



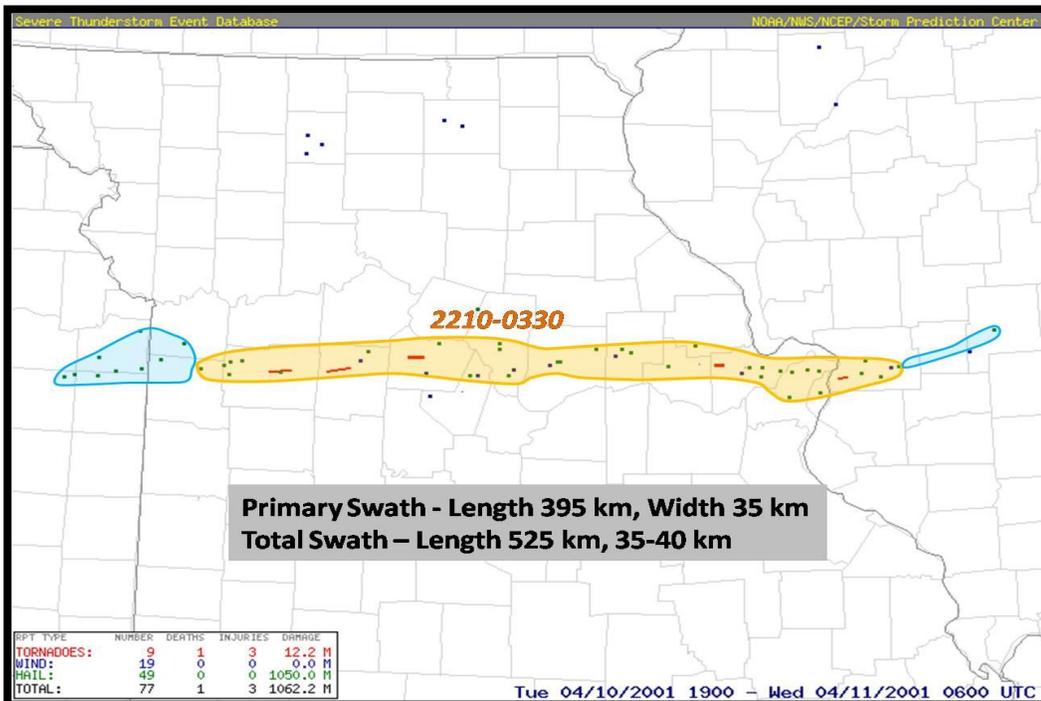
Historic Hailstorm and Supercell

April 10th, 2001

Overview

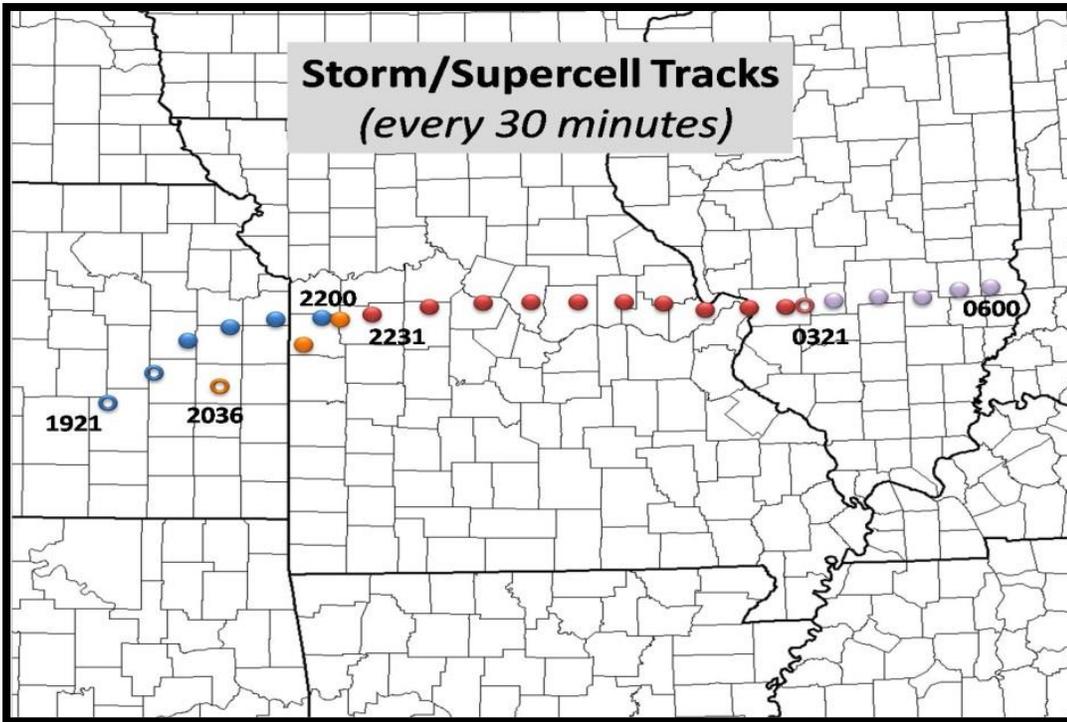
During the afternoon and evening hours of April 10, 2001, a long-lived high precipitation (HP) supercell thunderstorm traversed portions of Missouri and southwest Illinois producing catastrophic hail damage. The HP supercell produced a swath of large hail approximately 245 miles (395 km) in length and up to 22 miles (35 km) in width as it moved east through the highly populated Interstate 70 corridor from southeast of Kansas City through St. Louis. Most of the hail ranged in size from 1.00-3.00 inches in diameter, however south of the largest hail, marginally severe hail (0.75-1.00 inch) also caused considerable damage as it was propelled by 70+ mph downburst (rear flank downdraft) winds. This storm has been named the “Tristate Hailstorm” by Changnon and Burroughs (2003), and is considered the most costly hailstorm in United States History with insured losses of over \$1.0 billion. (*see the authors note below). Known Missouri insurance claims consist of 120,000 home claims, 65,000 auto claims, and 8,000 commercial claims. It is believed nearly every home and business in northern St. Louis County suffered hail damage. All of the vehicles parked outside at the Ford Motor Company assembly plant in Hazelwood were damaged (numbering in the hundreds), while in the adjacent community of Florissant, every home was estimated to have received damage. Twenty-four commercial and military aircraft at Lambert St. Louis International Airport were also damaged. Uninsured losses are unknown. Largely overshadowed by the devastating hail were the tornadoes produced by the HP supercell. This single storm produced a total of 9 weak tornadoes (6 - F1, 3 - F0) with path lengths ranging from 1-10 miles (1.6-16.0 km). The F1 tornado which struck Fulton (southeast of Columbia) destroyed a mobile home producing the first tornado fatality in Missouri since 1994. With \$12 million damage reported from the tornadoes, the total damage from the tornadoes paled in comparison to the hail damage.

* Careful and detailed radar analysis (some of which is briefly presented in this event review) reveals that the “Tristate Hailstorm” hailswath as defined by Changnon and Burroughs (2003) was actually the cumulative impact of three distinctly different supercell thunderstorms, rather than one exceptionally long-lived classic supercell. The HP supercell documented in this event review produced the largest hailswath of the three storms, and nearly all of the catastrophic damage.

