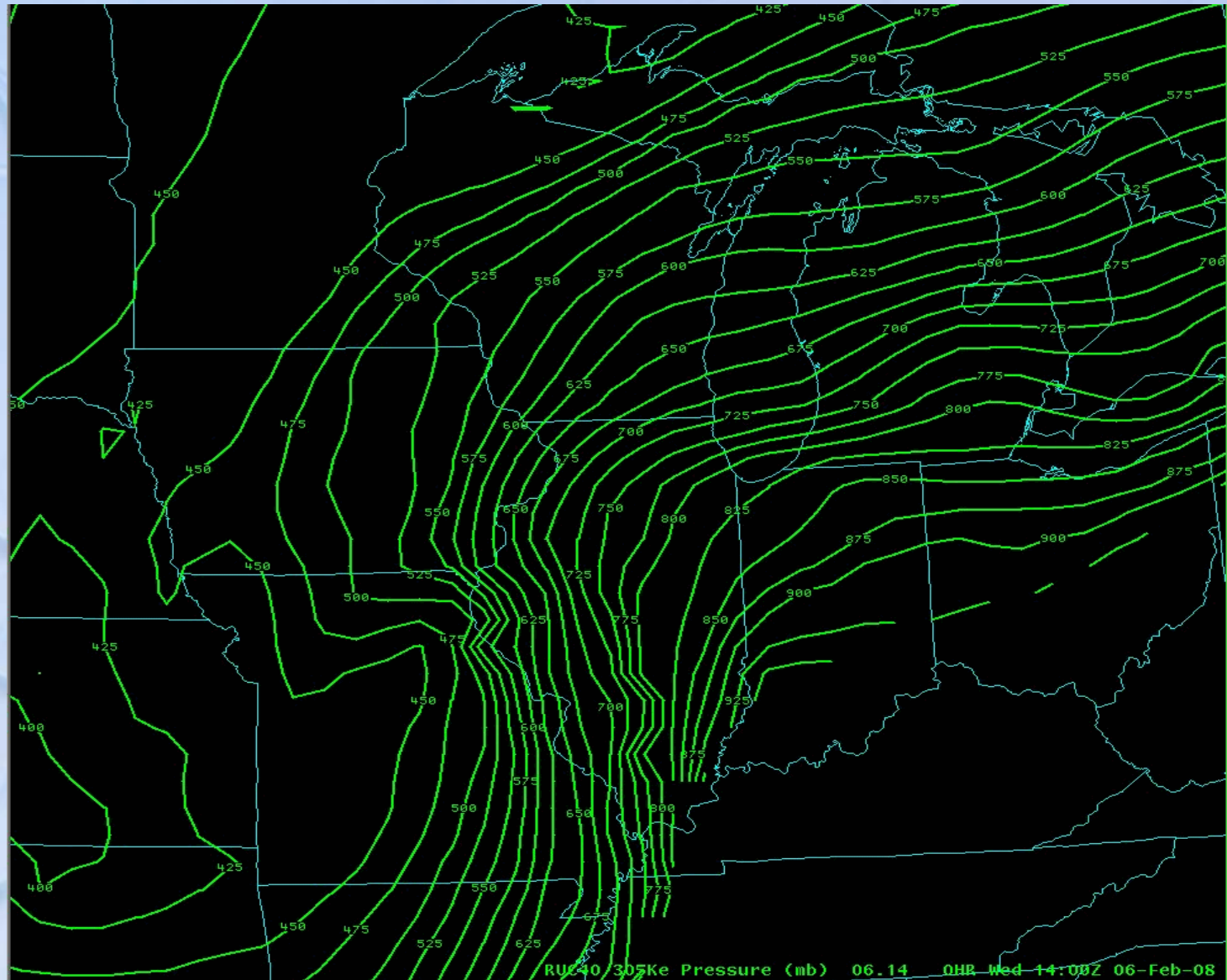


Time 2

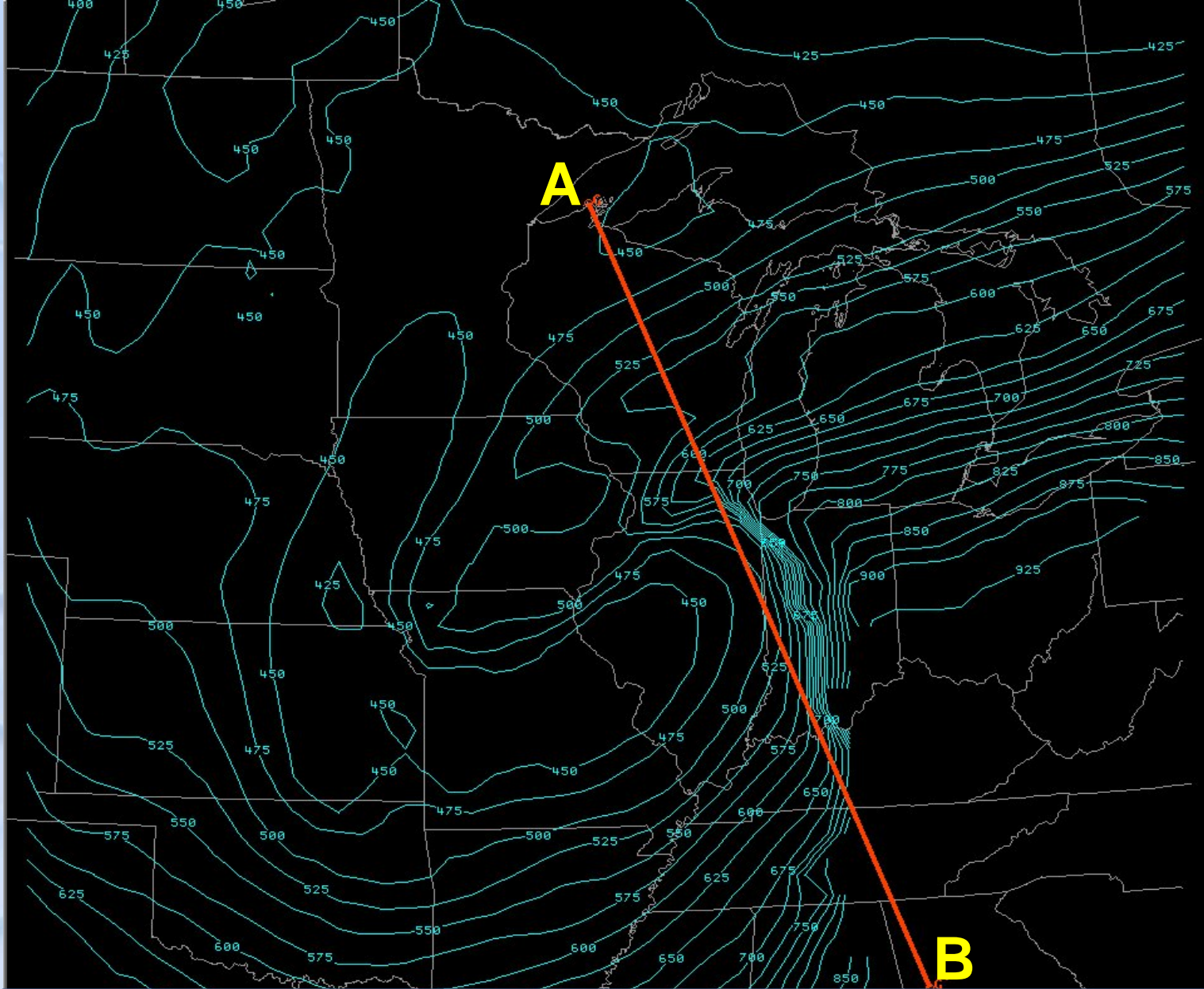




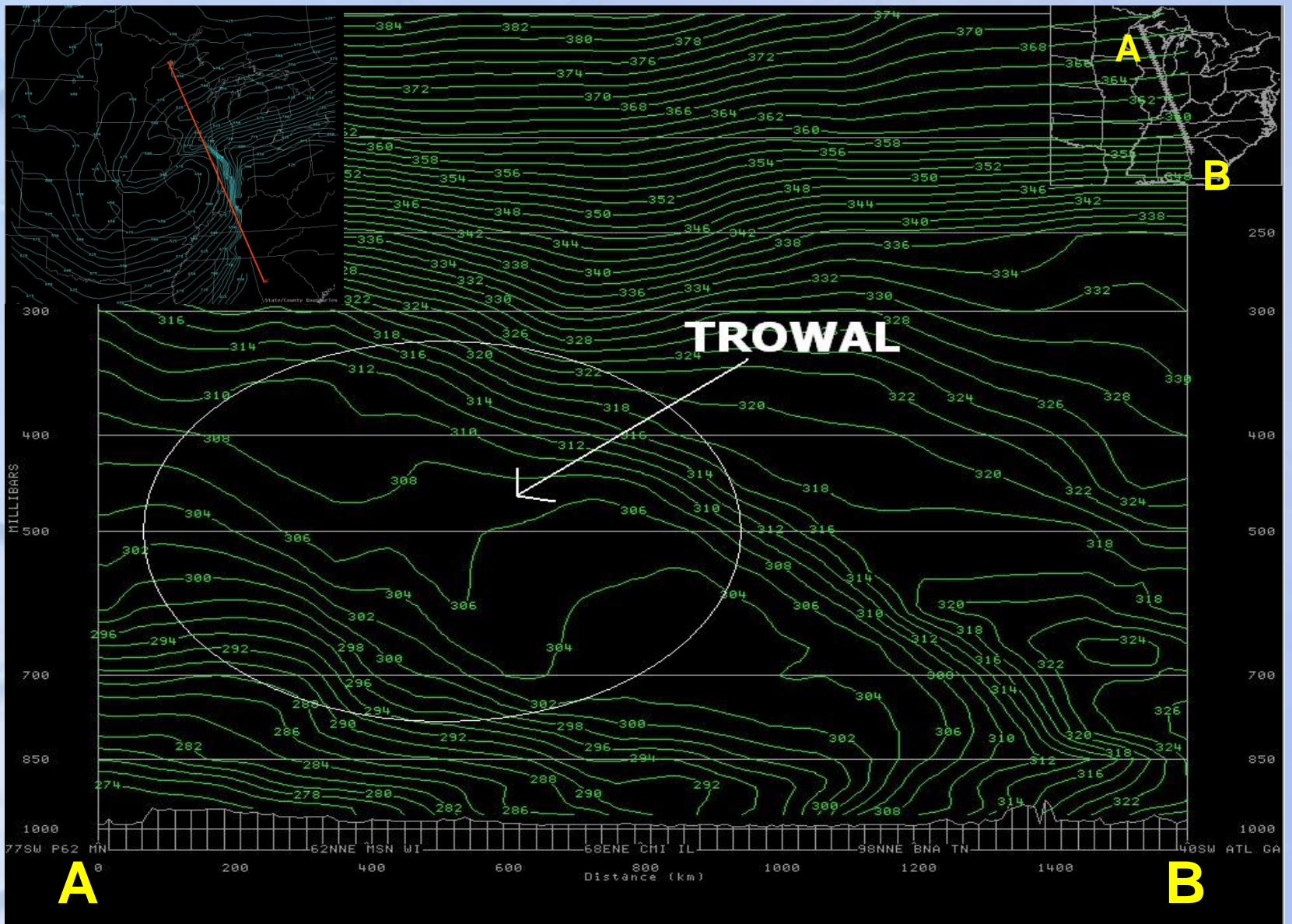
