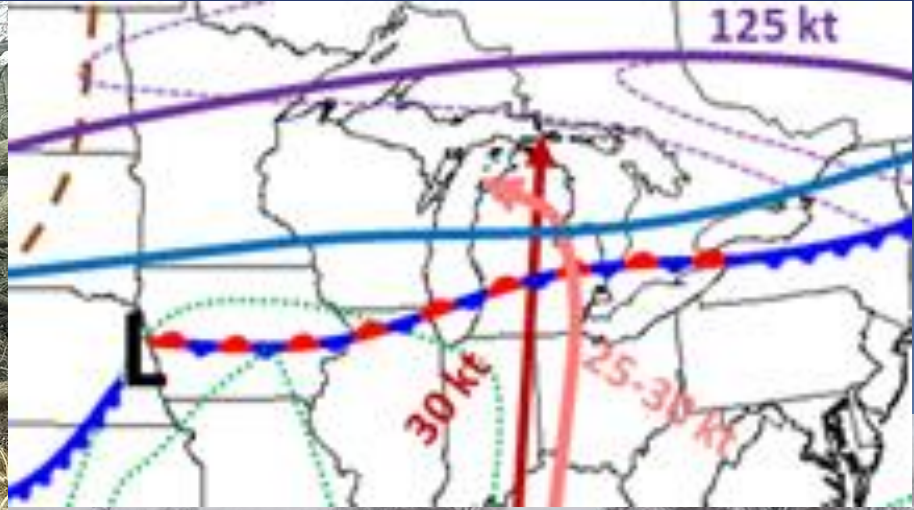
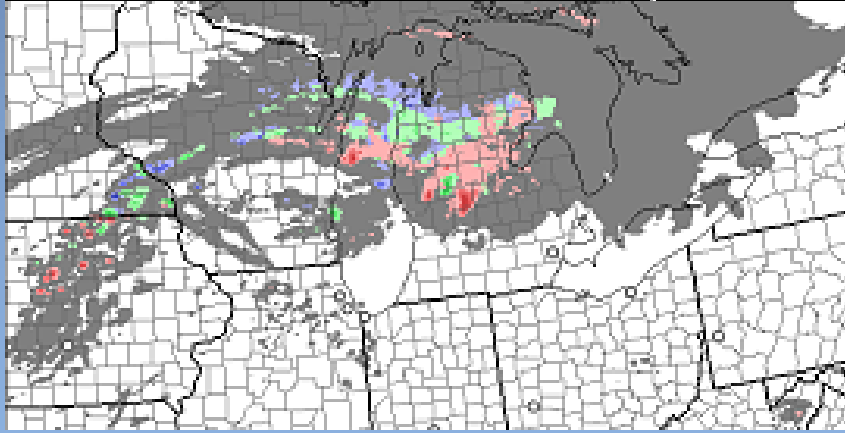


The 12 April 2014 Severe Downbursts



HRRR 04/12/2014 (10:00) 12h fcst - Experimental Valid 04/12/14
Ensemble Composite Reflectivity



12 April 2014 Severe Wx Reports

0455 PM TSTM WND DMG 1 ENE MUSKEGON 43.23N 86.24W
04/12/2014 MUSKEGON MI FIRE DEPT/RESCUE

FIRE-AMBULANCE RESPONSE TEAM CALLED TO REPORT ESTIMATED WINDS OF 65 MPH. STATED THAT SHINGLES WERE BLOWN OFF A ROOF ON A BUILDING NEAR THE FACILITY.

0502 PM TSTM WND DMG WOLF LAKE 43.25N 86.11W
04/12/2014 MUSKEGON MI AMATEUR RADIO

HAM RADIO OPERATOR CALLED IN TO REPORT WINDS ESTIMATED AROUND 60 MPH. A TREE WAS SNAPPED IN HALF NEAR MACARTHUR ROAD THAT MEASURES ABOUT 12 INCHES IN DIAMETER

0510 PM TSTM WND DMG 3 NNW KENT CITY 43.26N 85.77W
04/12/2014 KENT MI TRAINED SPOTTER

PINES TREES BLOWN OVER AND BARN ROOF DAMAGED

0512 PM TSTM WND DMG GRANT 43.33N 85.81W
04/12/2014 NEWAYGO MI EMERGENCY MNGR

COUNTY EMERGENCY MANAGEMENT REPORTS A PLANE FLIPPED OVER AT THE GRANT AIRPORT. ALSO A METAL HANGAR WAS DESTROYED WITH DEBRIS SCATTERED ALL AROUND.