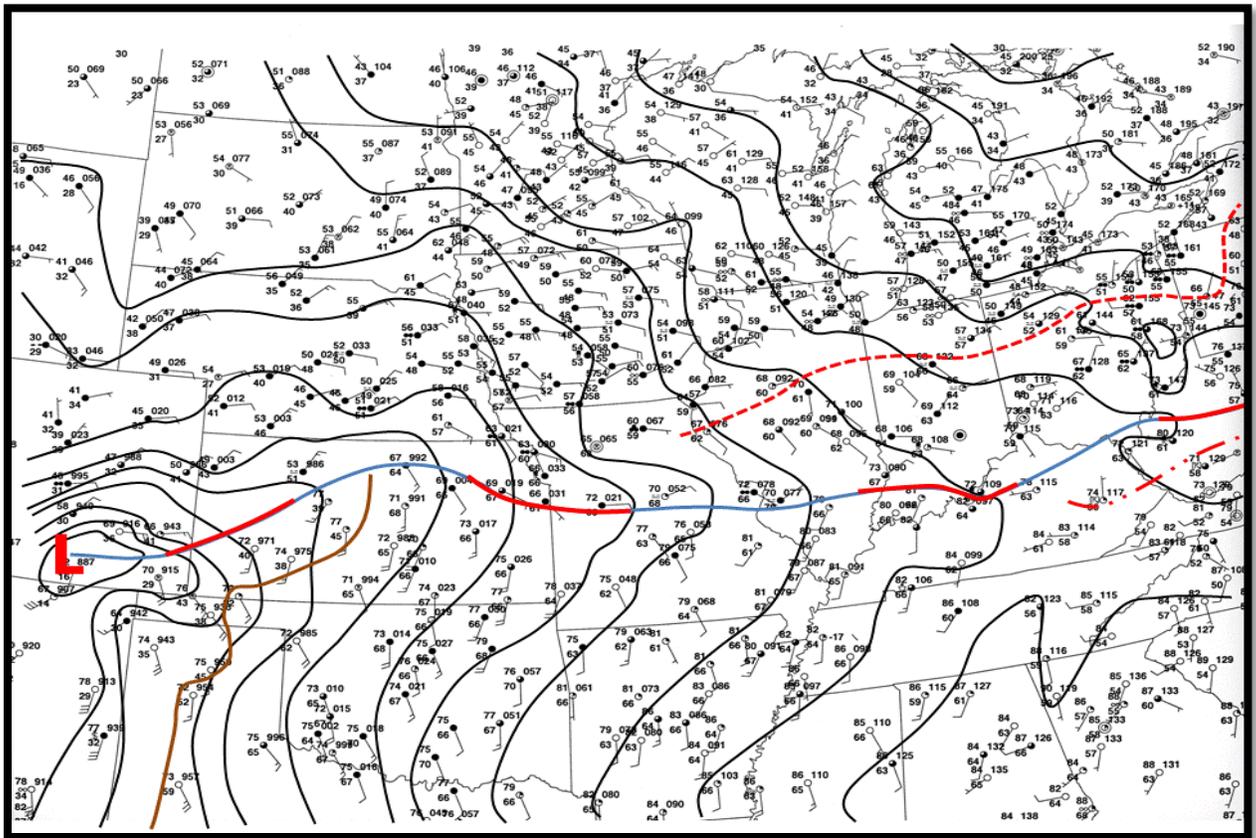


The devastating, large hailswath produced by the long-lived HP supercell is shown in yellow (primary swath). Smaller hailswaths produced by 2 other supercells are shown in blue. The cumulative hailswath produced by all three supercells is 325 miles (525 km) in length. The longer tornado tracks are also evident as red lines.