15Z (Feb06) RUC 00-hr fcst 700 hPa hght and 700-500 hPa Qs dvg.



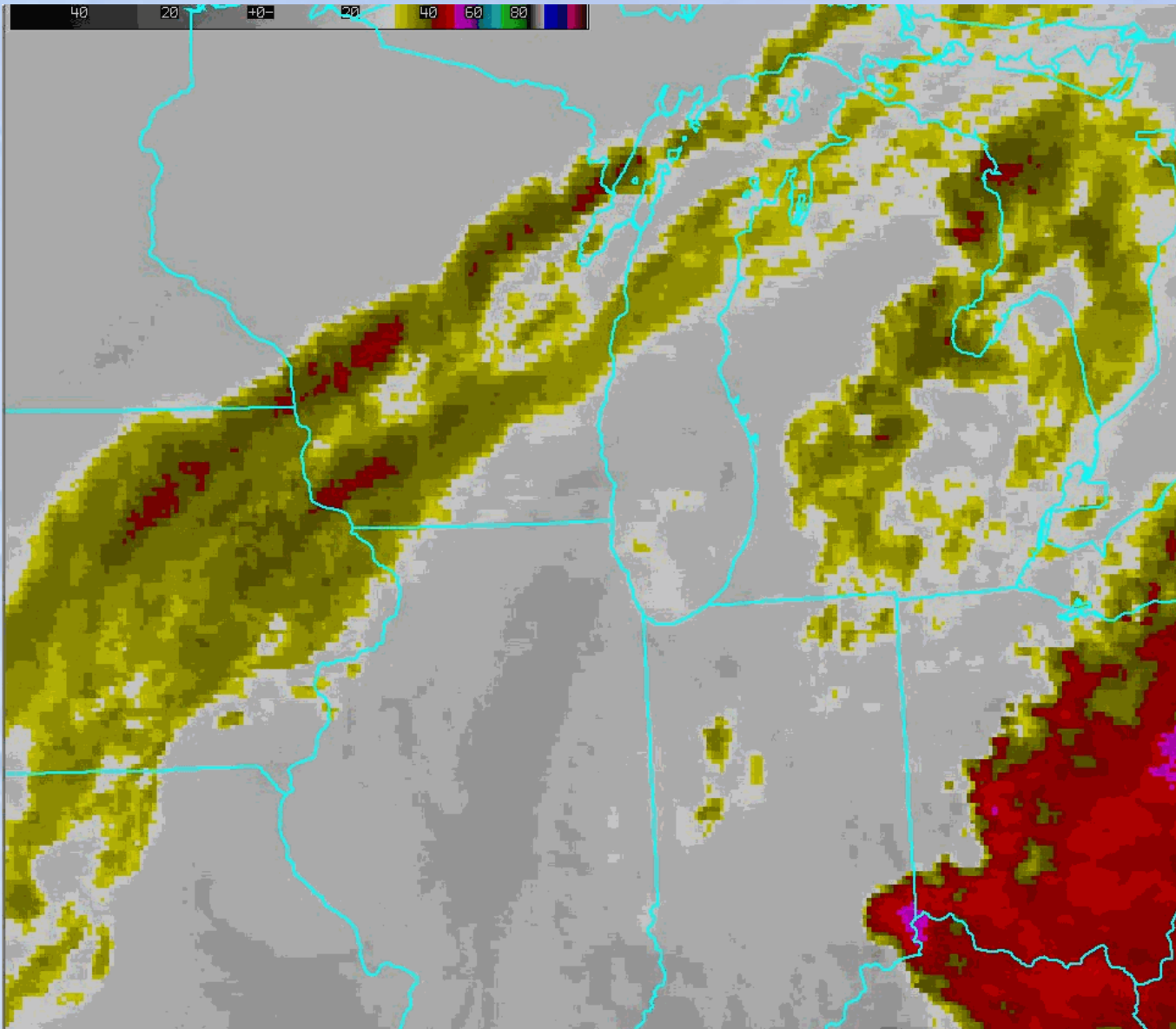
RUC 00-hr fcst analyses of pressure on 305K theta-e sfc 14Z-19Z Feb 06