0526 PM TSTM WND DMG KENT CITY 43.22N 85.75W
04/12/2014 KENT MI 911 CALL CENTER

LOCAL FORD DEALER HAS SUFFERED SEVERE ROOF DAMAGE

0527 PM TSTM WND GST SPARTA 43.16N 85.71W
04/12/2014 E80.00 MPH KENT MI 911 CALL CENTER

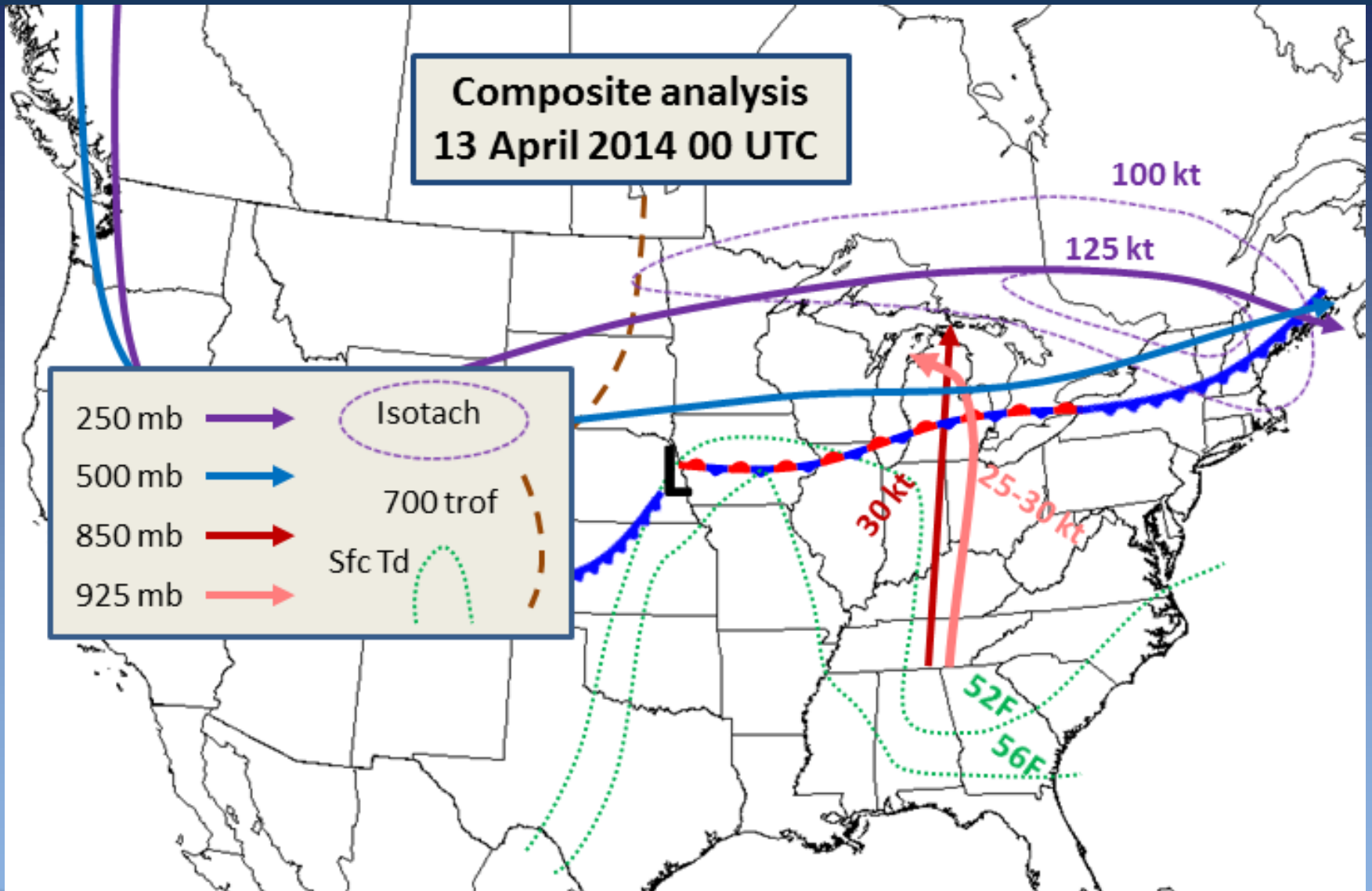
LOCAL AND STATE POLICE HAVE ESTIMATED WIND GUSTS TO BE AT LEAST 80 MPH.