Storm Tracks

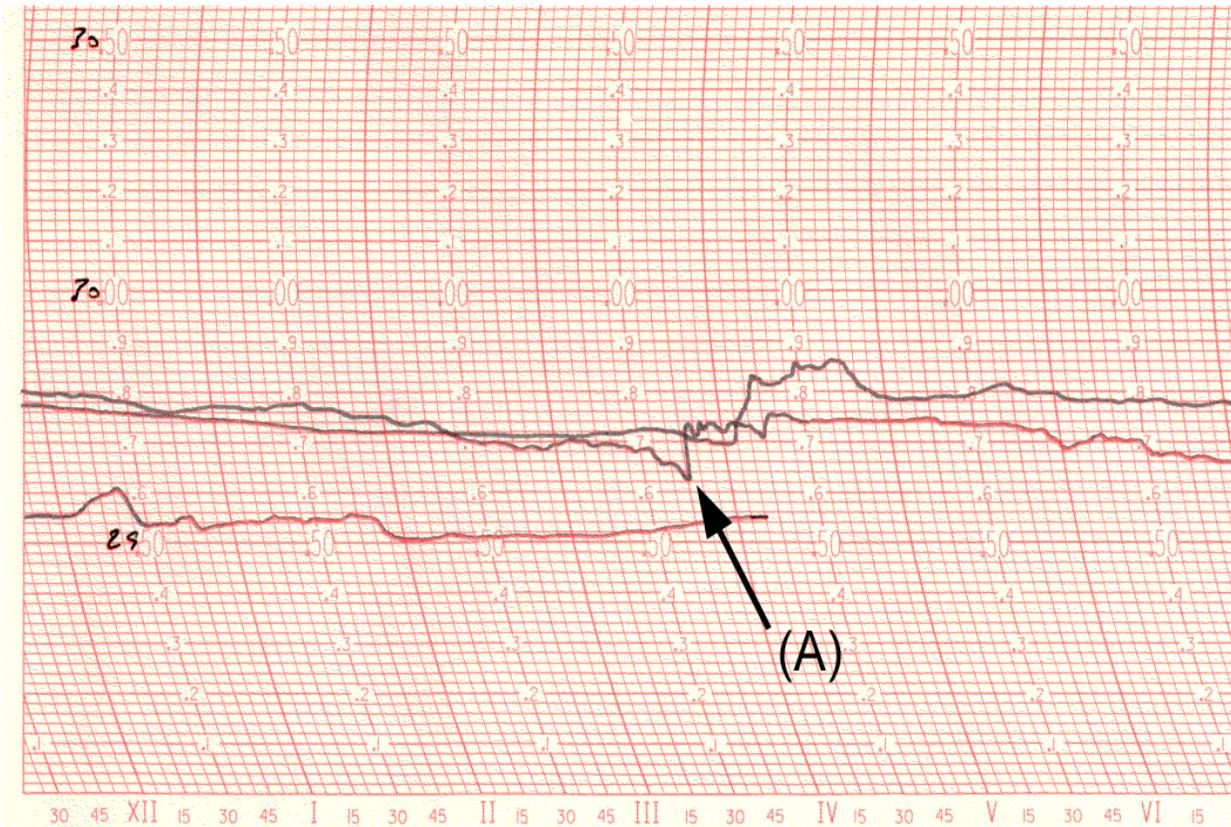


Tracks of the supercells observed with each color representing a different storm. The track of the HP supercell that produced the historic hailstorm is in red. This HP evolved over western Missouri between 2200-2230 UTC from the merger of two supercells with classic structure. Longevity of the HP supercell was over 5 hours.



