

Is the heat index efficient to measure heat stress?

A Look into an Alternative Index















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NWS Wichita



Background on Wet Bulb Globe Temperature (WBGT)

- Measures heat stress
- Alternative to heat index
- Utilized by the military and OSHA for years
- Taught to athletic training programs
- Provides guidelines especially for active individuals or those working outdoors

Wet Bulb Globe Temp vs Heat Index

	WBGT	Heat Index
Measured in the sun		
Measured in the shade		
Uses temperature		
Uses relative humidity		
Uses wind		
Uses cloud cover		
Uses sun angle		

Suggested Actions and Impact Prevention

WBGT(F)	Effects	Precautionary Actions
< 80		
80-85	Working or exercising in direct sunlight will stress your body after 45 minutes.	Take at least 15 minutes of breaks each hour if working or exercising in direct sunlight.
85-88	Working or exercising in direct sunlight will stress your body after 30 minutes.	Take at least 30 minutes of breaks each hour if working or exercising in direct sunlight.
88-90	Working or exercising in direct sunlight will stress your body after 20 minutes.	Take at least 40 minutes of breaks each hour if working or exercising in direct sunlight.
>90	Working or exercising in direct sunlight will stress your body after 15 minutes.	Take at least 45 minutes of breaks each hour if working or exercising in direct sunlight.

*Scale based on active work.

www.weather.gov/ict/WBGT

WBGT Project

- NWS nationwide project proposal
- Partnership with AccuWeather Enterprise Solutions, Inc.
- Heat tabletop exercises
- Local studies of heat parameters
- Coordination with school officials on heat plans

