

***Impressive Nocturnal  
Heat Burst  
over Wichita, Kansas  
June 9<sup>th</sup>, 2011***

By Kevin Darmofal  
WFO Wichita, KS

# What is a Heat Burst ?

- Localized, sudden increase in surface temperature associated with a thunderstorm, shower or mesoscale convective system, often accompanied by extreme drying. Occurs in association with precipitation-driven downdrafts penetrating a shallow surface layer and reaching the ground.

*Source: AMS, Glossary of Meteorology*

- *Characteristics from prior cases have shown presence of a deep, dry-adiabatic layer aloft (~ 450-700 mb), with a more stable layer near the surface (usually with the nocturnal inversion). The downdraft within the decaying precipitation warms and accelerates within the dry-adiabatic layer, eventually penetrating the more stable layer near the ground in the form of a heat burst.*

# How Rare are Heat Bursts?

## Some Recent and Notable Occurrences

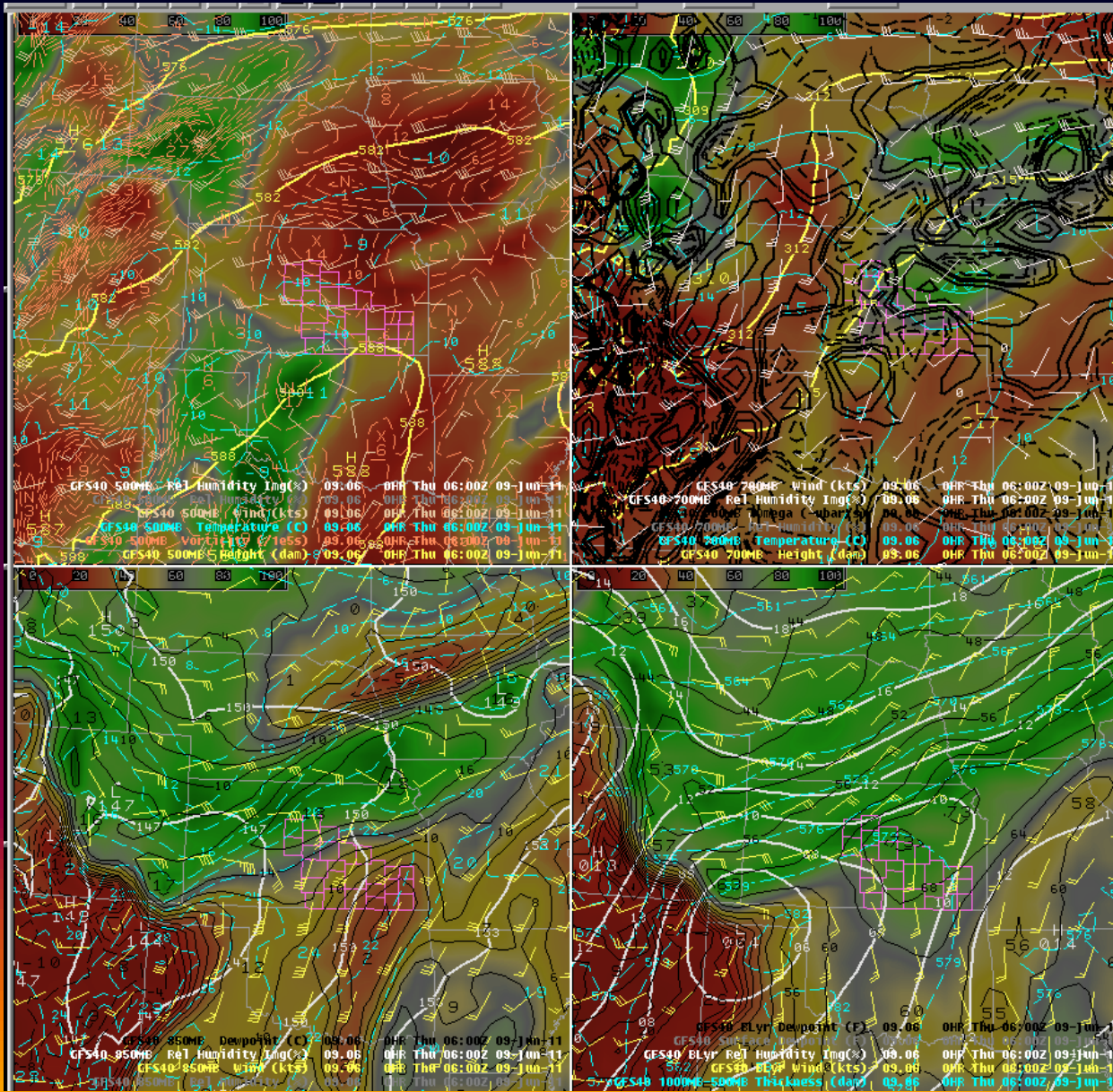
- Central Oklahoma, May 12-13, 2009 : Temperature climbed to over 90 degrees in the late evening at Hollis, OK, with Dew Point drop over 30 degrees. Several overnight heat bursts also in the OKC metro area with minor wind damage.
- Sioux Falls, SD, August 3, 2006 : Temperature rose from 70 to 101 in less than 20 minutes, and accompanied by 30 mph winds.
- Midland, TX, June 16, 2006 : Temperature rose from 71 to 97 degrees in 15 minutes just before Midland, TX, with wind measured to 62 mph.
- Emporia, KS, May 25, 2006 : Temperature rose from 71 to 91 degrees in 15 minutes around 5 am.
- Canby, MN, July 16, 2006 : Temperature rose from 71 to 100 degrees and Dew Point dropped from 70F to 32F in one hour (65 mph wind gust).
- Cherokee, OK, July 11, 1909 : at 3 am a Heat Burst caused the temperature to soar and briefly hit 136 degrees, desiccating crops.





