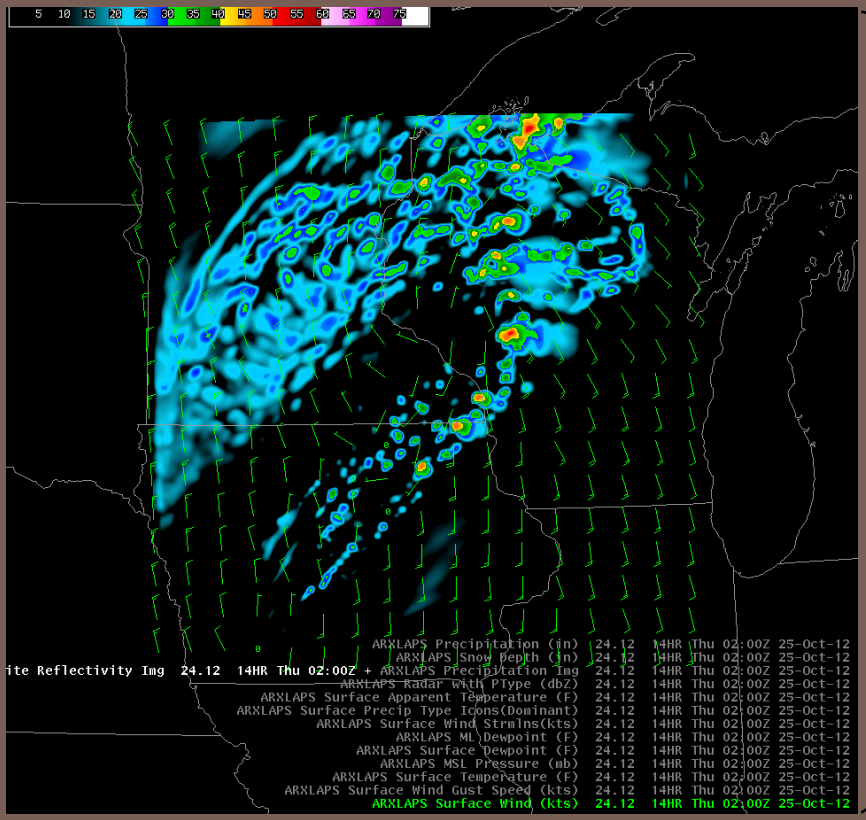
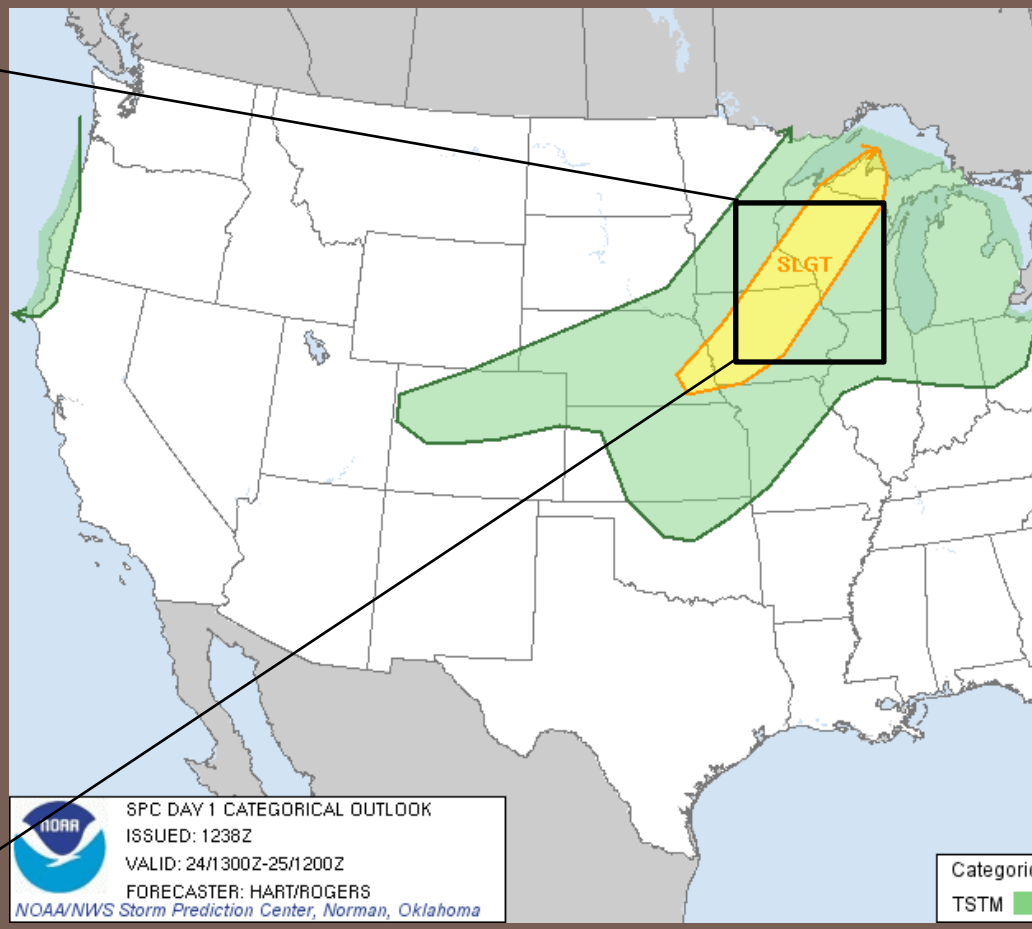




USE OF LAPS AT THE NWS LA CROSSE

NOAA/NWS/La Crosse

Dan Baumgardt and Matt Davis

Top Uses For LAPS

- Convective environment assessment
- Hot Start for 15h run of Hi-res WRF model

75%

- Winter environment assessment
- Verification “truth” background contribution

Convective environment assessment

- NST Environment Parameter (Baumgardt and Cook, SLS2006):

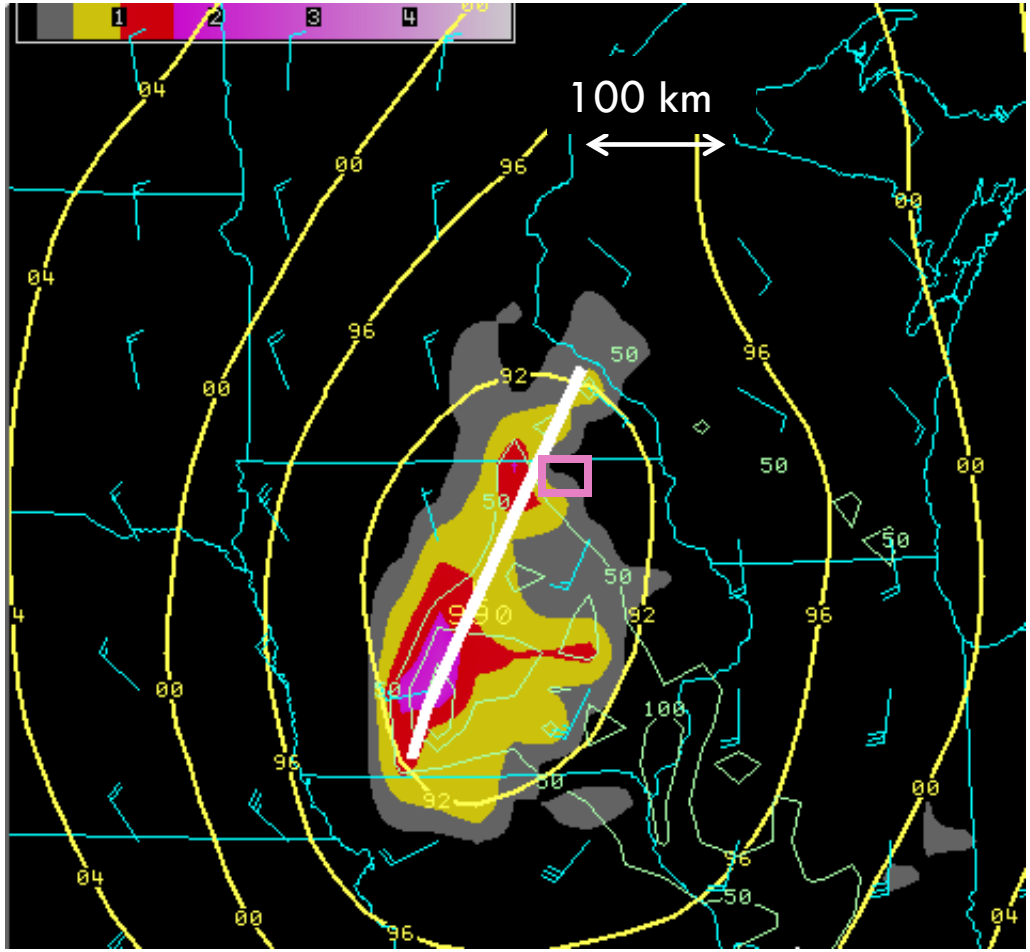
$$= \frac{\text{0-1km AGL Lapse Rate}}{\text{9 C/km}} \bullet \frac{\text{0-3km MLCAPE}}{\text{100J/Kg}} \bullet \frac{\text{(225 - MLCIN)}}{\text{200}} \bullet \frac{\text{(18 - BlkShr 0-6km)}}{\text{5}} \bullet \frac{\text{Sfc Relative Vorticity}}{\text{8 /1e5s}}$$

