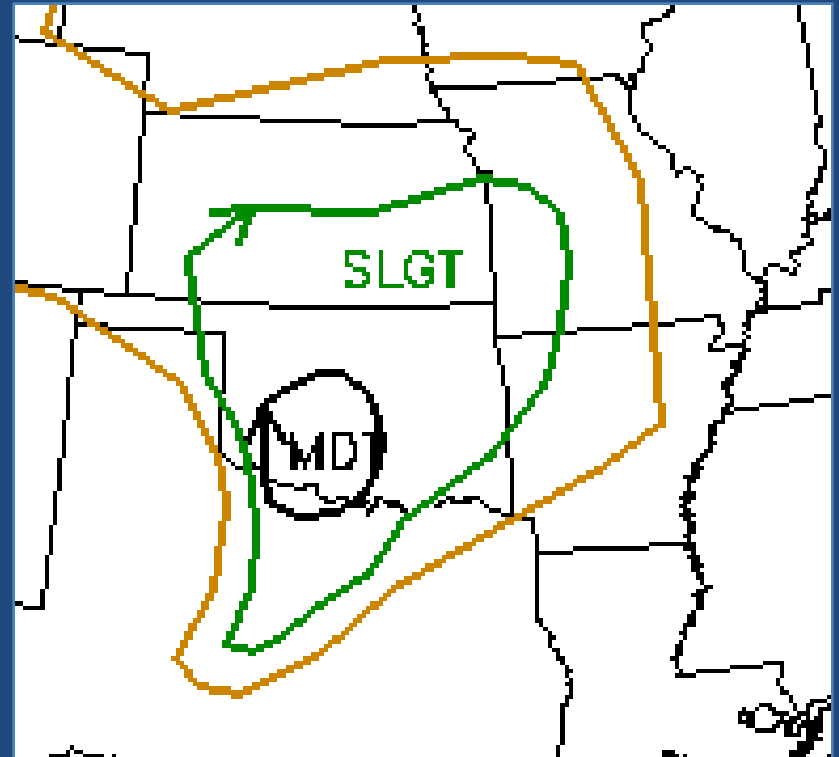


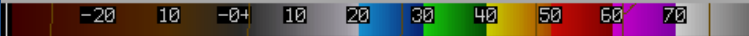
**A Mesoscale Discussion of the  
7 April 2008 Convective Event in South  
Central Kansas:  
Implications for Operational  
Meteorologists**

Paul Howerton  
Senior Meteorologist  
NWS Wichita KS

# Initial Briefing

- Small hail observed in SE KS during afternoon
- Warm front to remain in OK during the night
- Better chance for (severe) hail as LLJ develops during the evening and increases overrunning