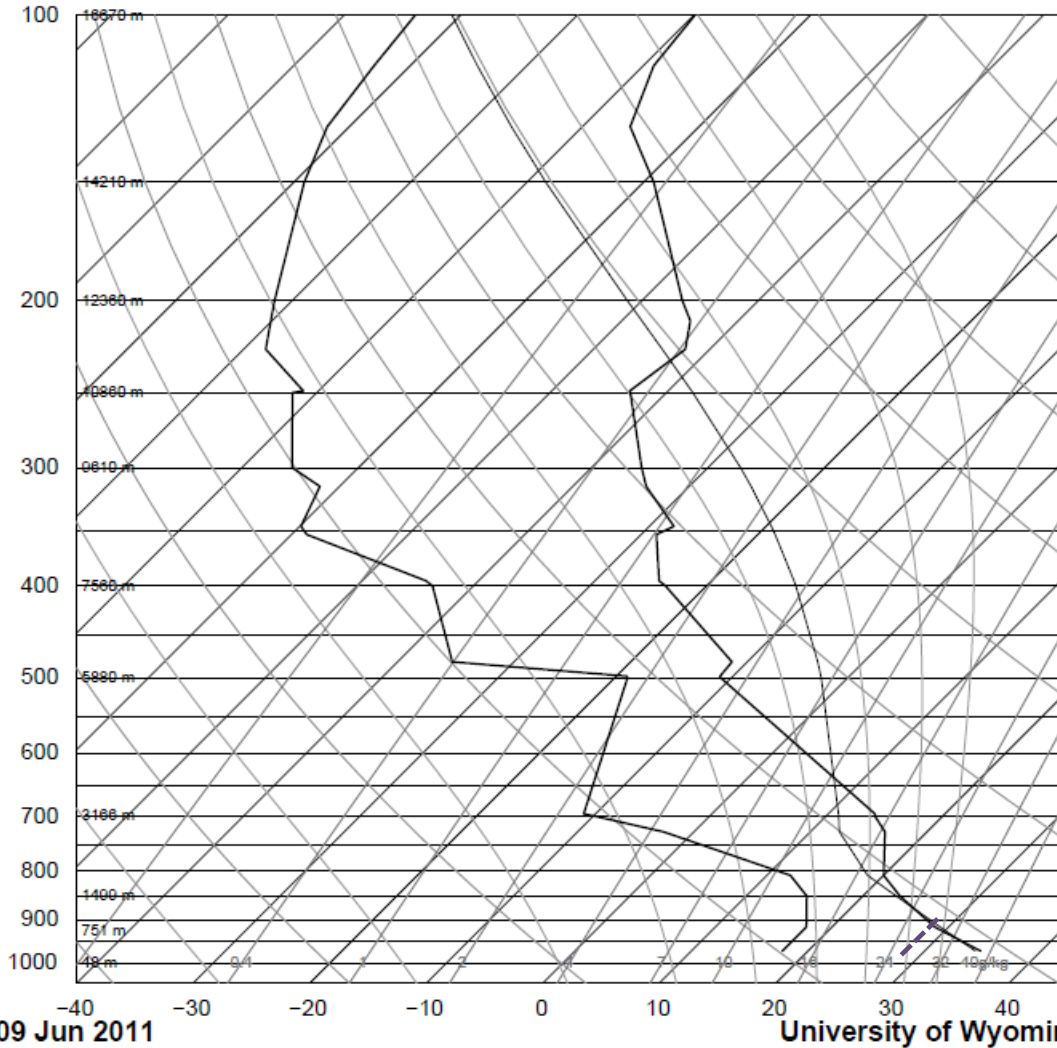


# Synoptic Overview..



# Proximity Sounding Prior to Event

74646 LMN Lamont Oklahoma



00Z 09 Jun 2011

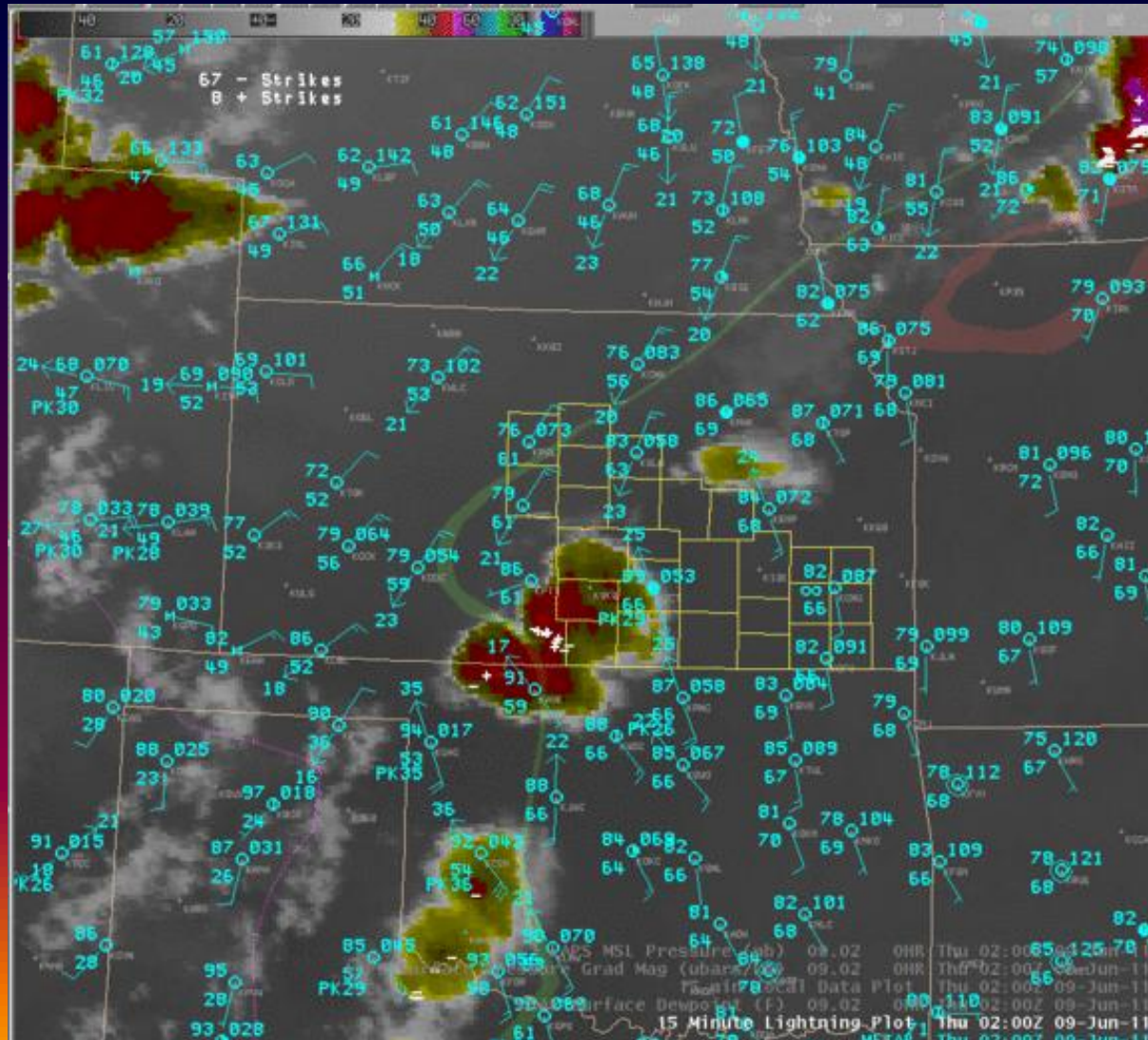
University of Wyoming

SLAT 36.62  
 SLON -97.48  
 SELV 317.0  
 SHOW -7.93  
 LIFT -8.68  
 LFTV -9.47  
 SWET 580.0  
 KINX 25.30  
 CTOT 28.10  
 VTOT 34.10  
 TOTL 80.20  
 CAPE 2138.  
 CAPV 2309.  
 CINS -192.  
 CINV -108.  
 EQLV 231.2  
 EQTV 231.0  
 LFCT 640.0  
 LFCV 666.6  
 BRCH 49.33  
 BRCV 53.28  
 LCLT 287.7  
 LCLP 769.3  
 MLTH 310.1  
 MLMR 13.77  
 THCK 5832.  
 PWAT 33.79