Natio
Storm

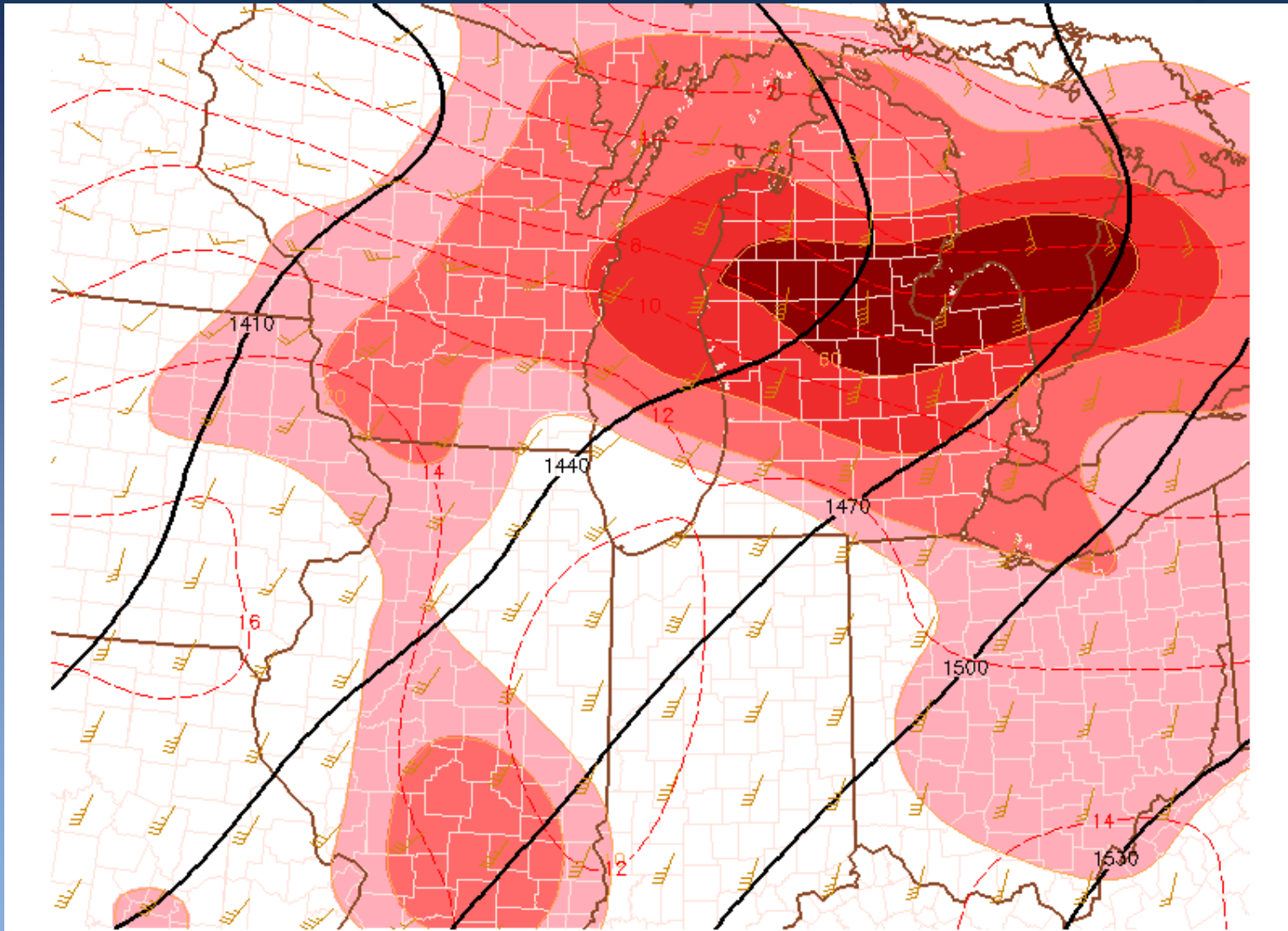


12 April 2014 Synoptic Setup



Right Ent. Region of Upper Jet, LLJ perpendicular to Sfc Boundary

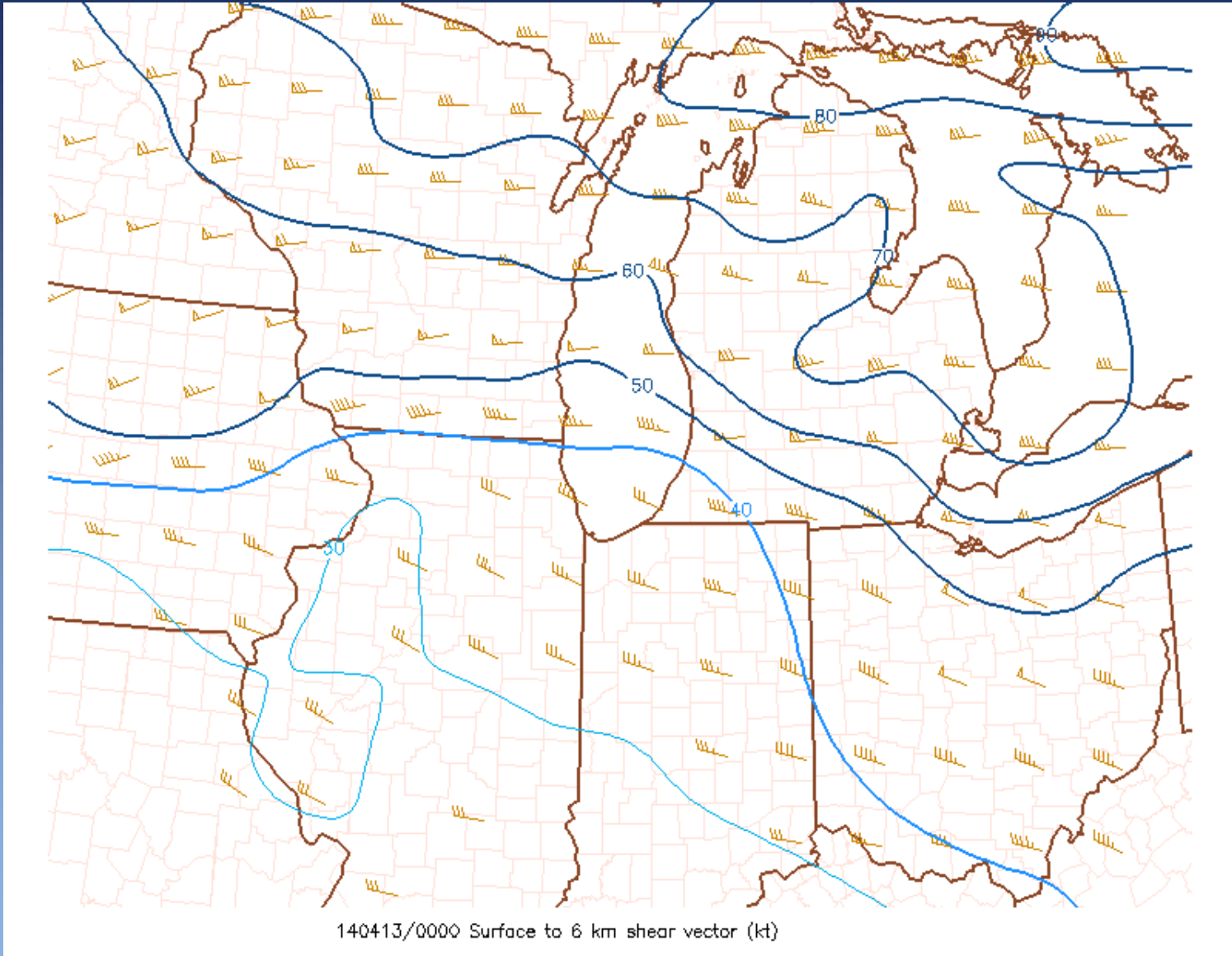
00Z 13 April 2014 850 mb Temp Adv



140413/0000 850 mb temperature advection (fill)
140413/0000 850 mb height, temperature and wind