0-1km Lapse Rate > 9C **0-3km MLCAPE > 100 J/Kg** **MLCIN < 25 J/Kg**	Vertical vorticity stretching
0-6km Bulk Shear < 13 m/s	Lower organizational wind shear
Surface Relative Vorticity > 8 /1e5s	Surrogate to misocyclone activity

- **NST >= 1 provides increasing non-mesocyclone tornado threat.**
- **Applied to a stationary boundary (or nearly stationary) with a wind shift present.**

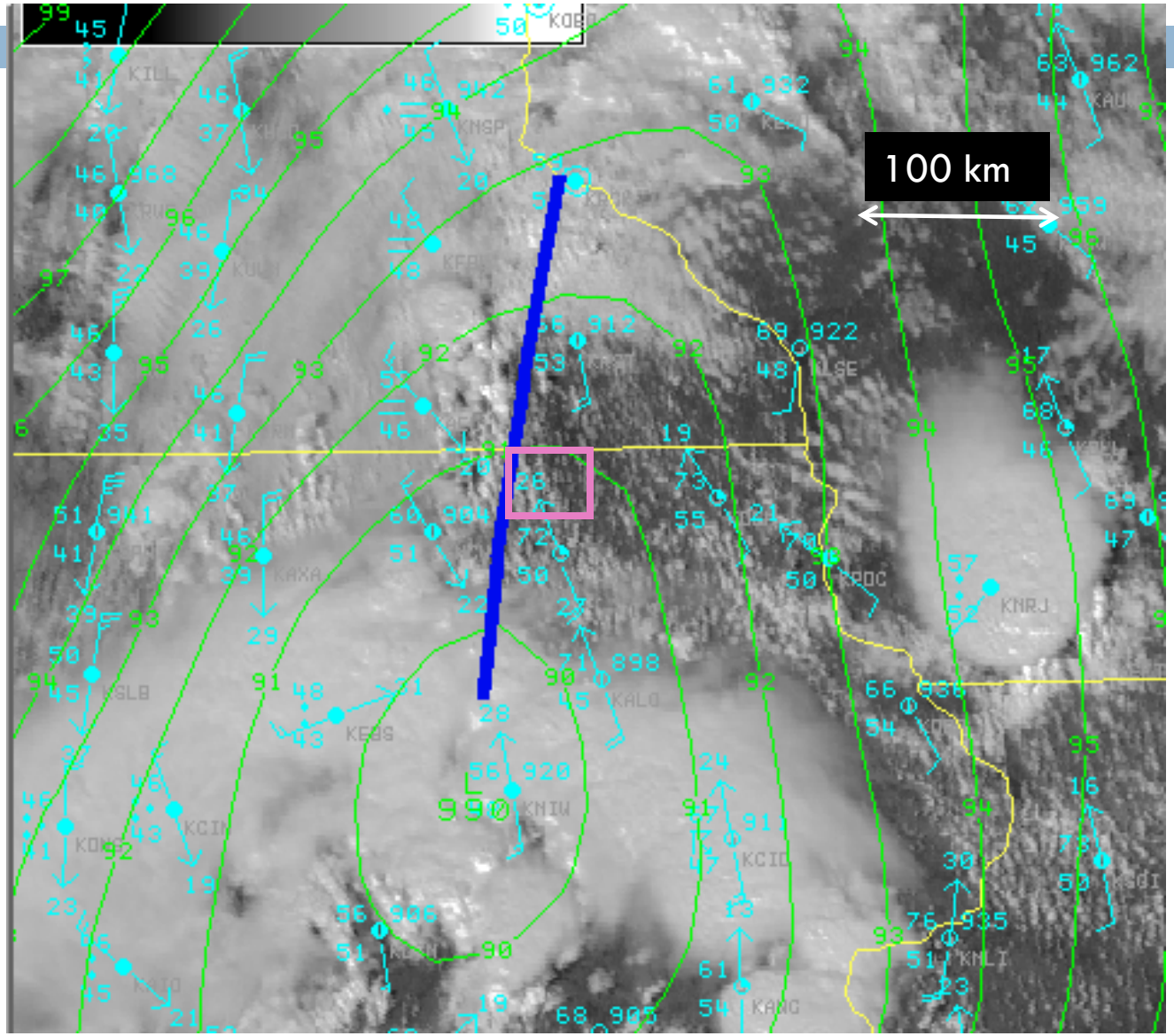
30 March 2005: NST Parameter

- 15Z RUC 40km grid 6 hour forecast valid 21Z.

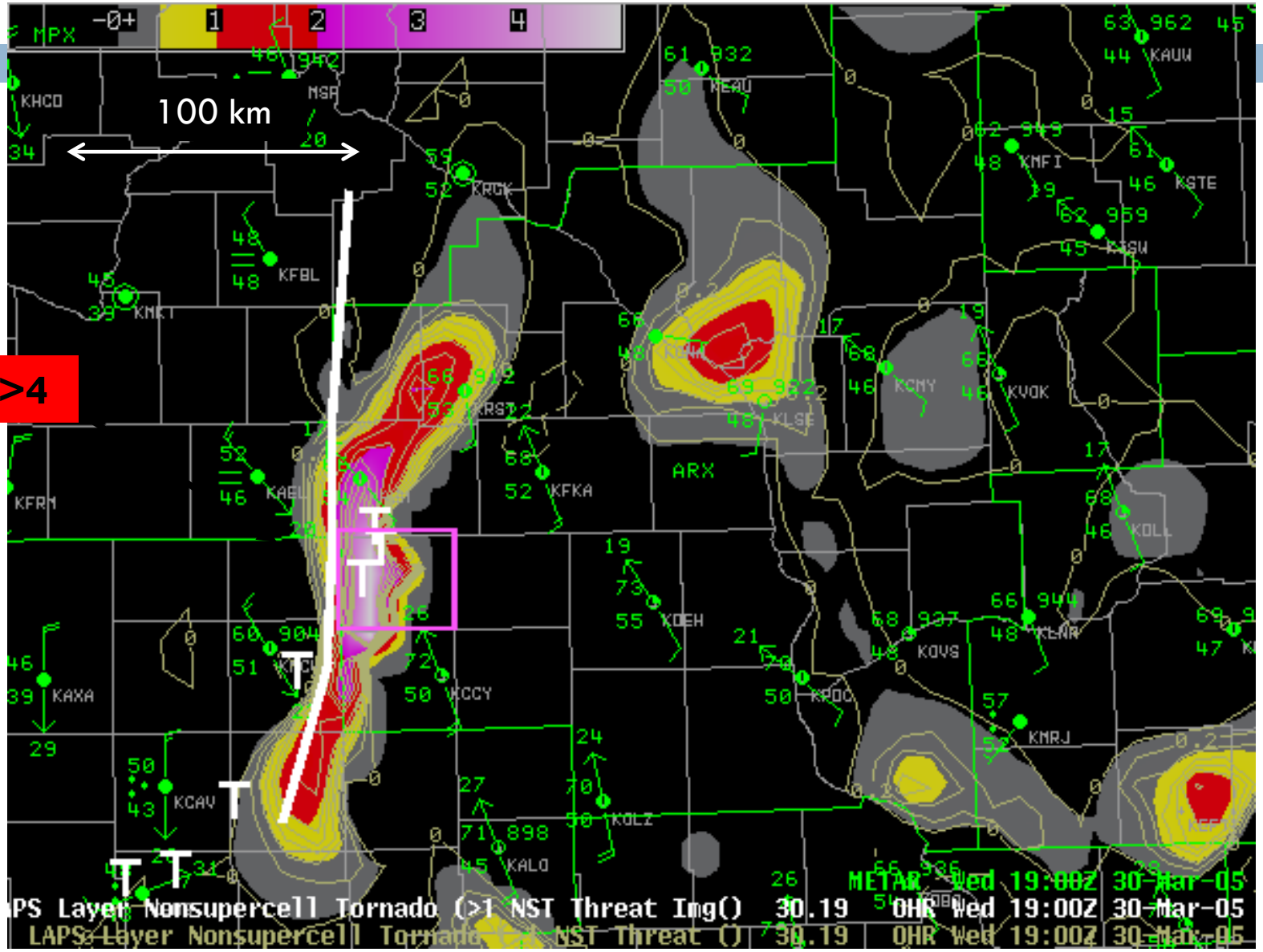


- NST >= 1 Red, Purple.