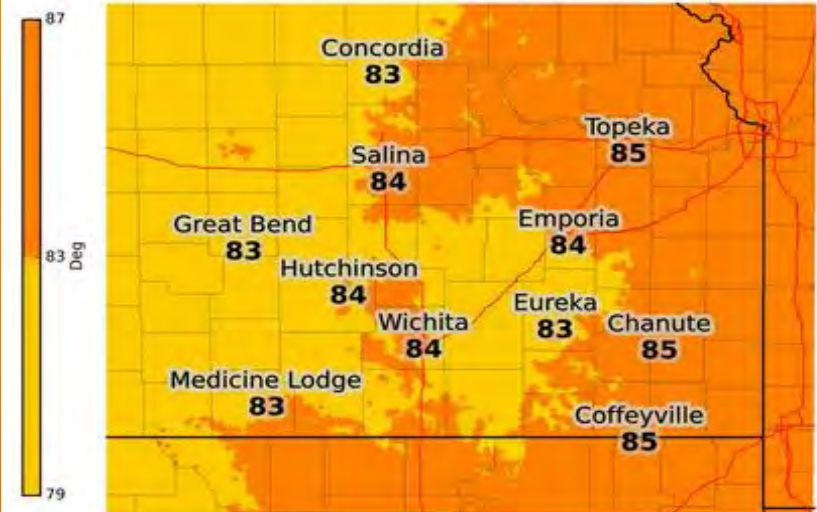
Offices Involved

- Tulsa
- Raleigh
- Burlington
- Wichita
- Minneapolis
- La Crosse

Day 2 Maximum Wet Bulb Globe Temperature

Highest Thursday Maximum WBGT

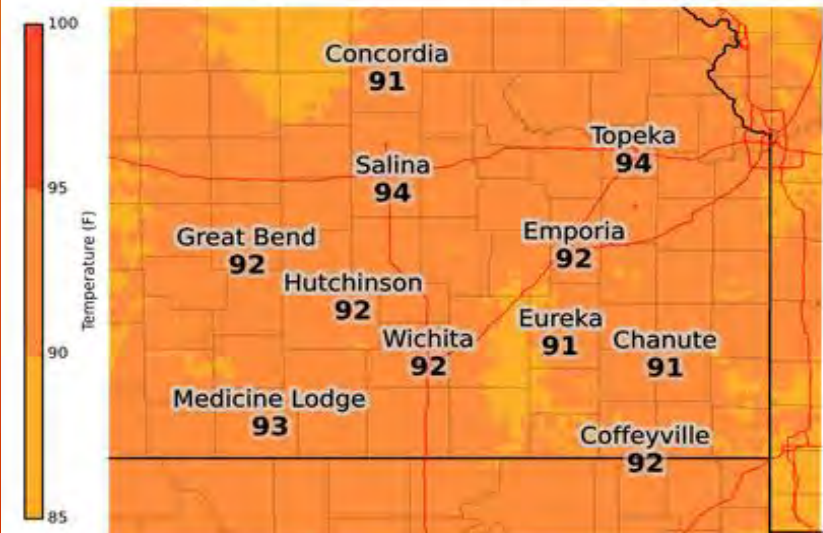
Valid: 08/02/18 12AM - 08/03/18 12AM Created: 08/01/18 0732 PM CDT



Day 2 Maximum Heat Index

Highest Thursday Maximum ApparentT

Valid: 08/02/18 12AM - 08/03/18 12AM Created: 08/01/18 0732 PM CDT



Comparative Assessment

Initial values are estimates
for the selected location
adjust sliders as needed

Month:	7	<input type="text"/>
Day:	22	<input type="text"/>
Latitude:	37.7	<input type="text"/>
Fcst Max Temp(F):	92	<input type="text"/>
DewPoint(F):	72	<input type="text"/>
RH(%):	52	<input type="text"/>
Wind Speed(mph):	0	<input type="text"/>
Cloud Cover(%):	10	<input type="text"/>

HeatIndex(F): 100

WBGT(F): 88

Initial values are estimates
for the selected location
adjust sliders as needed

Month:	7	<input type="text"/>
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Fcst Max Temp(F):	92	<input type="text"/>
DewPoint(F):	72	<input type="text"/>
RH(%):	52	<input type="text"/>
Wind Speed(mph):	15	<input type="text"/>
Cloud Cover(%):	10	<input type="text"/>

HeatIndex(F): 100

WBGT(F): 83

On-site Surface Study

- Dam Music Festival
 - 13 heat patients (5 on Friday & 8 on Saturday)
 - Difference surface comparison

Surface	Temp (F)	Wind speed (mph)	Heat Index	WBGT
Asphalt	93	4	98	86
Crowd	96	3	105	85
Dirt/dry grass	93	4	96	85
Green Grass	92	4	90	83
Sand	94	4	95	88

Climate Study with USD 259

- Coordinating current heat plan with WBGT
- Assessing climate conditions from August 15-31
- 12 year study (2005-2017)
 - At 21Z (preliminary results)
 - 0 days >90 WBGT with max of 87
 - 7 days >105 Heat Index with max of 112



Future Considerations

- Adjusting scale to make it easier to read
- Changing name
- Additional studies – different surfaces, acclimation and lower thresholds for different events

Questions?