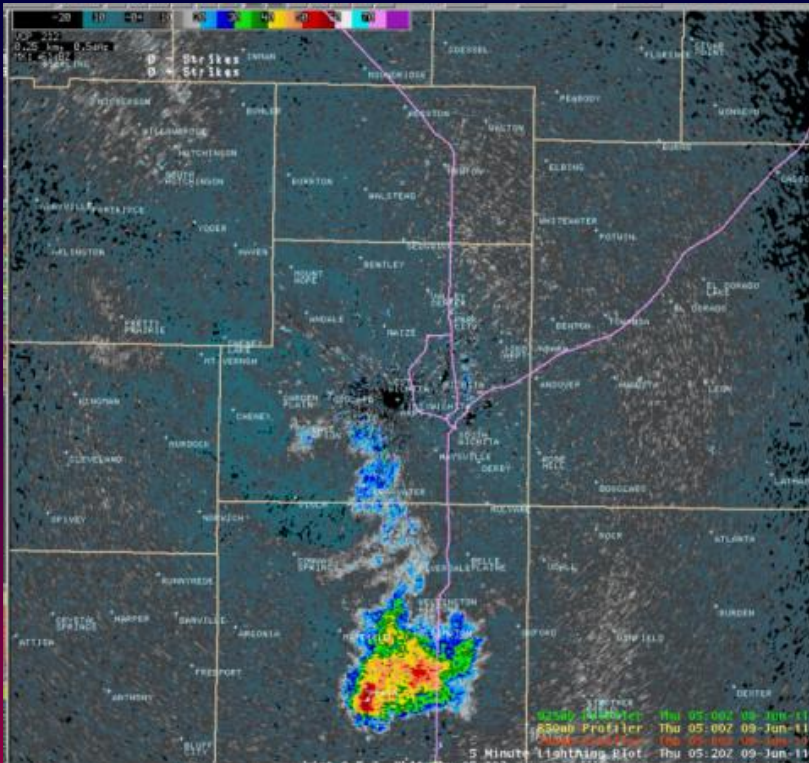
**84 / 66**  
**at KICT**



# IR Satellite/Lightning Replay..

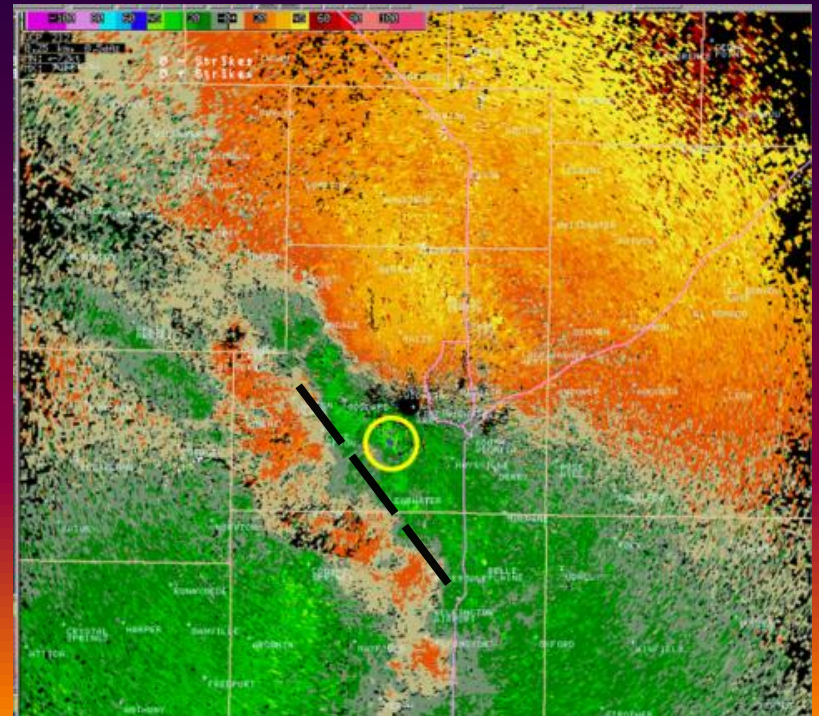


# What did Radar show?



*Weak reflectivity from decaying convection that originated over Harper county, KS*

*Small but locally strong inbound velocity core just southwest of KICT, with trailing divergent downburst signature of heat burst.*

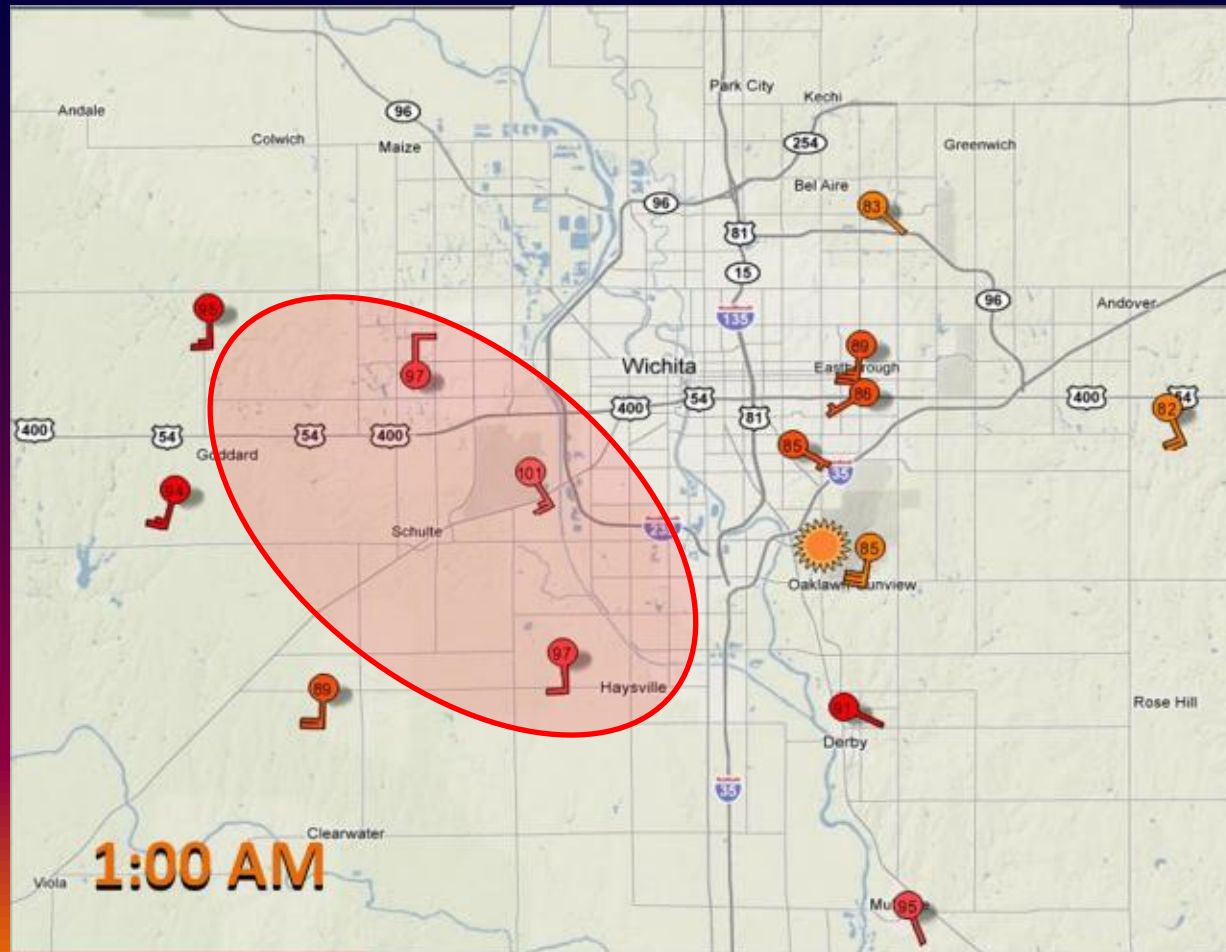




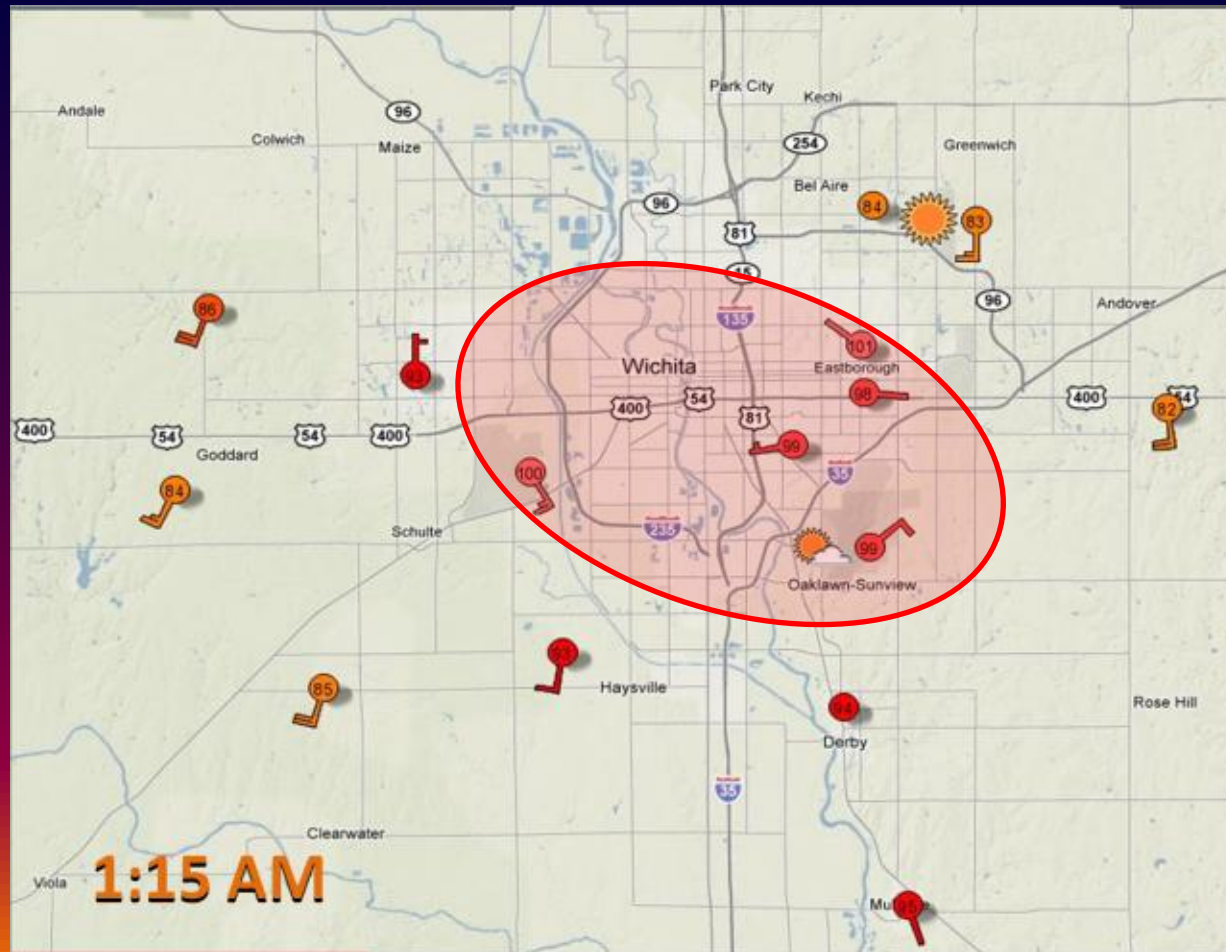
# *What happened?*

- *The temperature soared 17 degrees in 20 minutes from 85 degrees to 102 degrees at 1242 am.*
- *This equaled the calendar day (CST) high of 102. Ironically both fell 1 degree shy of the record high for the date.*
- *The Dew Point temperature plummeted from the mid 60s into the 20s.*
- *The heat burst continued to move east across the midtown area by 1 am, and eventually the east side of the metro area by 2am.*
- *Wind gusts of 45 to 58 mph were observed across the area with no rainfall.*