1855Z 30 March 2005: GOES Visible

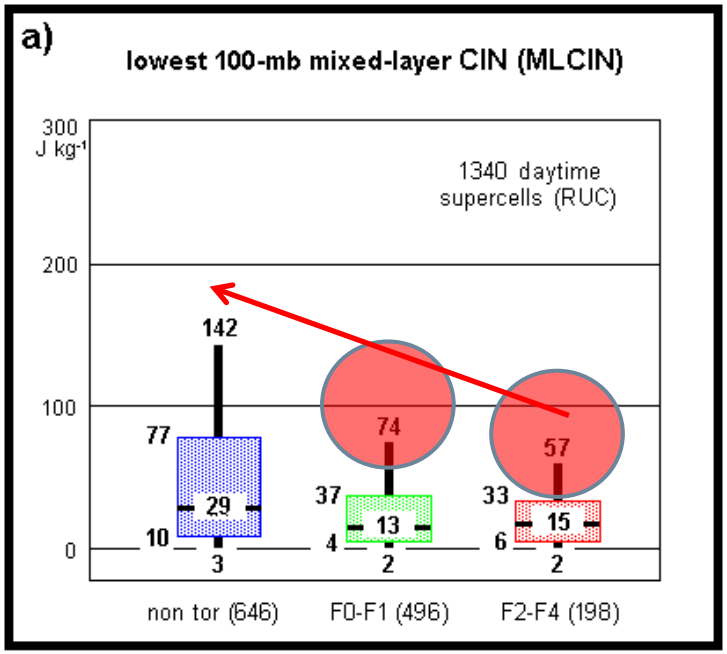


19Z 30 March 2005: NST Parameter



Convective Environment

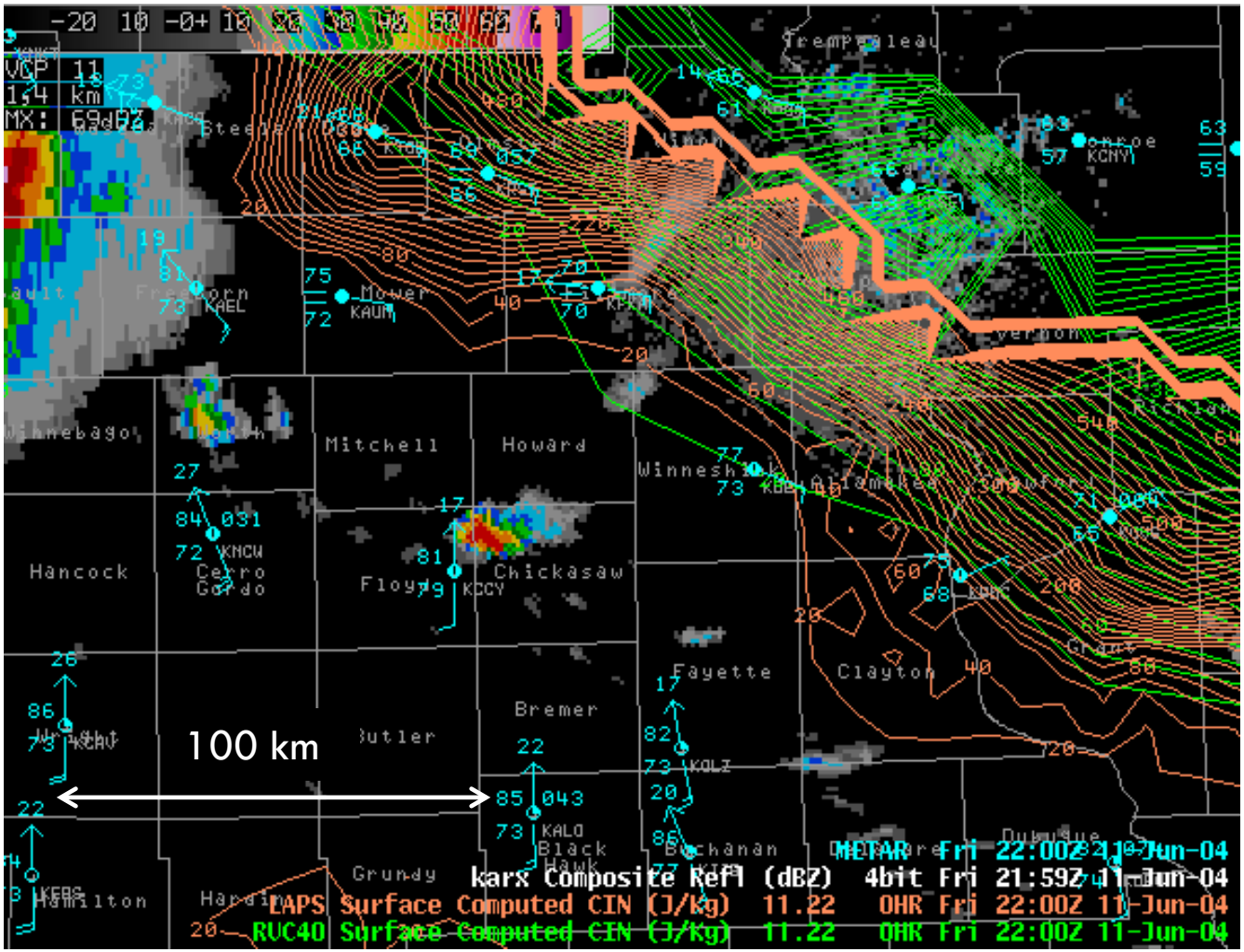
- Convective inhibition one key to reducing tornado warning false alarms