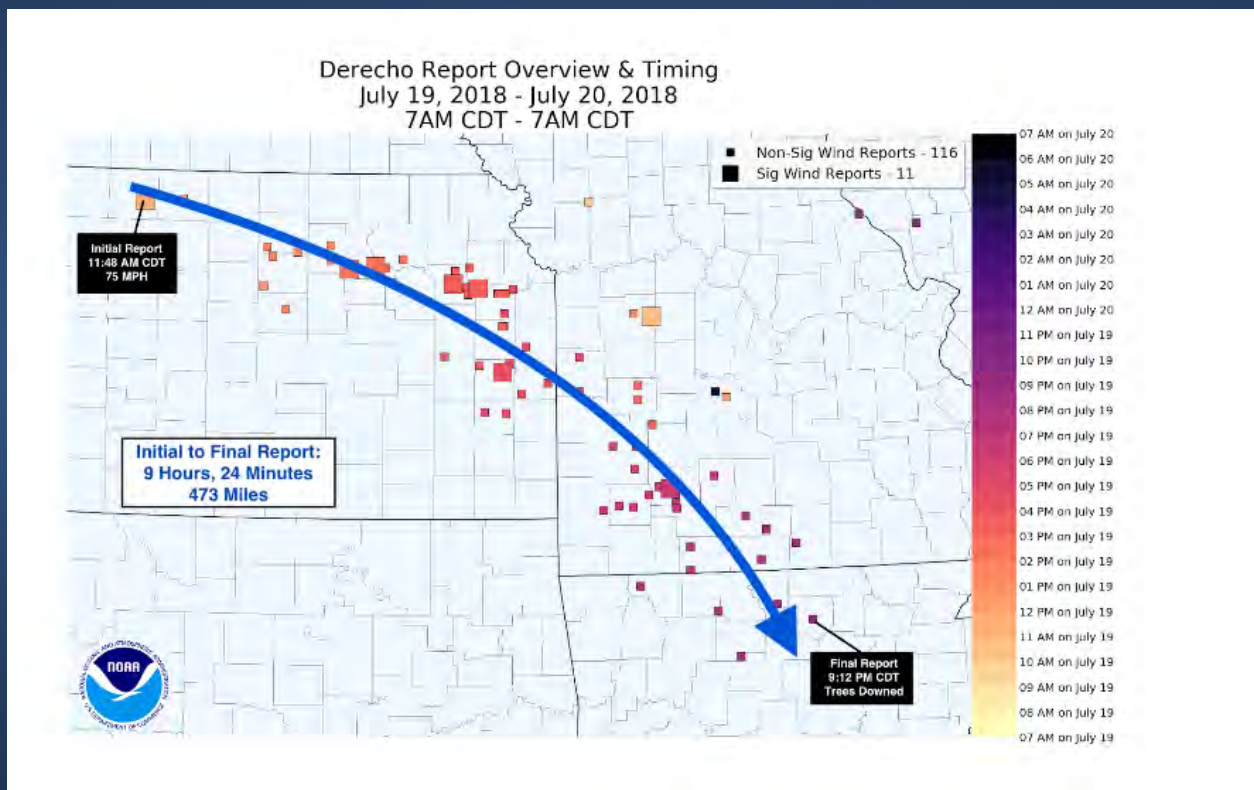
Thank You!





Building a Weather-Ready Nation

July 19, 2018 Derecho





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Derecho Classification

- Damaging wind swath (> 50 knots) of at least 250 miles in length
- At least 6 hours in duration

