

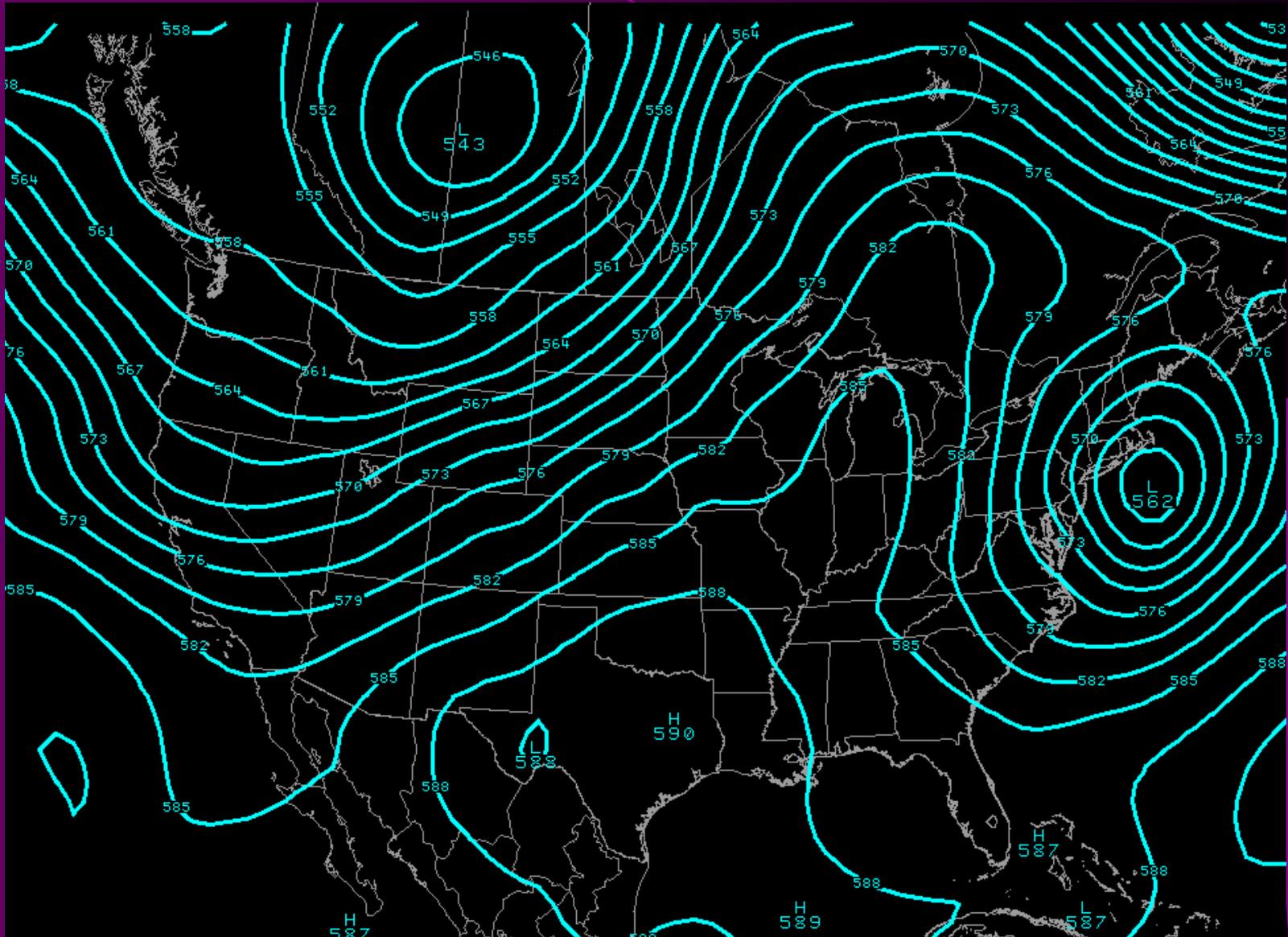
An Examination of the June 22, 2003 Aurora Nebraska Record Hail Event

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NWS Hastings, NE

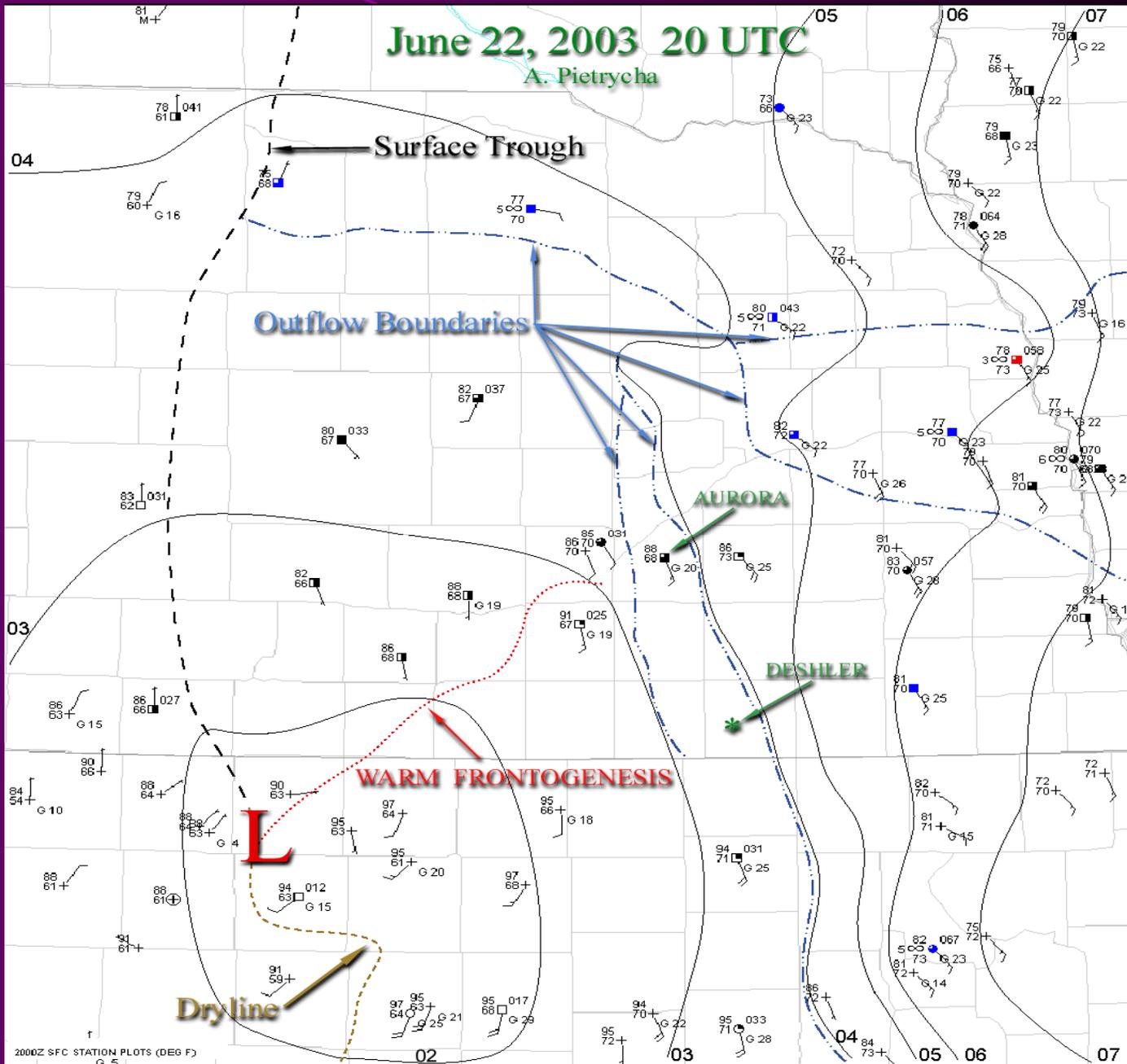
Introduction

- Several supercells developed in the Hastings' CWA during the late afternoon/evening of June 22, 2003
- One of these moved northeast across Hamilton County producing record hail and two F0 tornadoes
- Additional supercell storms formed in Thayer county resulting in the first tornado related fatality in the Hastings' CWA since the 1980 Grand Island tornado.
- Flash flooding was also a concern due to the slow moving nature of the storms