Manual surface analysis for 2200 UTC 10 April 2001 showing the stationary front which the storm became anchored to and tracked along.

Barograph



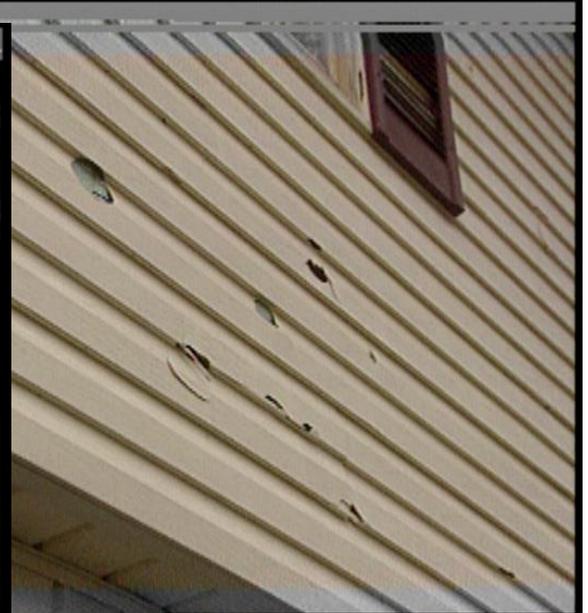
Barograph trace from the NWS office in Weldon Spring, MO (KLSX) showing first a pressure dip associated with the mesolow, followed by sharp rise associated with the wake bubble-high passage.

Observations

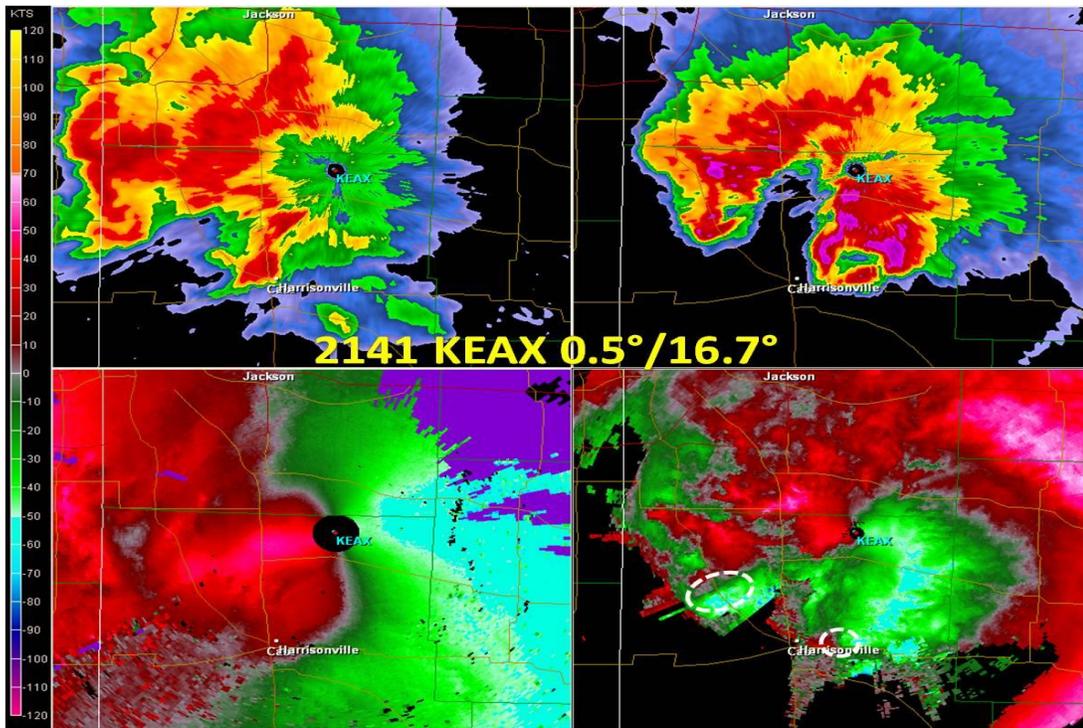
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MOV NE OCNL LTGICCGCC