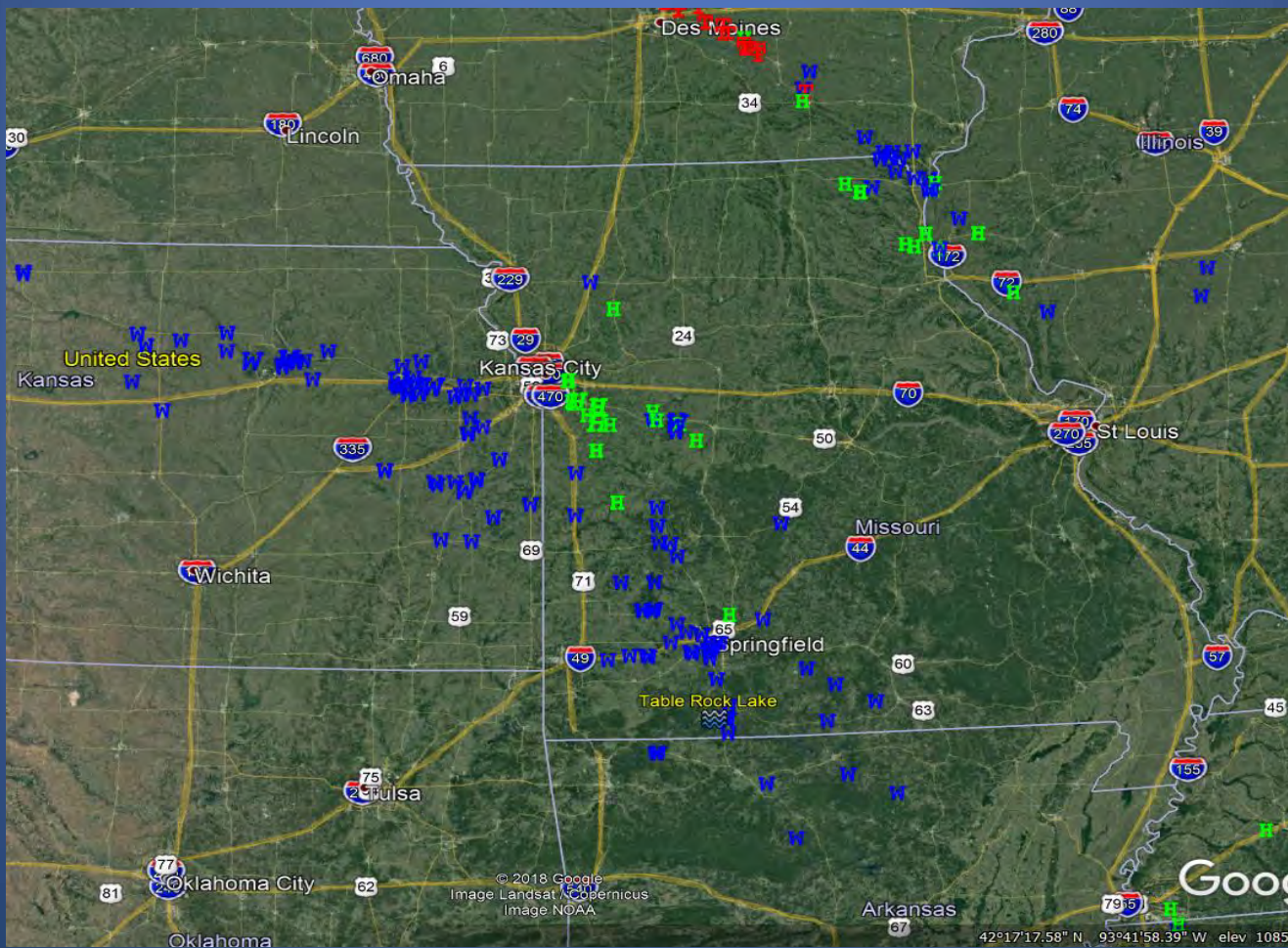


Image from Patrick Marsh SPC



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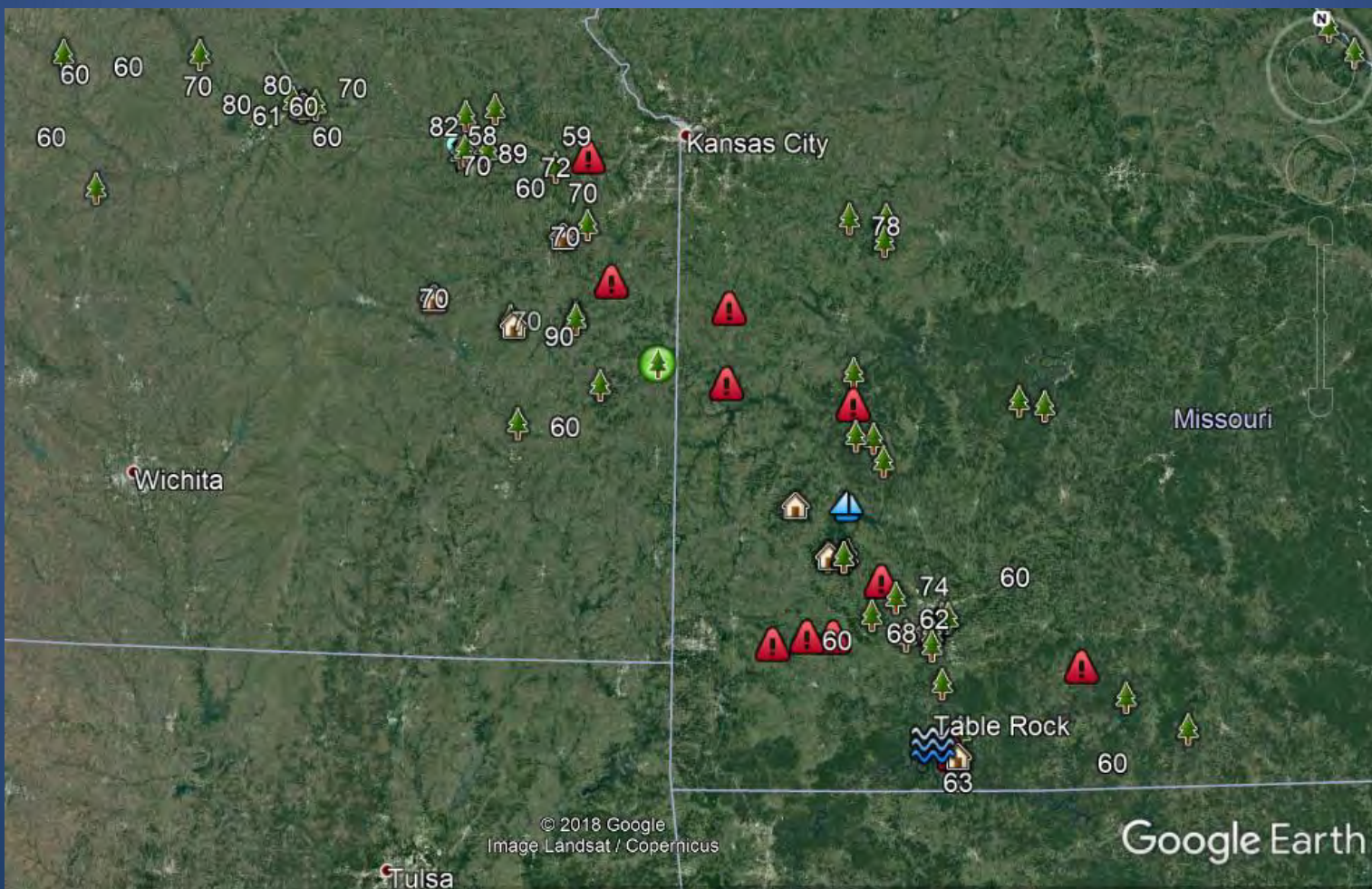
100+ Local Storm Reports





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Storm Reports by Type