# Heat Burst Observed...

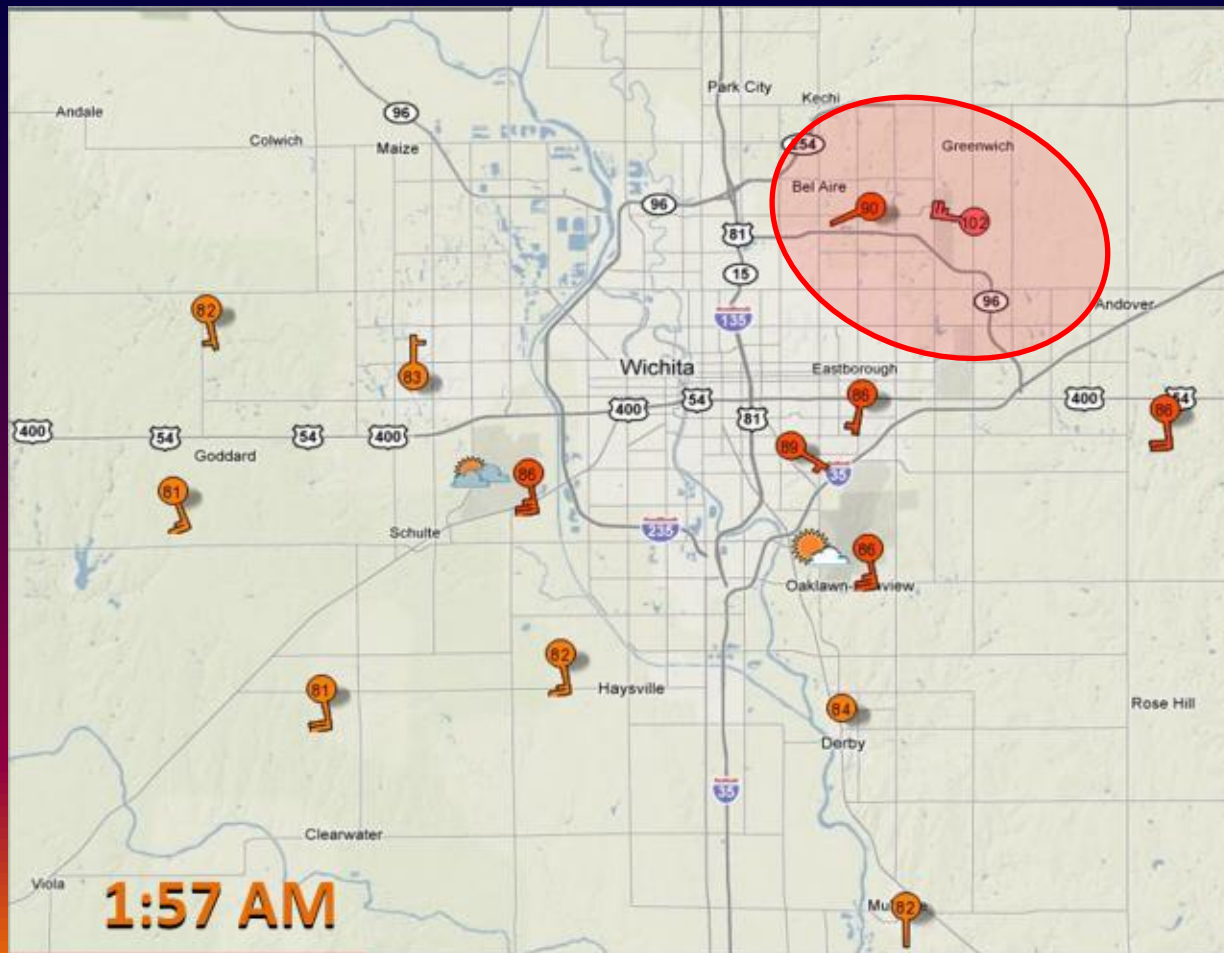


# Heat Burst Observed...

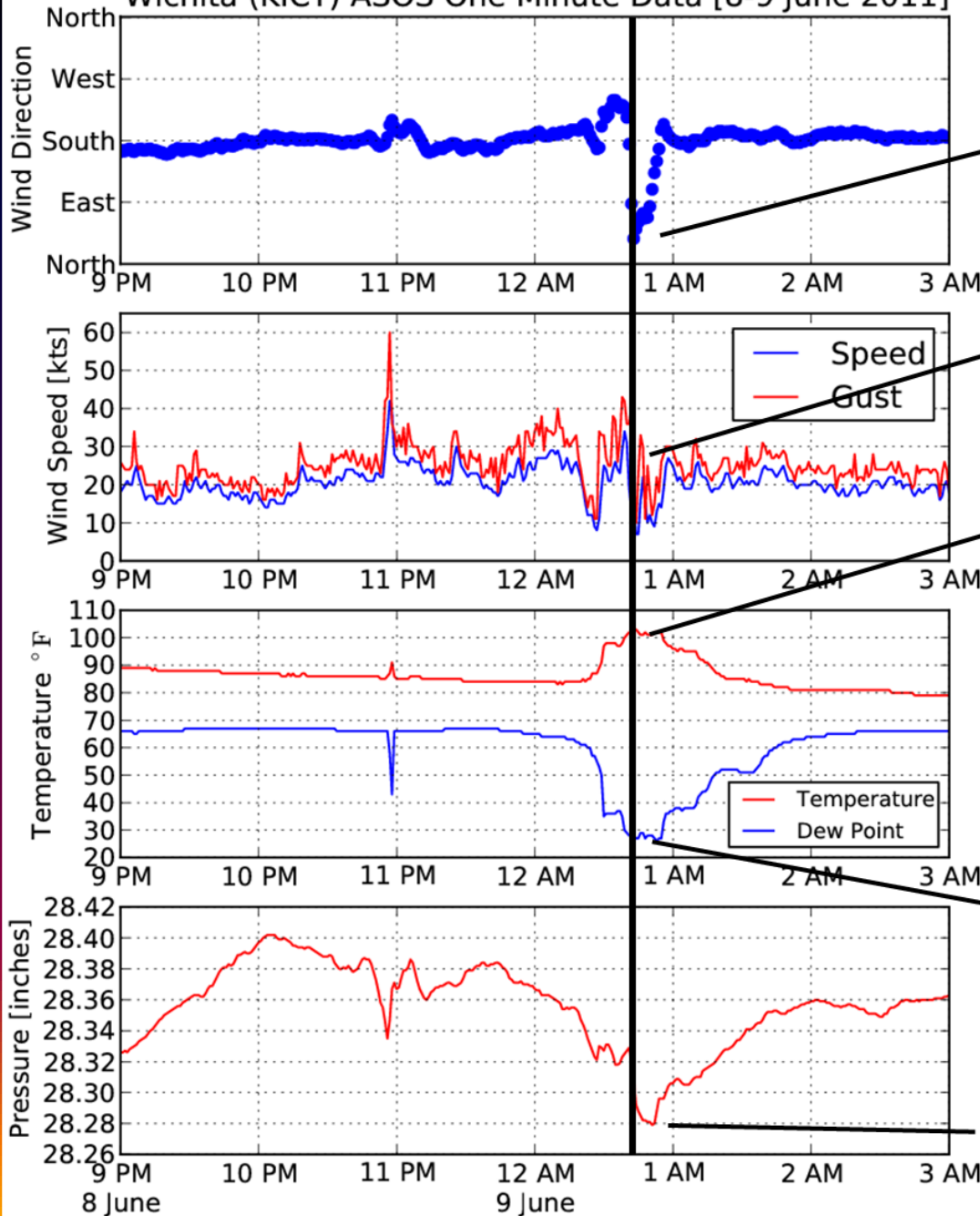




# Heat Burst Observed...