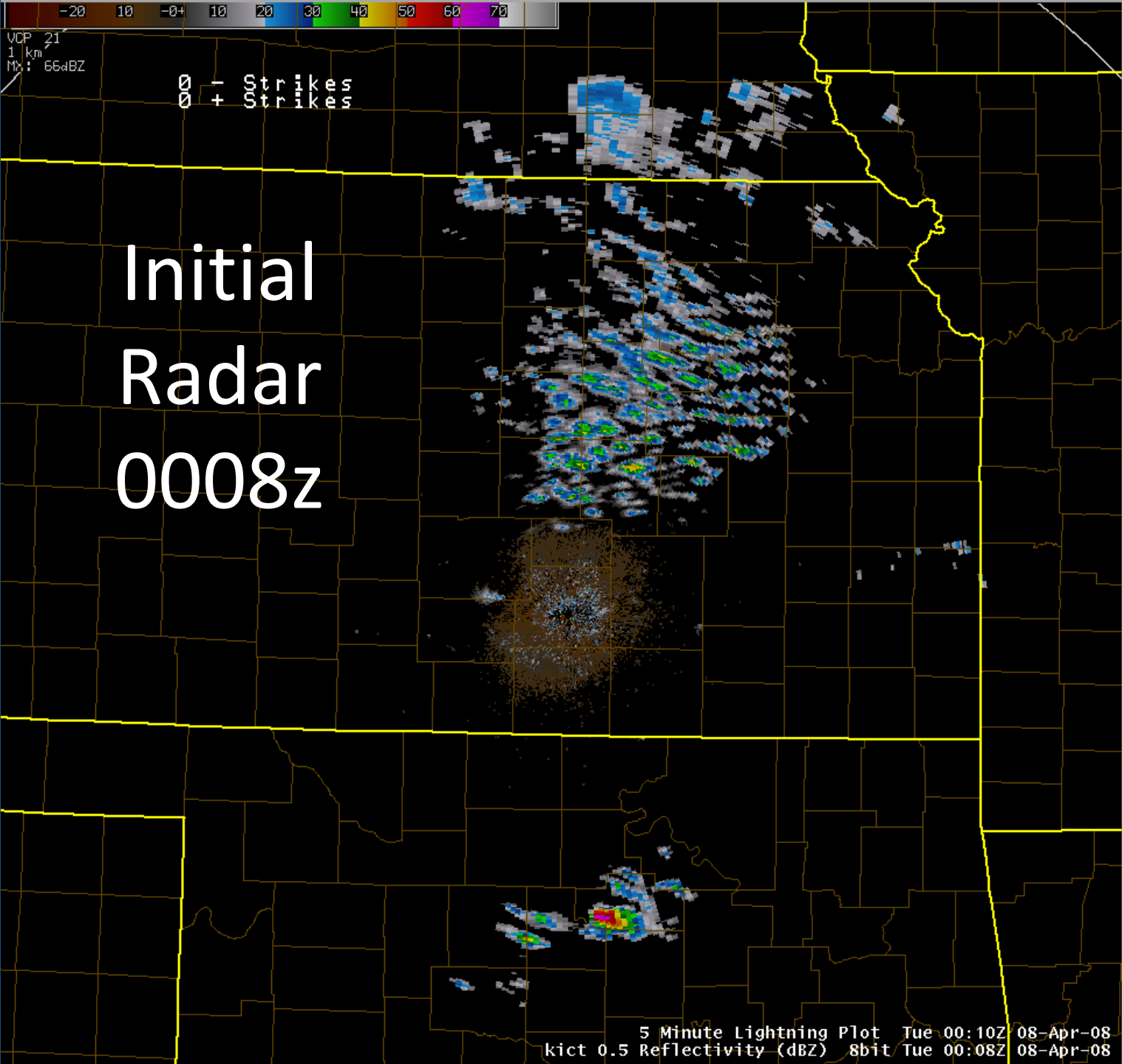




VCP 21  
1 km  
Mx: 66dBZ

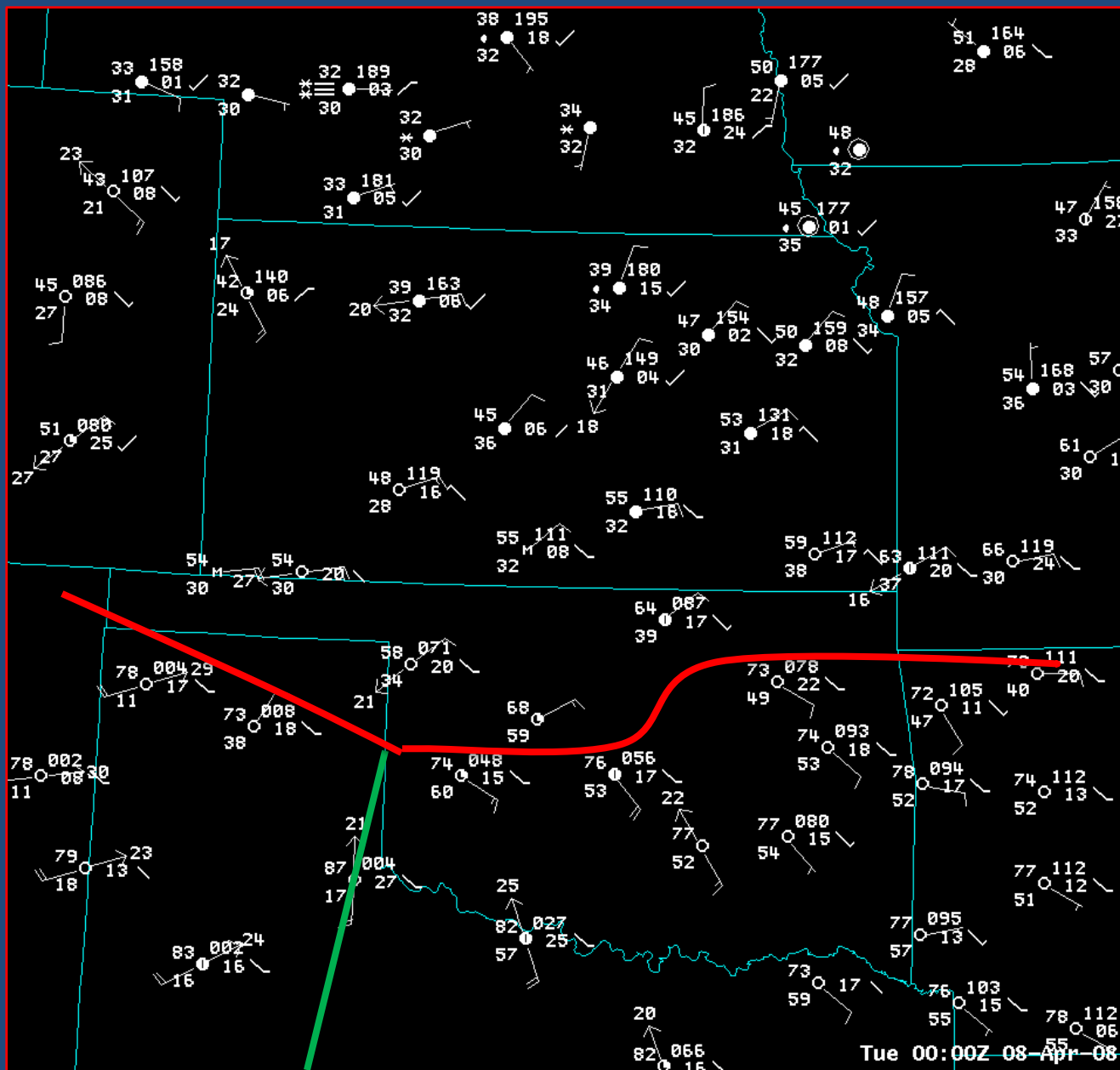
0 - Strikes  
+ Strikes

# Initial Radar 0008z

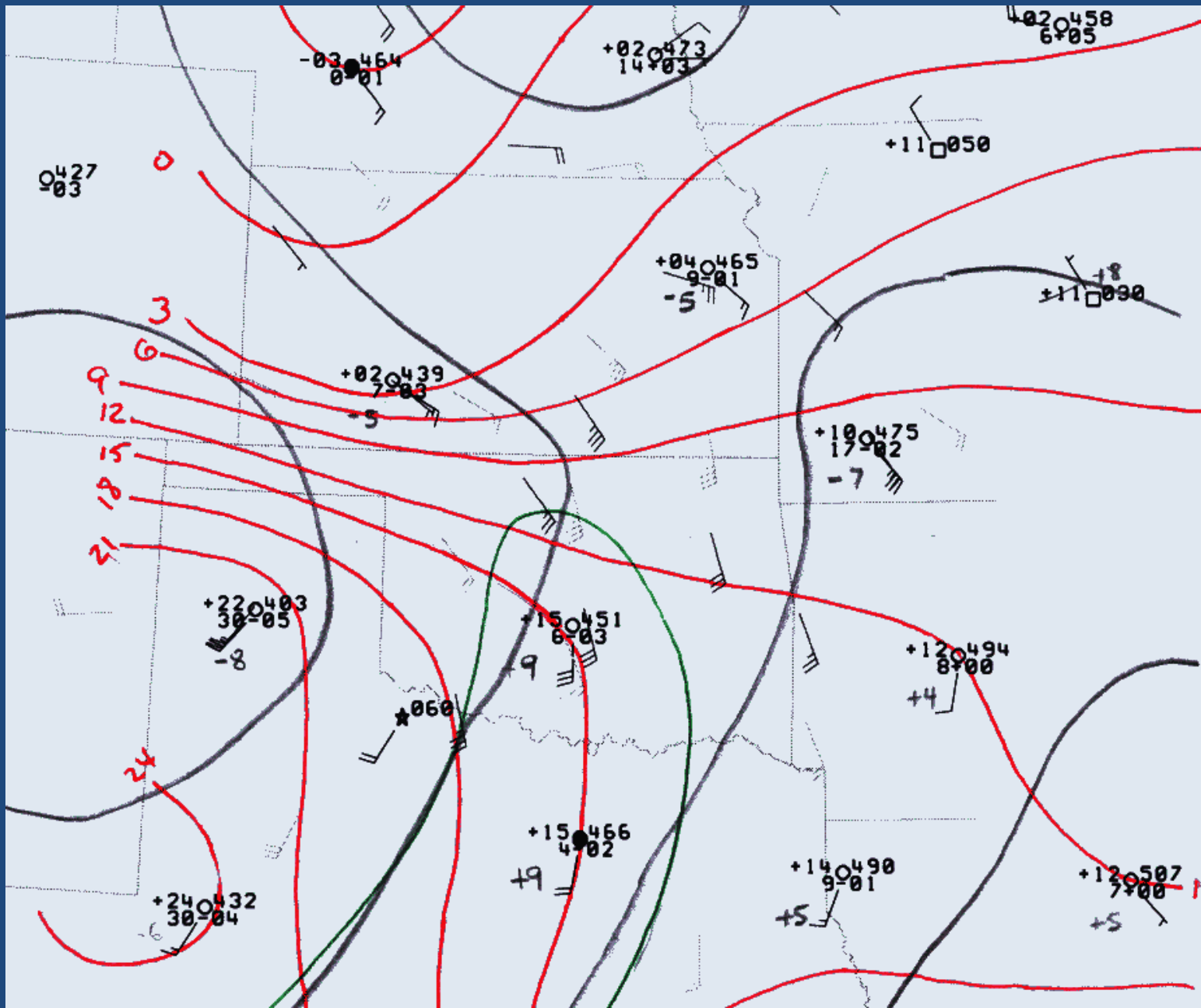


5 Minute Lightning Plot Tue 00:10Z 08-Apr-08  
kict 0.5 Reflectivity (dBZ) 8bit Tue 00:08Z 08-Apr-08

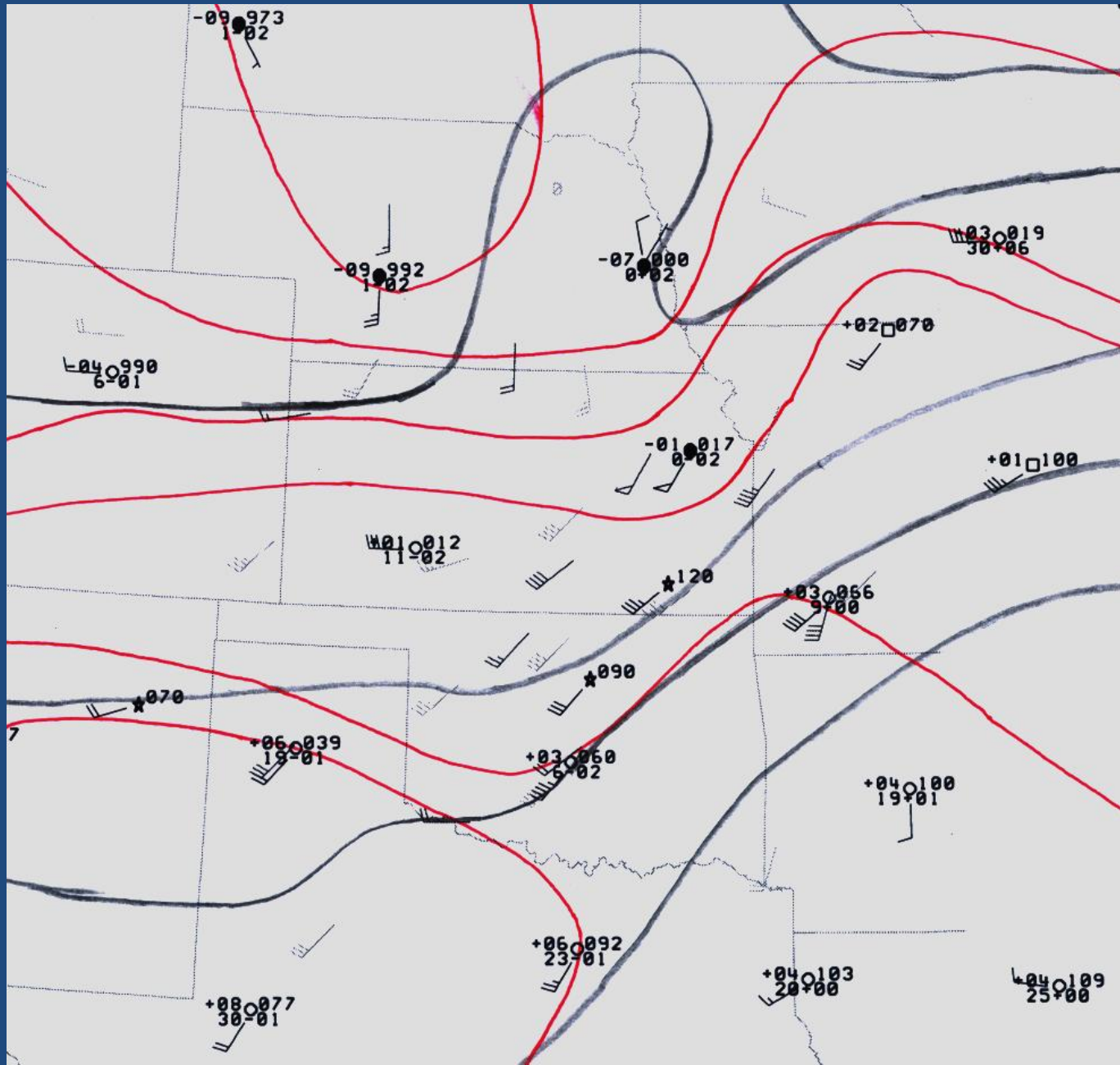
# 00z: SFC map



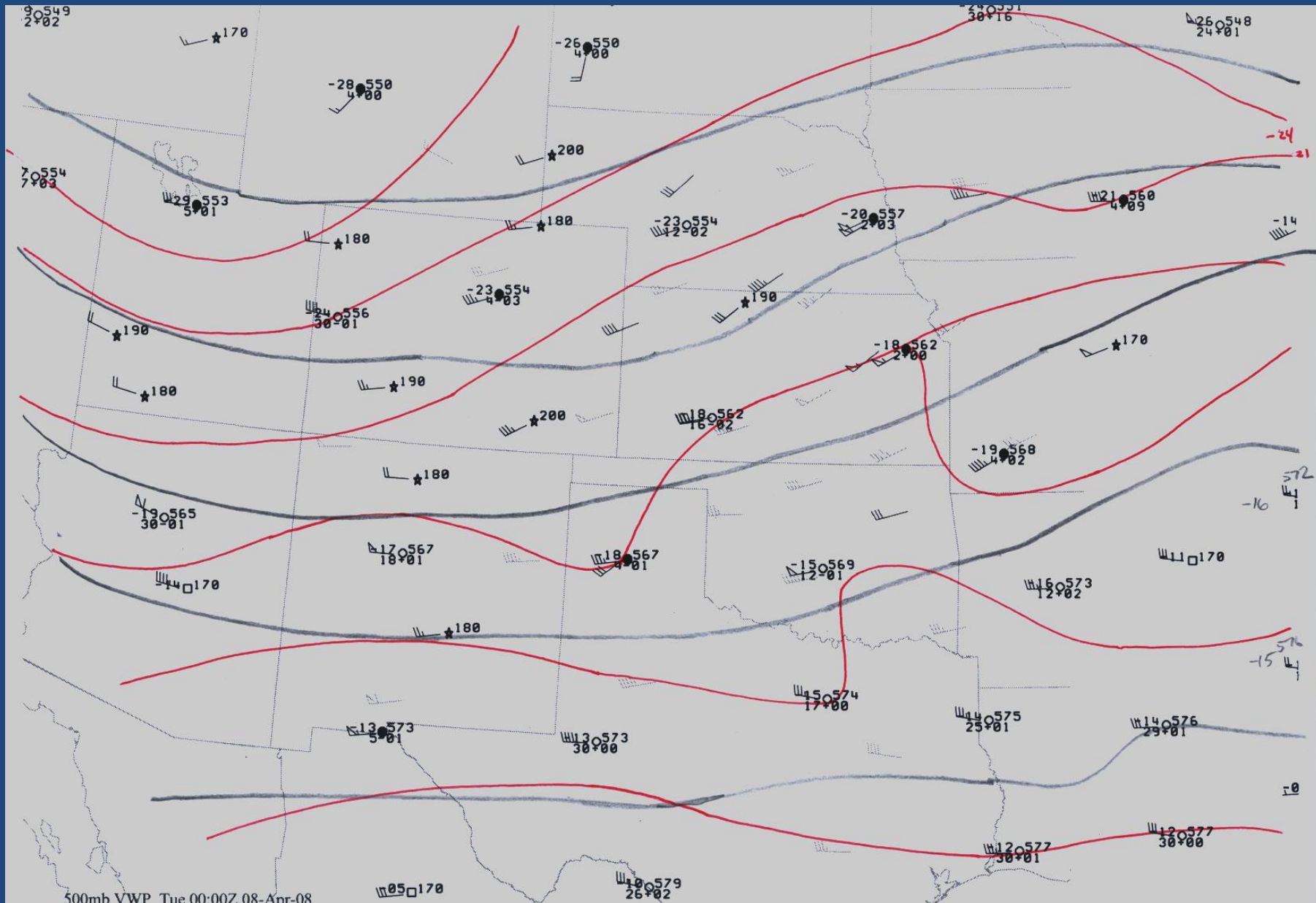
# 00z: 850mb



# 00z: 700mb

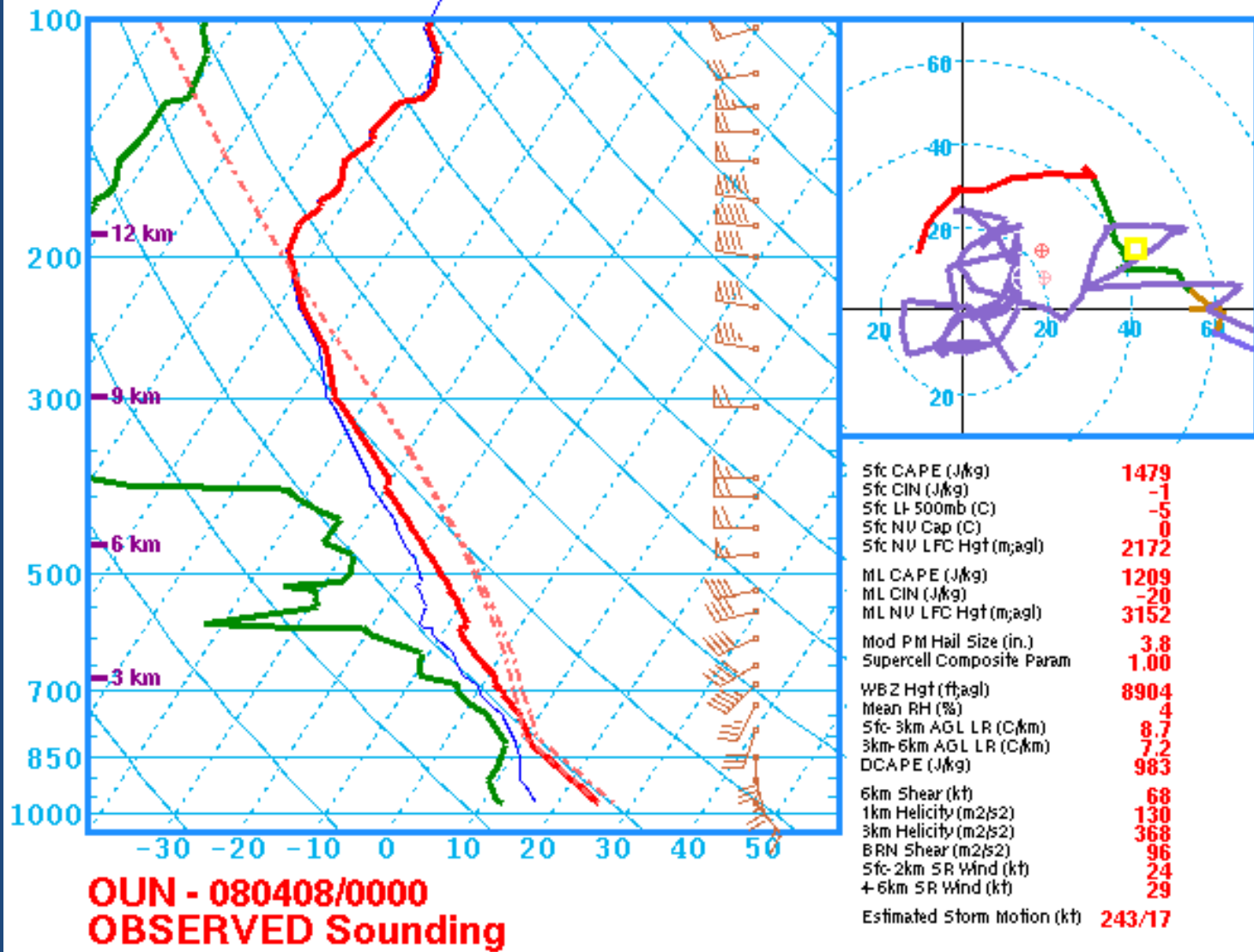


# 00z: 500mb



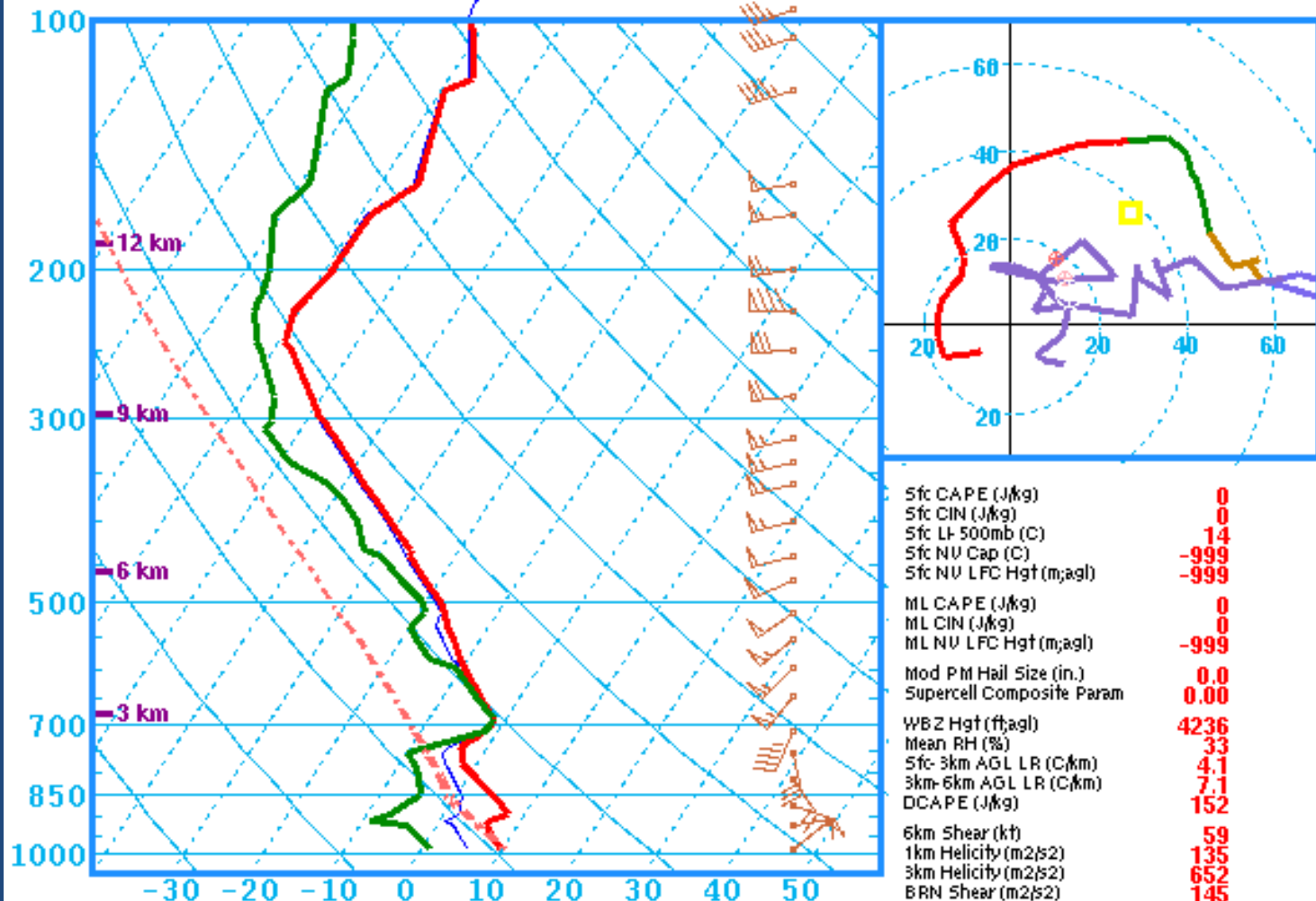


# 00z: OUN Sounding





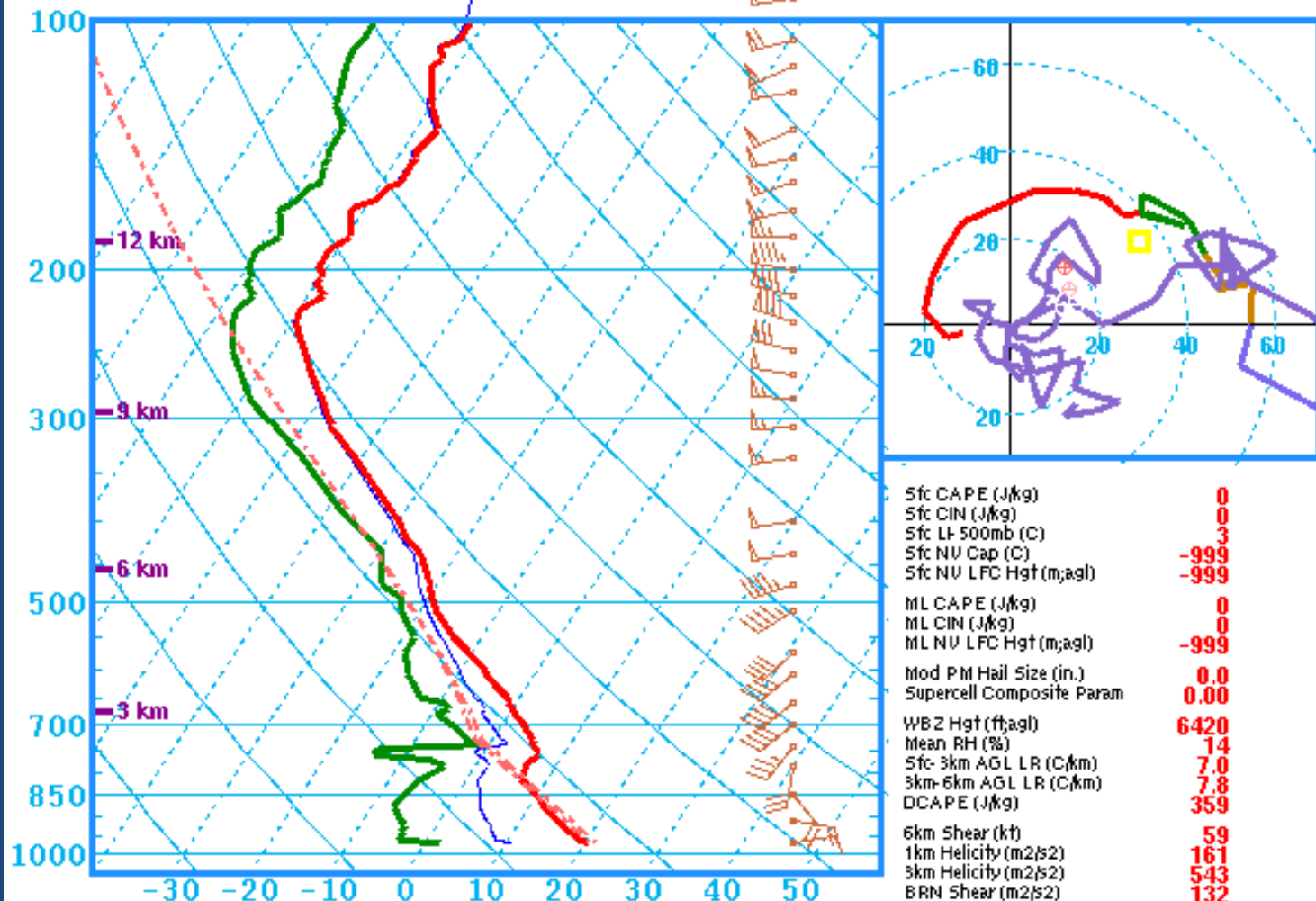
# 00z: TOP Sounding



**TOP - 080408/0000**  
**OBSERVED Sounding**

Sfc CAPE (J/kg)	<b>0</b>