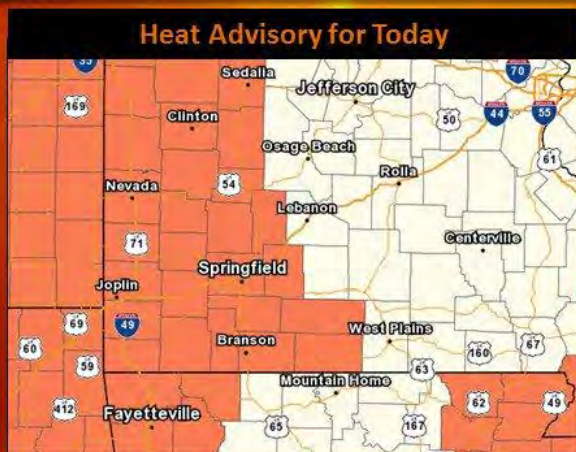


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Weather Story – 4:50 AM

Hot and Humid Today

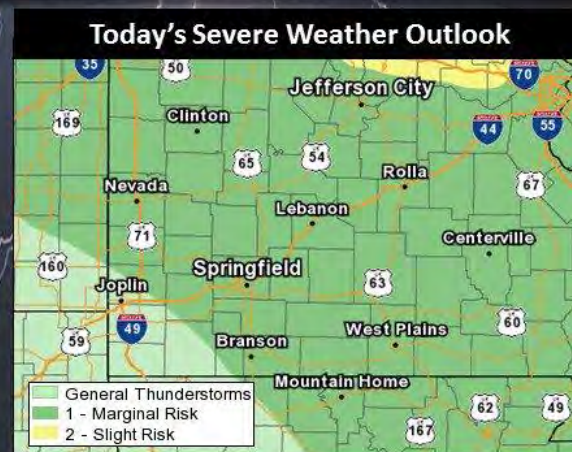
- High temperatures 90-100°
- Afternoon heat indices 100-110°
- Heat Advisory in effect for parts of the area!