# Wichita (KICT) ASOS One Minute Data [8-9 June 2011]



Winds switch direction

Wind Gusts

Peak In Temperature

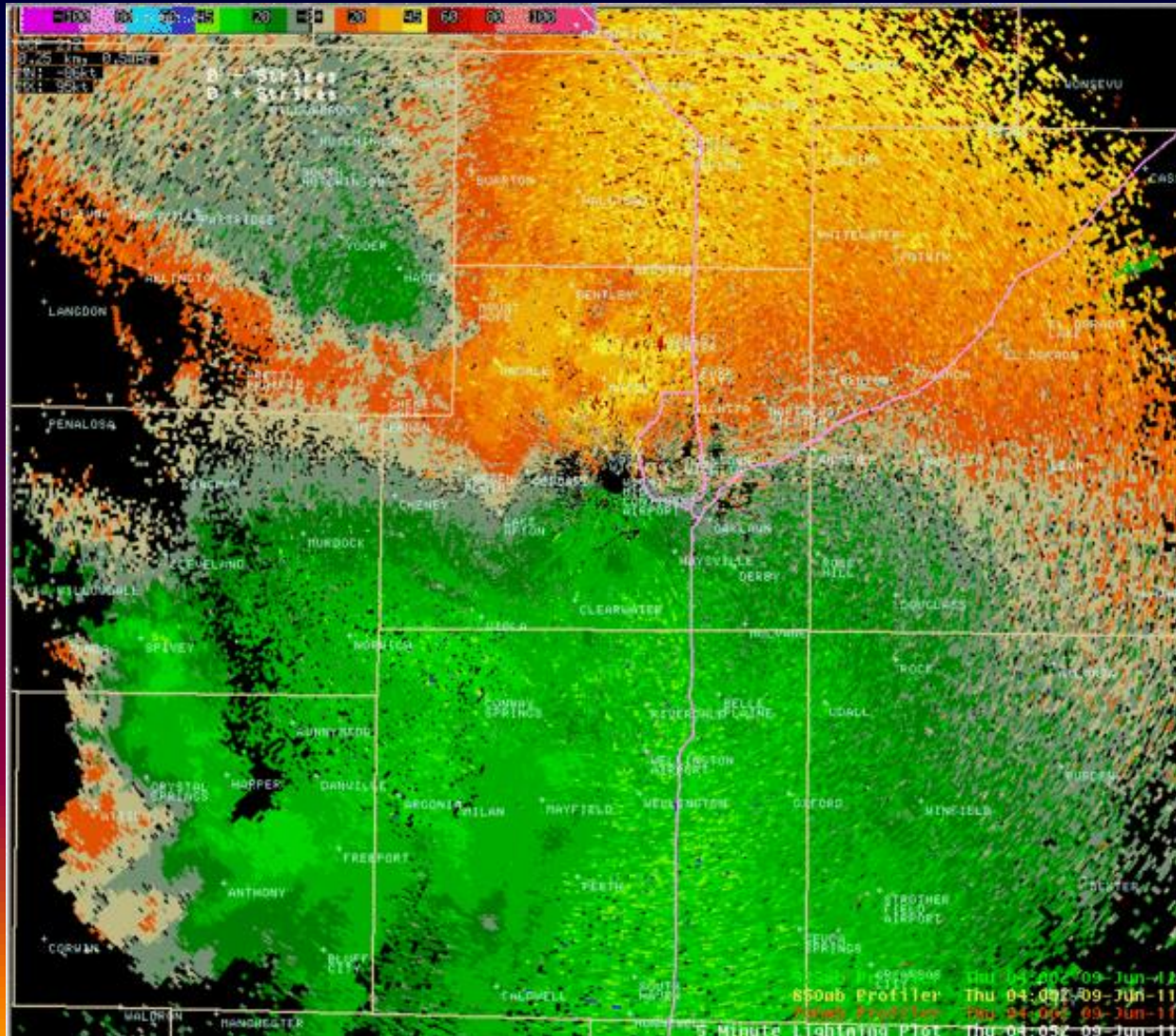
Decrease In Dewpoint

Decrease in Pressure