0Z ETA 500 mb Heights



Surface Analysis

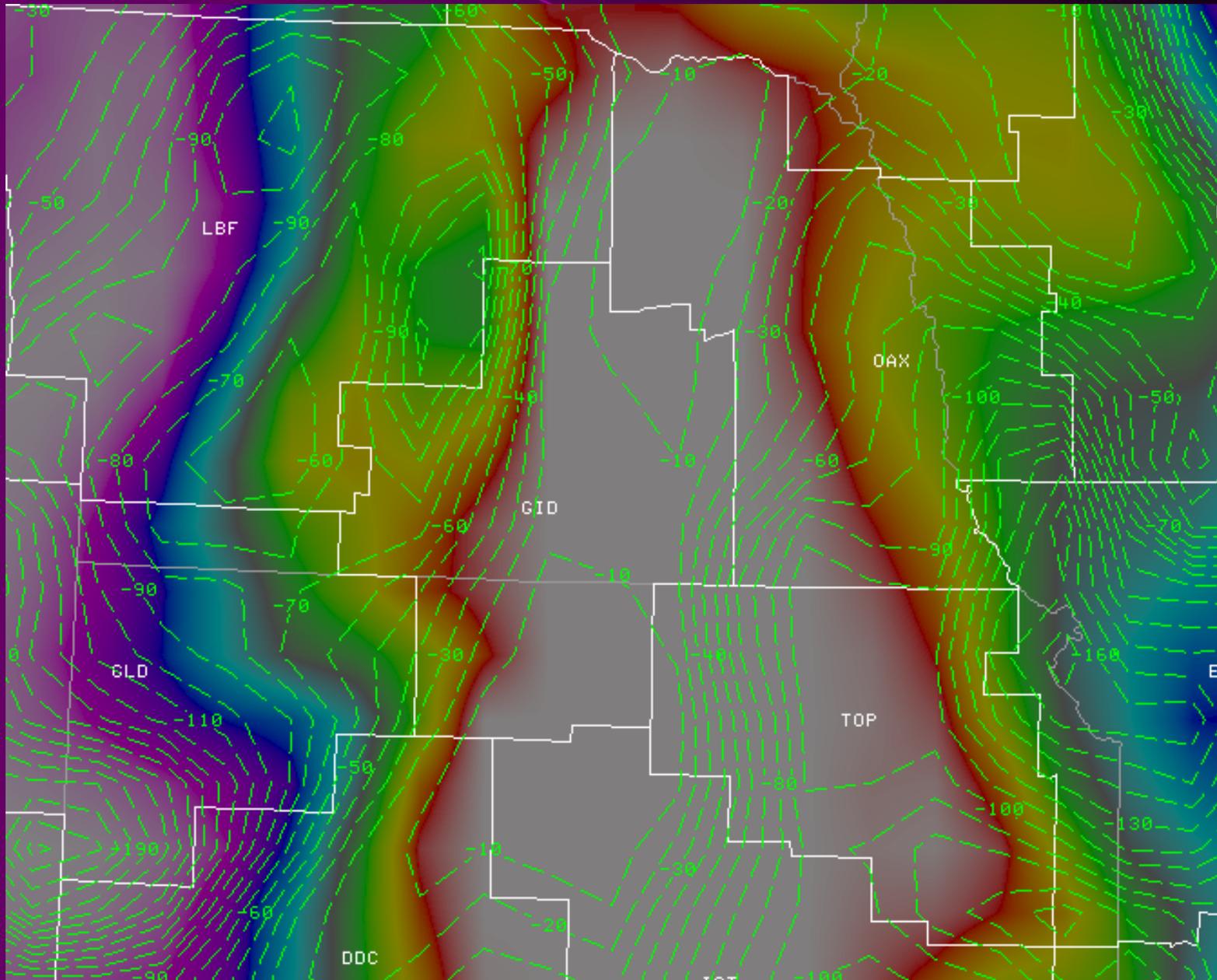


Meso-Analyst Severe Weather Guide

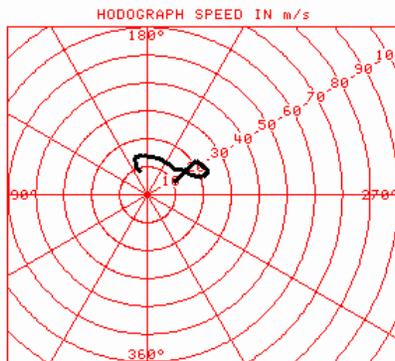
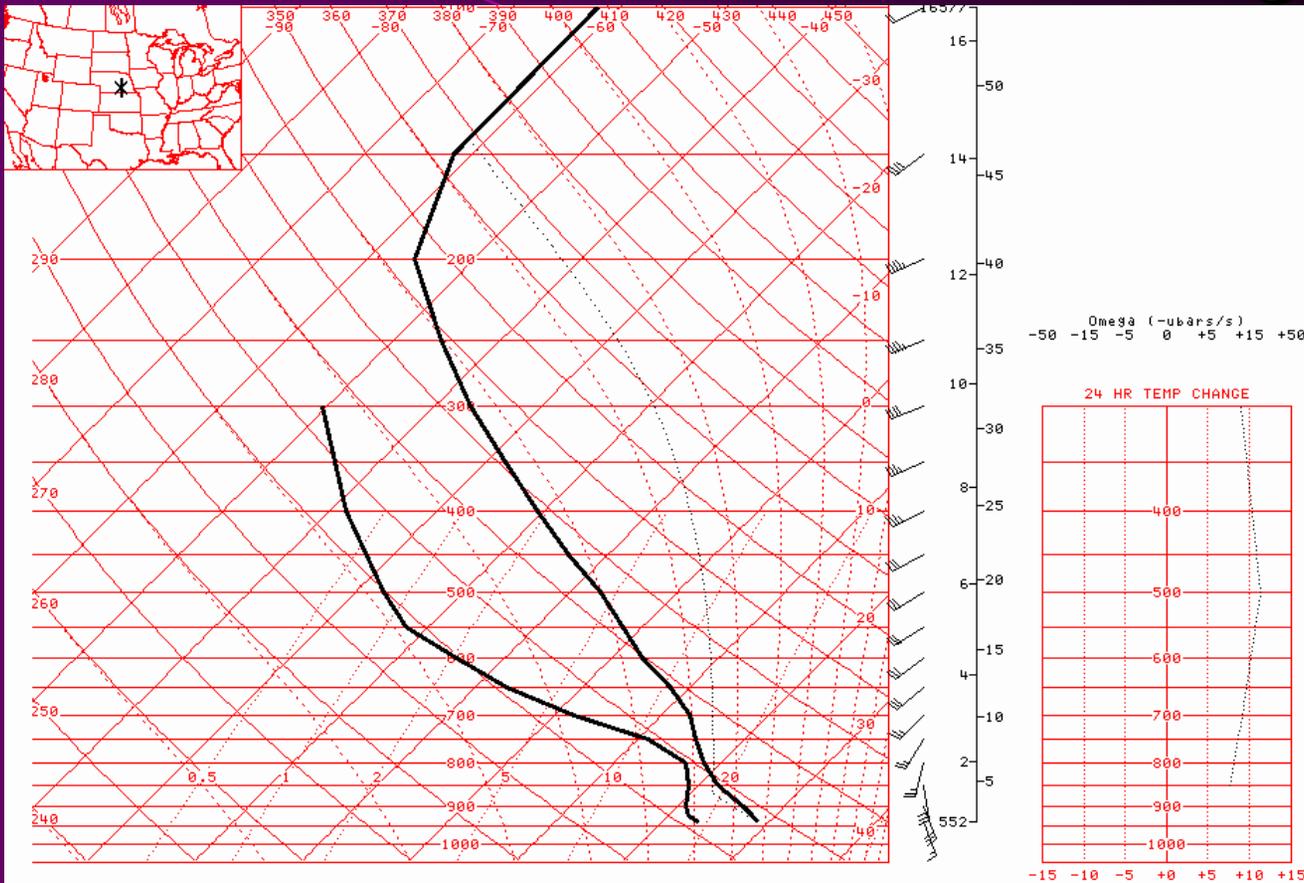
P. Wolf

Category	Factor	Very Favorable	Favorable	So-So	Un-favorable
Severe Storm Initiation	Low Level Boundary	Strong Strong	Moderate	Weak	Lack of Boundary
“ “	2xSqrt (CAPE) + SR Inflow	>125 172	100-125	80-99	<80
“ “	CIN	<15 <10	15-30	30-60	>60
“ “	850-700mb Isentropic Flow	Strong Upglide	Wk/Mdt Upglide Moderate	Little/No Upglide	Downglide
“ “	Bndry Layer-400mb ws/wd diff	>100 105	75-100	50-75	<50
Large Hail	400-700mb SR flow	>30 kt	20-29 kt 25kt	12-19 kt	<12 kt
“ “	Height of 0C lvl	<11.0 kft	11.5-13.5 kft	14.0-16.0 kft 13.7 kft	>17.0 kft
“ “	Mesocyclone Inten/Dpth	Strng/Deep Strng/Deep	Mdt/Deep	Weak Shallow	No Meso
“ “	2xSqrt (CAPE) + SR Inflow	>125 172	100-125	80-99	<80