weather.gov/springfield

Scattered Thunderstorms

- Risk for storms today and tonight
- Main hazards will be frequent lightning and locally heavy rainfall
- Marginal risk for severe storms including hail up to the size of half dollars and damaging winds



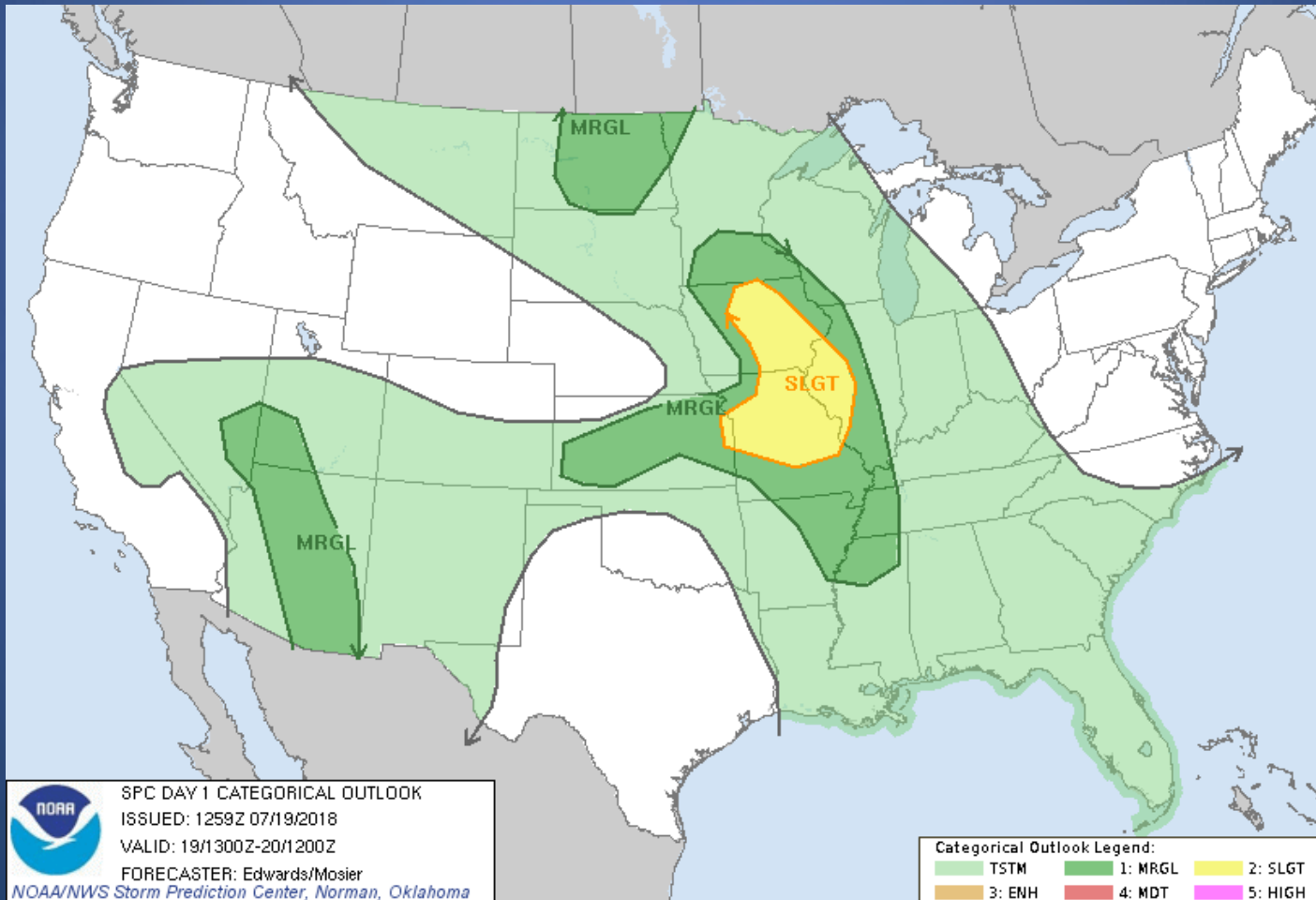
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SPC Day 1 Convective Outlook – 8 AM