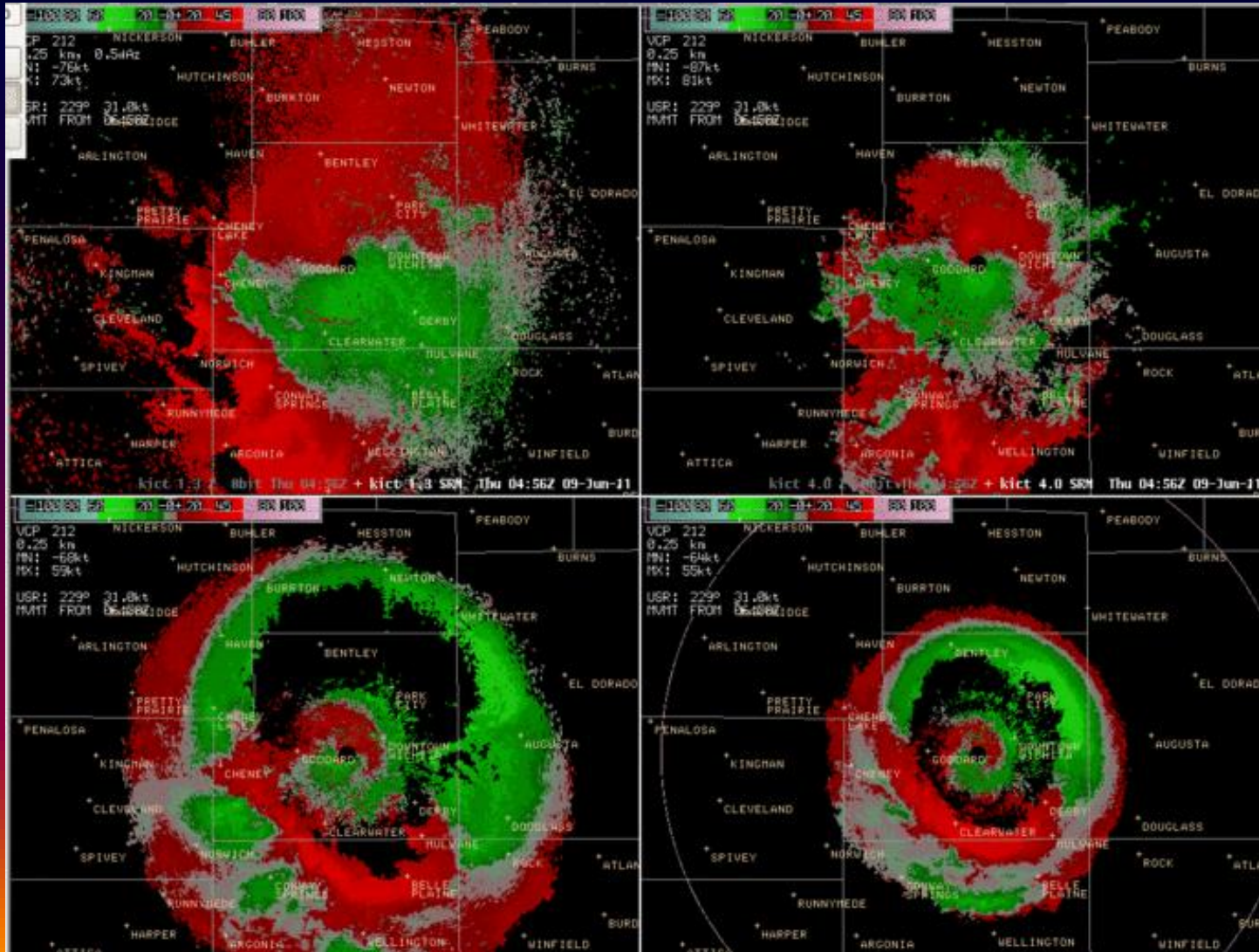




# Radar Velocity Replay...

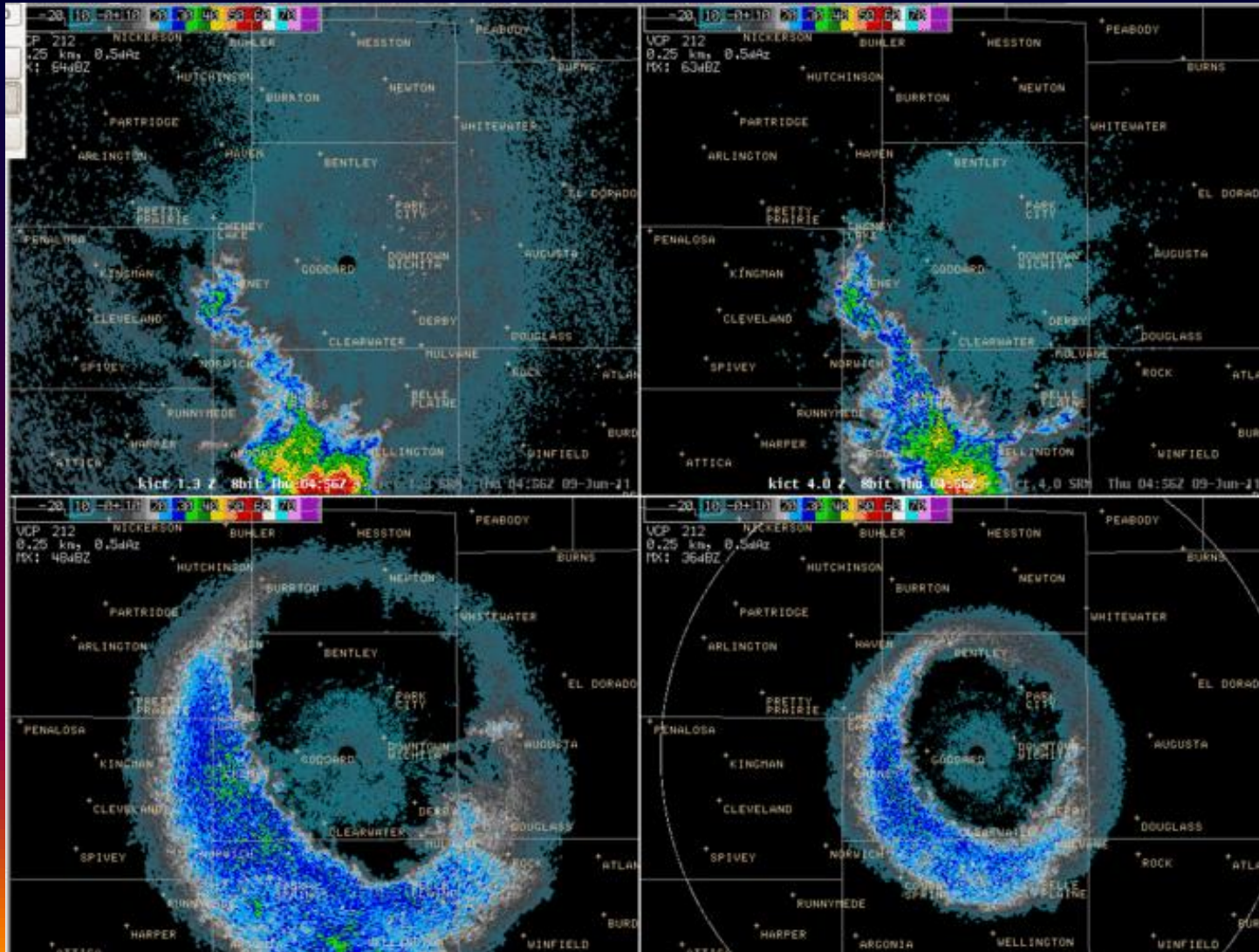


# Radar SRM/Multi-Elevation Slices...



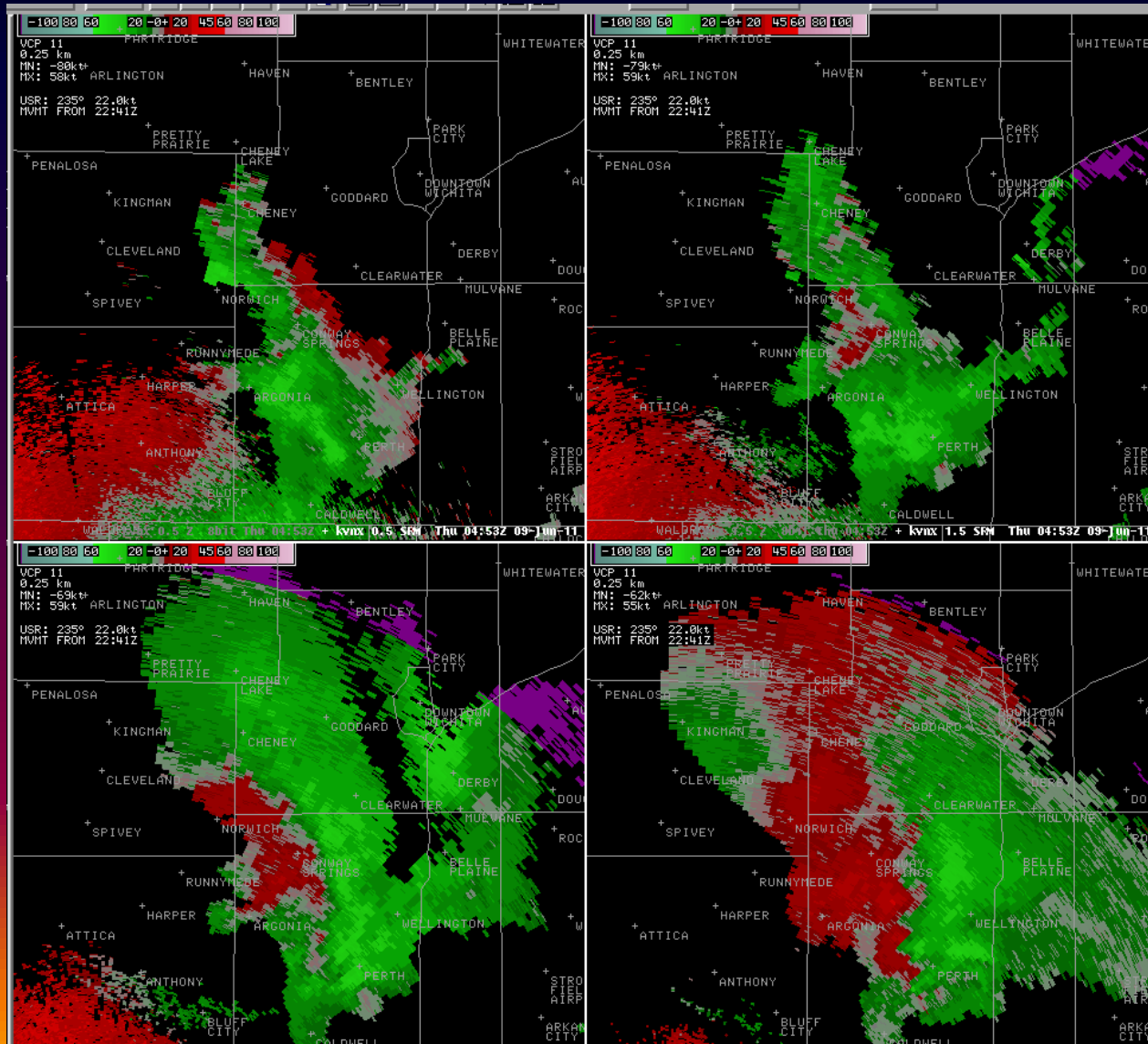