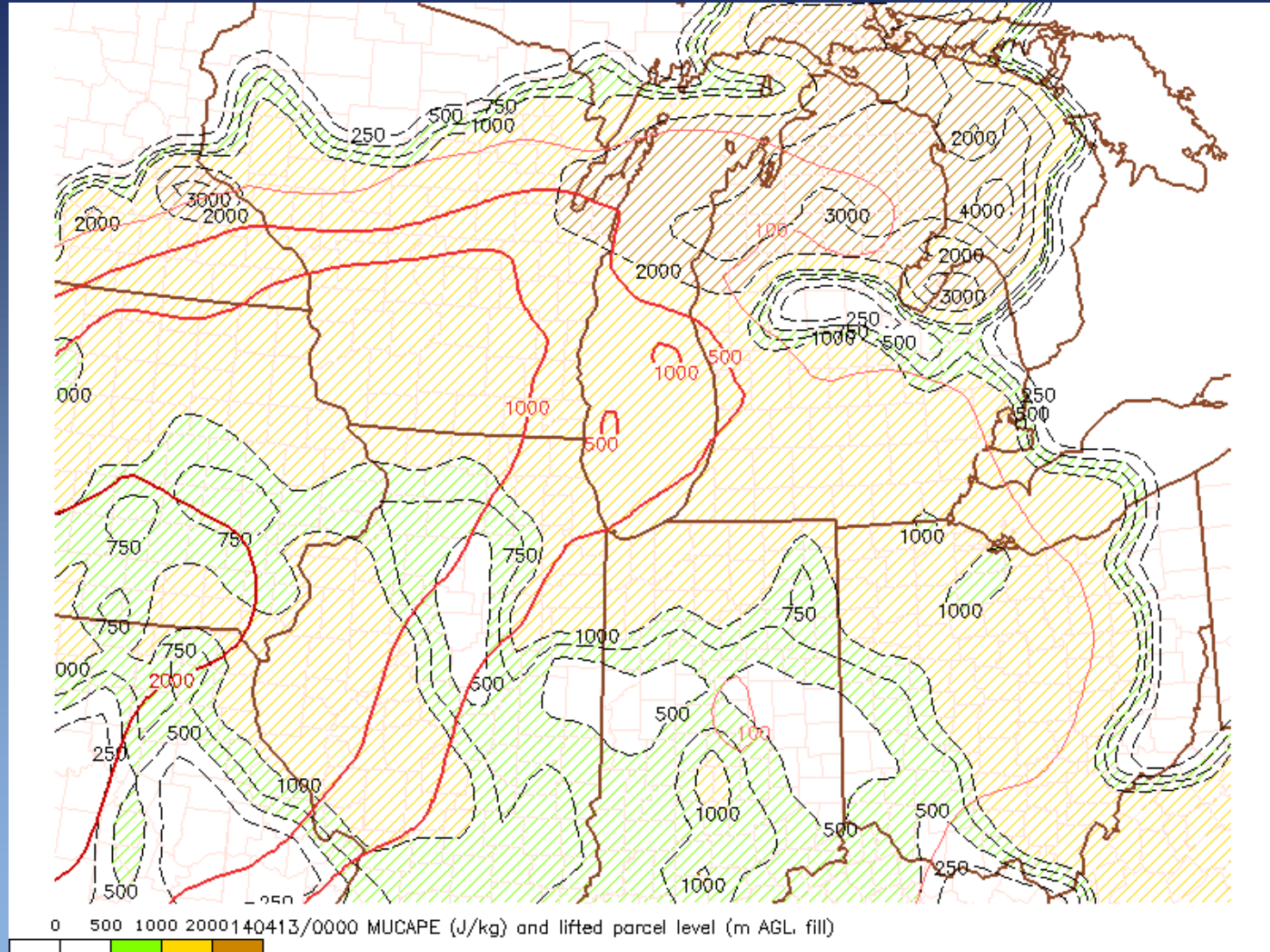
Strong Mid-level Warm Advection/Isentropic Ascent