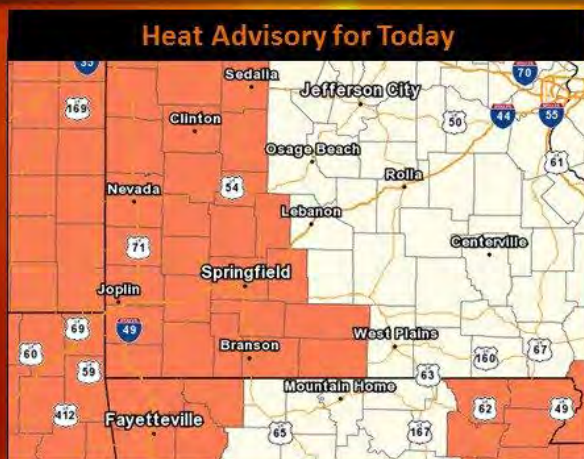


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Weather Story – 8:49 AM

Hot and Humid Today

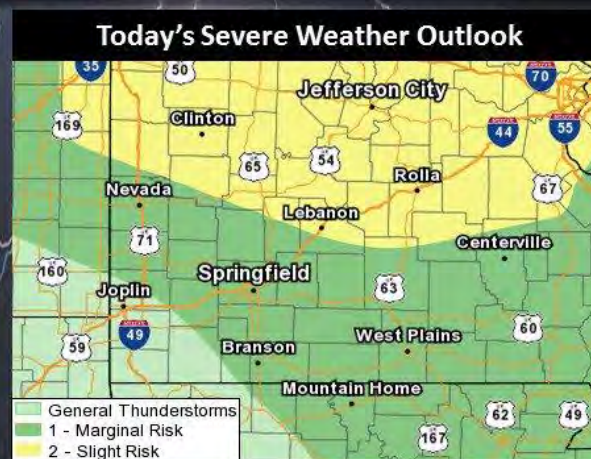
- High temperatures 90-100°
- Afternoon heat indices 100-110°
- Heat Advisory in effect for parts of the area!



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Scattered Thunderstorms

- Risk for storms today and tonight
- Main hazards will be frequent lightning and locally heavy rainfall
- Slight risk for severe storms including hail up to the size of half dollars and damaging winds