RUC 23 UTC CAPE & CIN



RUC Forecast Sounding

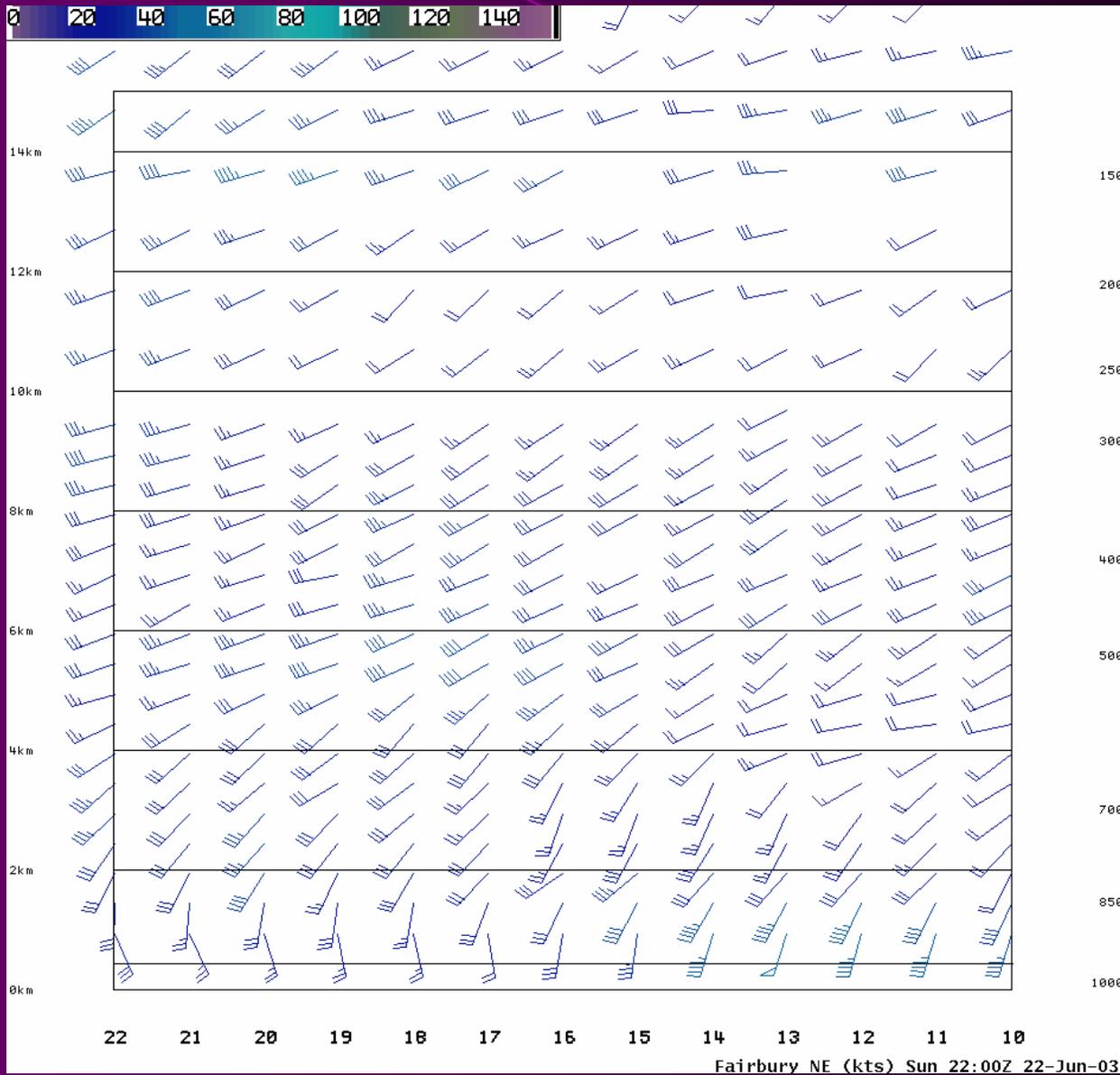


PRECIP WATER= 1.60 in
 K-INDEX= 37
 TOTALS INDEX= 55
 SWEAT INDEX= 581
 DRY MICROBURST POT=3: GST 30-40 kts
 FREEZING LEVEL= 15790 ft ASL
 WET-BULB ZERO HGT= 12763 ft ASL
 0-6 KM AVG WIND= 216°/24 kts
 0-6 KM STM MTN (30R75)= 246°/18 kts
 0-3 KM STM REL HELICITY= 190 m²/s²
 FORECAST MAX TEMP=NA
 TRIGGER TEMP= 30°C/87°F
 SOARING INDEX=NA
 MDPI/WINDEX = 1.27/55

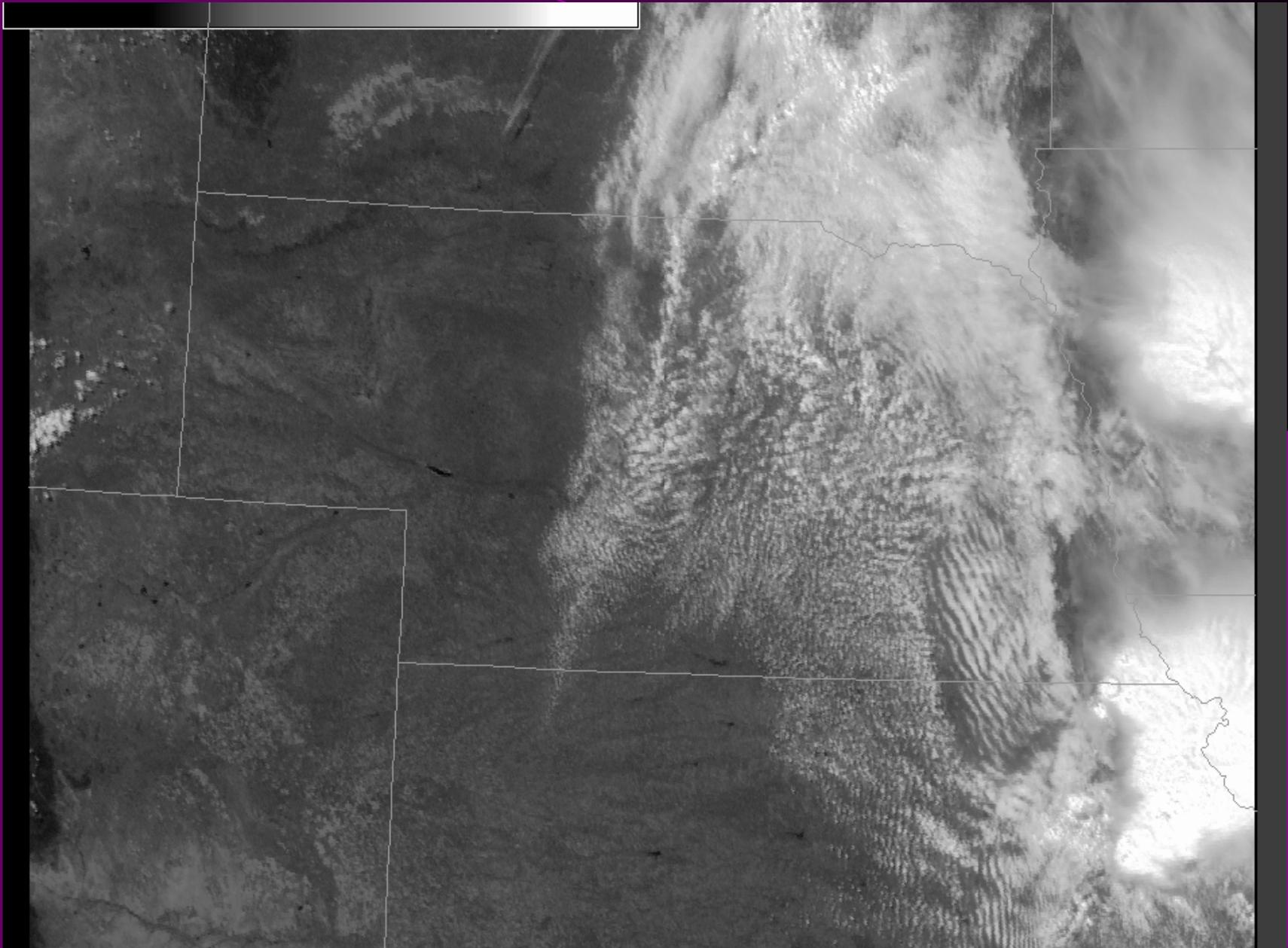
-PARCEL- T=SFC;Td=SFC
 INIT PARCEL P= 940 83 74 ° mb
 INIT PARCEL T/Td= 83/74°F/28/23°C
 CONVECTIVE TEMP= 87°F
 LIFTED INDEX= -9.7
 CCL= 4839 ft ASL/ 846 mb
 LCL= 4141 ft ASL/ 867 mb
 LFC= 5331 ft ASL/ 832 mb
 MAX HAILSIZE= 218.5 cm/86.0 in
 MAX VERTICAL VELOCITY= 215 m/s
 EQUIL LEVEL= 47038 ft ASL/143 mb
 APPROX CLOUD TP=NA
 POSITIVE ENERGY ABV LFC= 5318 J/KG
 NEGATIVE ENERGY BLW LFC= -26 J/KG
 BULK RICHARDSON NUMBER= 77.9