Sfc CIN (J/kg)	<b>0</b>
Sfc LF-500mb (C)	<b>14</b>
Sfc NU Cap (C)	<b>-999</b>
Sfc NU LFC Hgt (m;agl)	<b>-999</b>
ML CAPE (J/kg)	<b>0</b>
ML CIN (J/kg)	<b>0</b>
ML NU LFC Hgt (m;agl)	<b>-999</b>
Mod PM Hail Size (in.)	<b>0.0</b>
Supercell Composite Param	<b>0.00</b>
WBZ Hgt (ft;agl)	<b>4236</b>
Mean RH (%)	<b>33</b>
Sfc-3km AGL LR (C/km)	<b>4.1</b>
3km-6km AGL LR (C/km)	<b>7.1</b>
DCAPE (J/kg)	<b>152</b>
6km Shear (kt)	<b>59</b>
1km Helicity (m2/s2)	<b>135</b>
3km Helicity (m2/s2)	<b>652</b>
BRN Shear (m2/s2)	<b>145</b>
Sfc-2km SR Wind (kt)	<b>27</b>
+6km SR Wind (kt)	<b>38</b>
Estimated Storm Motion (kt)	<b>242/15</b>

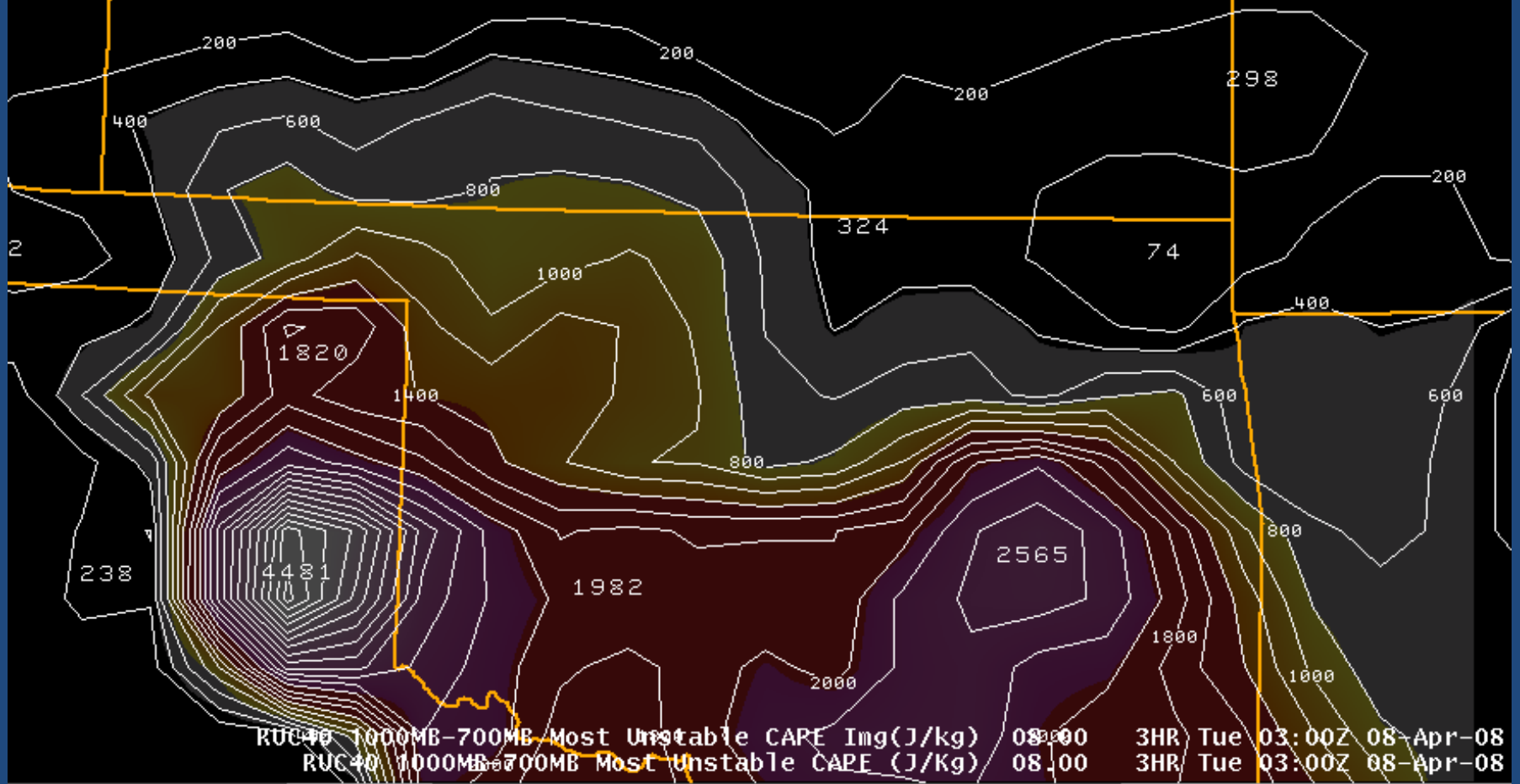