00Z 13 April 2014 0-6 km Shear



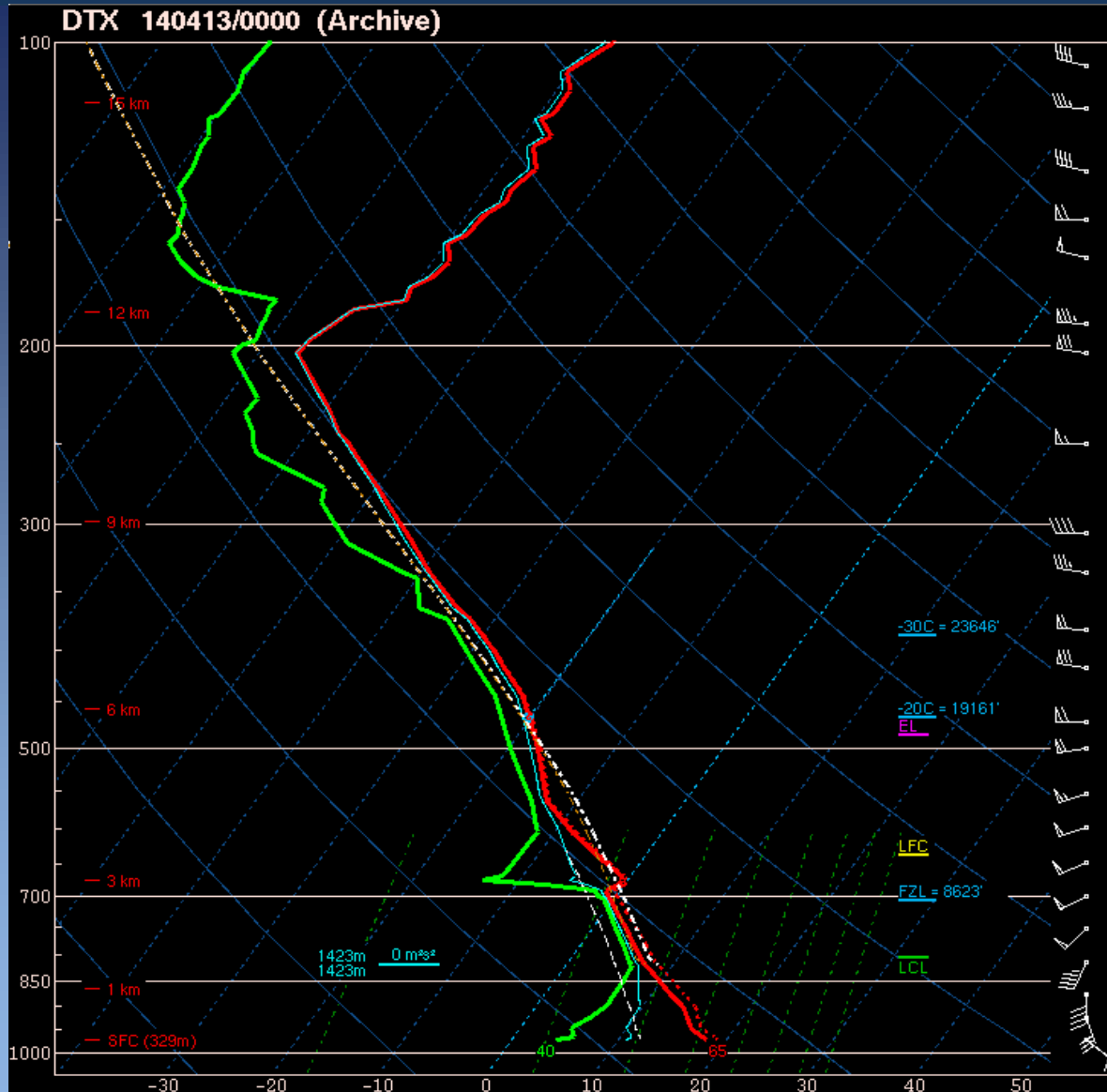
Strong Shear

00Z 13 April 2014 MUCAPE

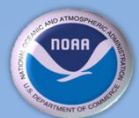


Low CAPE

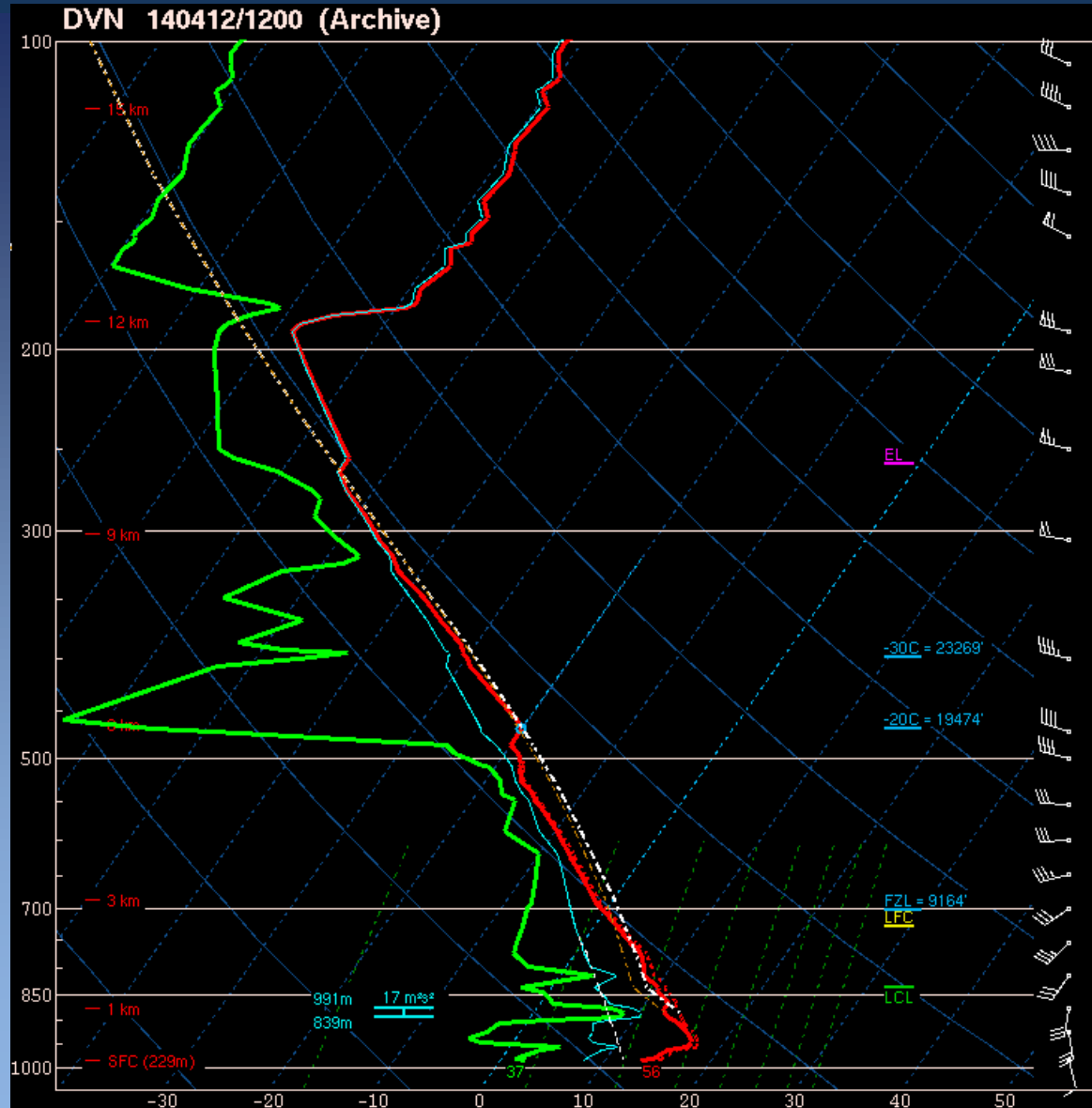
00Z 13 April 2014 DTX Sounding