Interactive Skew-T 22.21 3HR Mon 00:00Z 23-Jun-03
 RUC40 ptB 40.9N 98.2W Sounding () 22.21 3HR Mon 00:00Z 23-Jun-03

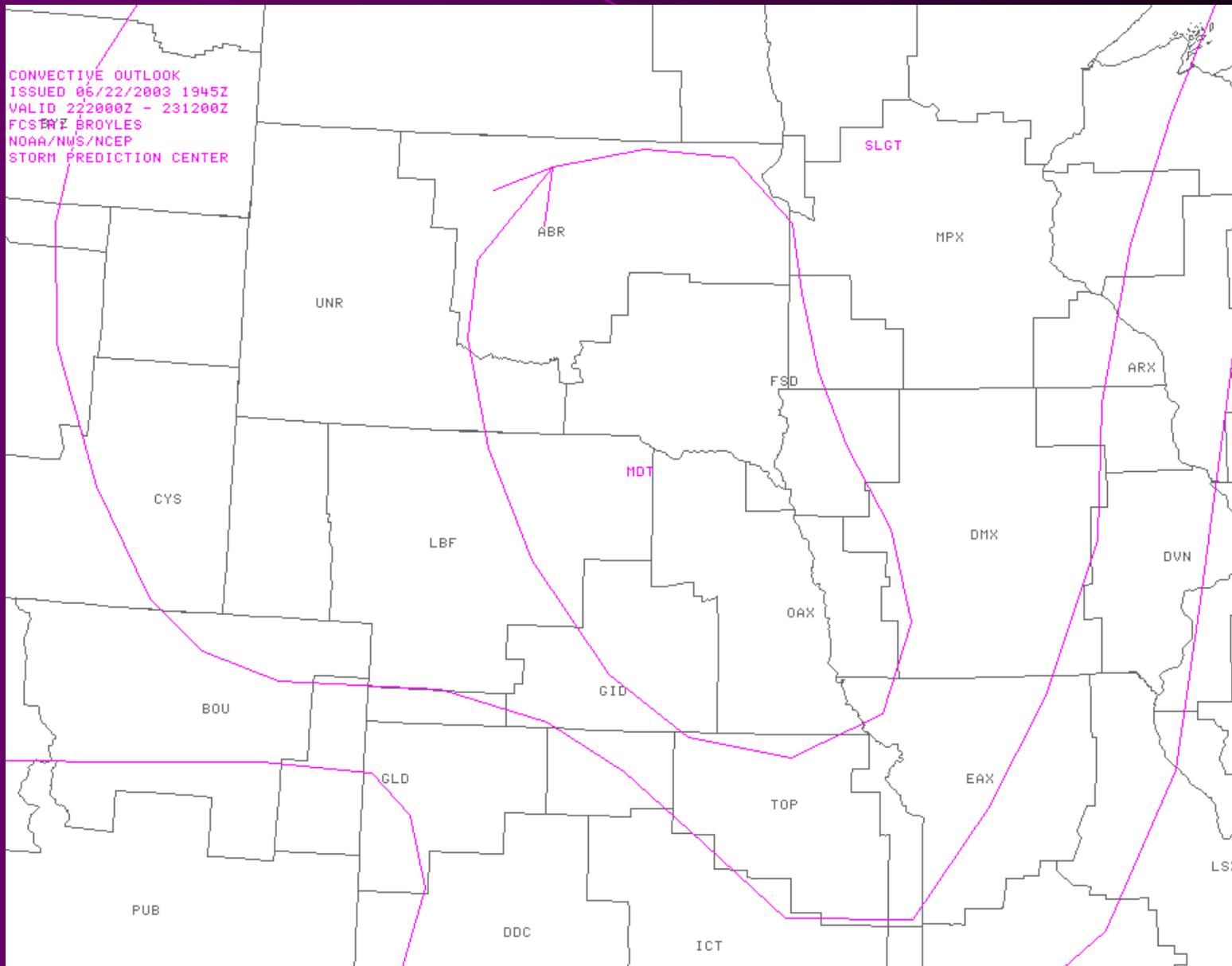
Fairbury Wind Profiler



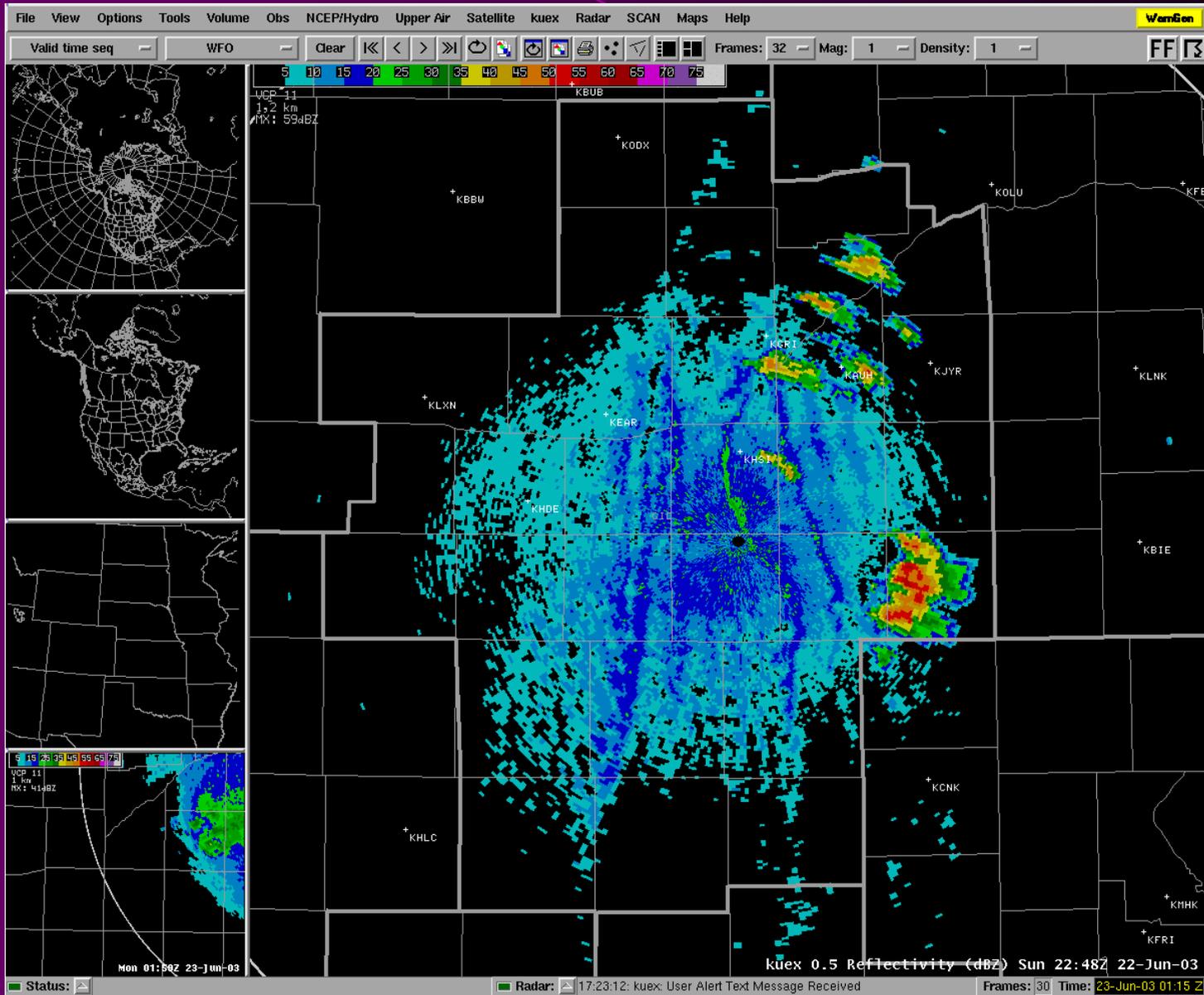
Visible Image 1900-2400 UTC



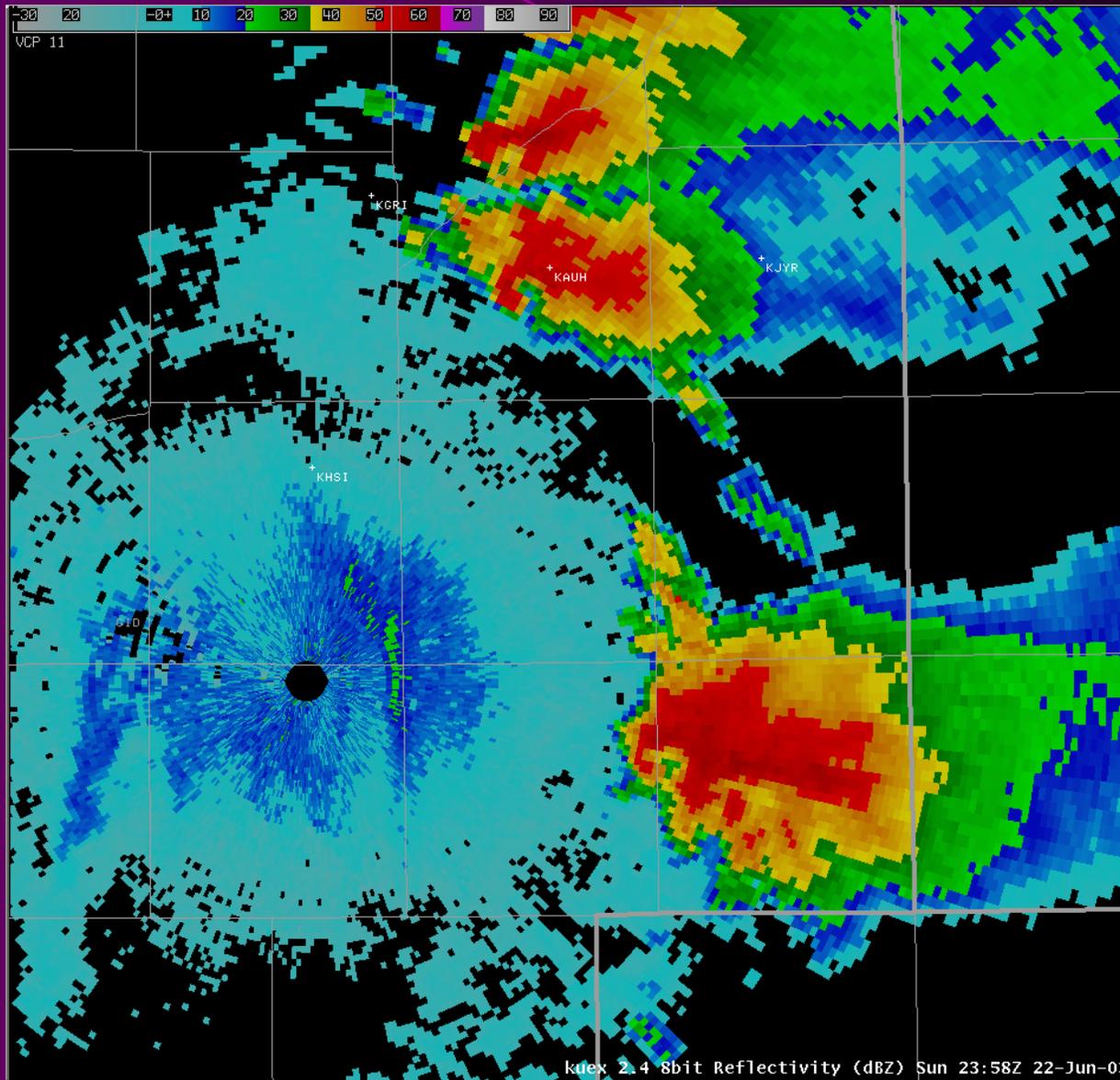
SPC Day 1 Outlook