SPECI KCOU 110014Z **31046G59KT** 3/4SM +TSRA BR SQ BKN012 BKN042 OVC080 17/17 A2971
RMK A02 PK WND 33059/0010 WSHFT 2354 RAB08 PRESRR P0030

SPECI KSTL 110220Z 30011G37KT 270V340 1SM R30R/1200VP6000FT +TSRA SCT017
SCT046CB BKN050 18/17 A2975 RMK A02 PK WND 30037/0214 WSHFT 0202 TSE14B19RAB14
LTGICCGCAIC TS OHD MOV E **GR2** P0050

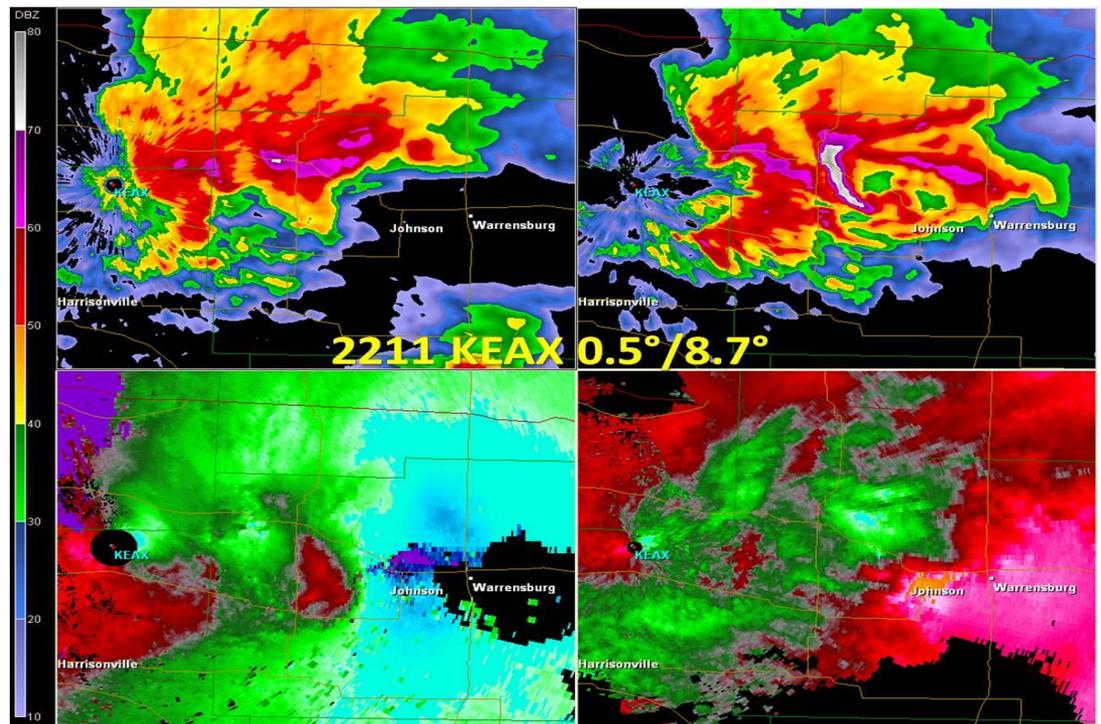


Radar Data

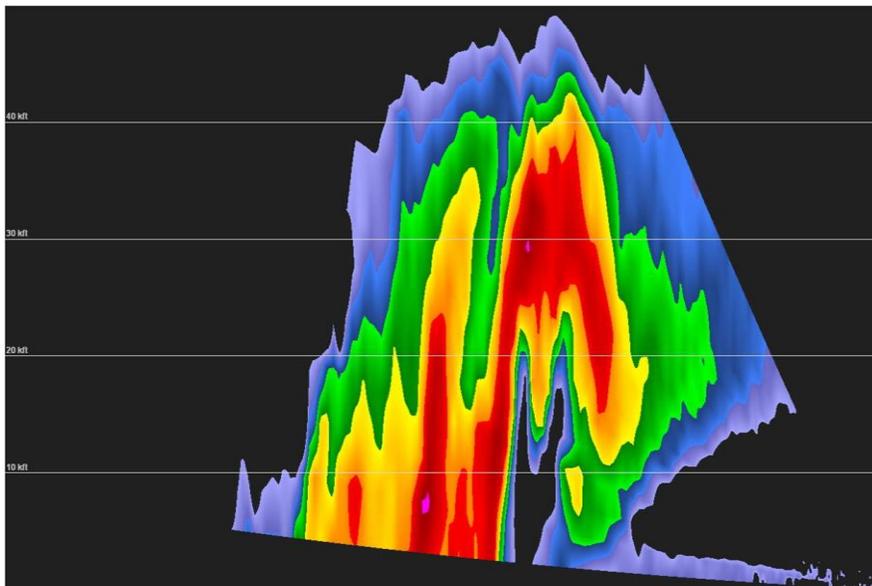


A 4-panel view of the two supercells at 2141 UTC from the KEAX WSR-88D. Base reflectivity is on top and storm-relative velocity is on the bottom, while the right images are from the 16.7° radar elevation and the left images are from the 