Steep Mid-level lapse rates and Dry Sub-Cloud Layer



00Z 13 April 2014 DVN Sounding



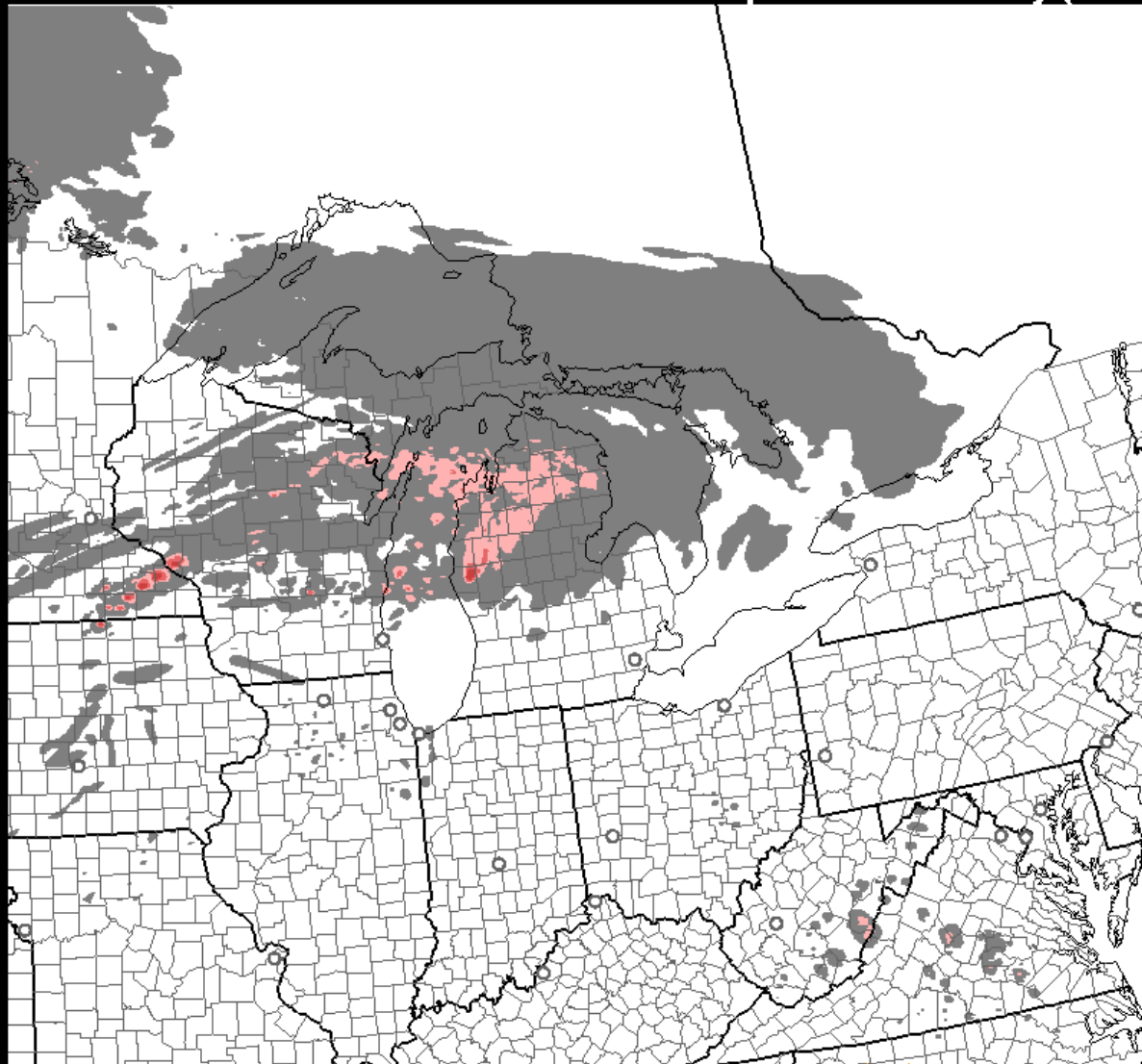
Elevated Mixed Layer



HRRR 04/12/2014 (07:00) 15h fcst - Experimental

Valid 04/12/2014 22:00 UTC

Ensemble Composite Reflectivity (dBZ)