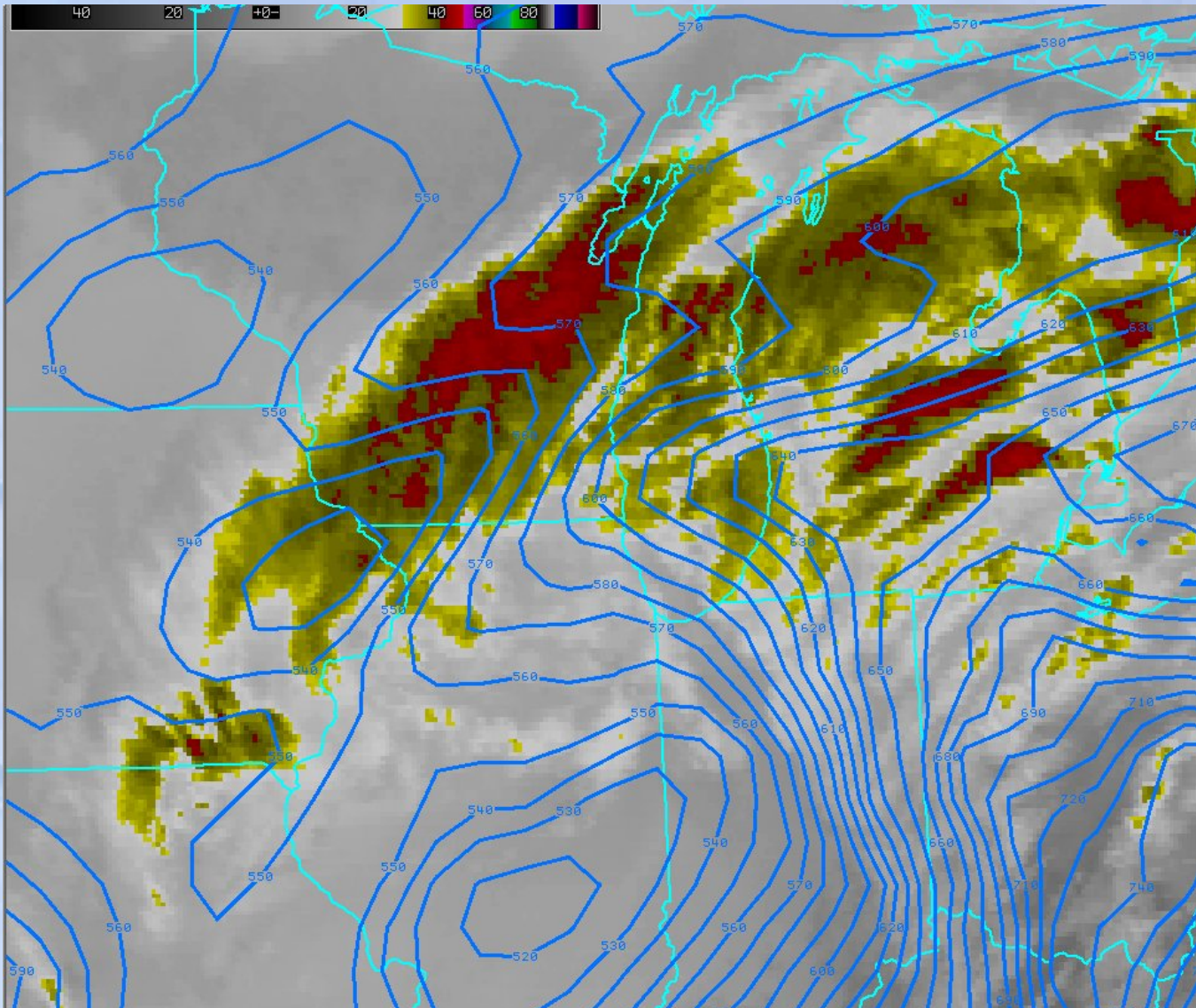
18Z RUC (Feb 06) 00-hr fcst of pressure on 305K theta-e sfc



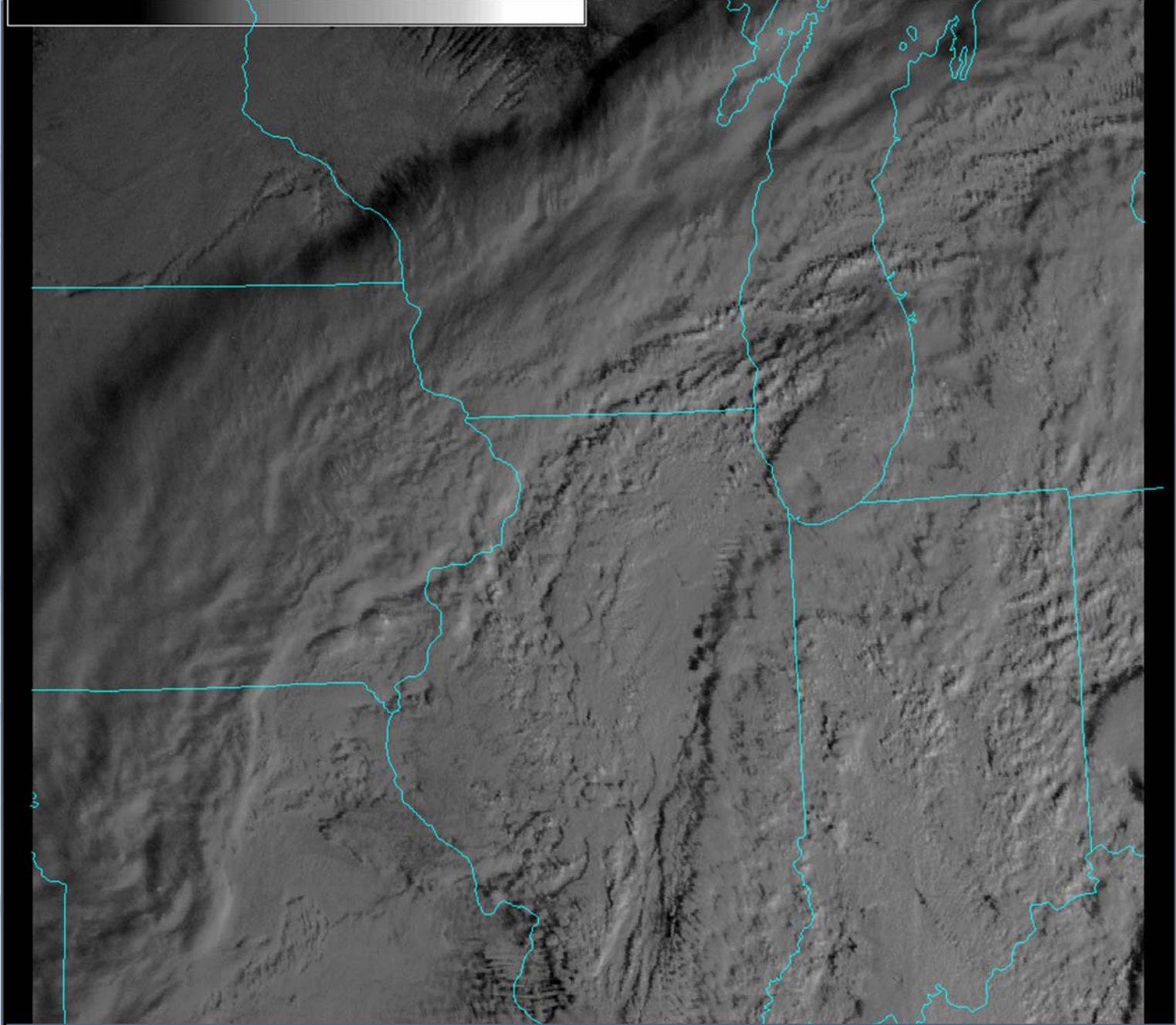
18Z RUC (Feb 06) 00-hr fcst cross section of theta-e