From Jon Davies
NWA E-Journal 2009

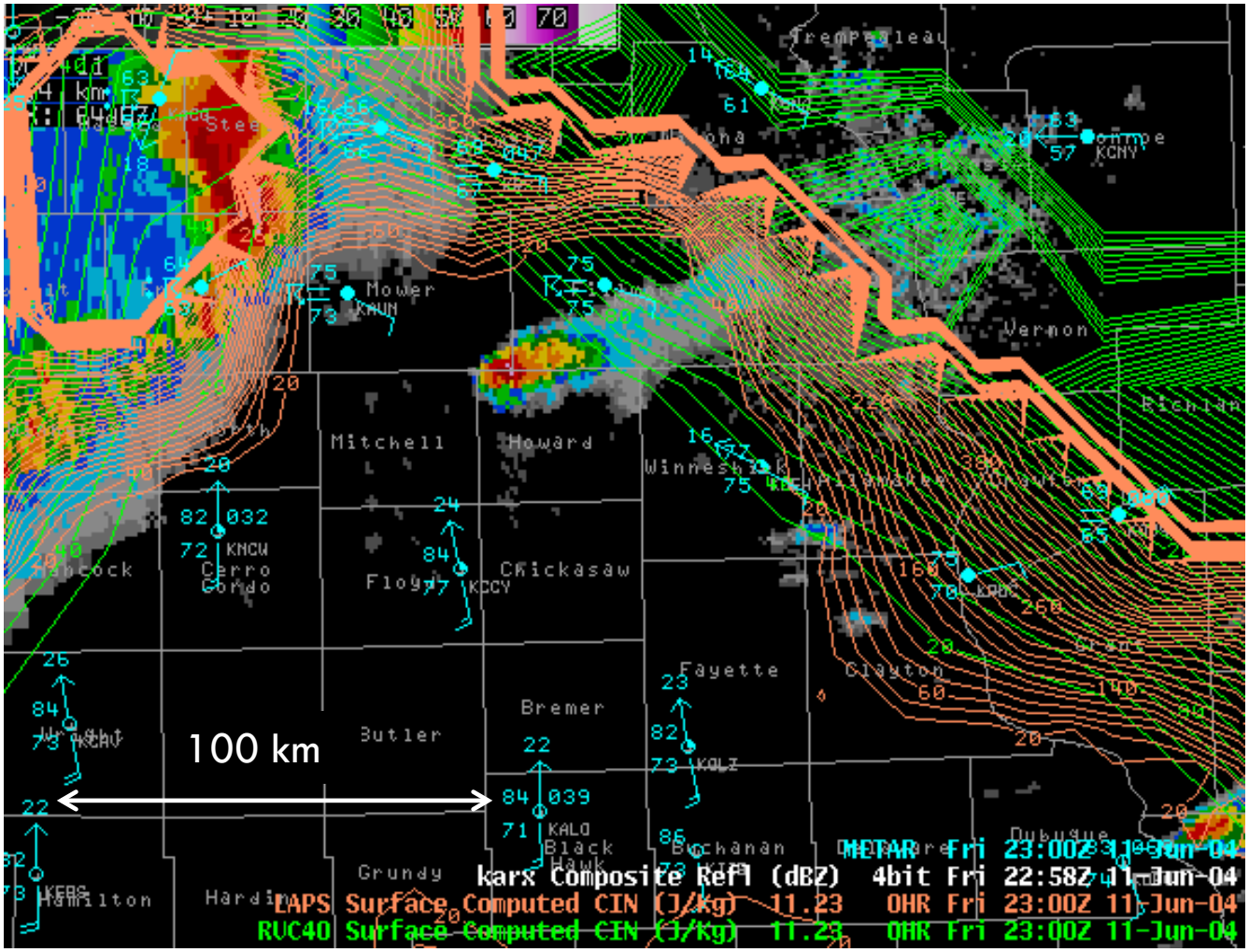
Convective Environment

- 22Z



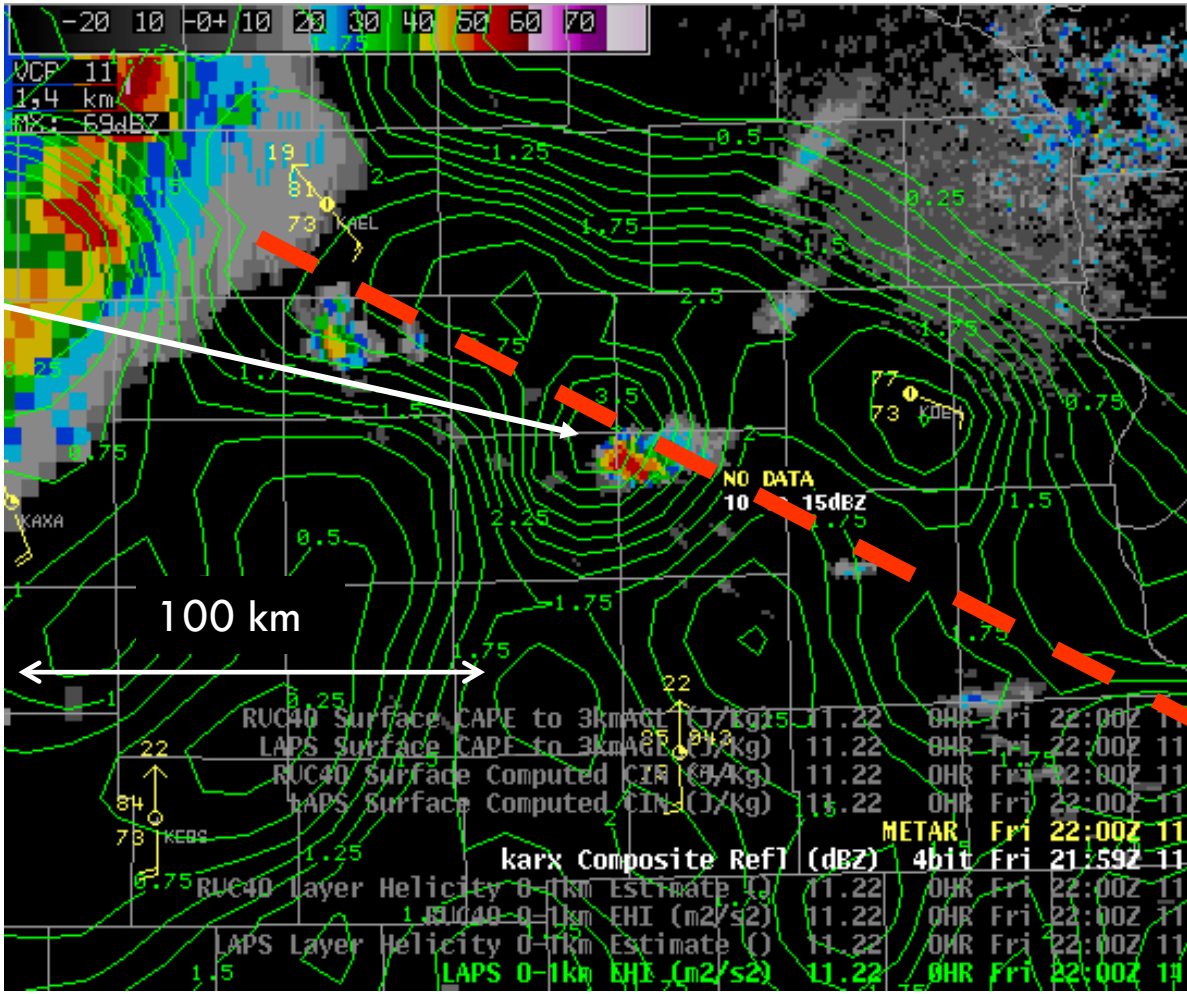
Convective Environment

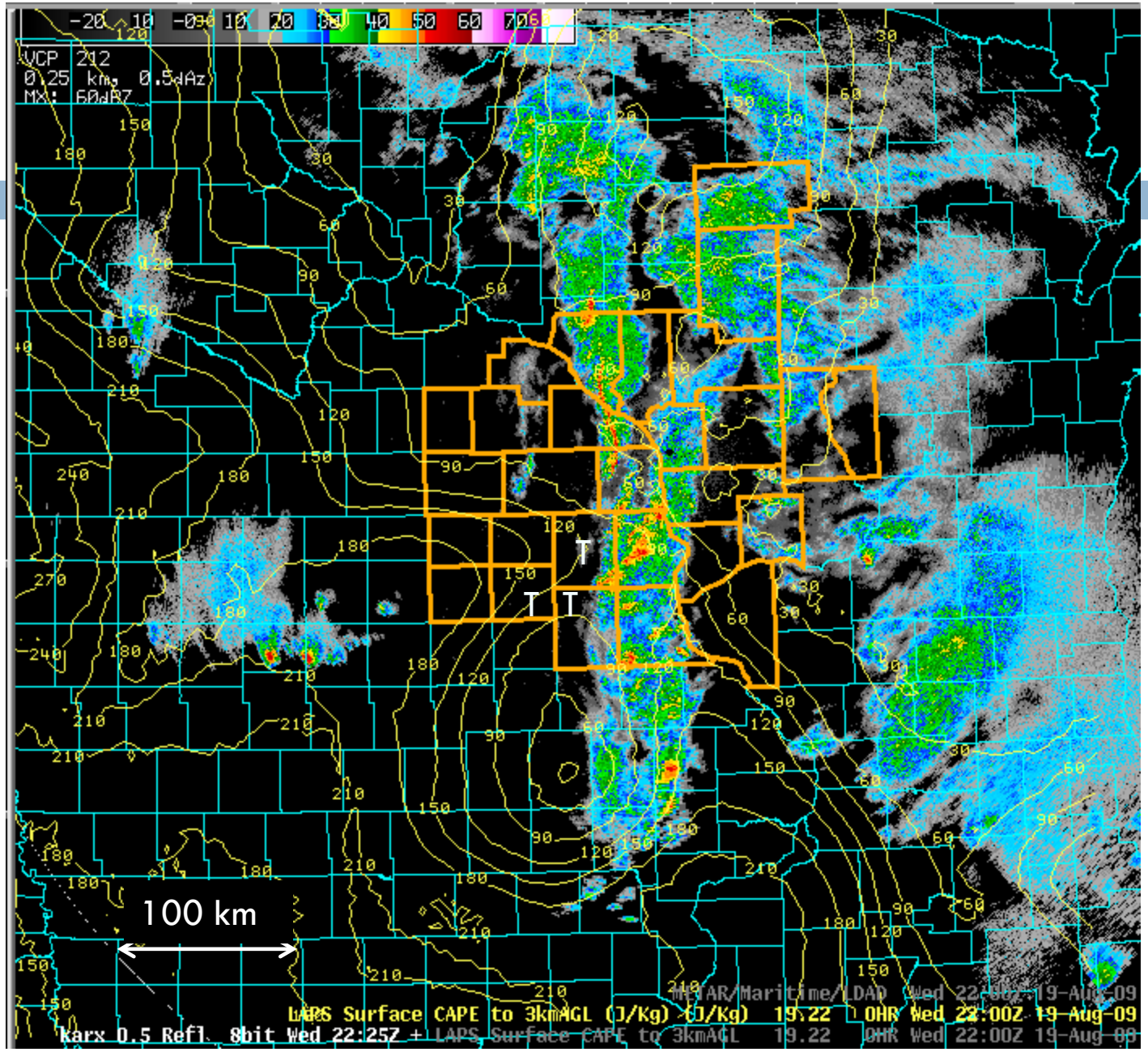
- 23Z



Convective Environment

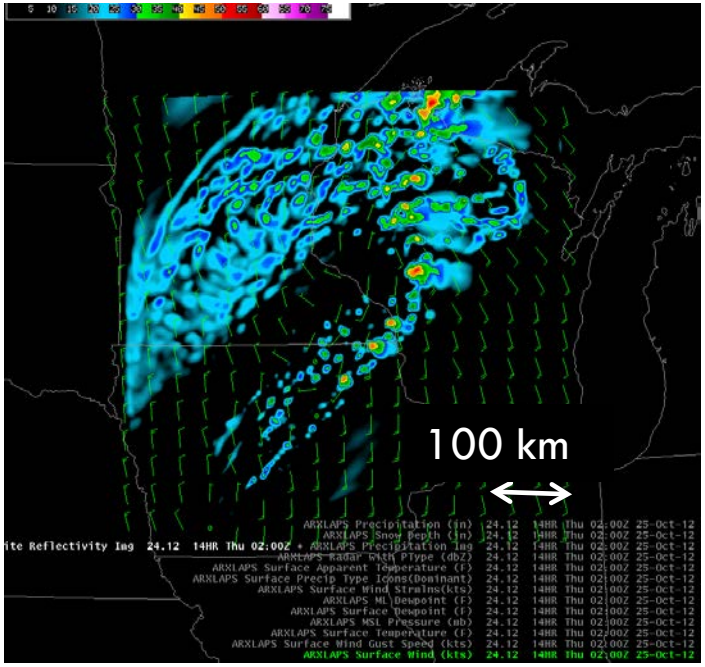
- F3 in the LAPS 0-1km EHI maximum bulls eye.




VCP 212
0.25 km, 0.5dAz
MXU 60dBZ
100 km
LAPS Surface CAPE to 3kmAGL (J/Kg) (J/Kg) 19.22 0HR Wed 22:00Z 19-Aug-09