# 00z: SGF Sounding



**SGF - 080408/0000**  
**OBSERVED Sounding**

Sfc CAPE (J/kg)	<b>0</b>
Sfc CIN (J/kg)	<b>0</b>
Sfc LF 500mb (C)	<b>3</b>
Sfc NU Cap (C)	<b>-999</b>
Sfc NU LFC Hgt (m;agl)	<b>-999</b>
ML CAPE (J/kg)	<b>0</b>
ML CIN (J/kg)	<b>0</b>
ML NU LFC Hgt (m;agl)	<b>-999</b>
Mod PM Hail Size (in.)	<b>0.0</b>
Supercell Composite Param	<b>0.00</b>
WBZ Hgt (ft;agl)	<b>6420</b>
Mean RH (%)	<b>14</b>
Sfc-3km AGL LR (C/km)	<b>7.0</b>
3km-6km AGL LR (C/km)	<b>7.8</b>
DCAPE (J/kg)	<b>359</b>
6km Shear (kt)	<b>59</b>
1km Helicity (m2/s2)	<b>161</b>
3km Helicity (m2/s2)	<b>543</b>
BRN Shear (m2/s2)	<b>132</b>
Sfc-2km SR Wind (kt)	<b>26</b>
+6km SR Wind (kt)	<b>30</b>
Estimated Storm Motion (kt)	<b>251/14</b>