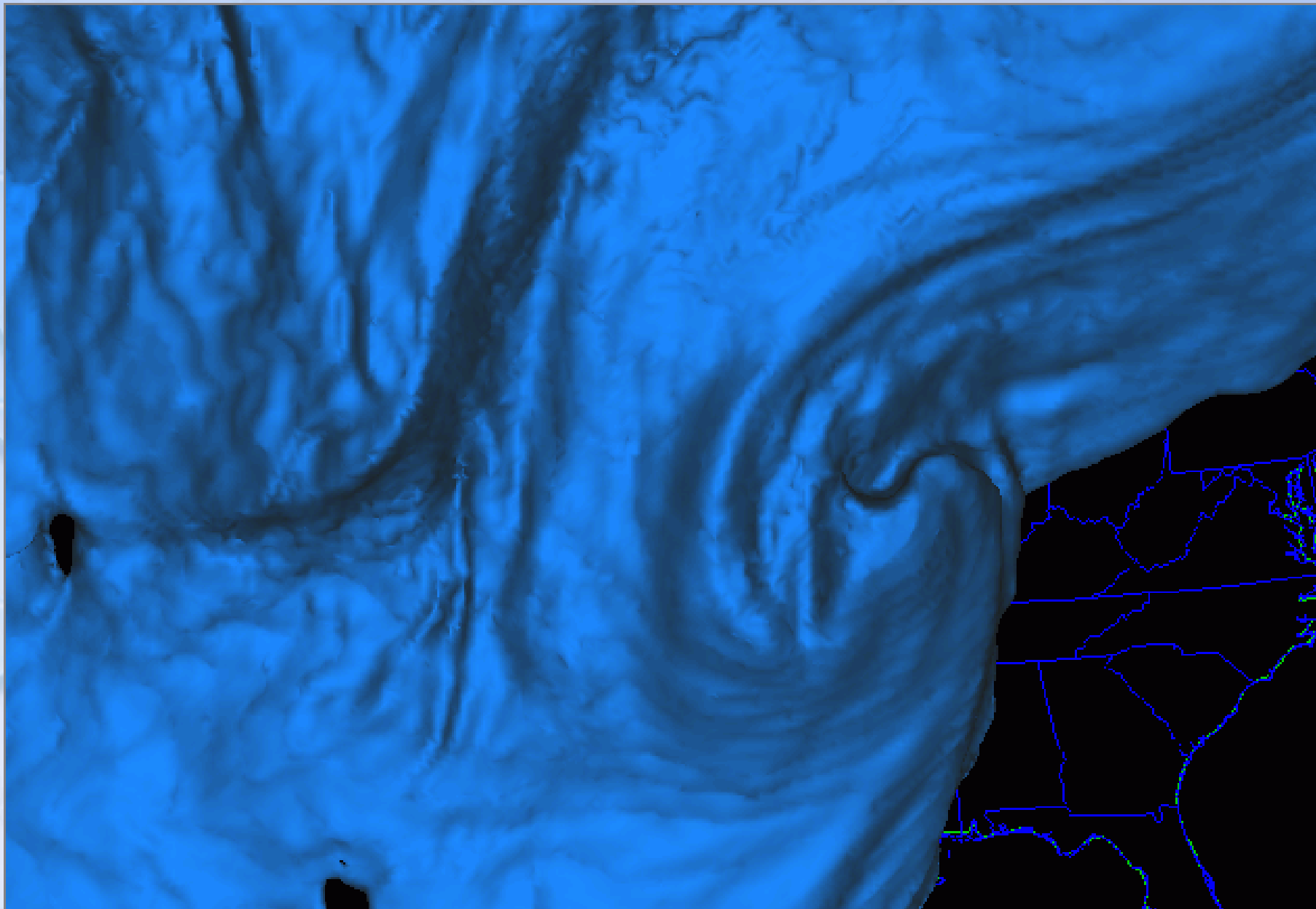
IR Satellite loop ~ 14Z-19Z Feb06



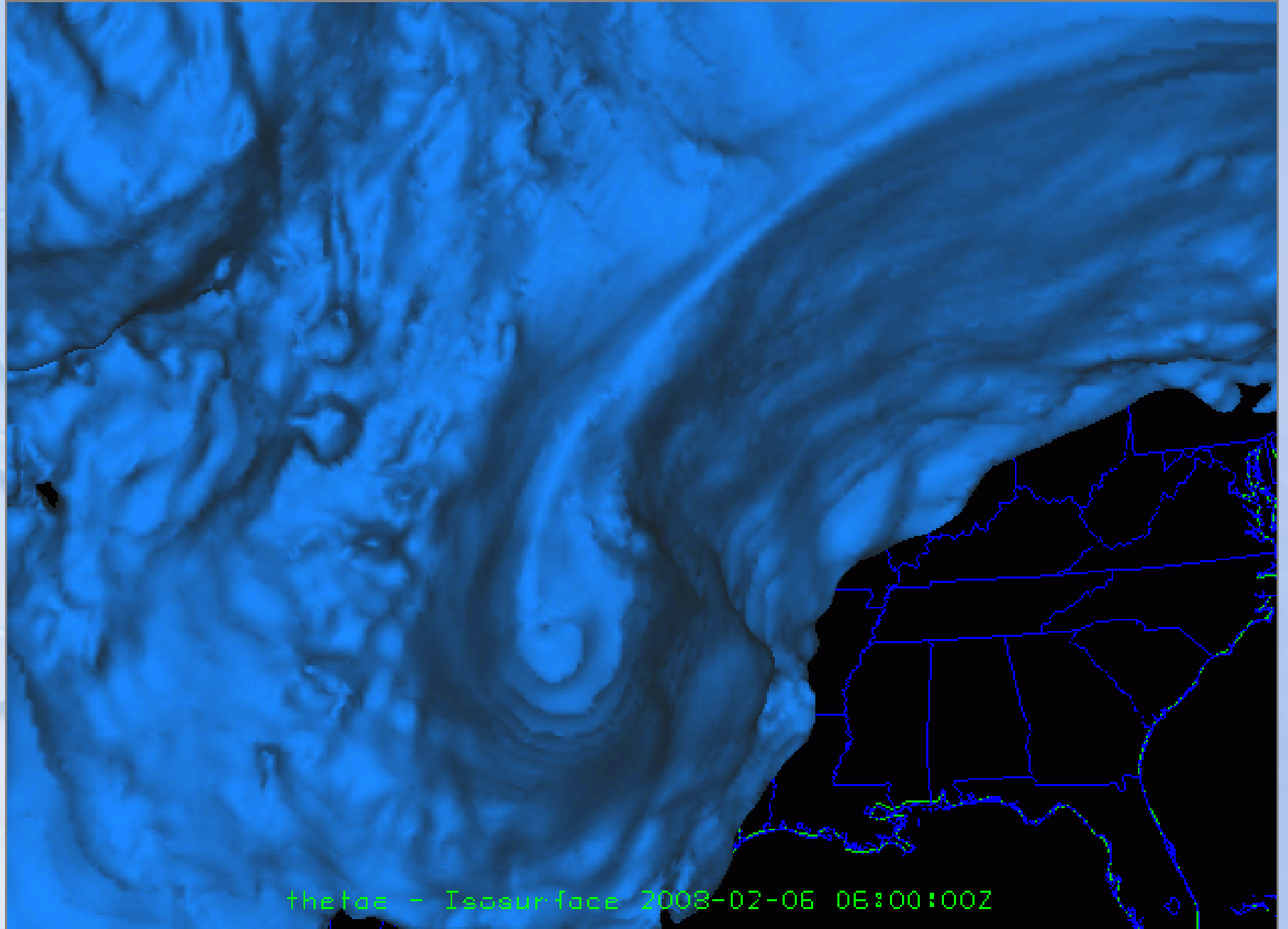
IR Satellite/18Z RUC (Feb 06) 00-hr fcst of press. on 305K theta-e sfc



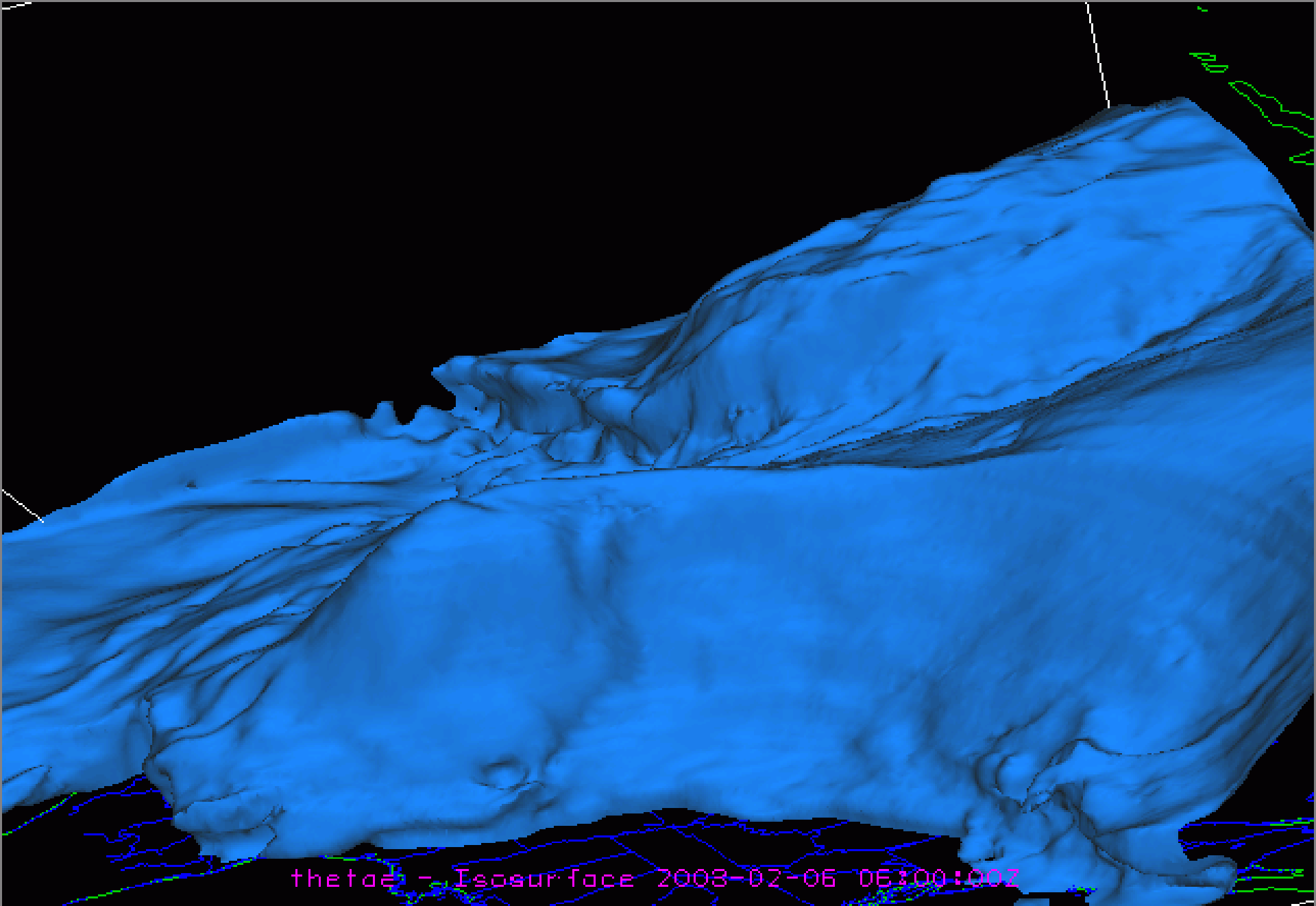
15Z -19Z (Feb 06) Visible Satellite Imagery