# Radar Z/Multi-Elevation Slices...

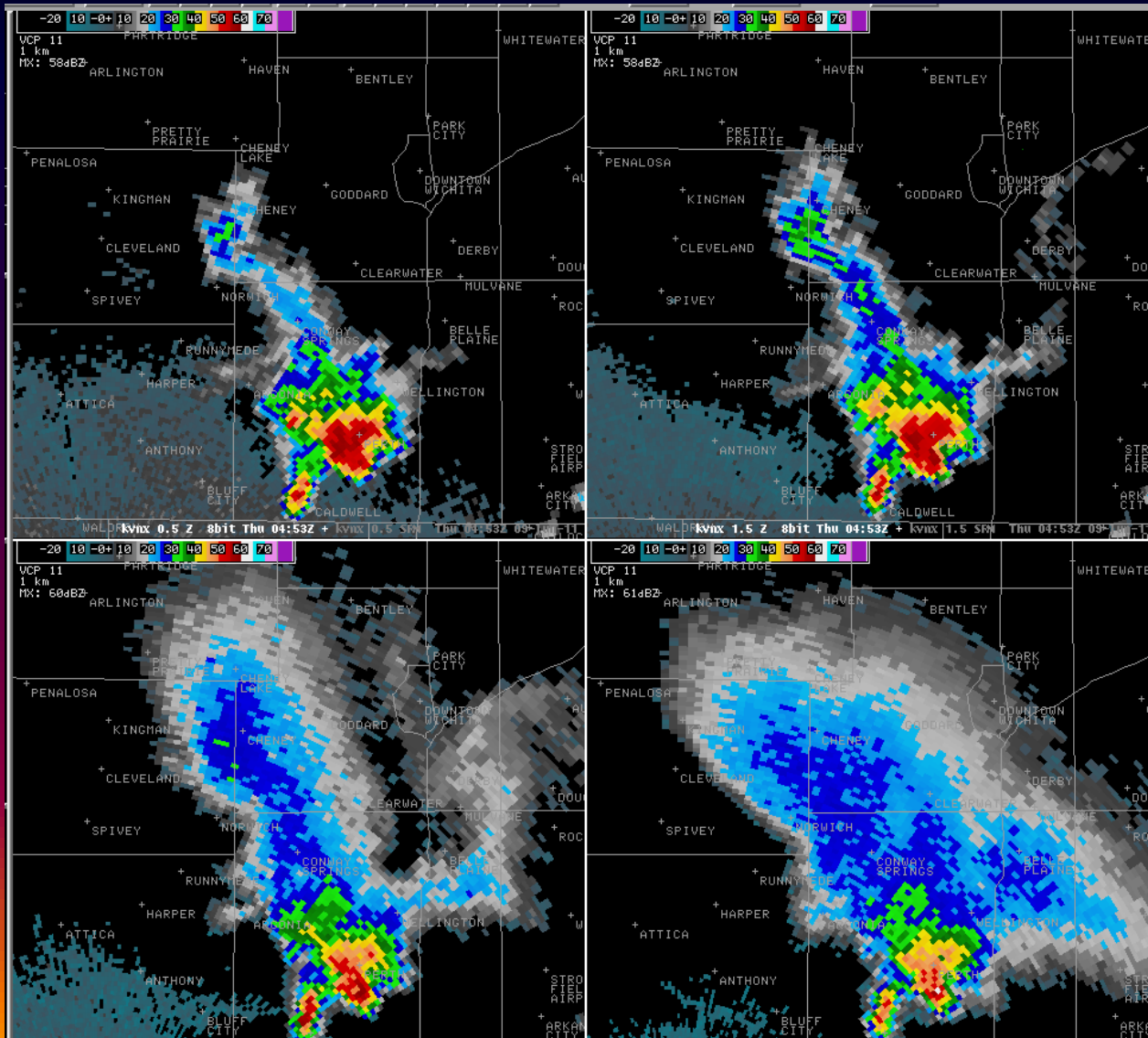




# View from KVNx (SRM/Multi-Elevation)...



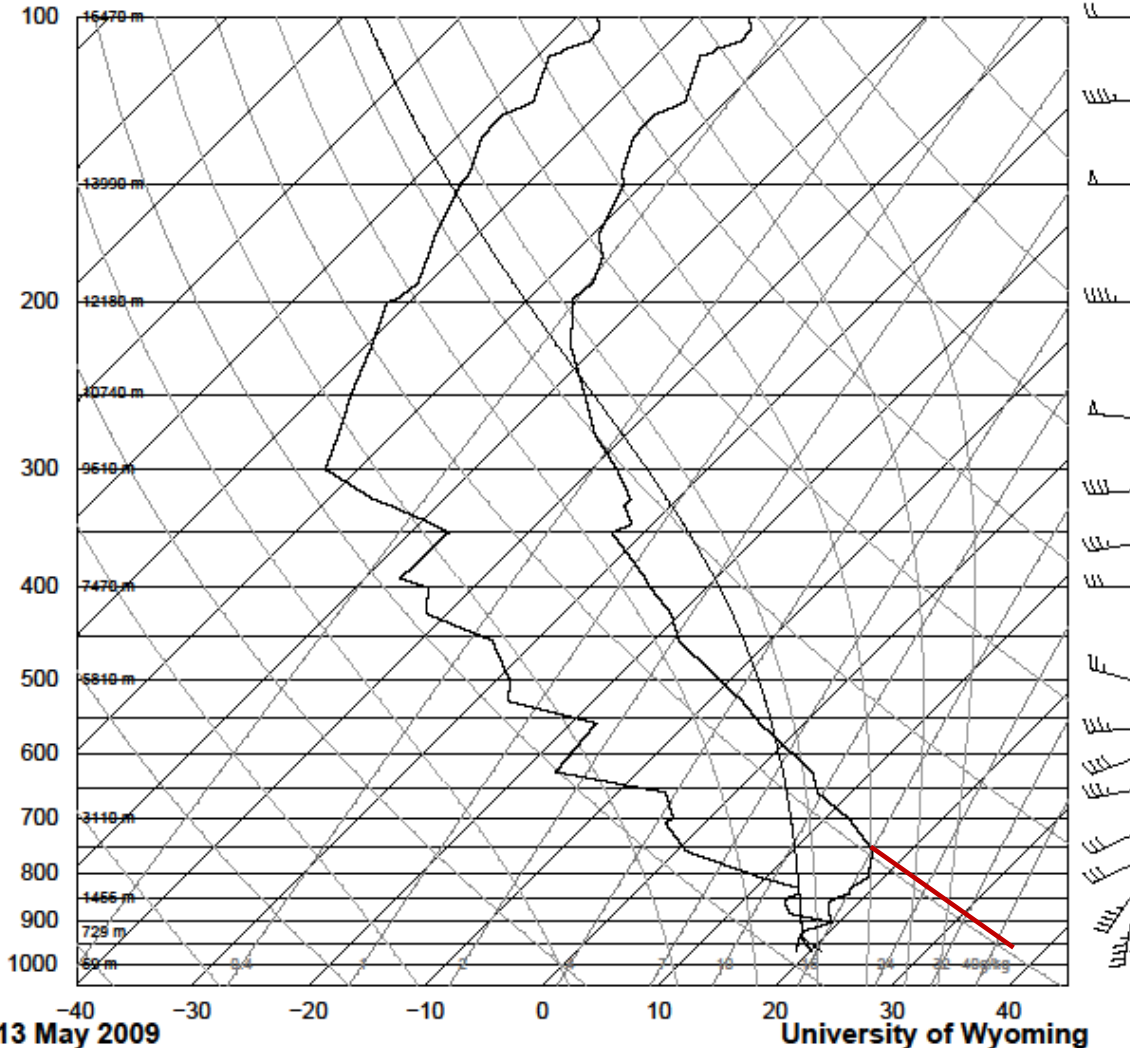
# View from KVNx (Z/Multi-Elevation)...