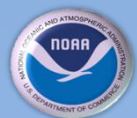
MISSING

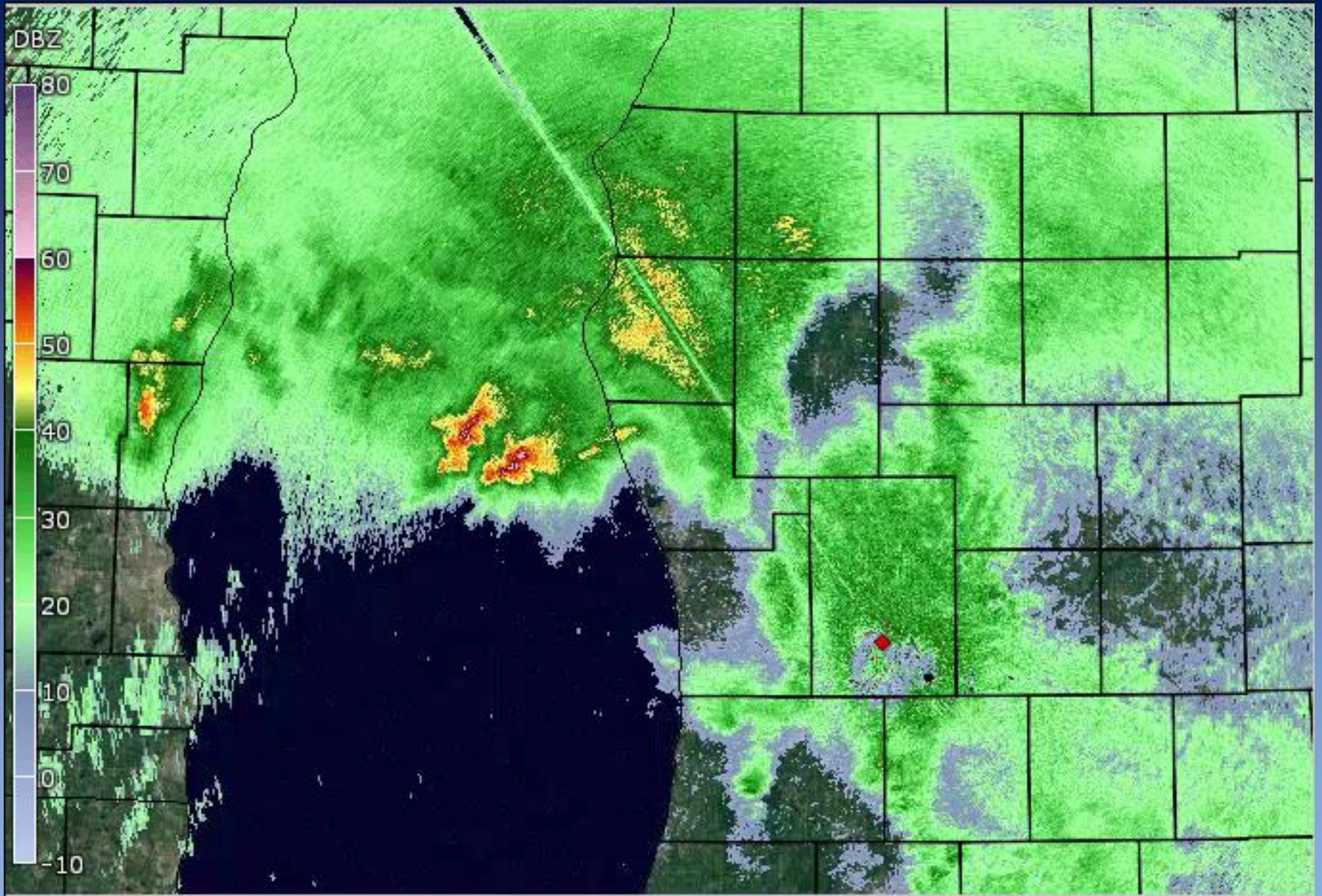
MISSING

04/12/2014 07Z 15hr fcst



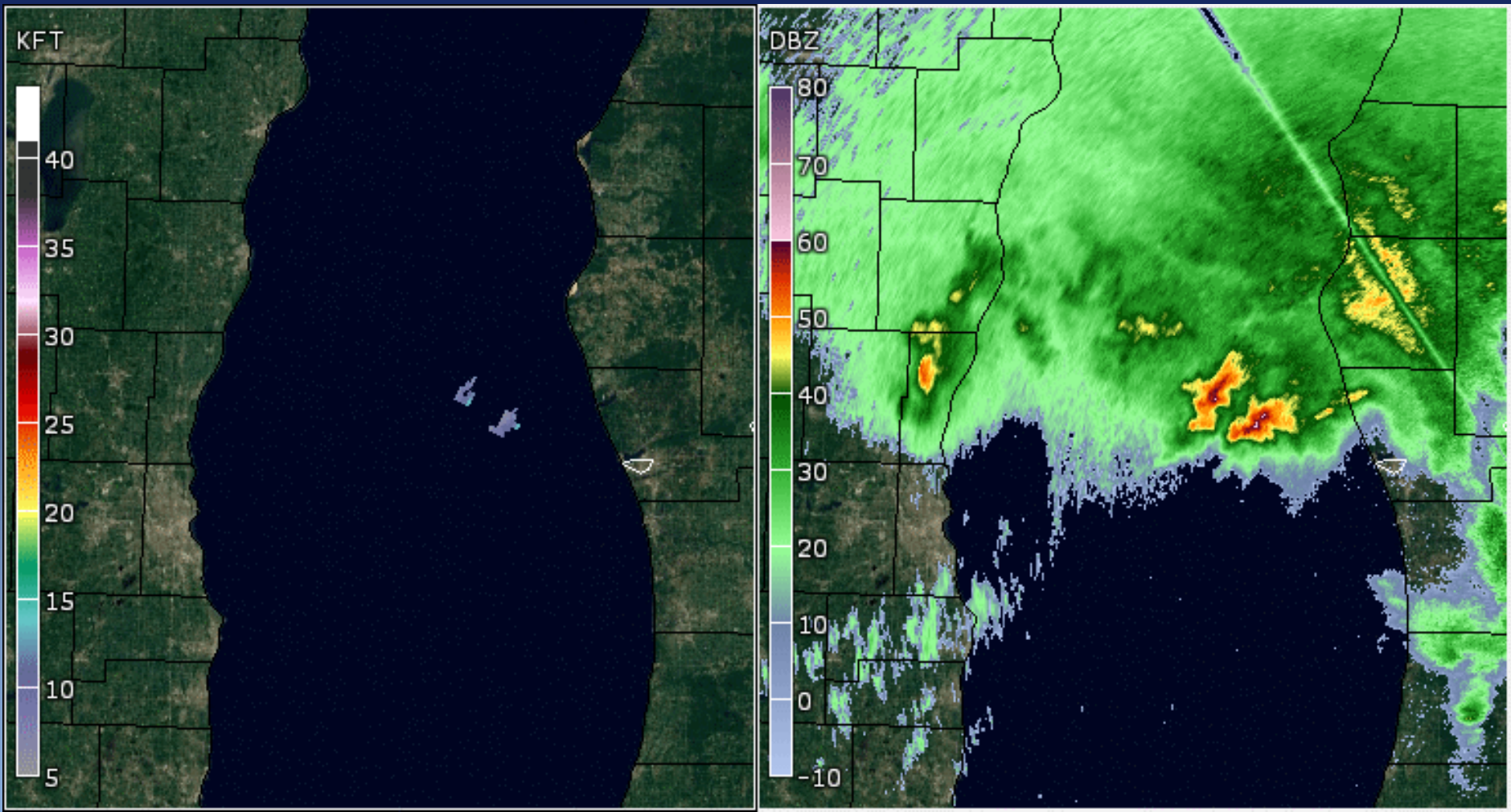
HRRR forecast evolution



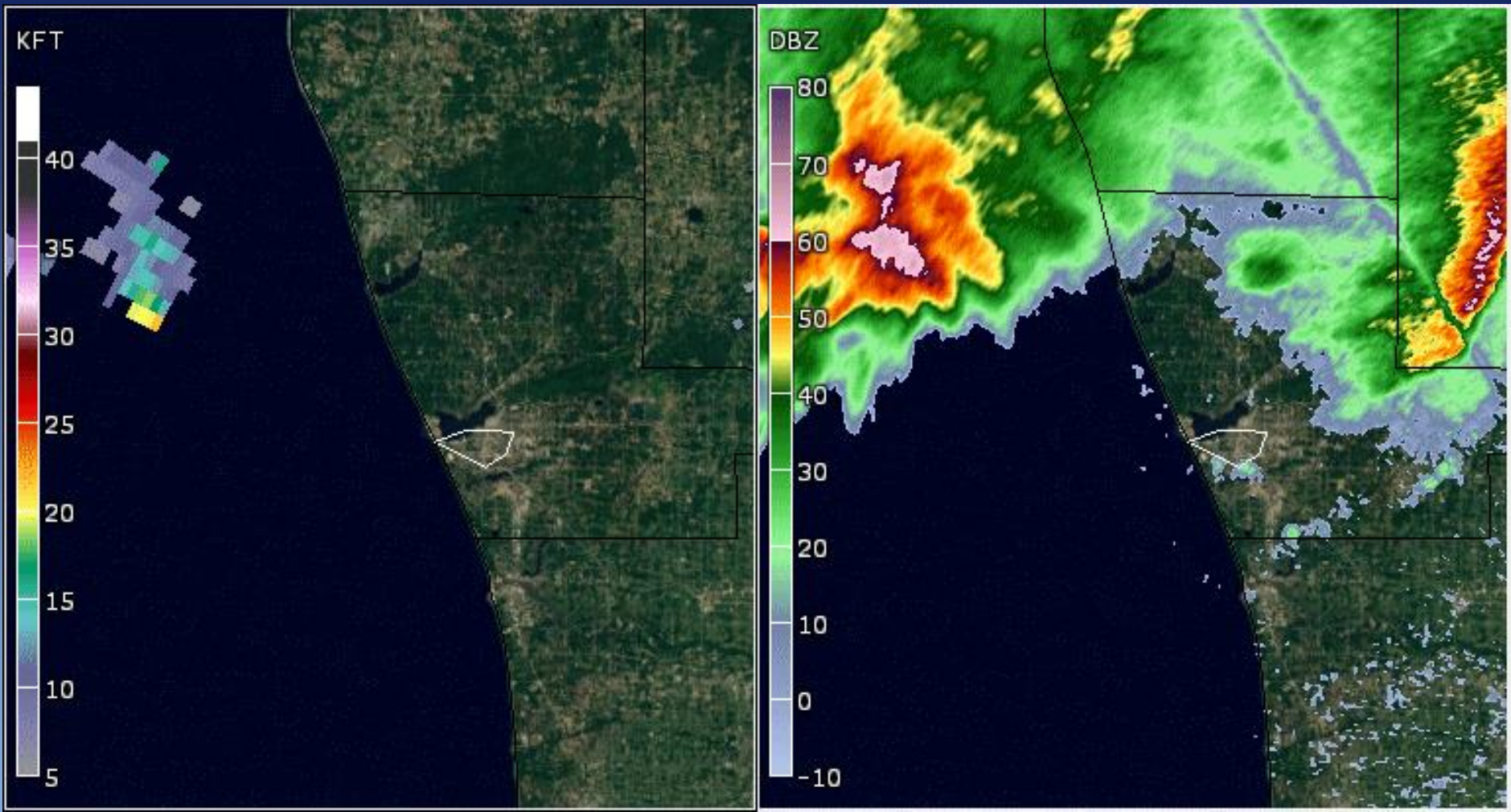


0.5 degree reflectivity 1900Z – 2238Z

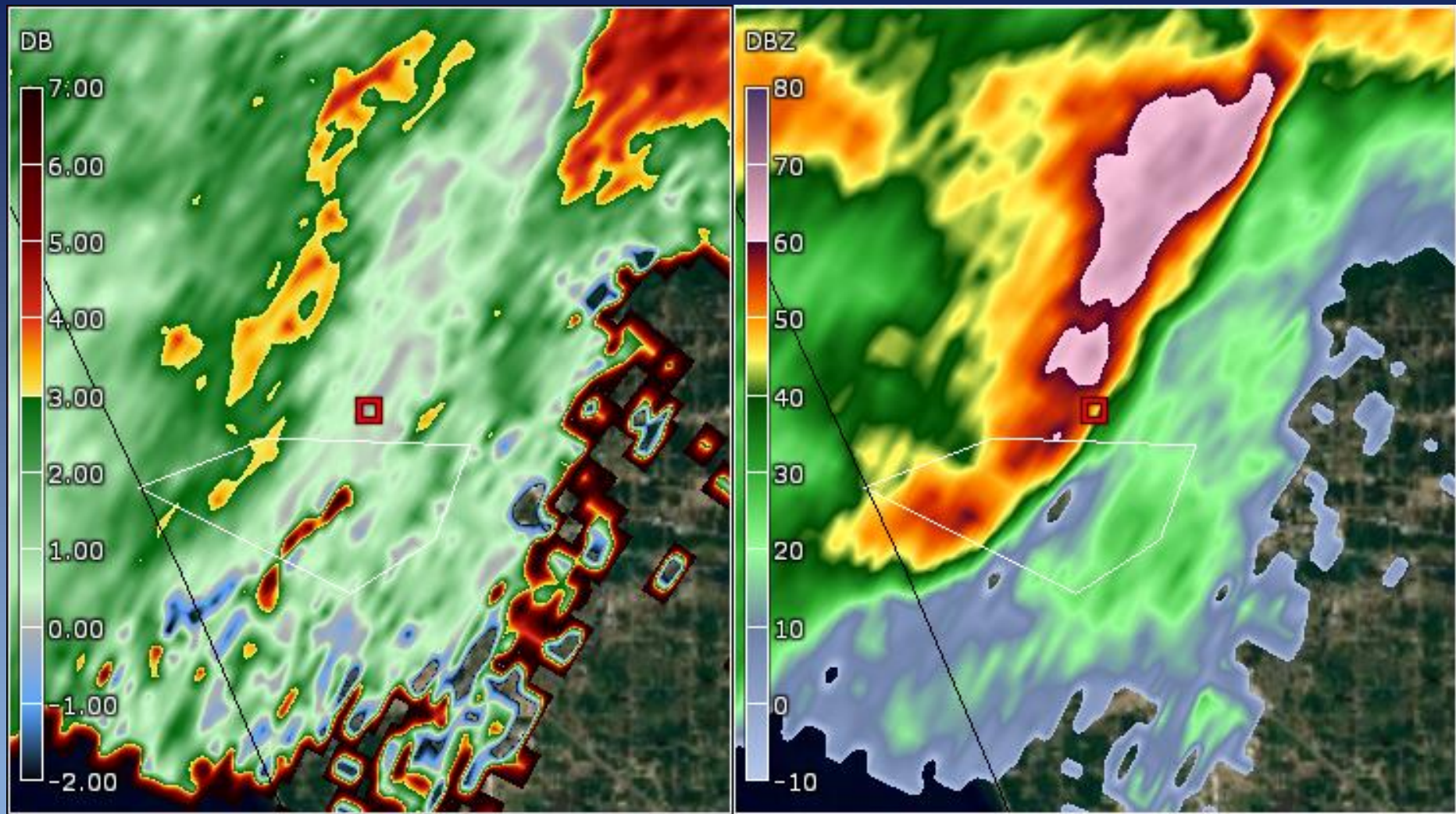




Height of 55 dBZ echo (left) and 0.5 Z (right)
1901Z – 2149Z



Height of 55 dBZ echo (left) and 0.5 Z (right)
2010Z – 2049Z



Height of 55 dBZ echo (left) and 0.5 Z (right)
2010Z – 2049Z



Comparison of Z, V, ZDR



12 April 2014 Severe Downbursts

Conclusions

Marginal severe synoptic environment over-performs due to:

- Deep mixed sub-cloud layer
- Possible gravity wave constructive interference
- Copious hail production aiding cold pool
- Down-shear propagation expanding threat

Clues for future events:

- Antecedent deep mixed sub-cloud layer (high T-Td spreads)
- Ice crystal seeding from initial storms
- Strong down shear reflectivity gradient

12 April 2014 Severe Downbursts

Thank You!

Questions?