06Z RUC 12-hr fcst (valid 18Z Feb 06) of the 304K theta-e isosurface

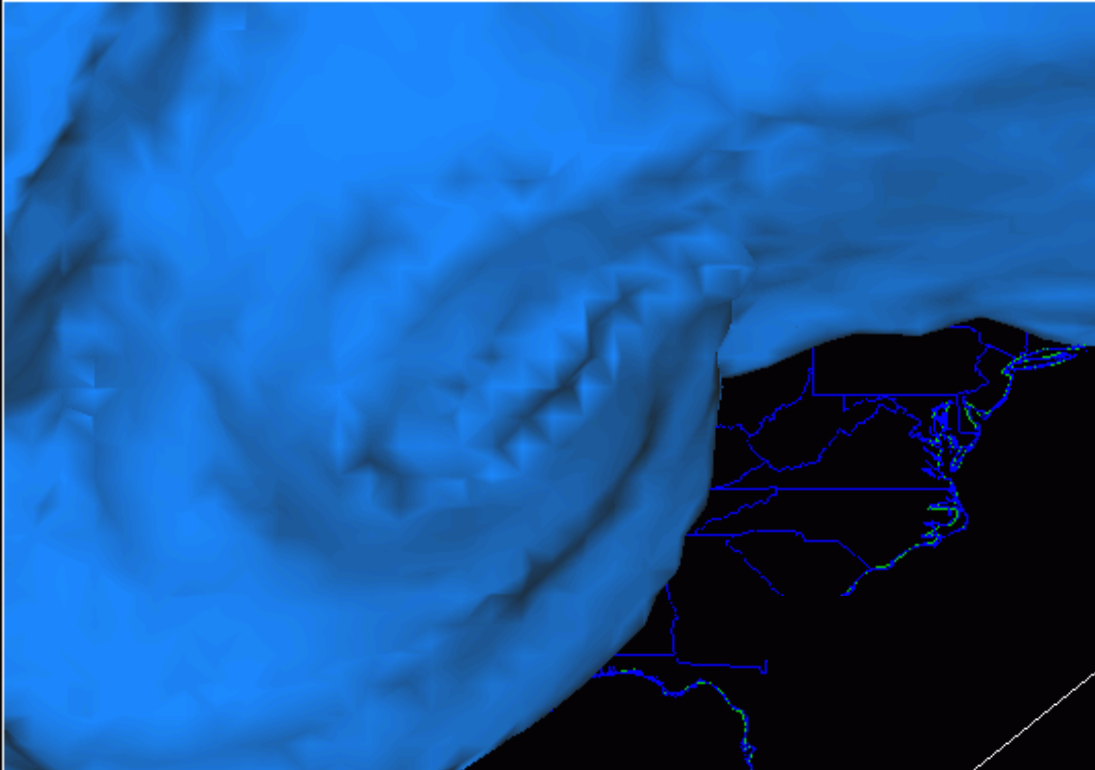


06Z RUC fcst (valid 06Z-18Z Feb06) of the 304K theta-e isosurface



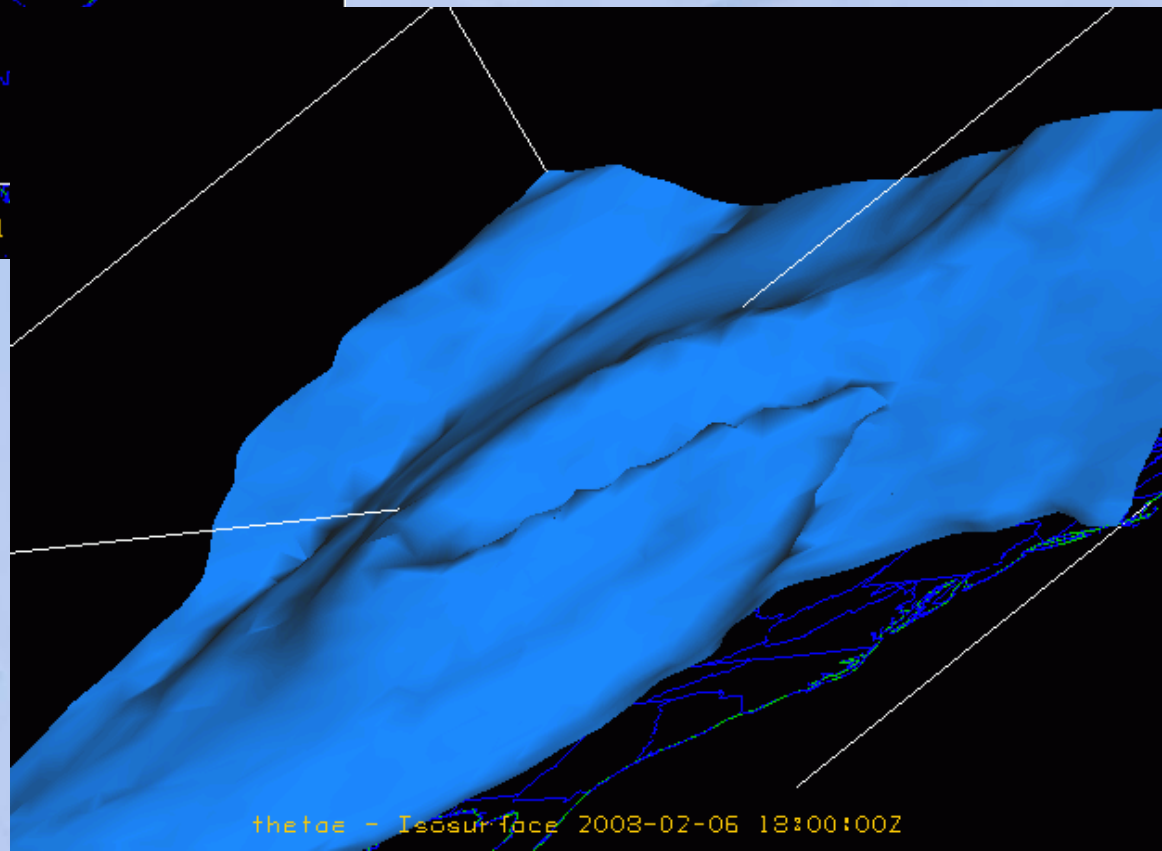
theta_e - Isosurface 2008-02-06 06:00:00Z