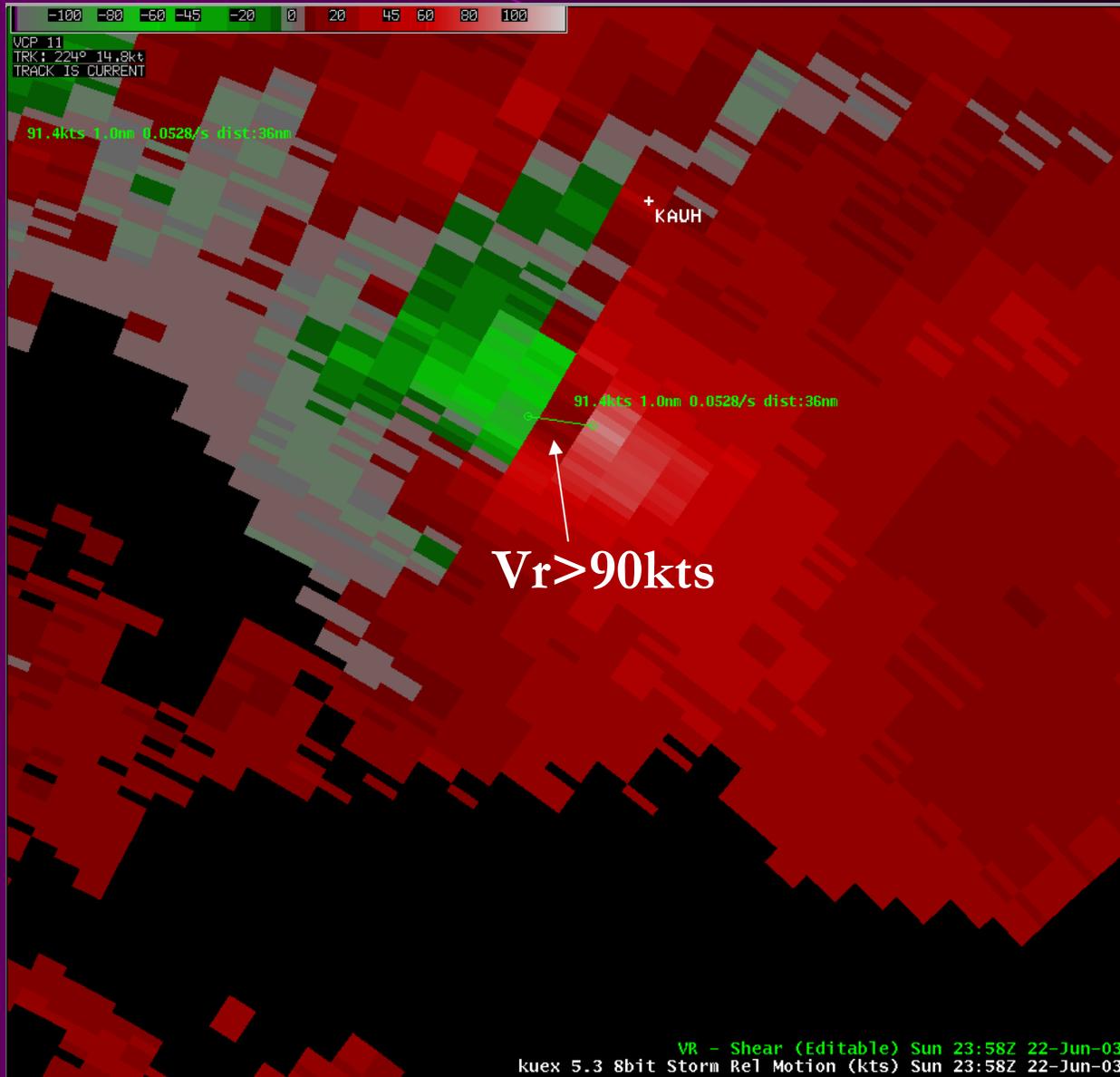
0.5 Degree Reflectivity



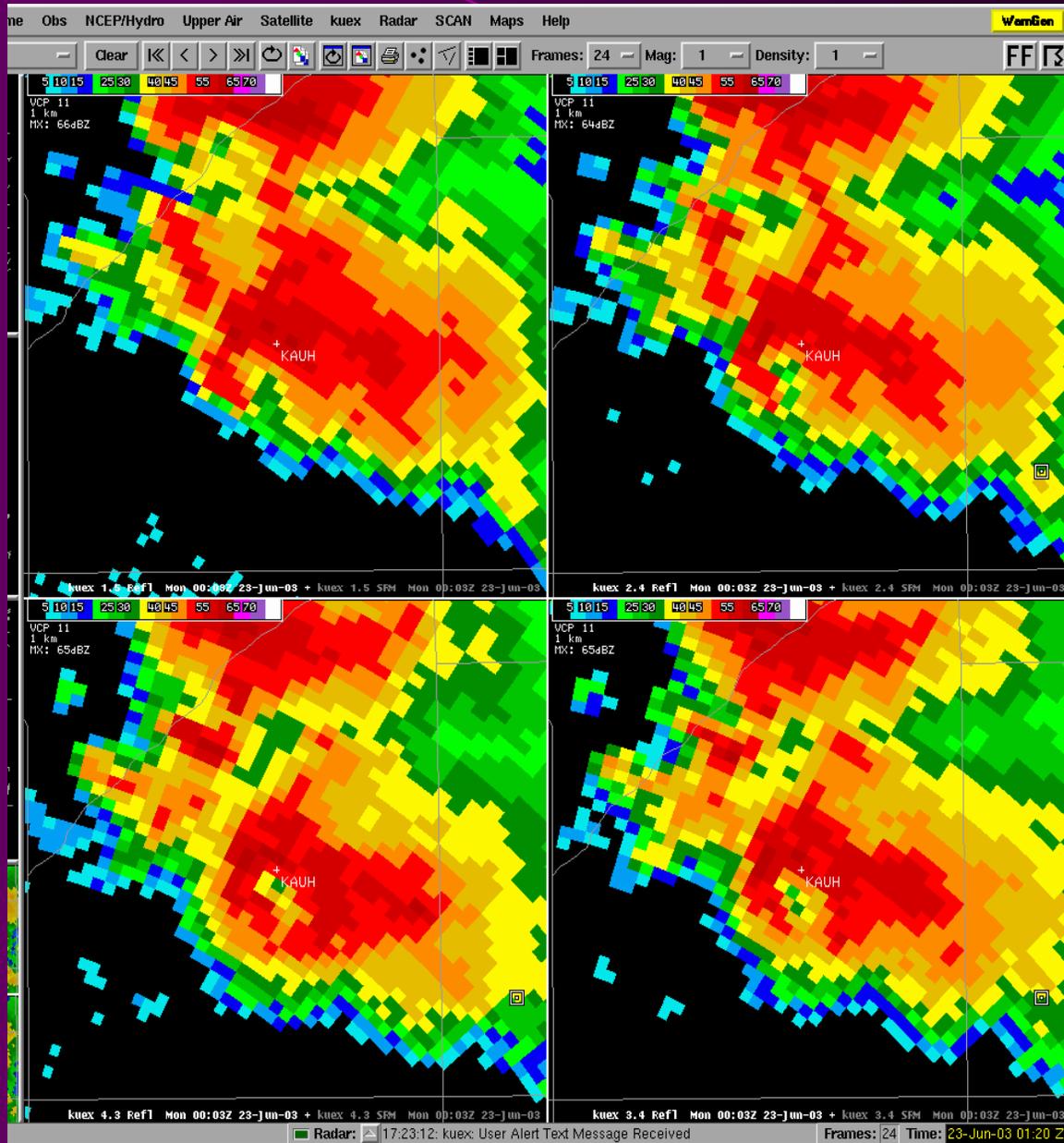
2.4 degree reflectivity



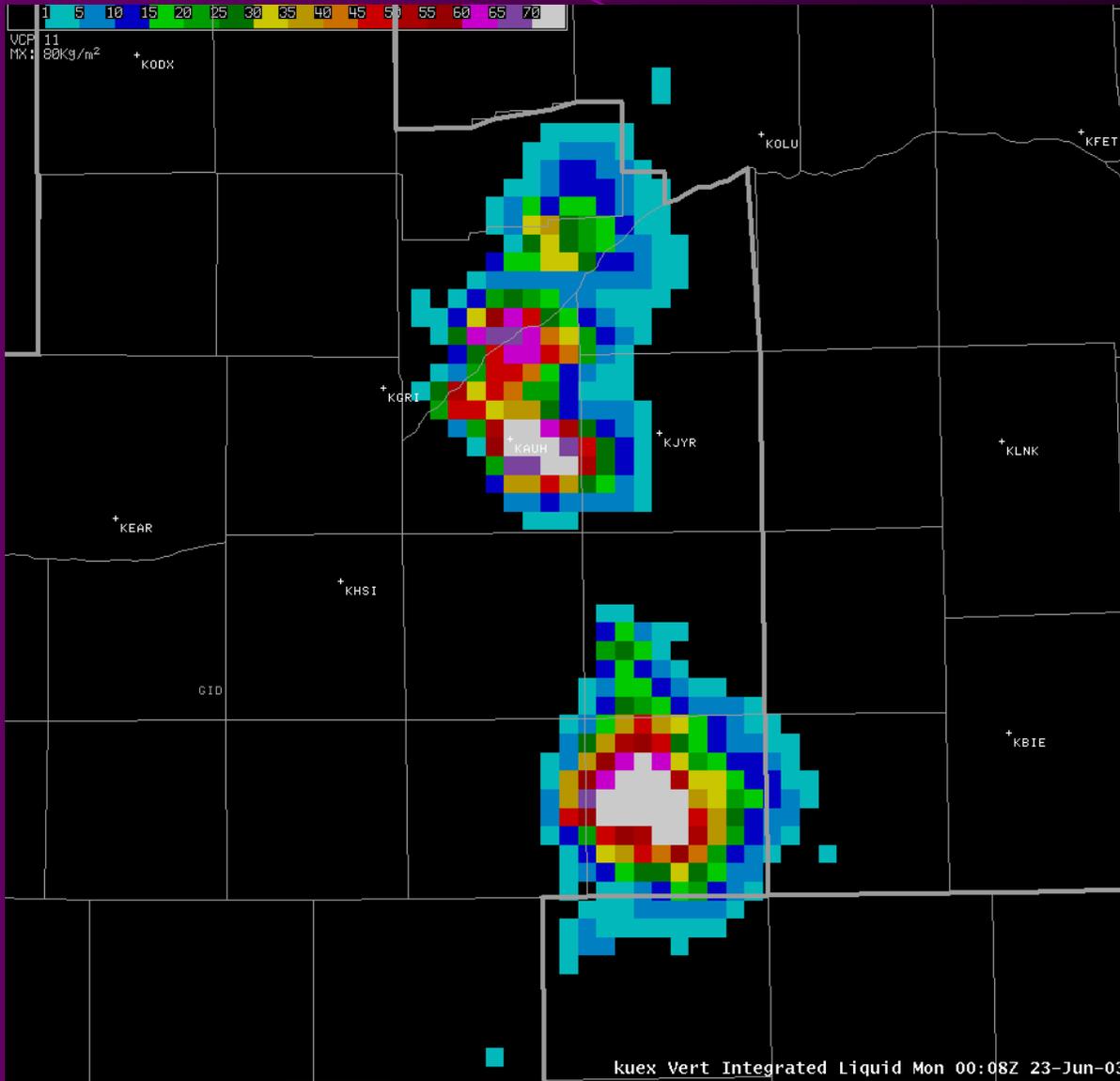
5.3 degree SRM



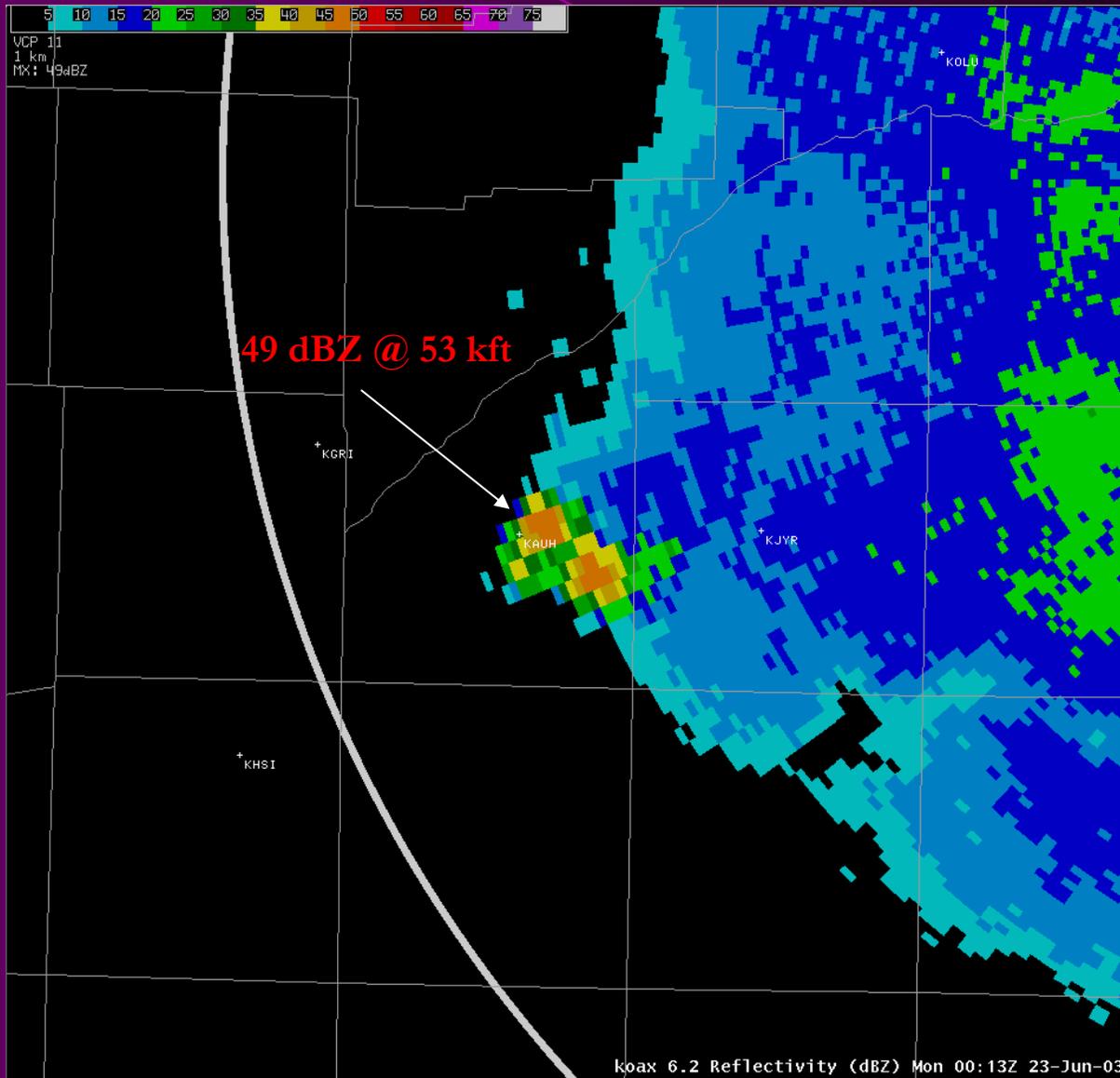
KUEX 4-Panel Reflectivity



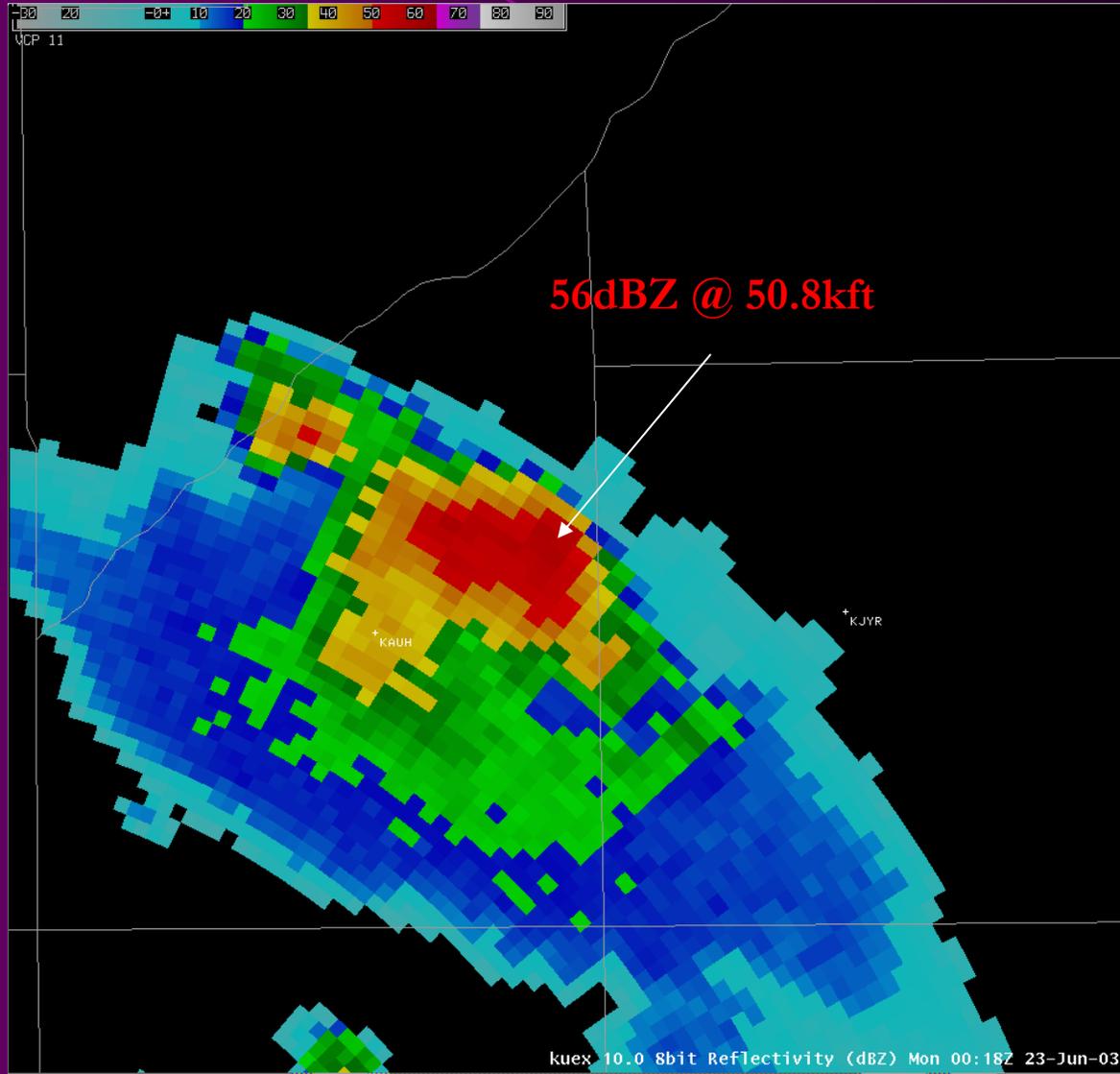
VIL



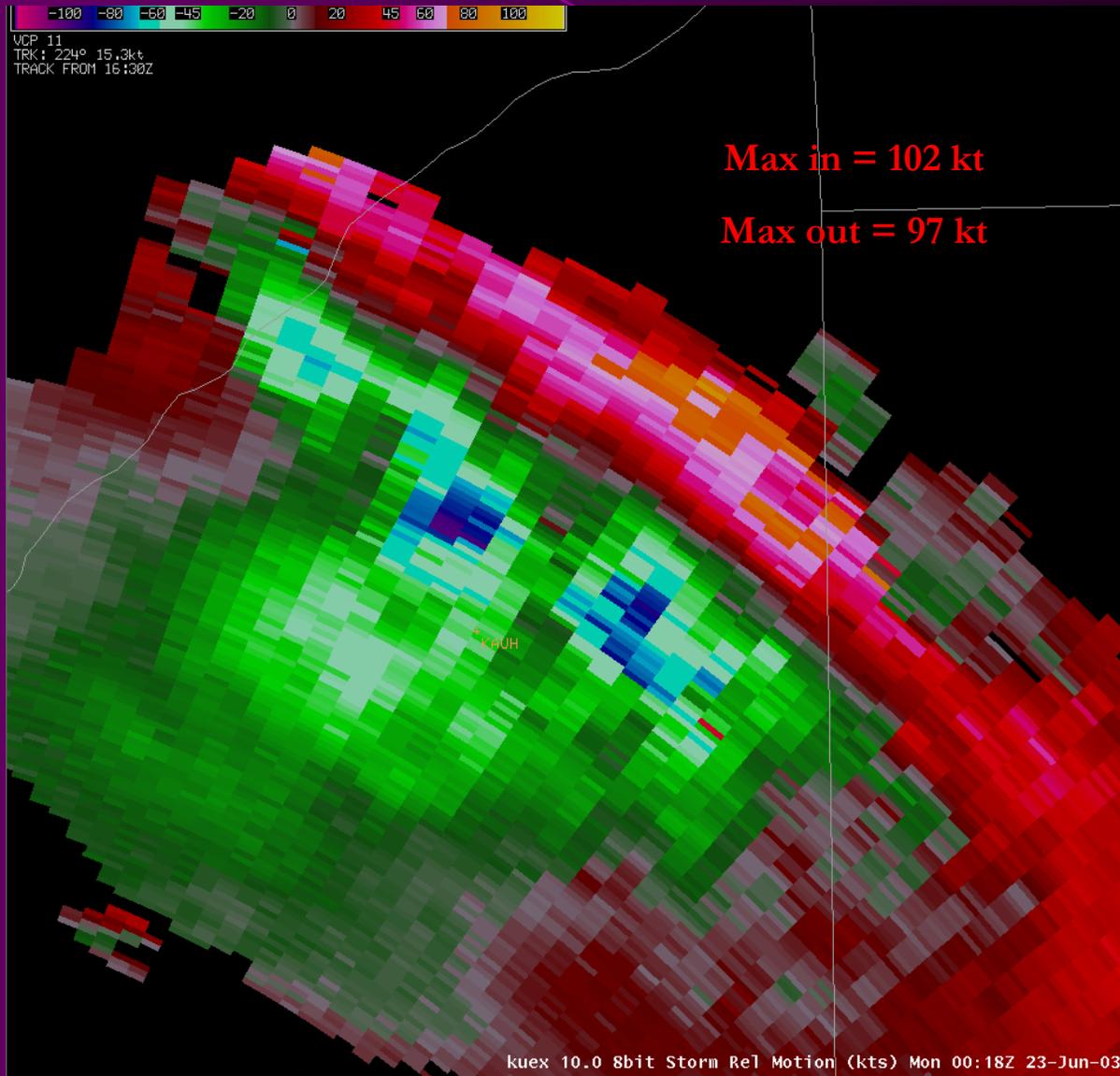