Karx 0.5 Refl 8bit Wed 22:25Z + LAPS Surface CAPE to 3kmAGL 19.22 0HR Wed 22:00Z 19-Aug-09

ARXWRF Defined

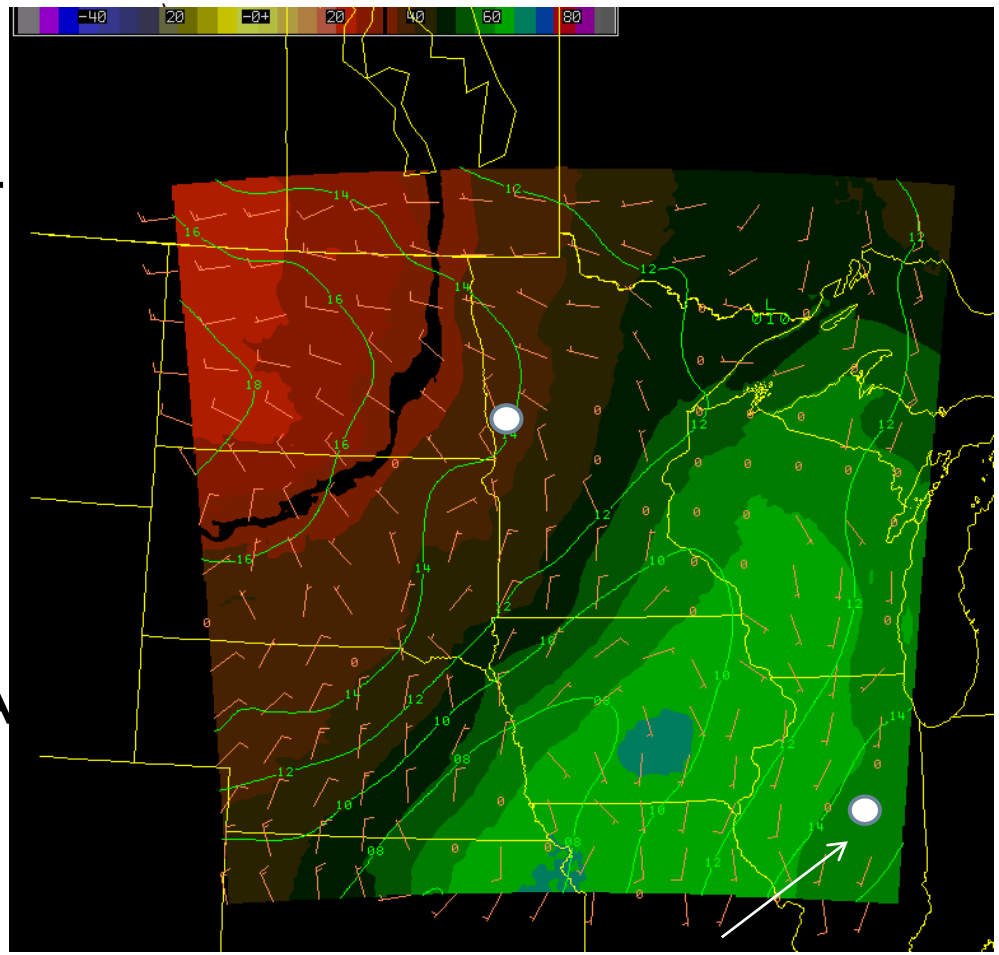
- Domain: Inside LAPS domain
- Initialization: LAPS Hot Start
- Boundary: NCEP NAM NMM
- Vertical levels: 35
- Horizontal grid spacing: 3.8 km
- Microphysics Parm: Thompson
- Convective Parm: None
- Run times: Every 2 hours, to 15 hour forecast
- Available: t + 1.5h