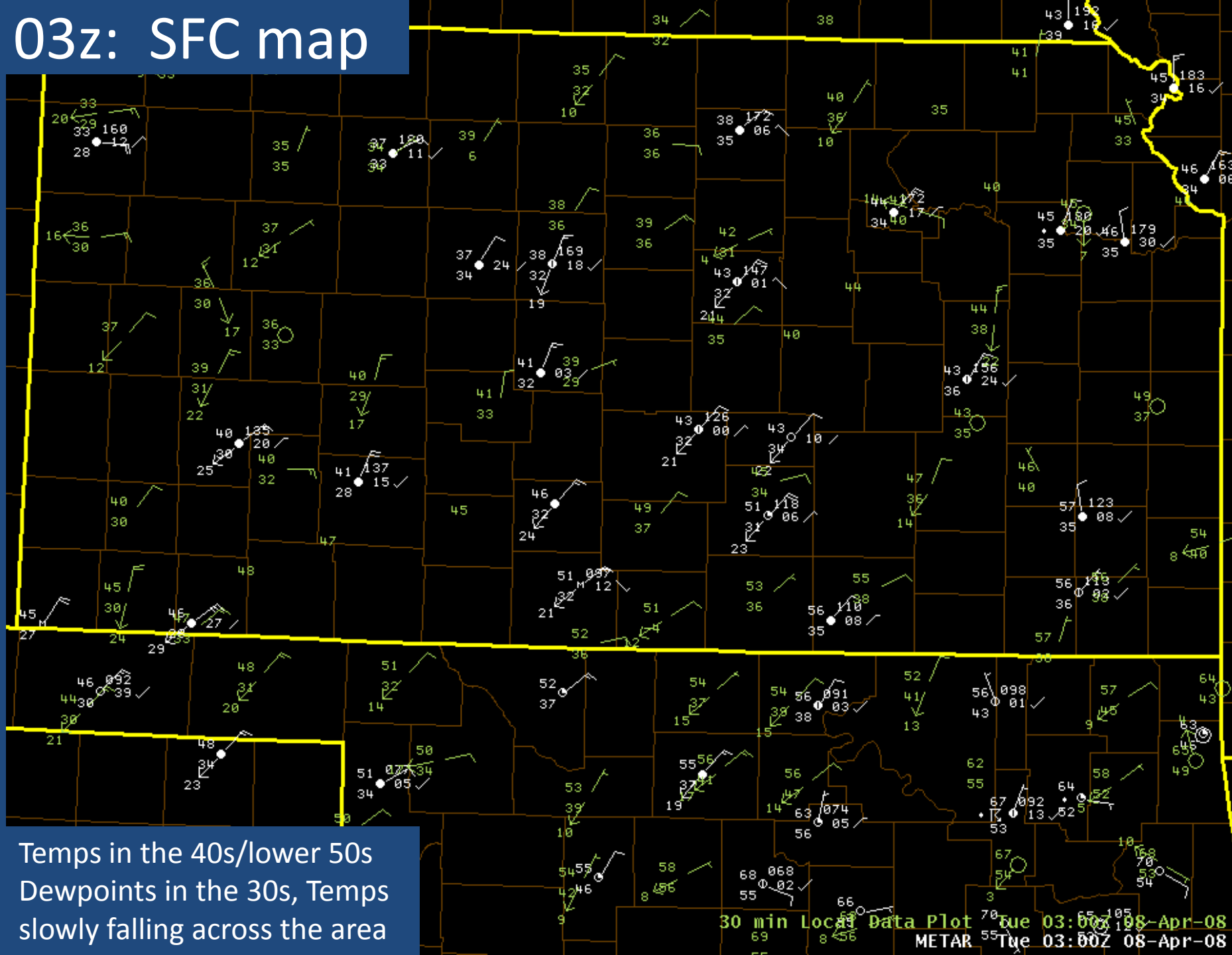
# 00Z RUC MUCAPE for 03z



# So what do YOU think?

- Hail?
- Wind?
- Tornado?
- Any severe?

# 03z: SFC map



Temps in the 40s/lower 50s  
Dewpoints in the 30s, Temps  
slowly falling across the area

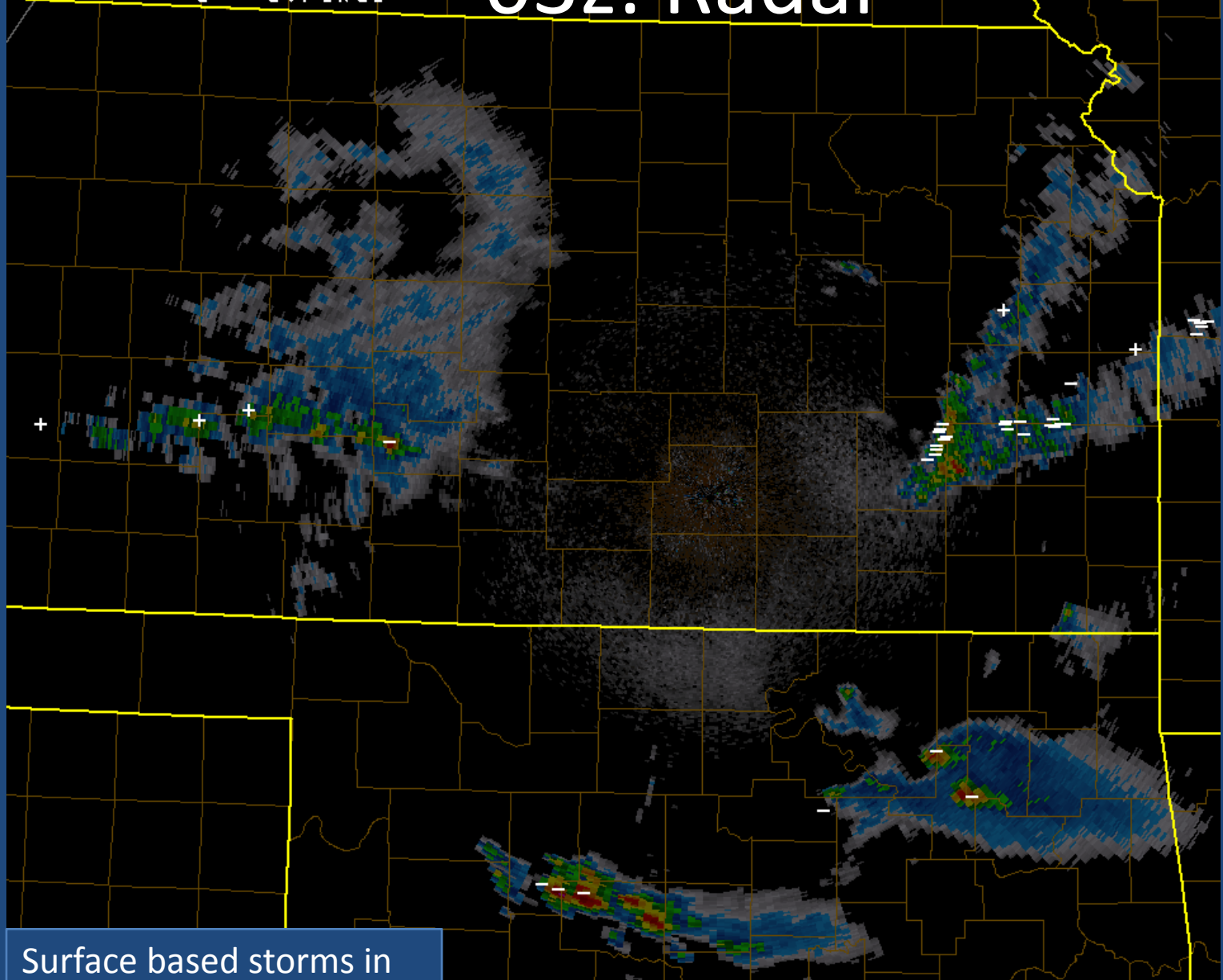
30 min Local Data Plot Tue 03:00Z 08-Apr-08  
METAR Tue 03:00Z 08-Apr-08