06Z RUC fcst (valid 06Z-18Z Feb06) of the 304K theta-e isosurface

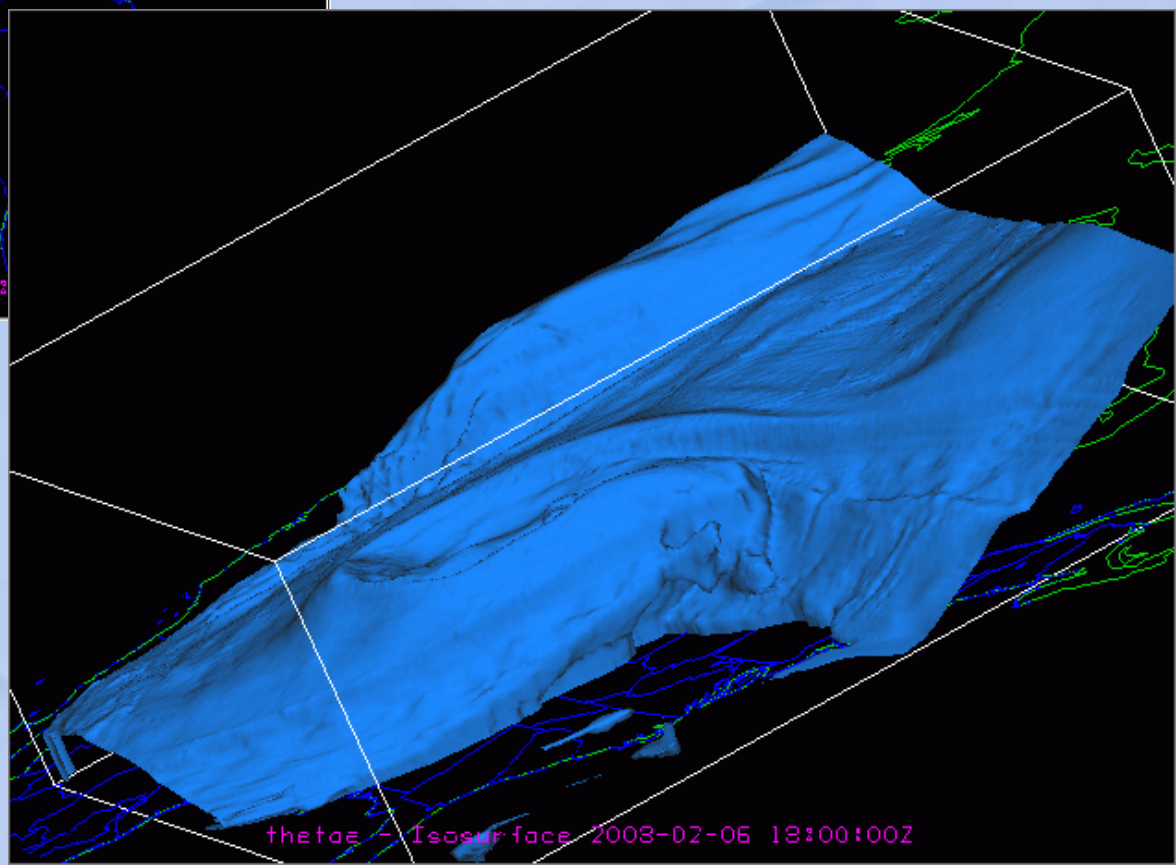
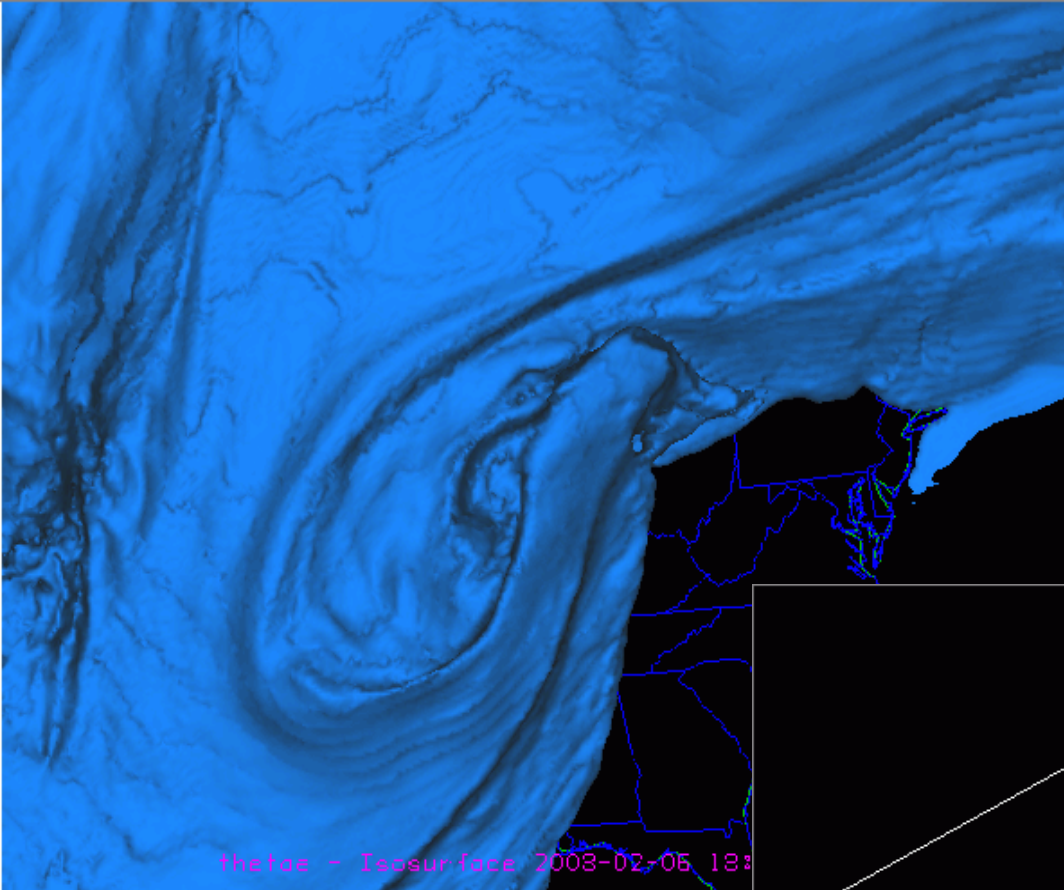


thetae - Isosurface 2008-02-06 1

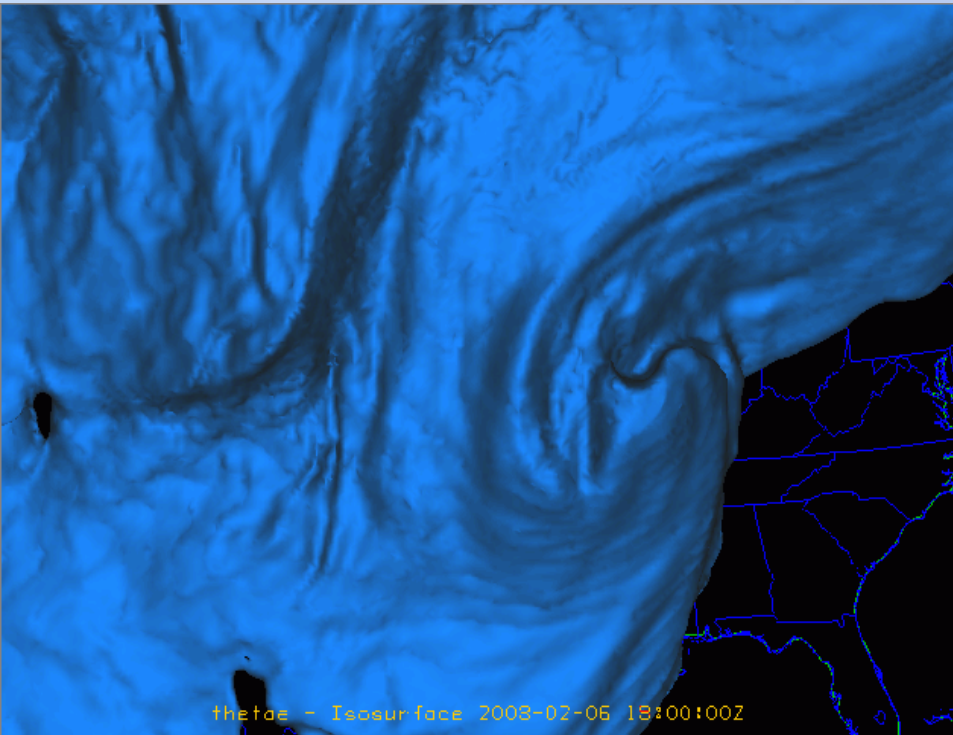
**12Z GFS 36-hr fcst
(valid 18Z Feb06)
304K theta-e isosurface**



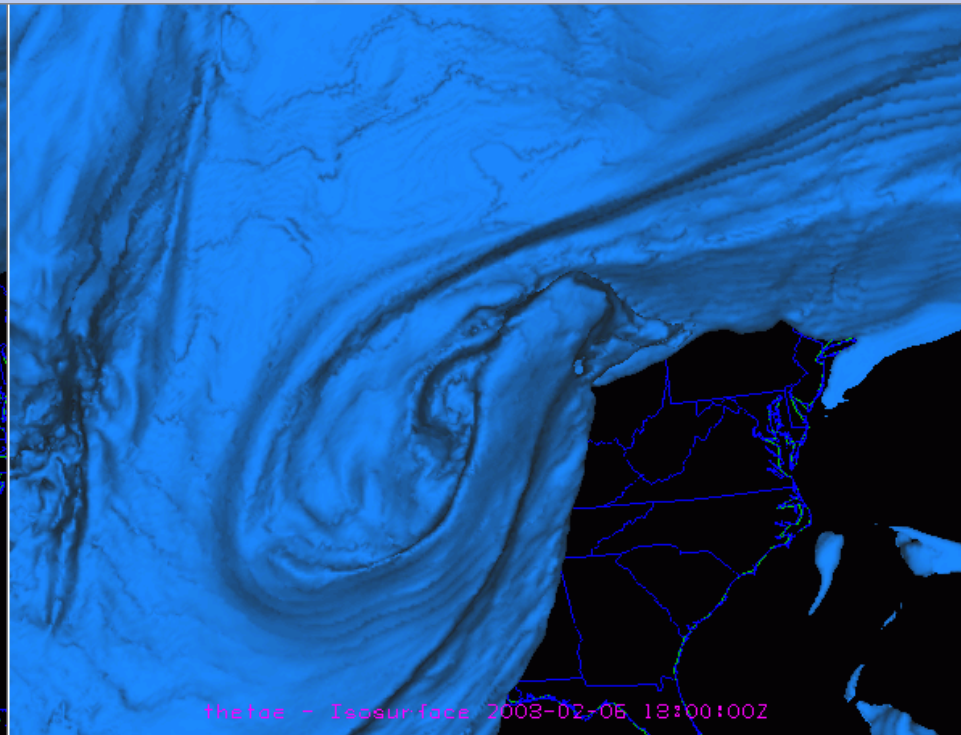
thetae - Isosurface 2008-02-06 18:00:00Z