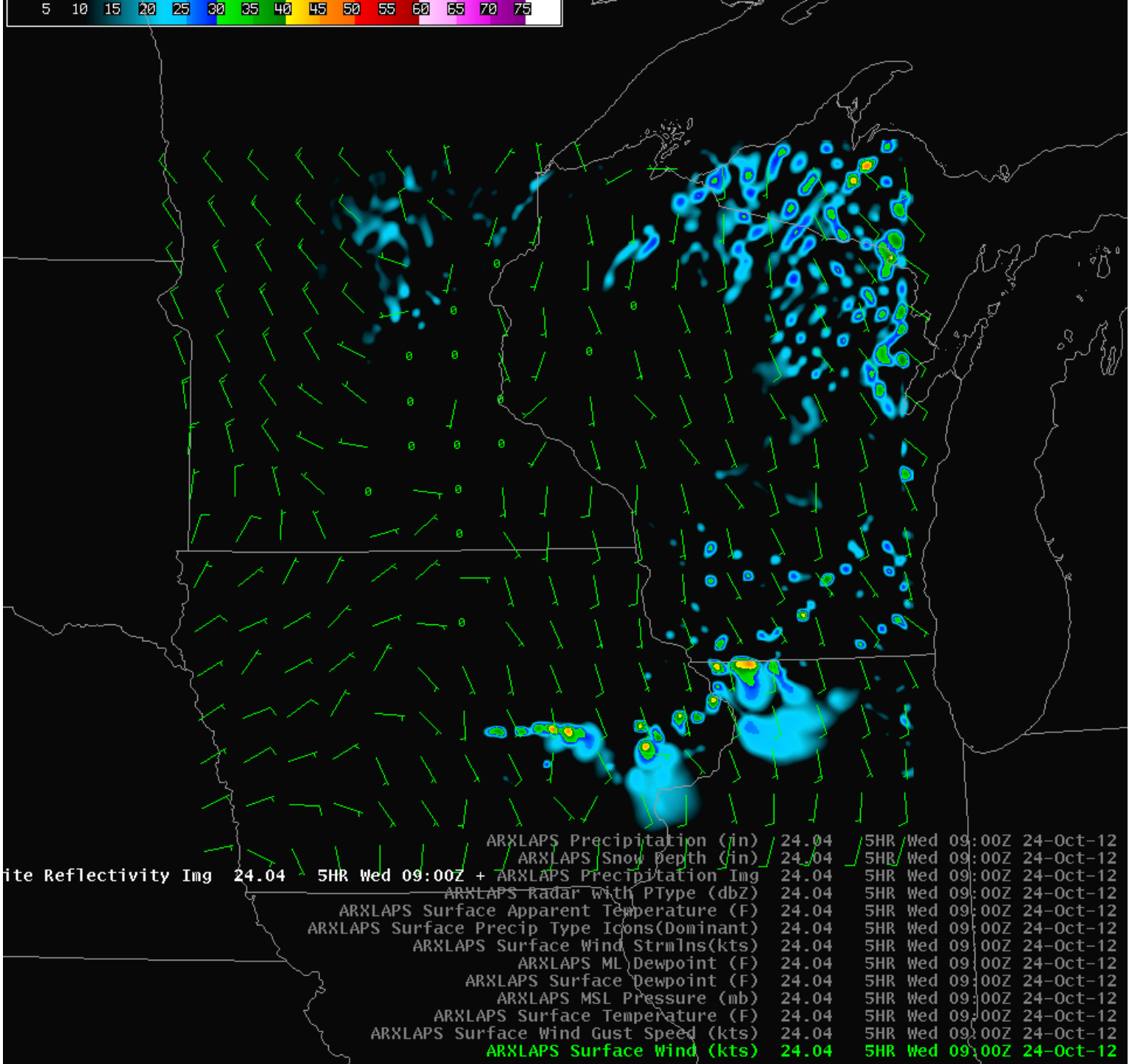
ARXWRF Defined

- LAPS Domain
- WRF uses LAPS Hot Start
- 40 vertical levels
- 5km horizontal resolution
- 21 radars ingested

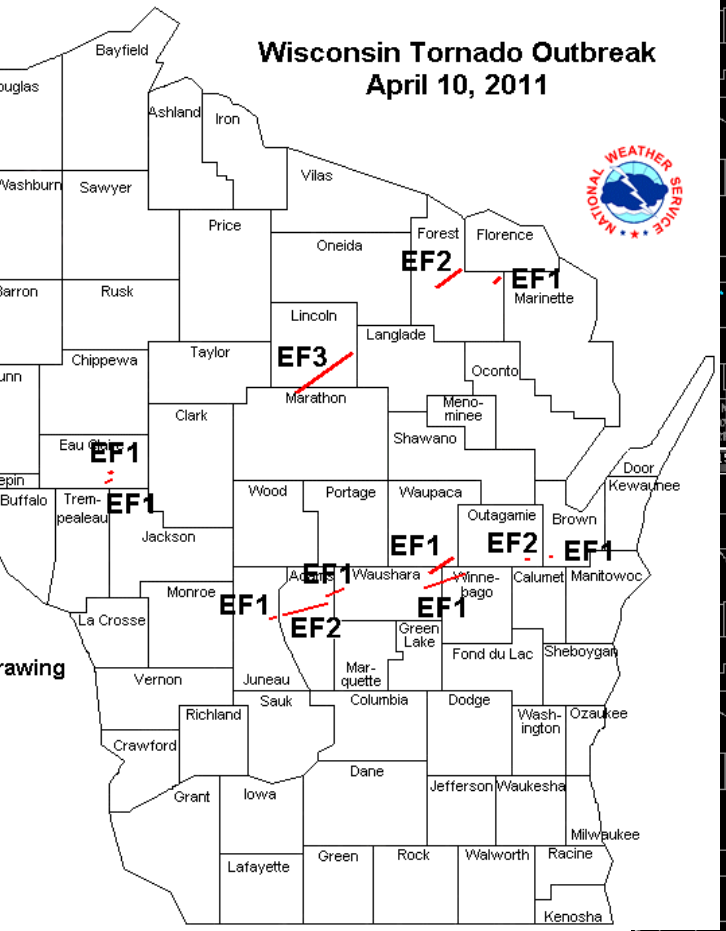
- Issues: TSRA inits as SHRA
  - Need raw hydrometeor mixing ratio output from LAPS?

