A State Record Tornado Outbreak?

Preliminary Investigation of 23 May 2008 Supercells and Tornadoes

Mike Umscheid
National Weather Service Forecast Office – Dodge City, KS

Jeff Hutton
National Weather Service Forecast Office – Dodge City, KS

12th High Plains Conference – Hays, KS
September 4-5, 2008

Tornado “C8” (rated EF-4) Southwest of Quinter, KS

© Bill Hark
Outline

• Quick synoptic overview
• Previous one-day state records
• 23 May supercells & tornado tracks
  – Identification scheme modeled after Speheger et al. 2002 (3 May 1999 Oklahoma tornado outbreak)
  – 4 “phases” of outbreak
    • Dighton to Quinter (15 tornadoes)
    • Ness City to Ellis (17 tornadoes)
    • OK-KS border monsters (33 tornadoes)
    • Cold front supercells (4 tornadoes)
  – A look at some of the notable tornadoes
    (1/2 mile wide or larger)
    • WSR-88D KGLD & KDDC “super-res” imagery
May 23\textsuperscript{rd} Setting

0-1km Storm Relative Helicity

Boundary positions 1500 UTC
One-day state tornado records

• state record (Kansas)
  – 36 on 5 May 2007
  – 21 on 26 April 1991

• state record (National)
  – 67 on 24 June 2003 (South Dakota)
  – 67 on 20 September 1967 (Texas) *Hurricane Beulah
  – 65 on 3 May 1999 (Oklahoma)
23 May 2008
Outbreak Statistics

• **15** Supercells
  – **11** tornado producing
  – **7** sig-tor producing

• **69** “cluster outbreak” Tornadoes*
  – **69** total tornadoes in Kansas**
  – **78** total tornadoes on 23 May
  – **13** half-mile wide or larger
  – **5** mile-widers
  – **16** sig-tors
    • **9** EF-2, **6** EF-3, **1** EF-4

• **2** fatalities

* Not including 2 additional brief tornadoes in WFO GLD area unassociated with supercells. Also not including 7 other small tornadoes along the Cheyenne Ridge area.

** Would set a new “national” 24-hr state record
Tornado Count:

- Phase 1:
  - A: 0
  - B: 5
  - C: 9
  - D: 0
  - E: 1

- Phase 2:
  - F: 3
  - G: 0
  - H: 10
  - I: 4

- Phase 3:
  - J: 15
  - K: 10
  - L: 7
  - M: 3
  - N: 1
  - O: 0

- Phase 4:
  - X: 1

23 May 2008

Tornado & Supercell Tracks
23 May 2008
Communities impacted & close-calls

- Directly & partially impacted communities
  - Ellis, KS  *(EF-1 damage mainly to W and SW part of town)*
  - Protection, KS  *(relatively light EF-1 rated damage in town)*
  - Kinsley, KS  *(areas of EF-1 to EF-2 damage southeast outskirts of town)*
23 May 2008
Communities impacted & close-calls

- A number of close calls!
  - Quinter, KS
  - Dighton, KS
  - Macksville, KS
  - Greensburg, KS (again)
  - Others: Coldwater, Park, Ransom
Notable Tornadoes

“B3 & B4”

Notable Tornadoes

**Time:** 4:34 to 4:47pm CDT
**Path Length:** 5 mi.
**Max Path Width:** 200 yd.
**Rating:** EF1

**Time:** 4:35 to 5:13pm CDT
**Path Length:** 14 mi.
**Max Path Width:** 1 mi.
**Rating:** EF2

© Chris Collura
Notable Tornadoes
“B4” Super-Res Imagery (WSR-88D KGLD)

2149 UTC (4:49pm CDT) 0.5° (7000 FT ARL) RANGE = 69NM

vortex hole
Notable Tornadoes

“C8”

Time: 6:10 to 6:31pm CDT
Path Length: 11.4 mi.
Max Path Width: 1320 yd. (0.75 mi.)
Rating: EF4
Notable Tornadoes

“C8” Super-Res Imagery (WSR-88D KGLD)

2326 UTC (6:26pm CDT)

0.5° (6800 ft ARL) RANGE = 67NM
Notable Tornadoes

“J3”

**Time:** 7:25 to 8:14pm CDT

**Path Length:** 20.9 mi.

**Max Path Width:** 1.8 mi.

**Rating:** EF3 (+)
Notable Tornadoes

“J3” Super-Res Imagery (WSR-88D KDDC)

0053 UTC (7:53pm CDT)

0.5° (2100 FT ARL) RANGE = 28NM
Notable Tornadoes
“H5”, “H6”, “H7” series

**Time:** 7:49 to 8:36pm CDT (3 combined)

**Path Length:** 25.3 mi. (3 combined)

**Max Path Width:** 1 mi. (H6)

**Rating:** H5 – EF1, H6 – EF2, H7 – EF2
Notable Tornadoes

“H5” (near Cedar Bluff Reservoir)
Notable Tornadoes

“K1”

**Time:** 8:03 to 8:15pm CDT

**Path Length:** 5 mi.

**Max Path Width:** 1100 yd. (0.6 mi.)

**Rating:** EF3

BUFFALO, OK

@2008 TexasTailchaser.com

©2008 TexasTailchaser.com
Notable Tornadoes

“K1” Super-Res Imagery (WSR-88D KDDC)

0103 UTC (8:03pm CDT)

0.5° (7000 ft ARL) RANGE = 69NM
Notable Tornadoes "J11"

**Time:** 9:17 to 9:47pm CDT

**Path Length:** 18.2 mi.

**Max Path Width:** 1935 yd. (1.1 mi.)

**Rating:** EF3
Notable Tornadoes

“J11” Super-Res Imagery (WSR-88D KDDC)

0226 UTC (9:26pm CDT)

0.5° (2100 FT ARL) RANGE = 28NM

vortex hole
Notable Tornadoes

“K8”

**Time:** 10:24 to 11:05pm CDT

**Path Length:** 21.9 mi.

**Max Path Width:** 1430 yd. (0.8 mi.)

**Rating:** EF3

**Fatalities:** 2
Notable Tornadoes
“K8” Super-Res Imagery (WSR-88D KDDC)

0354 UTC (10:54pm CDT)

0.5° (7300 FT ARL) RANGE = 70NM
Ness County Storm Merger

A 4-to-1 merger!

2229 UTC

2301 UTC
Ness County Storm Merger

A 4-to-1 merger!

2330 UTC

2339 UTC
Ness County Storm Merger
A 4-to-1 merger!
Legacy Res -vs- Super Res

Velocity Legacy Resolution (250m x 1°)

-106 kt “inbound” gate

+96 kt “outbound” gate

Velocity Super Resolution (250m x 0.5°)

-126 kt “inbound” gate

+107 kt “inbound” gate

RANGE = 29NM

0053 UTC
Tornado “J3”
16 miles SW of Greensburg, KS

1 nm
0312 UTC

Tornado "M2"
14 miles SW of Kinsley, KS

RANGE = 17NM

Reflectivity Legacy Resolution
(1km x 1°)

Reflectivity Super Resolution
(250m x 0.5°)
0112 UTC
Tornado “H6”
10 miles SW of Ellis, KS
RANGE = 68NM

Reflectivity Legacy Resolution
(1km x 1°)

Reflectivity Super Resolution
(250m x 0.5°)
Thank You!

WSR-88D Composite of May 23 Outbreak