-20 10 -0+ 10 20 30 40 50 60 70

WCP 211  
1 km  
MX: 61dBZ

32 - strikes  
5 + strikes

# 03z: Radar

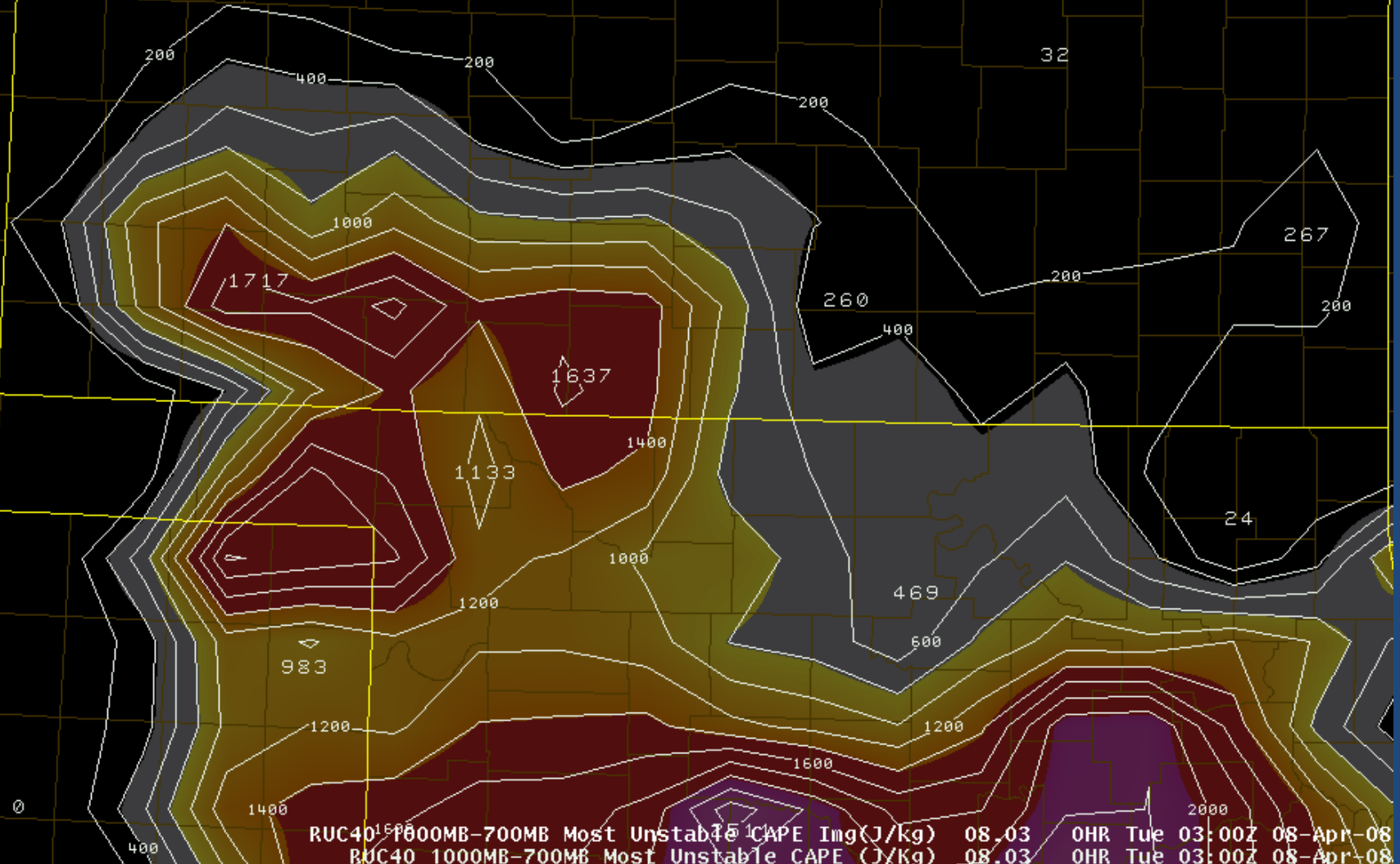


Surface based storms in OK, elevated storms in KS

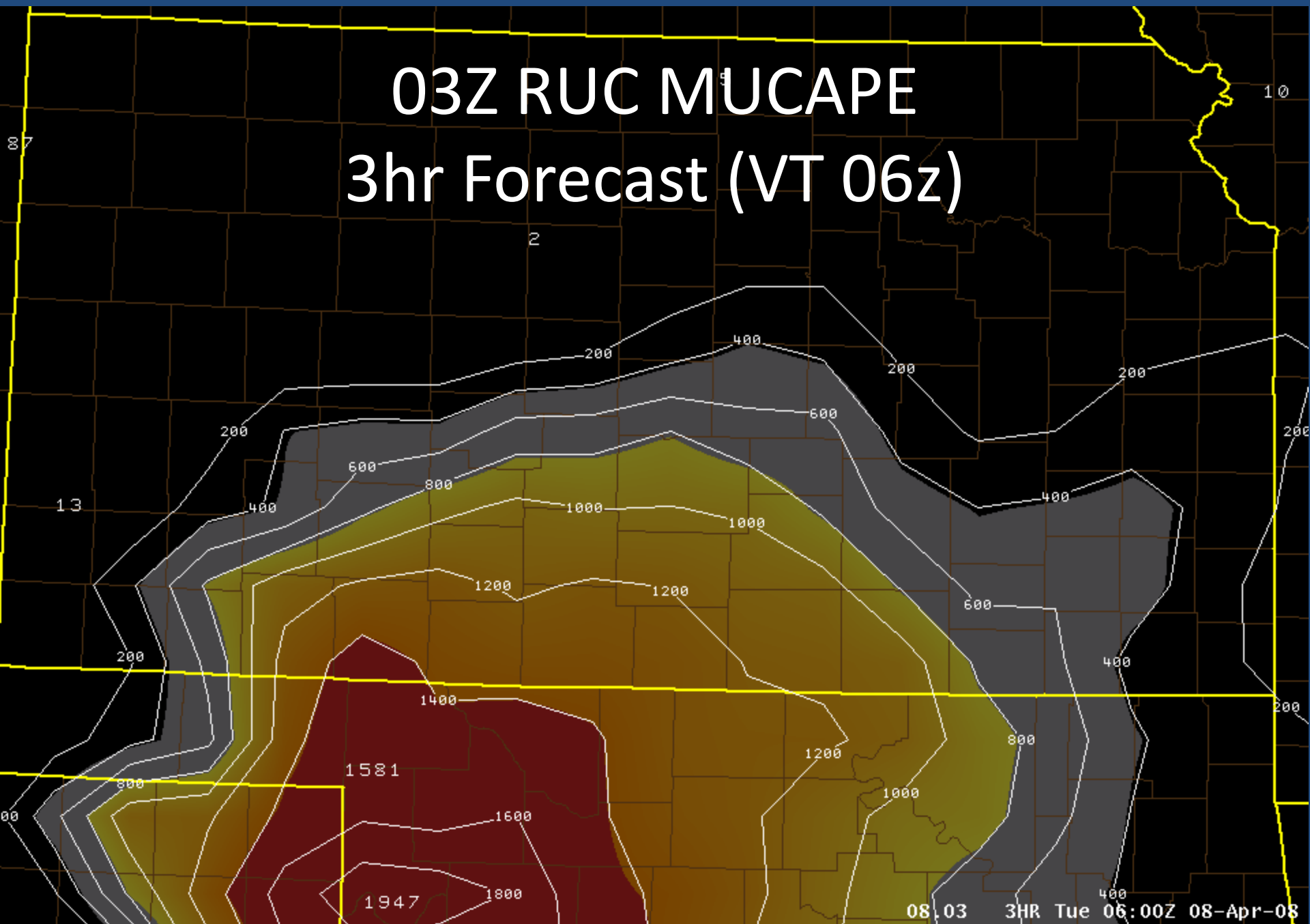
5 Minute Lightning Plot Tue 02:55Z 08-Apr-08  
kict 0.5 Reflectivity (dBZ) 8bit Tue 02:56Z 08-Apr-08

# 03z RUC MUCAPE (00hr)

Anything wrong with this picture?



# 03Z RUC MUCAPE 3hr Forecast (VT 06z)



# So what do YOU think now?

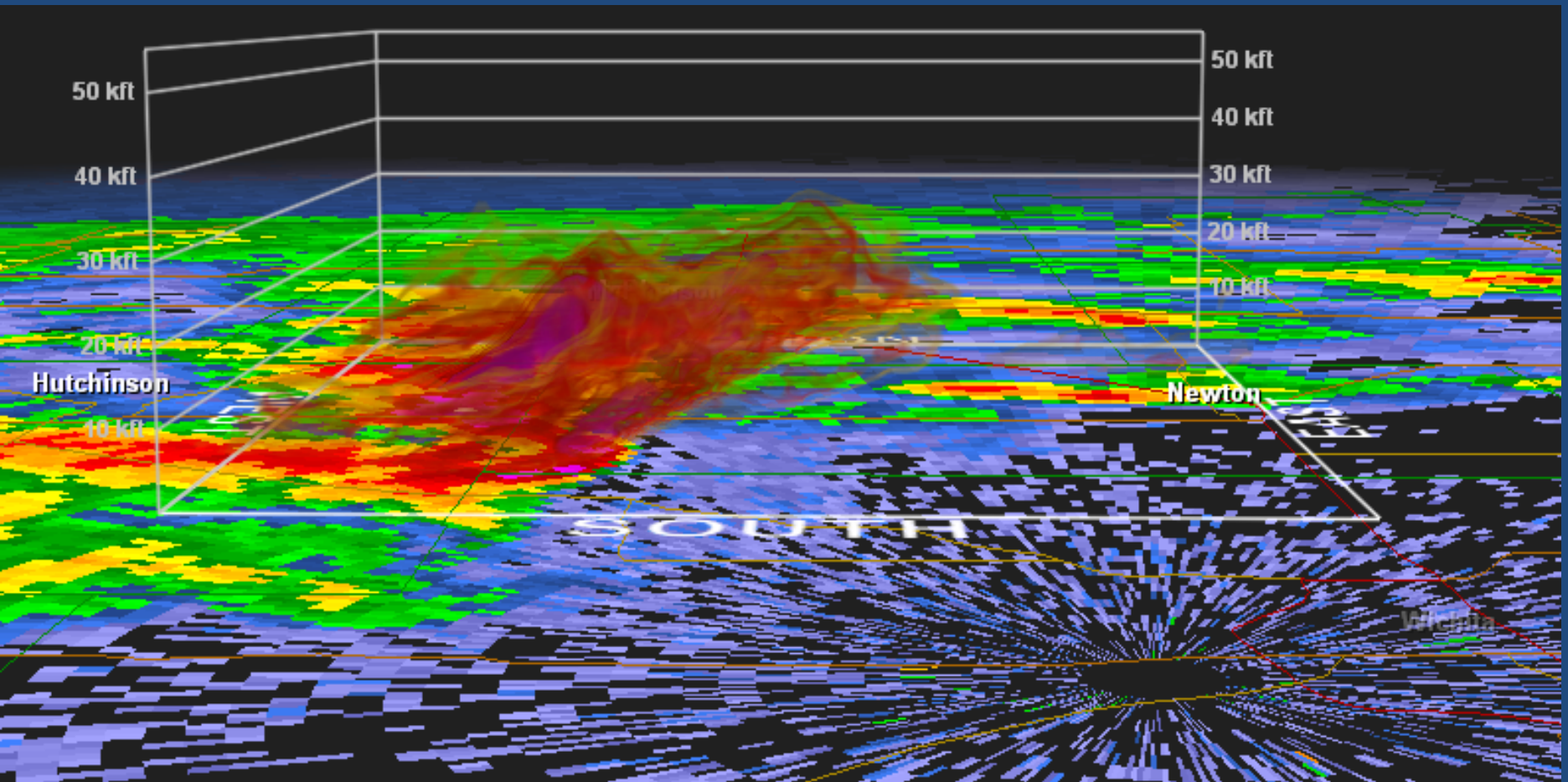
- Hail?
- Wind?
- Tornado?
- Any severe?