0.5° elevation angle. Intense rotating updrafts are evident with the appearance of Bounded Weak Echo Regions (BWERs) in the reflectivity data and mesocyclones (dashed) in the SR velocity data.

A 4-panel view of the merger of the two supercells at 2211 UTC from the KEAX WSR-88D. Base reflectivity is on top and storm-relative velocity is on the bottom, while the right images are from the 8.7° radar elevation and the left images are from 0.5° elevation angle. A large updraft region is evident in the 8.7° reflectivity data with multiple intense updraft centers (note two BWERs).

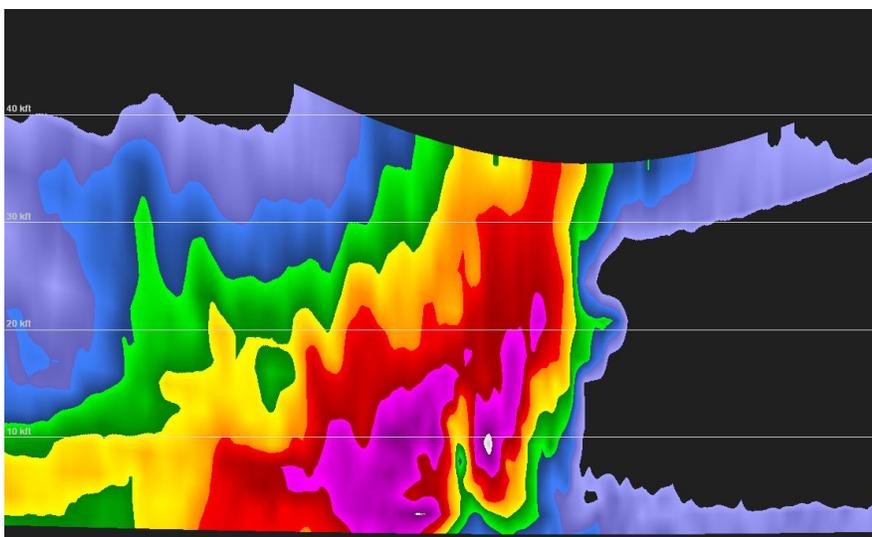
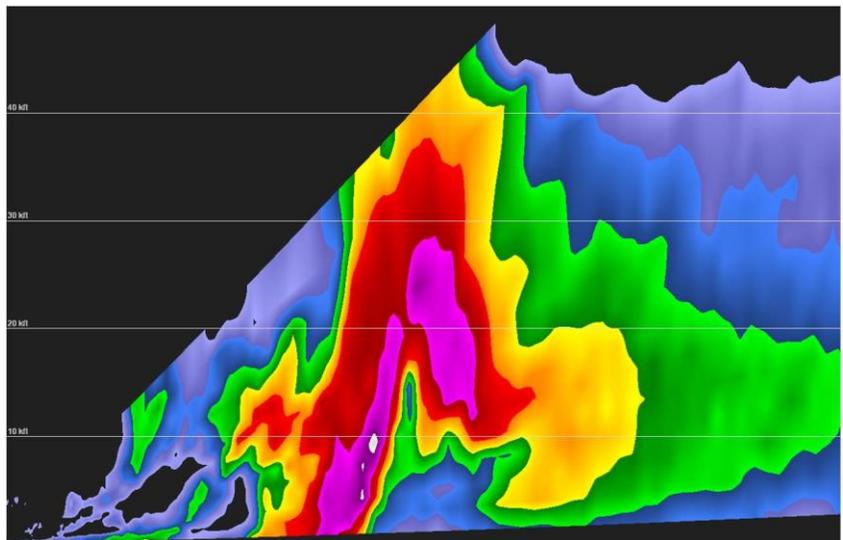