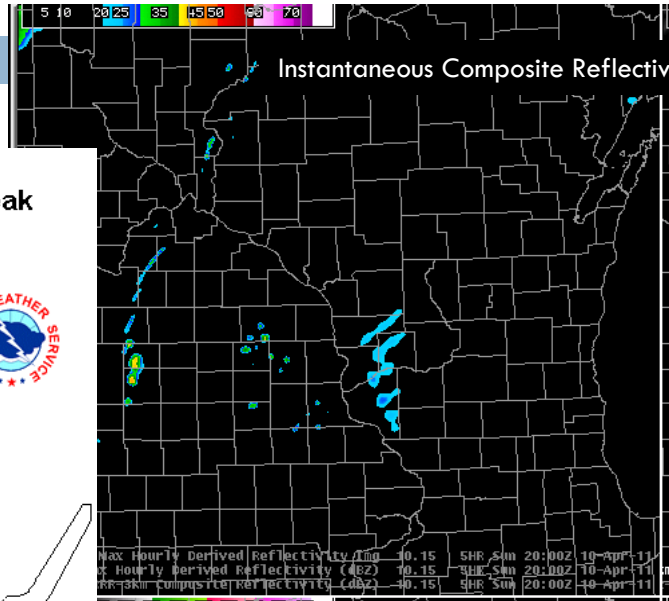


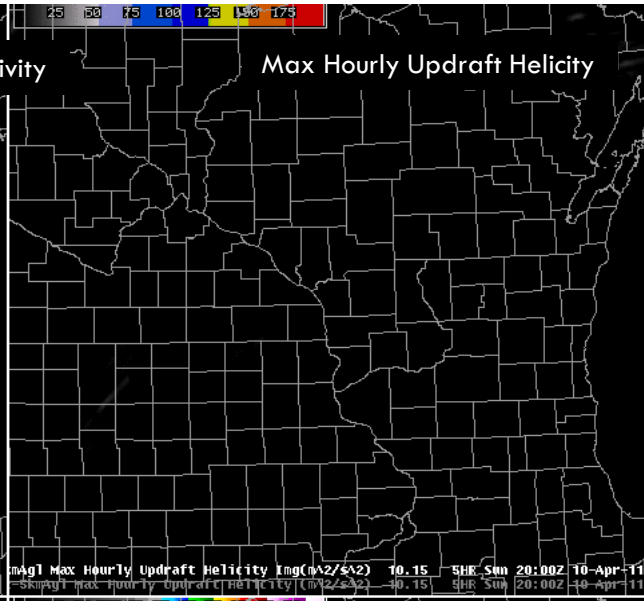
WRF domain corners

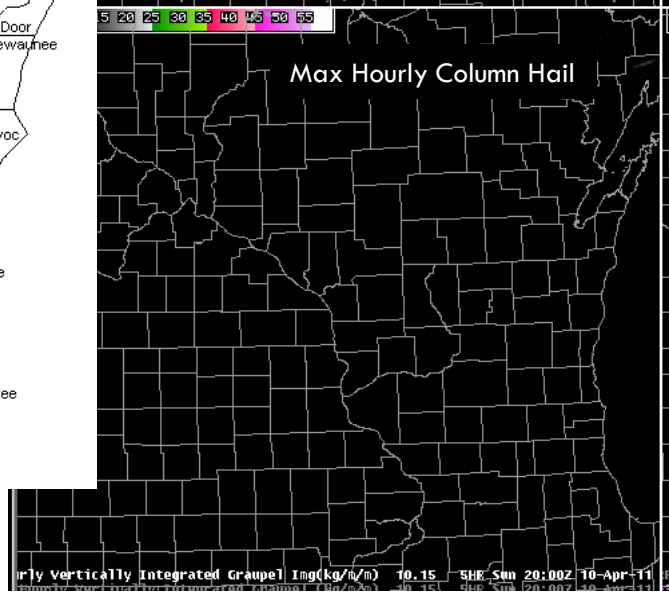

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
ite Reflectivity Img 24.04 5HR Wed 09:00Z + ARXLAPS Precipitation Img 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Precipitation (in) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Snow Depth (in) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Radar with PType (dbZ) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Apparent Temperature (F) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Precip Type Icons(Dominant) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Wind Strmlns(kts) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS ML Dewpoint (F) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Dewpoint (F) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS MSL Pressure (mb) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Temperature (F) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Wind Gust Speed (kts) 24.04 5HR Wed 09:00Z 24-Oct-12
ARXLAPS Surface Wind (kts) 24.04 5HR Wed 09:00Z 24-Oct-12