**12Z NAM 36-hr fcst
(valid 18Z Feb06)
304K theta-e isosurface**

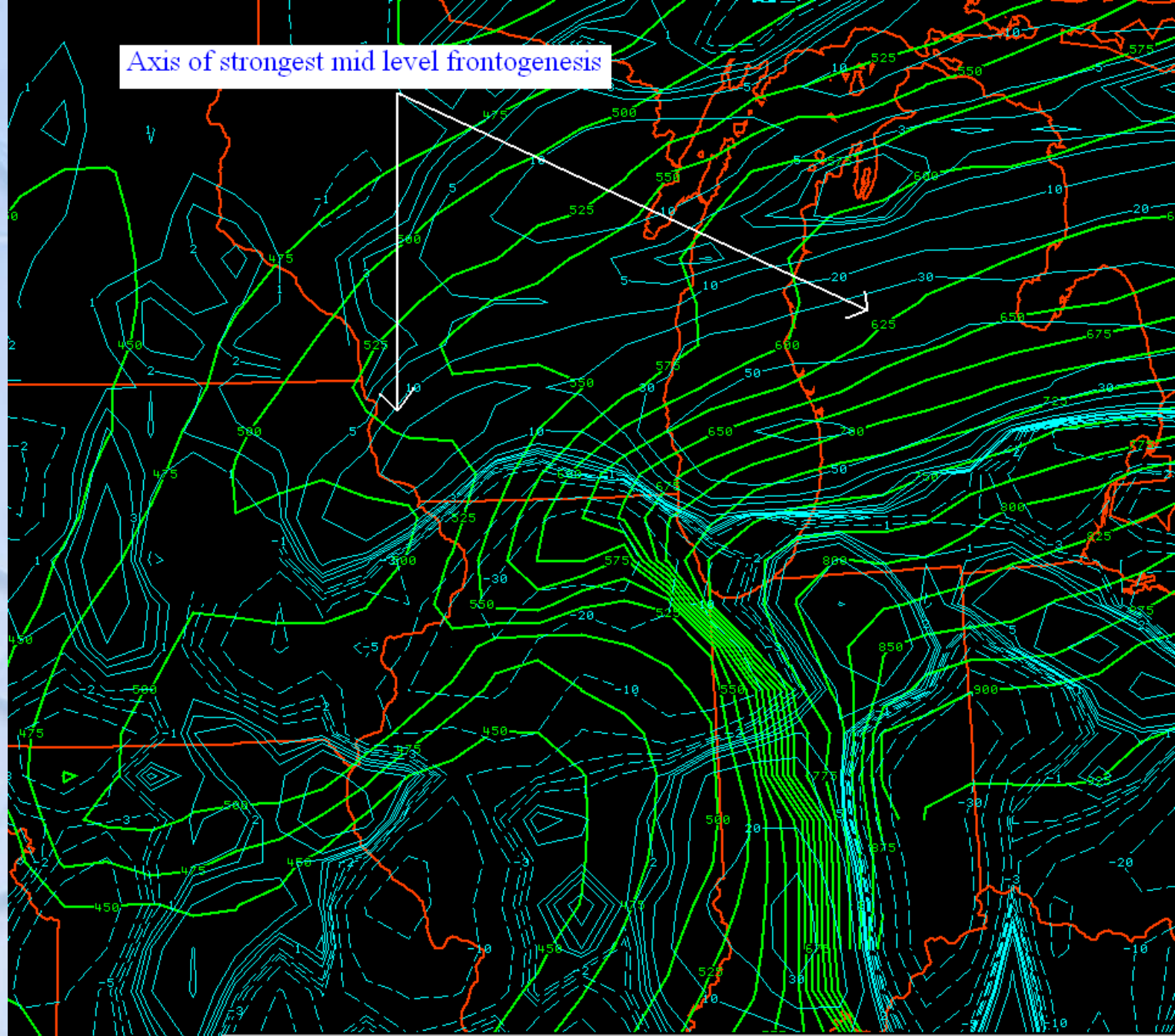


**06Z RUC 12-hr fcst (valid 18Z Feb06)
304K theta-e isosurface**

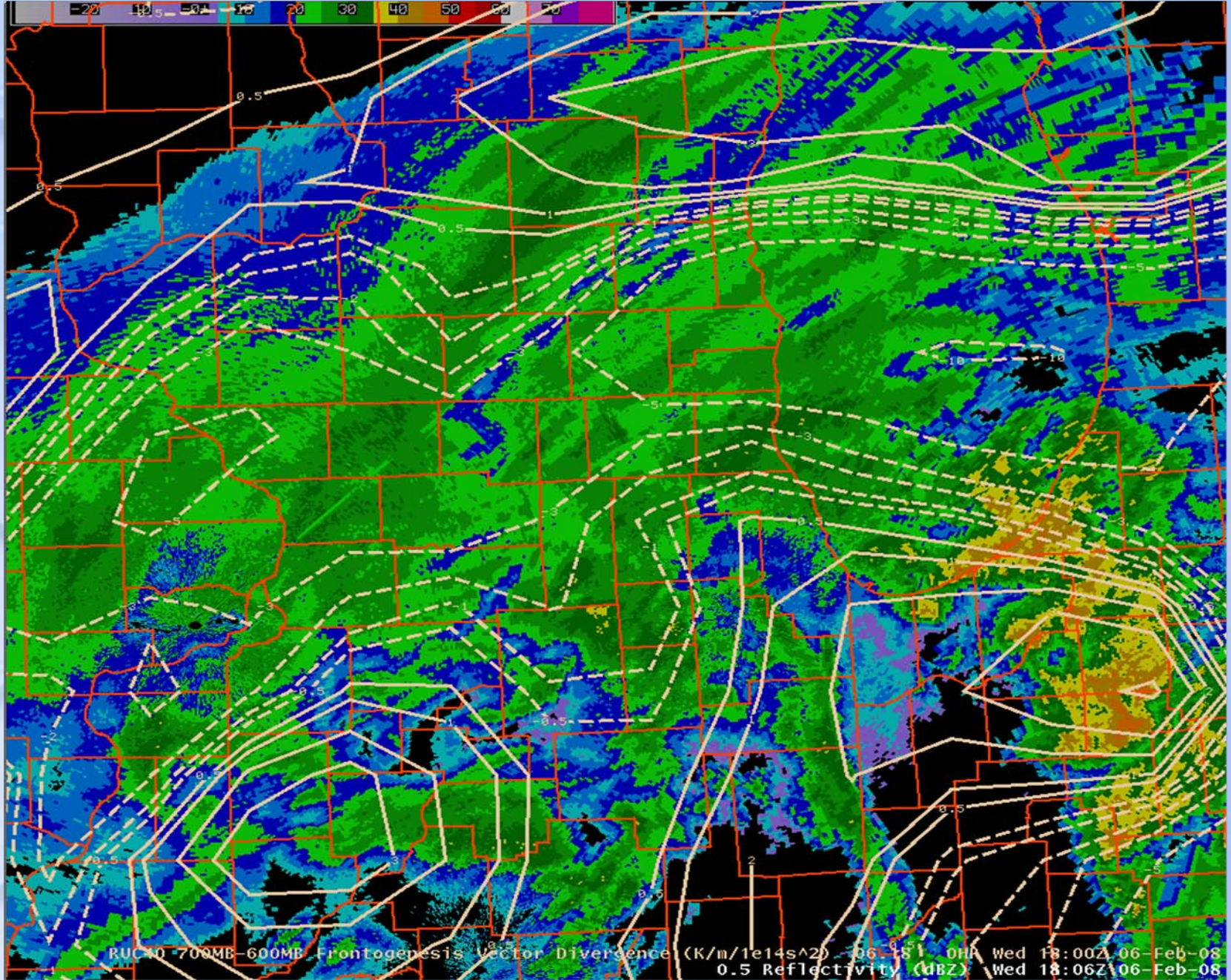


**12Z NAM 36-hr fcst (valid 18Z Feb06)
304K theta-e isosurface**

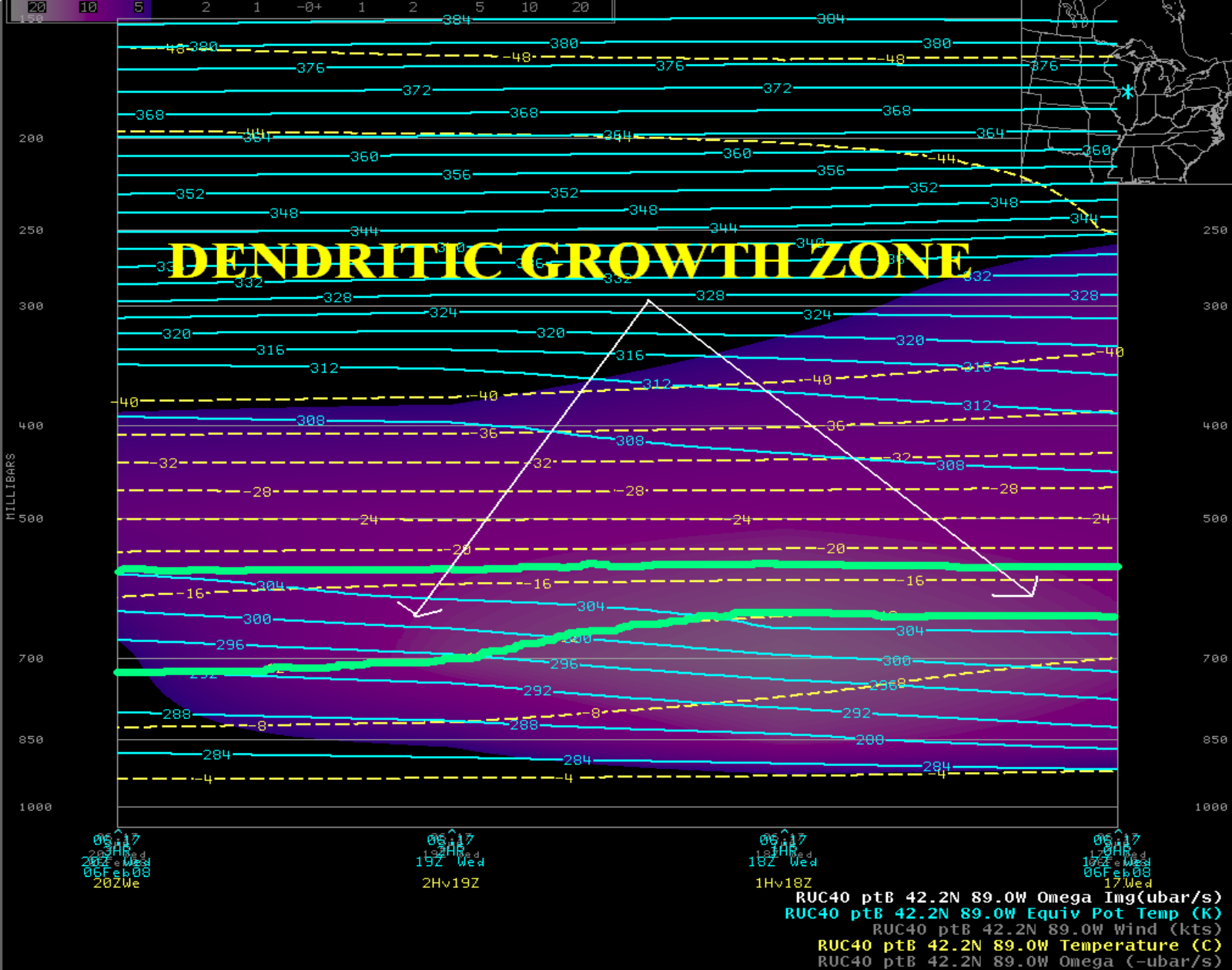
Axis of strongest mid level frontogenesis



18Z RUC 0HR fcst (700 hpa frntgen. (cyan) and 305K theta-e

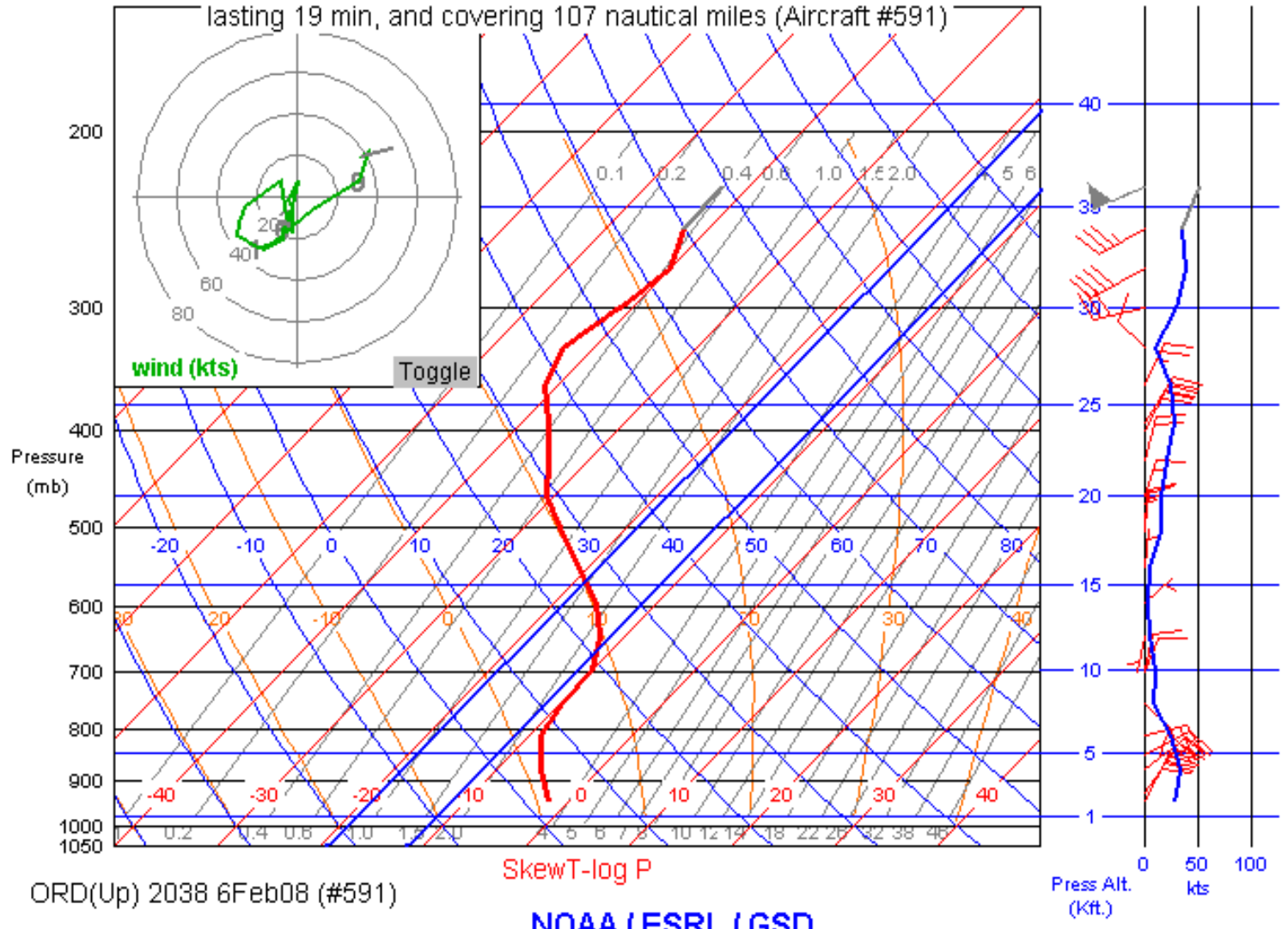


0.5 base reflec. and 18Z RUC fcst of 700-600 hPa F vector dvg. (18Z-00Z Feb 06)



17Z RUC Feb06 fcst omega at RFD(color filled), theta-e (blue), and temp. (orange)

Ascent sounding toward 262° from Chicago/Ohare, IL (ORD)
lasting 19 min, and covering 107 nautical miles (Aircraft #591)



ORD(U) 2038 6Feb08 (#591)

SkewT-log P

NOAA / ESRL / GSD

Press Alt. (Kft.)
0 50 100
kts

Ascent sounding from ORD approx 2030Z Feb 06

SUMMARY

- Models significantly underestimate strength of vort max lifting out of the southern Plains
- TROWAL feature not captured by the 12Z Feb 05 models, thus synoptic forcing was significantly weaker with no TROWAL development in 12Z Feb 05 model runs
- Factors influencing heavy snowfall Feb 06
 - Ascent in the TROWAL airstream. TROWAL not nearly as pronounced in model data the day preceding the event. Synoptic forcing (Qs convg) underdone in previous data model data
 - Decreased stability associated with TROWAL airstream likely enhanced response to frontogenetic forcing
 - Dendritic snow growth zone located just above max mid level frontogenesis

SUMMARY

- 18Z RUC forecast of mid level F vector divergence does respectable job indicating evolution of forcing after TROWAL formation ---- NOWCAST utility?
- Visualization of model data coming to AWIPS in near future will make it easier for forecasters to recognize these important features operationally in a more timely manner.