Radar Data



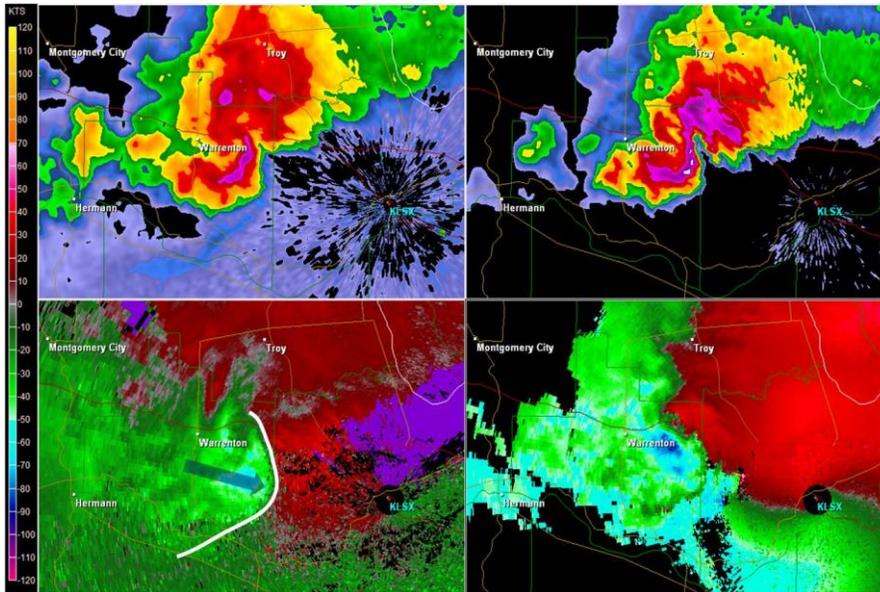
A west-east oriented radar reflectivity cross section from the KLSX WSR-88D at 0058 UTC when the HP supercell was centered in Montgomery County Missouri. The cross section depicts a large updraft region with multiple intense centers, and an echo overhang of around 10 miles.

A west-east oriented radar reflectivity cross section from the KLSX WSR-88D at 0215 UTC when the HP supercell was producing destructive hail in northern St. Louis County including Lambert-St. Louis International Airport. The cross section depicts a large updraft region with the purple and white colors indicative of very large hail.