# Prior Case : May 12-13, 2009

## Central Oklahoma

72357 OUN Norman



SLAT 35.18  
 SLON -97.44  
 SELV 345.0  
 SHOW -3.94  
 LIFT -3.33  
 LFTV -3.90  
 SWET 503.4  
 KINX 27.20  
 CTOT 24.60  
 VTOT 28.70  
 TOTL 53.30  
 CAPE 897.4  
 CAPV 971.8  
 CINS -503.  
 CINV -428.  
 EQLV 239.4  
 EQTV 239.0  
 LFCT 575.6  
 LFCV 590.9  
 BRCH 5.55  
 BRCV 6.01  
 LCLT 291.1  
 LCLP 934.1  
 MLTH 296.9  
 MLMR 14.13  
 THCK 575.1  
 PWAT 32.33

**37C;98F**

**90**

00Z 13 May 2009

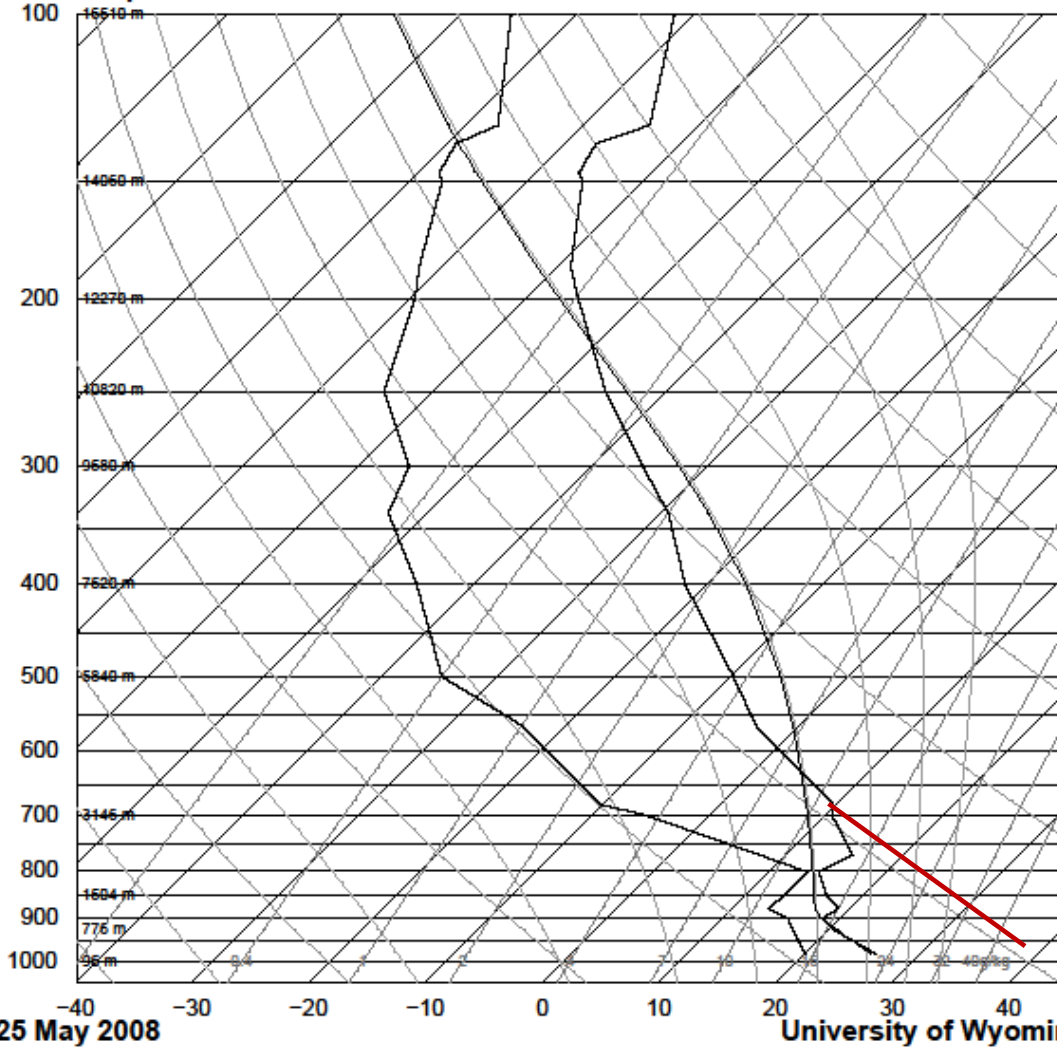
University of Wyoming



# Prior Case : May 25, 2008

## Emporia, KS

72456 TOP Topeka



SLAT 39.07  
 SLON -95.62  
 SELV 270.0  
 SHOW -2.06  
 LIFT -4.03  
 LFTV -4.77  
 SWET 416.6  
 KINX 23.90  
 CTOT 23.10  
 VTOT 26.70  
 TOTL 49.80  
 CAPE 959.6  
 CAPV 1086.  
 CINS -179.  
 CINV -114.  
 EQLV 223.2  
 EQTV 222.6  
 LFCT 630.9  
 LFCV 655.7  
 BRCH 13.60  
 BRCV 15.40  
 LCLT 290.5  
 LCLP 888.1  
 MLTH 300.5  
 MLMR 14.27  
 THCK 5745.  
 PWAT 33.78

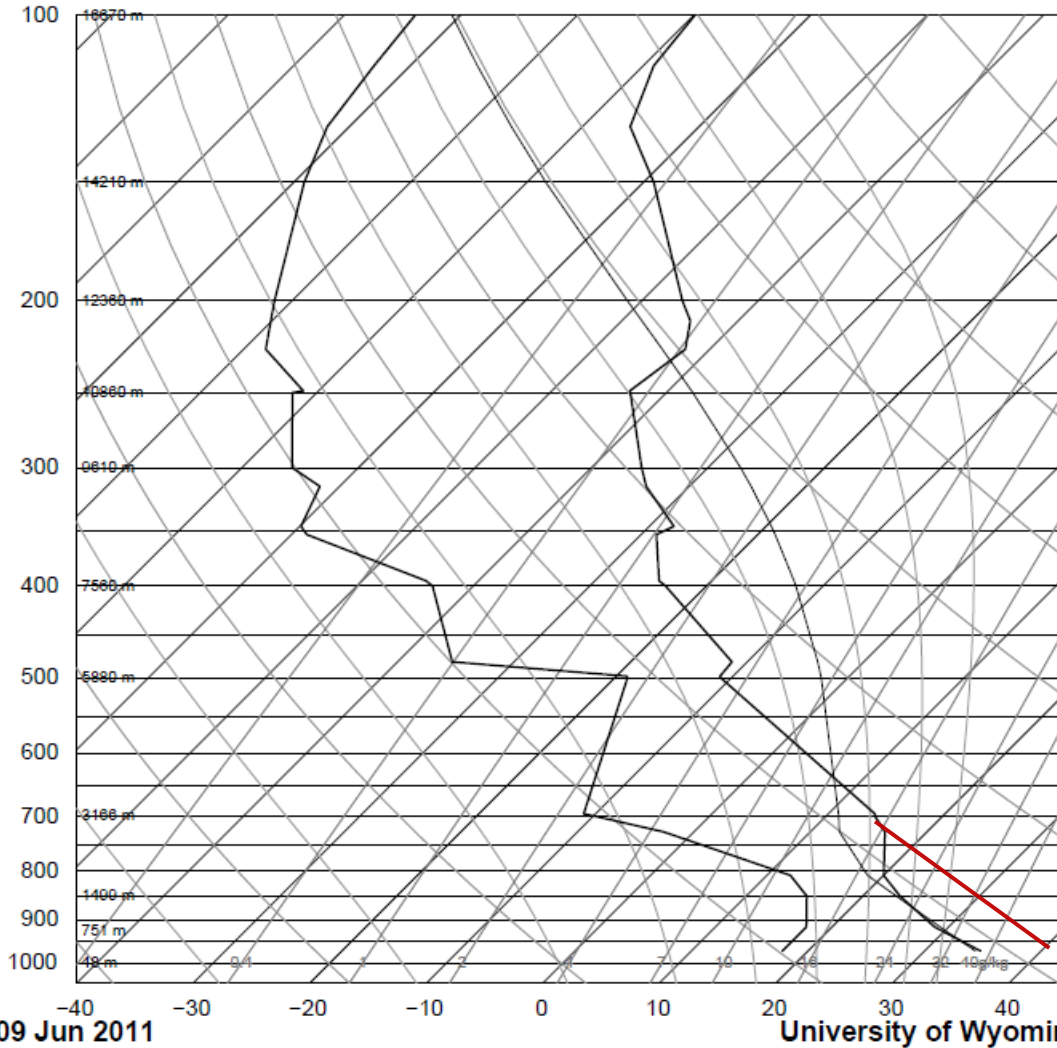
**38C;100F**

**91**



# Proximity Sounding Prior to Event

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 BRCV 53.28  
 LCLT 287.7  
 LCLP 769.3  
 MLTH 310.1  
 MLMR 13.77  
 THCK 5832.  
 PWAT 33.79

**40C;104F**

**102**



# ***Thanks and Credits...***

- ***WeatherUnderground, for the mesonet data which showed the progression of the heat burst.***
- ***University of Wyoming for the sounding data presented.***
- ***Daryl Herzmann and Jerilyn Billings for the one minute KICT ASOS data/element graphs.***
  
- ***Post conference requests about this event or presentation send to: [kevin.darmofal@noaa.gov](mailto:kevin.darmofal@noaa.gov)***