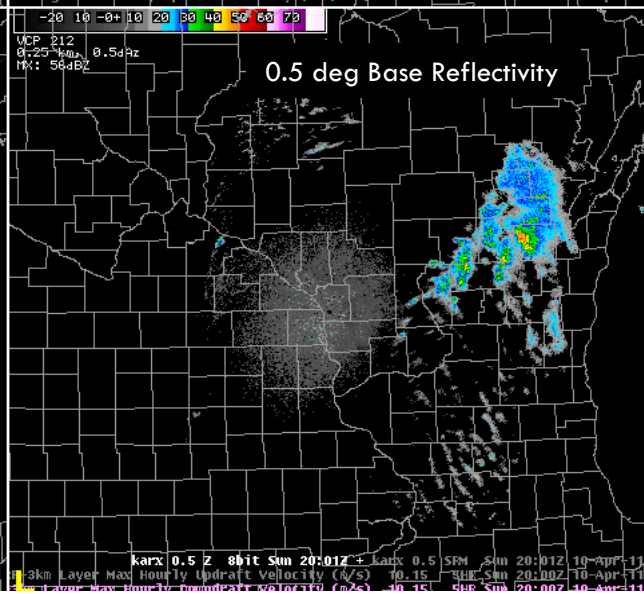
Cases – April 10, 2011- HRRR 15Z





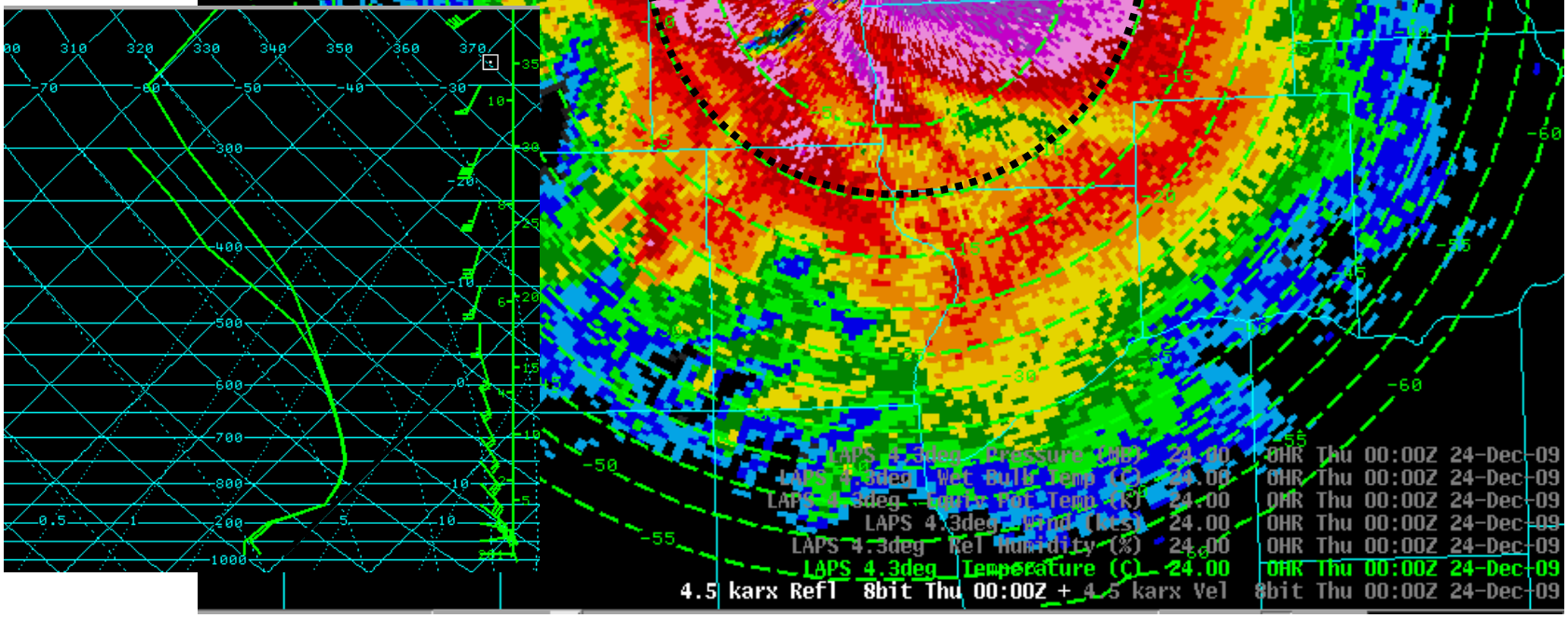




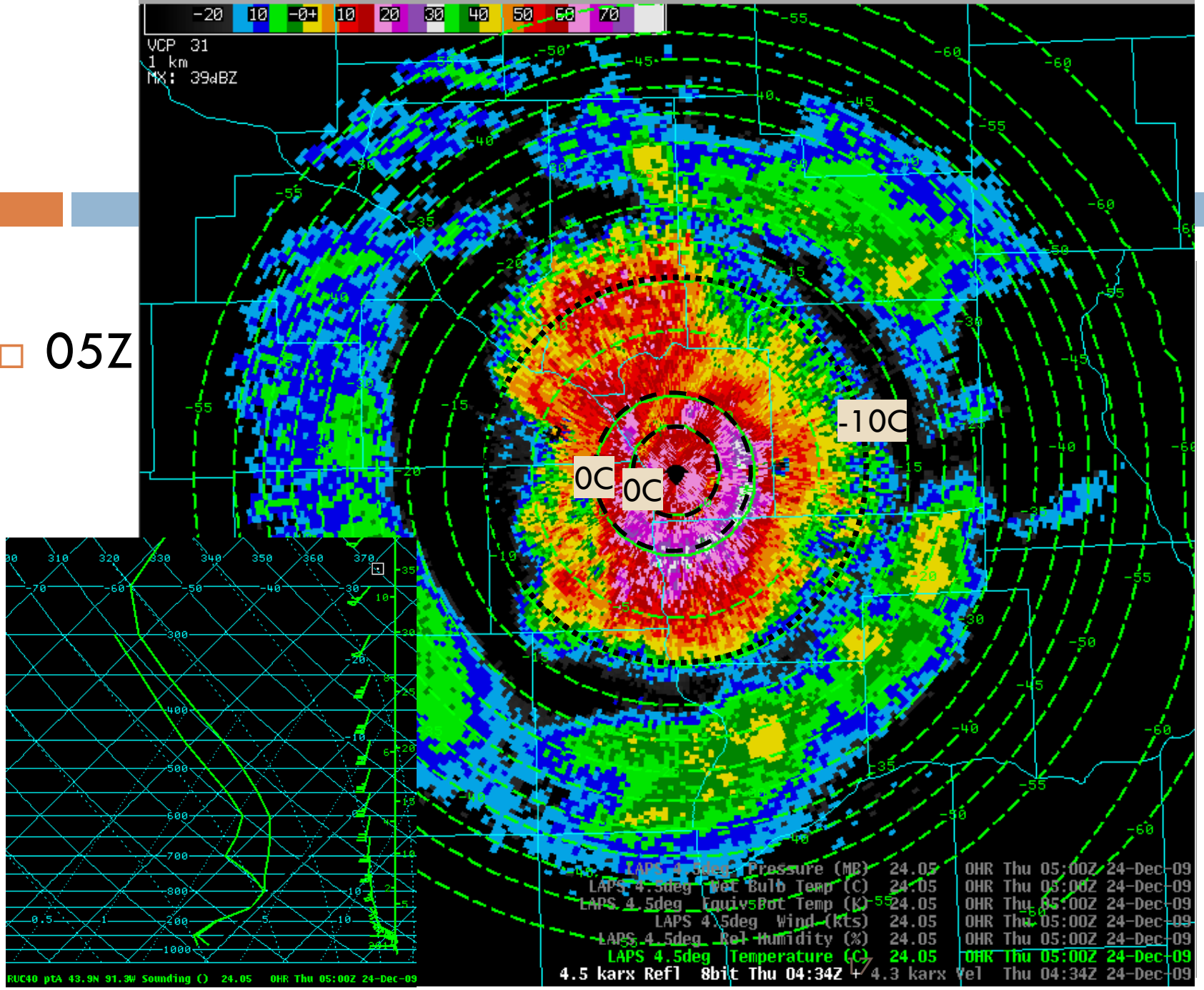


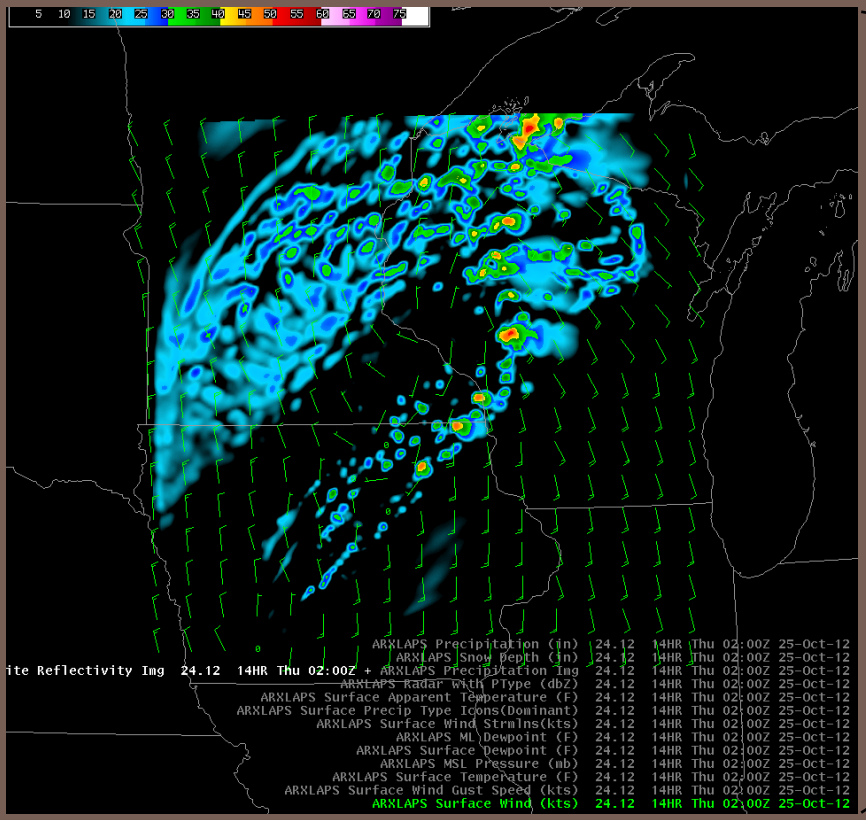
Fo

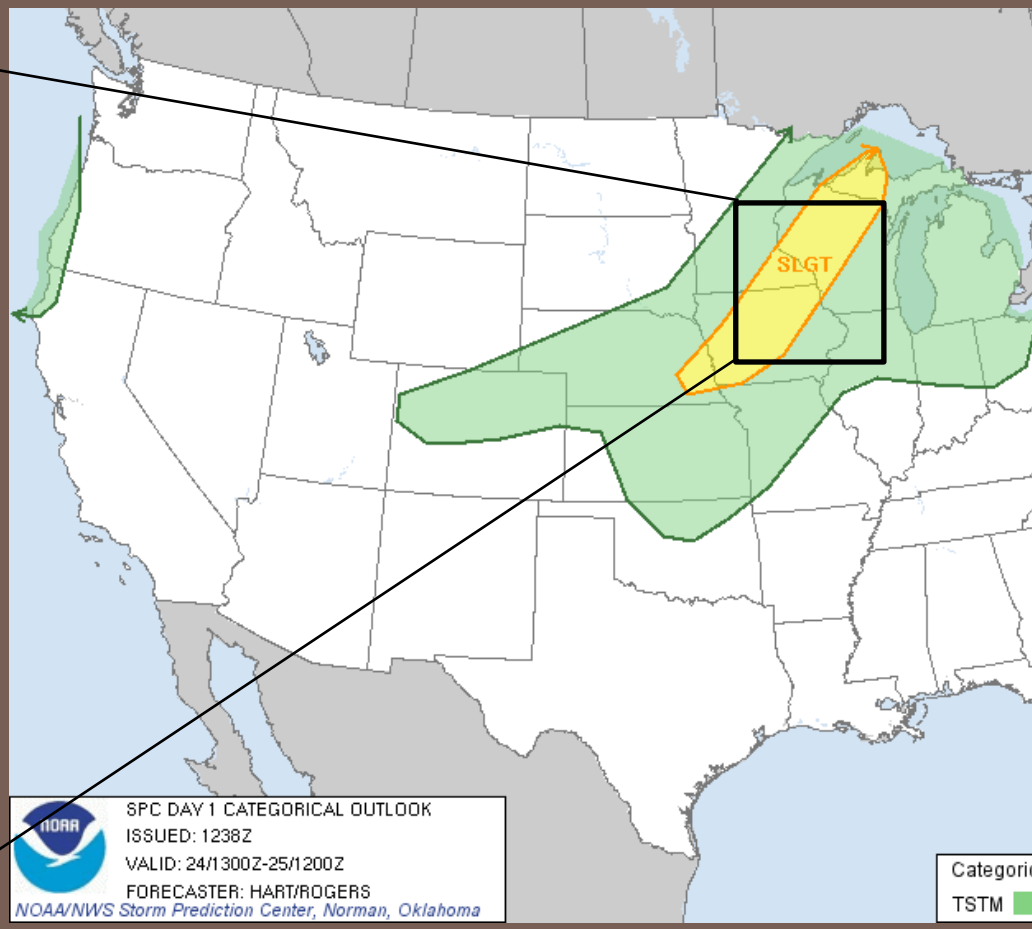
- 0Z


-20 10 -0+ 10 20 30 40 50 60 70
VCP 31
1 km
MX: 36dBZ
-10C
LAPS 4.3deg Temperature (C) 24.00
4.5 karx Refl 8bit Thu 00:00Z + 4.5 karx Vel 8bit Thu 00:00Z
0HR Thu 00:00Z 24-Dec-09

- 05Z


-20 10 -0+ 10 20 30 40 50 60 70
VCP 31
1 km
MX: 39dBZ
-10C
0C
0C
LAPS 4.5deg Pressure (MB) 24.05 OHR Thu 05:00Z 24-Dec-09
LAPS 4.5deg Wet Bulb Temp (C) 24.05 OHR Thu 05:00Z 24-Dec-09
LAPS 4.5deg Equiv Pot Temp (K) 24.05 OHR Thu 05:00Z 24-Dec-09
LAPS 4.5deg Wind (Kts) 24.05 OHR Thu 05:00Z 24-Dec-09
LAPS 4.5deg Rel Humidity (%) 24.05 OHR Thu 05:00Z 24-Dec-09
LAPS 4.5deg Temperature (C) 24.05 OHR Thu 05:00Z 24-Dec-09
4.5 karx Refl 8bit Thu 04:34Z 4.3 karx Vel Thu 04:34Z 24-Dec-09
RUC40 pta 43.9N 91.3W Sounding () 24.05 OHR Thu 05:00Z 24-Dec-09





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