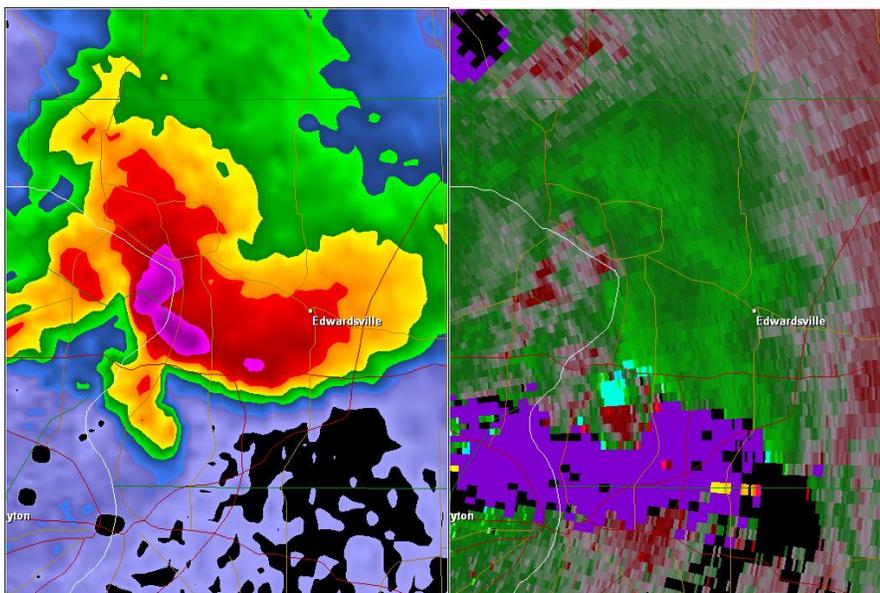
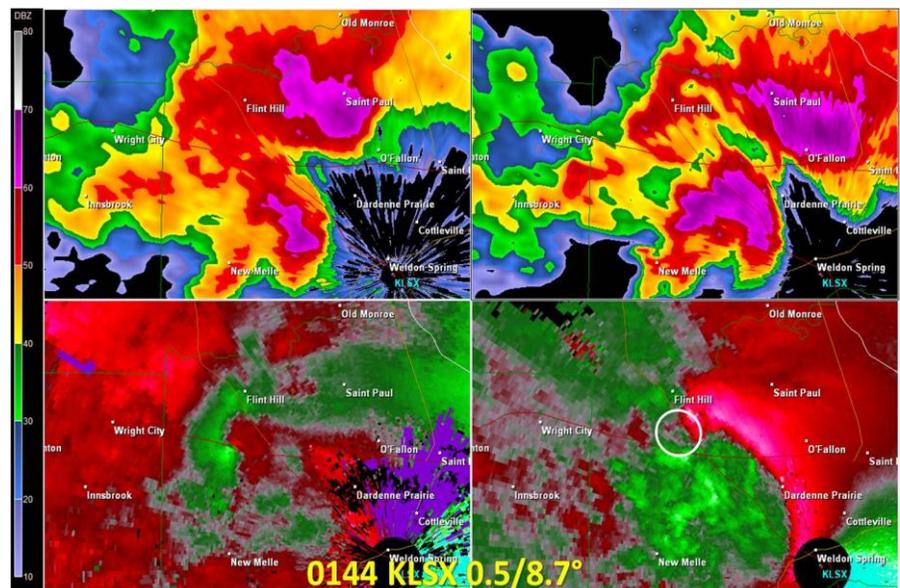
A north-south oriented radar reflectivity cross section from the KLSX WSR-88D at 0215 UTC when the HP supercell was producing destructive hail in northern St. Louis County including Lambert-St. Louis International Airport. The area of purple on the left side of the image depicts the large hail core extending to the ground across northern St. Louis County.

Radar Data



A 4-panel view at 0129 UTC as the HP supercell was beginning to move into western St. Charles County. The velocity images on the bottom depict an intense rear flank downdraft (winds of 70+ mph) and mesocyclone which comprise a feature know as a “Deep Convergence Zone” or DCZ. The white line marks the leading edge of the storm’s gust front.

A 4-panel view at 0144 UTC of the HP supercell while it was producing a tornado near Interstate 70 between Foristell and Wentzville in St. Charles County. Reflectivity is on top and storm-relative velocity is on the bottom, while the right images are from the 8.7° radar elevation and the left images are from 0.5°. A mesocyclone and tornado cyclone are evident in the storm-relative velocity data. Note that the tornado is in the rear of the storm embedded in precipitation.



A 2-panel view at 0235 UTC of the supercell after it had transitioned to a more classic structure and while it was producing a tornado in the Granite City-Pontoon Beach area in Madison County Illinois. A hook echo is clearly evident in the reflectivity image on the left, while the adjacent blue and red colors in the storm-relative velocity image on the right depict a low-level mesocyclone.

Please note that while the severe weather data presented in this event synopsis has been quality controlled, it is still considered unofficial. Official reports & statistics for severe weather events can be found in the **Storm Data** publication (<http://www.ncdc.noaa.gov/IPS/sd/sd.html>) or **Storm Events Database** (<http://www.ncdc.noaa.gov/stormevents/>), available from the National Centers for Environmental Information (NCEI) web page [formerly the National Climate Data Center (NCDC)].

More detailed tornado track information can be accessed using the National Weather Service Damage Assessment Toolkit for all tornadoes beginning in 2012. <https://apps.dat.noaa.gov/StormDamage/DamageViewer/>

Any questions regarding this event review should be address to w-lsx.webmaster@noaa.gov