# 05z: Radar

(Houston, we have a big problem)



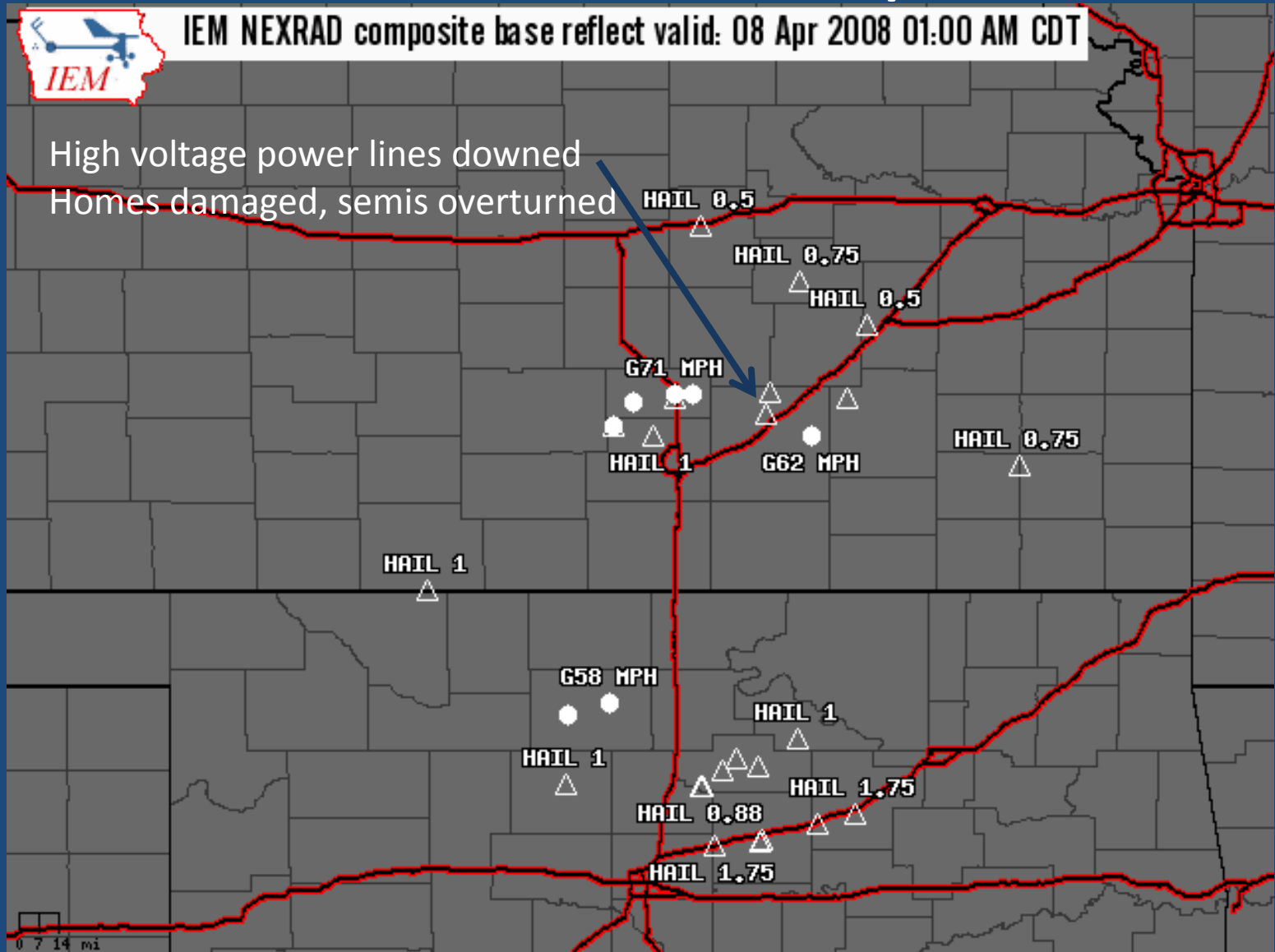


# Plotted Storm Reports

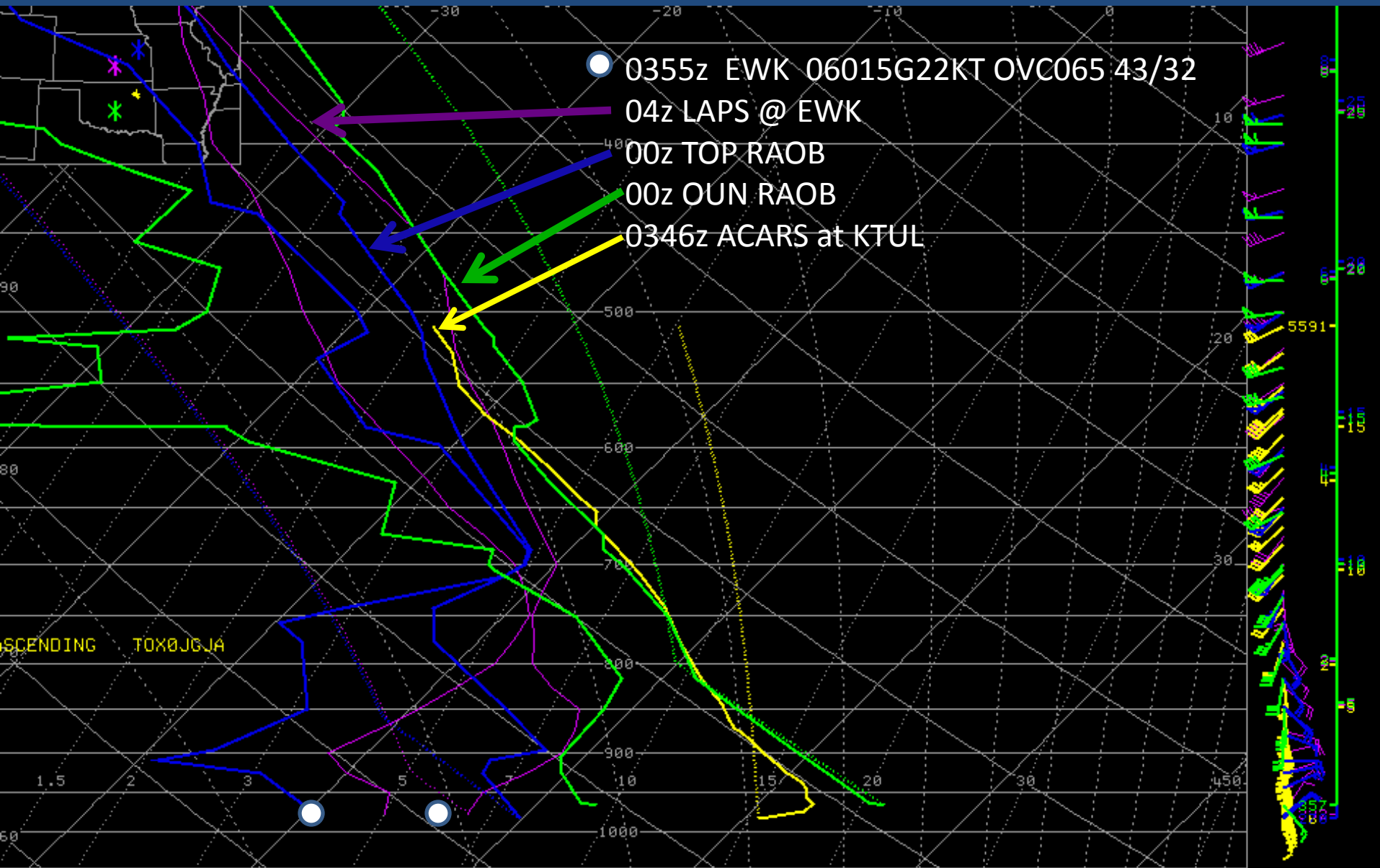


IEM NEXRAD composite base reflect valid: 08 Apr 2008 01:00 AM CDT

High voltage power lines down  
Homes damaged, semis overturned



# LAPS 04z Sounding



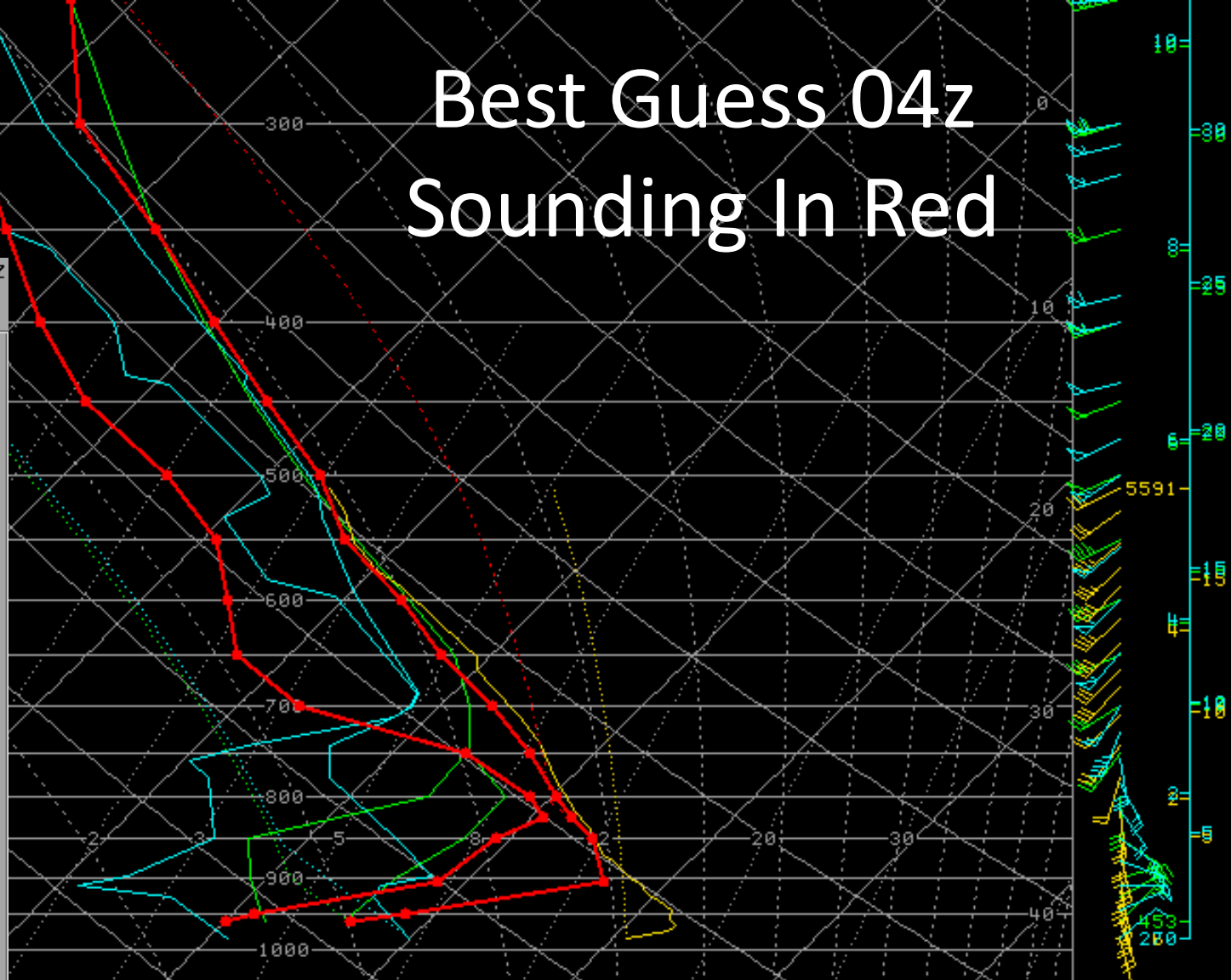


# Best Guess 04z Sounding In Red

RUC40 ptE 38.0N 97.4W 04/08/08 0400Z

based on a 825mb Lift

Precipitable Water= 0.93 in  
 K-Index= 31  
 Totals Index= 58  
 Sweat Index= 400  
 Dry Microburst Pot= 2: Gusts < 30 kts  
 Freezing Level= 10942 ft ASL  
 Wet-bulb Zero Hgt= 9673 ft ASL  
 0-6 km Avg Wind dir/spd= 224/17 kts  
 0-6 km Stm Motion (30R75)= 254/13 kts  
 0-3 km Stm Rel Helicity= 738 m2/s2  
 Forecast Max Temp= NA  
 Trigger Temp= 24 C/75 F  
 Soaring Index= NA  
 MDPI/WINDEX= 0.54 /0 kts  
 - Parcel Data -  
 Initial Parcel Pressure= 825 mb  
 Initial Parcel T/Td= 54/51 F  
 Initial Parcel T/Td= 12/11 C  
 Convective Temp= 44 F  
 Lifted Index= -6.62  
 CCL= 1487 ft ASL/960 mb  
 LCL= 6075 ft ASL/807 mb  
 LFC= 6972 ft ASL/783 mb  
 LFC2= 7074 ft ASL/780 mb  
 Max Hailsize= 12.44 cm/4.90 in  
 Max Vertical Velocity= 51 m/s  
 Equilibrium Level= 36007 ft ASL/230 mb  
 Approximate Cloud Top= 47736 ft ASL  
 Positive Energy Above LFC= 1882 J/kg  
 Negative Energy Below LFC= -3 J/kg



Interactive Skew-T (Editable) 08-04 08R Tue 04:00Z 08-Apr  
 K-IDX=NA19 PARCEL P= 989 mb Tue 00:00Z 08-Apr  
 TOT IDX=NA36 ROUN Skew-T Tue 00:00Z 08-Apr  
 SMT IDX=NA93 PRCL T/Td= 89/89 F: 200/200 F Tue 00:00Z 08-Apr  
 DMP=84 GST < 30 kts MDCRS ptC TUL Sounding (C) Tue 03:45Z 08-Apr  
 RUC40 ptE 38.0N 97.4W Sounding (C) 08-04 08R Tue 04:00Z 08-Apr

# HVLK1 Dir/Spd (kts)

Height (m) AGL	00z	01z	02z	03z	04z	0448z
2500	255/31	267/29	201/20	E190/25	E190/40	E190/55
2250	255/28	263/23	198/22		E190/37	
2000	251/28	251/18	206/22	E220/22	195/45	E190/50
1750	249/28	248/17	210/25	E185/30	E190/33	E190/50
1500	221/18	209/16	209/27	177/30	177/39	E160/40
1250	207/19	187/17	181/24	169/31	162/33	E150/35