KOAX 6.2 degree reflectivity



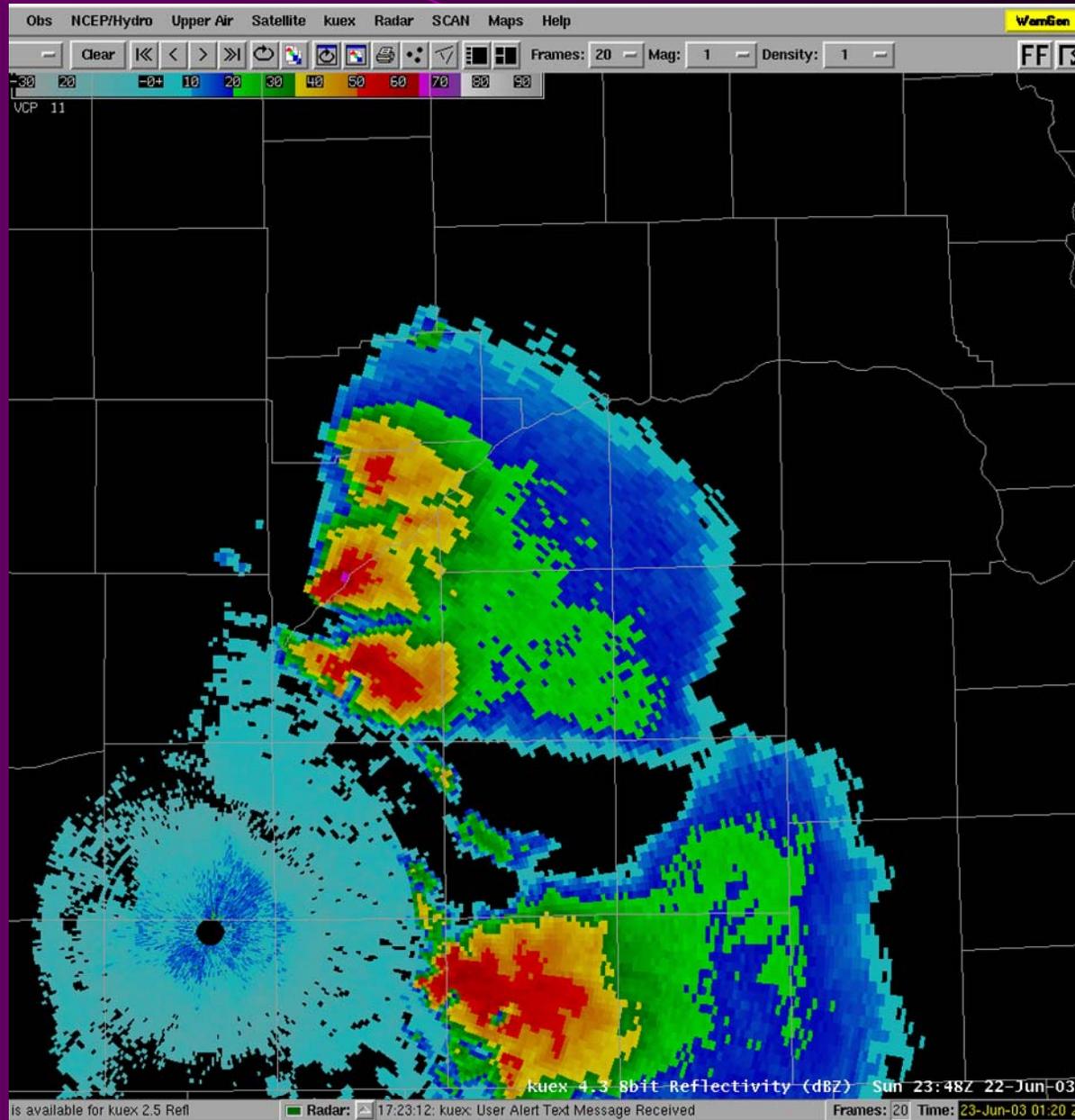
10.0 degree reflectivity



10.0 degree SRM

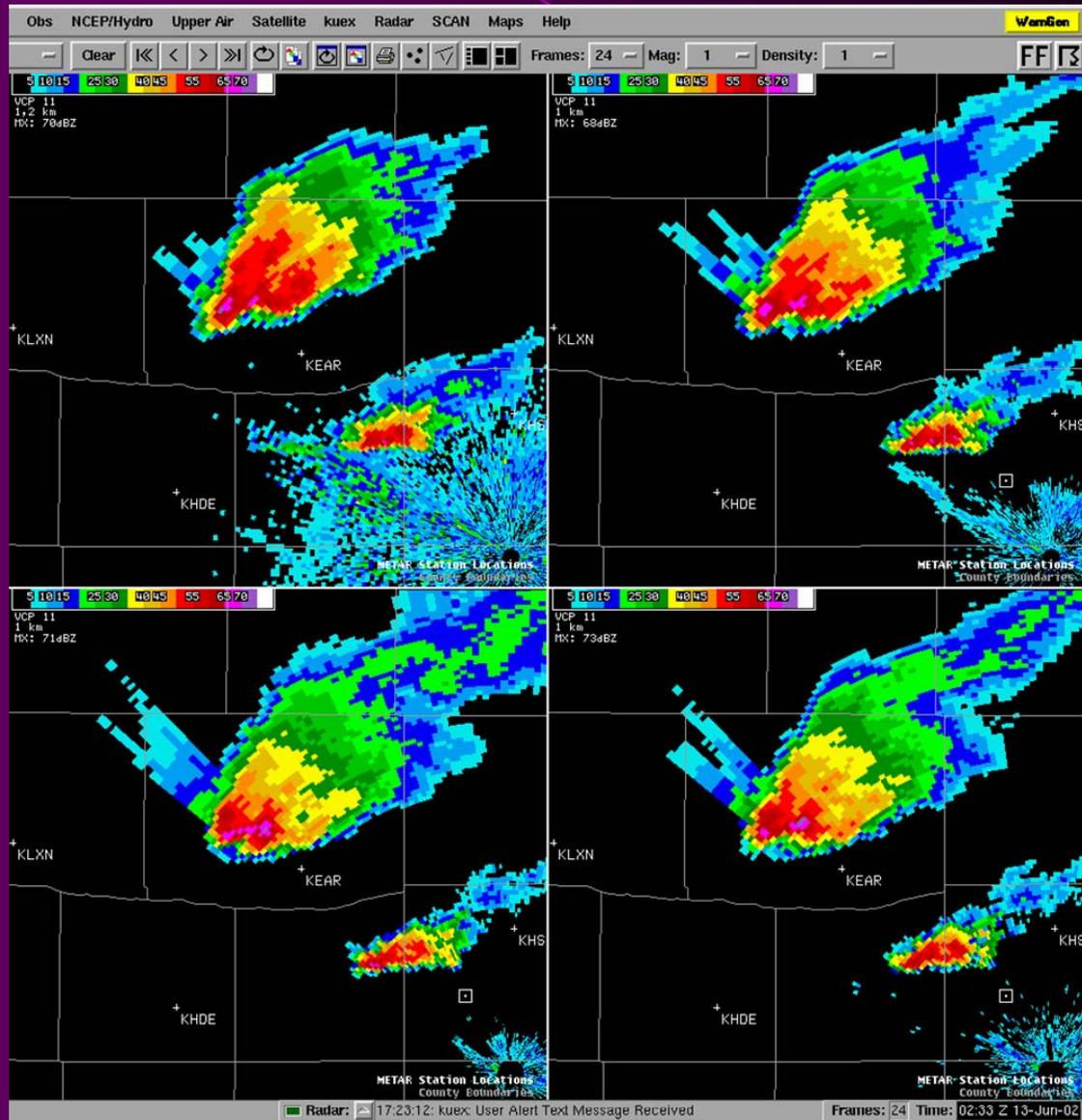


KUEX Ref 4.3 deg 2348Z



KUEX 4-panel Ref

06-12-2002



Other Hail Parameters

- Maximum values for the Aurora Storm
- POSH = 80%
- MEHS = 2.75"
- VIL = 91
- WBZ & Ref Aloft Nomogram = 2.5"
- $V_r = 91$ kt
- ST Div = 200 kt = 2.75"

Aurora Hailstone

*National Weather Service
Hastings Nebraska*



Concluding Remarks

- Supercells formed on old outflow boundary in area with very high CAPE
- Most of the parameters from Wolf's Severe Weather Guide were in the Favorable or very Favorable category

Concluding Remarks (cont)

- Best radar signatures for large hail appeared to be: (1) strong rotation and (2) high reflectivities aloft
- VIL, POSH, MEHS all pointed to large hail, but not necessarily record hail
- Final note of interest, for the most part hail spikes were absent

It's getting close to lunch time...let's fire up the grill