1000	166/19	E180/25	176/26	150/31		
750	115/19	E155/20	150/27	E100/22		
500	94/17	E90/22	E80/25	E60/30	E50/30	E45/40
sfc						

# HBRK1 Dir/Spd (kts)

Height (m) AGL	00z	01z	02z	03z	04z	0448z
2500	224/42	227/50	238/29	242/21	E255/15	
2250	212/37	226/45	233/33	E230/27	228/28	
2000	213/37	204/36	E230/35	E230/25	E220/30	
1750	E210/30	184/29	E210/35	E205/30	195/24	
1500	178/28	183/26	179/28	E215/35		
1250	152/30	159/28	170/32	E180/30		
1000	128/32	E120/27	E130/30	138/28		
750	92/35	E90/32	E115/30	E100/30	E95/27	
500	86/36	72/36	71/25	E70/30	E70/37	E80/45
sfc						

Heights AGL

H 4400' +55kts

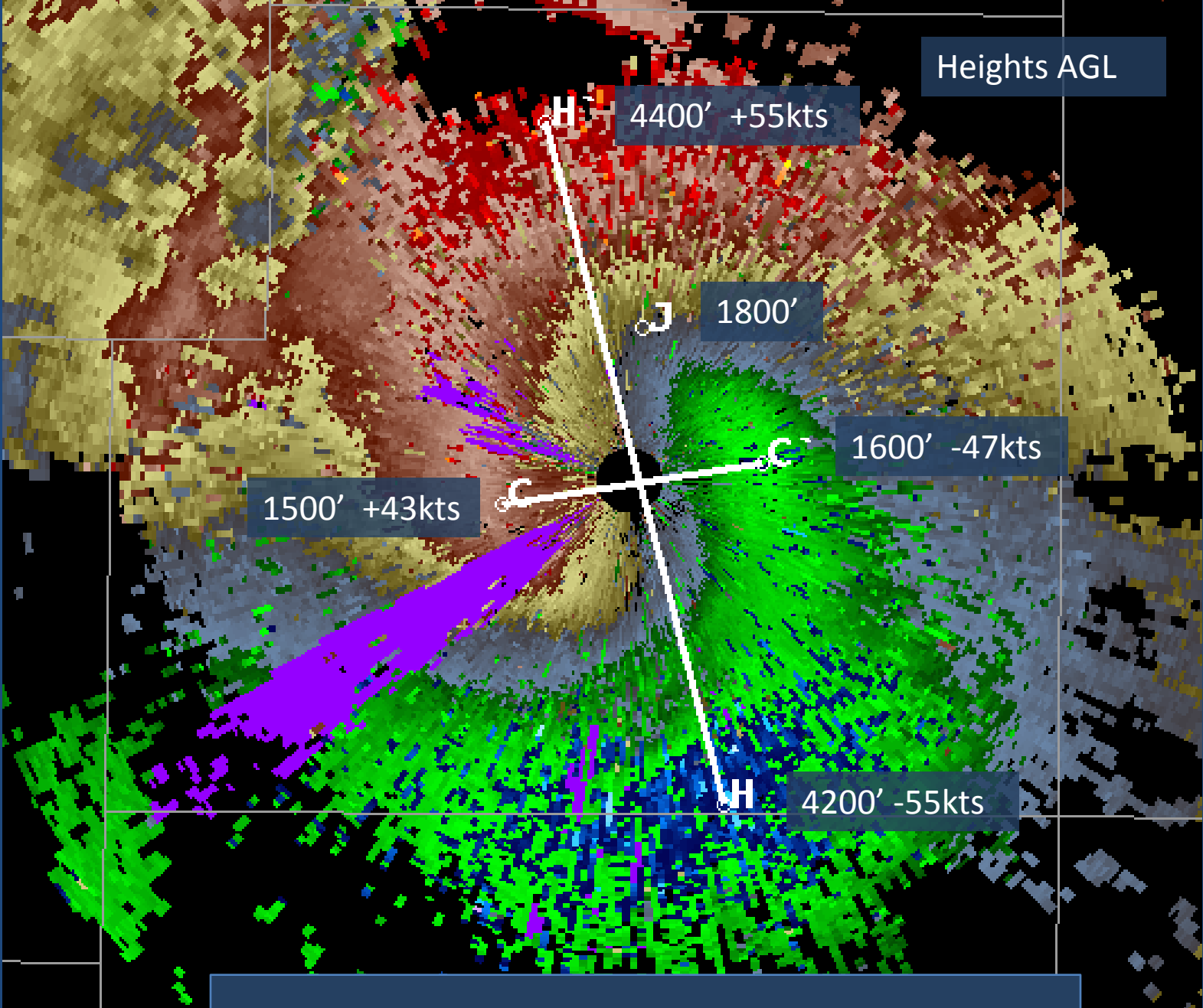
J 1800'

C 1600' -47kts

1500' +43kts

H 4200' -55kts

3.4 Deg Base Velocity KICT 0504z



# Meteorological Observations

- Initial conceptual plan was incorrect, despite later RUC/LAPS data suggesting it was still on target
- Instability **much higher** than initially thought
- It appears that the initial high wind was the result of a core collapse
- Subsequent severe wind may have been a function of midlevel wind diverted down and/or synergistic interaction with gravity waves
- Gravity wave train extended into SW KS (wavelength = 23nm, period = 27min)
- Surface temperatures only cooled about 5F with storm passage, which suggests low level evaporative cooling was not the primary factor, mid level dry air may have been

# Operational Observations

- Monitoring observational data are critical for validating model data, but it may not be sufficient
- Warning process:
  - Observation of severe wind in DDC CWA
  - Radar indicated a very large storm w/ high velocities at 0.5 slice
  - Warning team correctly discounted conceptual model and warned
  - Team correctly continued to warn downstream storms despite initial significant lag in severe reports
  - NOTE: Incorrect Mesoscale Situational Awareness can be worse than no environmental data in warning decisions (Wolf/Howerton)
- Use higher base velocity slices as a proxy to VWP and to monitor changes in winds over time.