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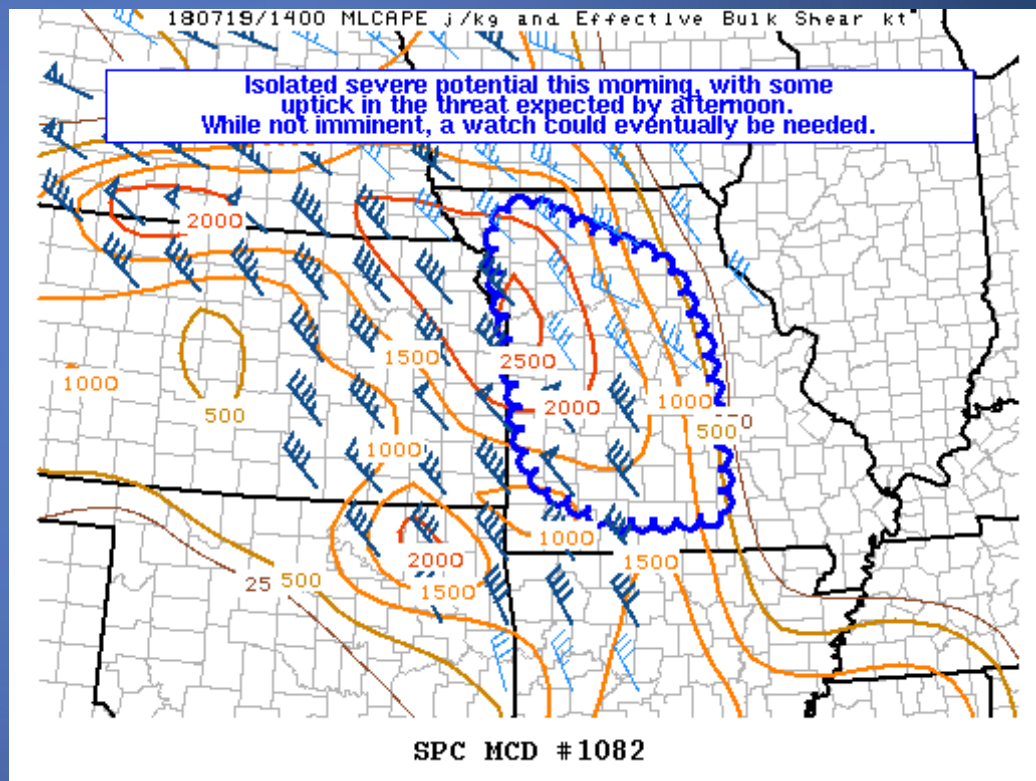




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SPC Mesoscale Discussion **958 AM**

By mid-morning the apparent risk for severe weather is now extending into southern Missouri

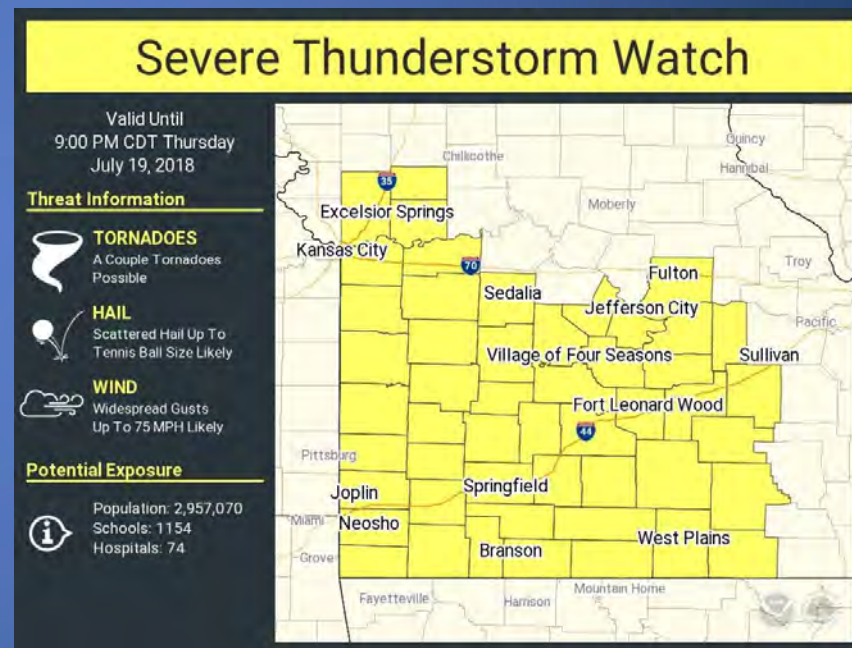




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SVR Thunderstorm Watch **1120 AM-900 PM CDT**

- Widespread damaging winds likely, isolated **significant gusts to 75 mph** possible
- Scattered large hail likely with isolated **very large hail events to 2.5 inches**
- A tornado or two possible

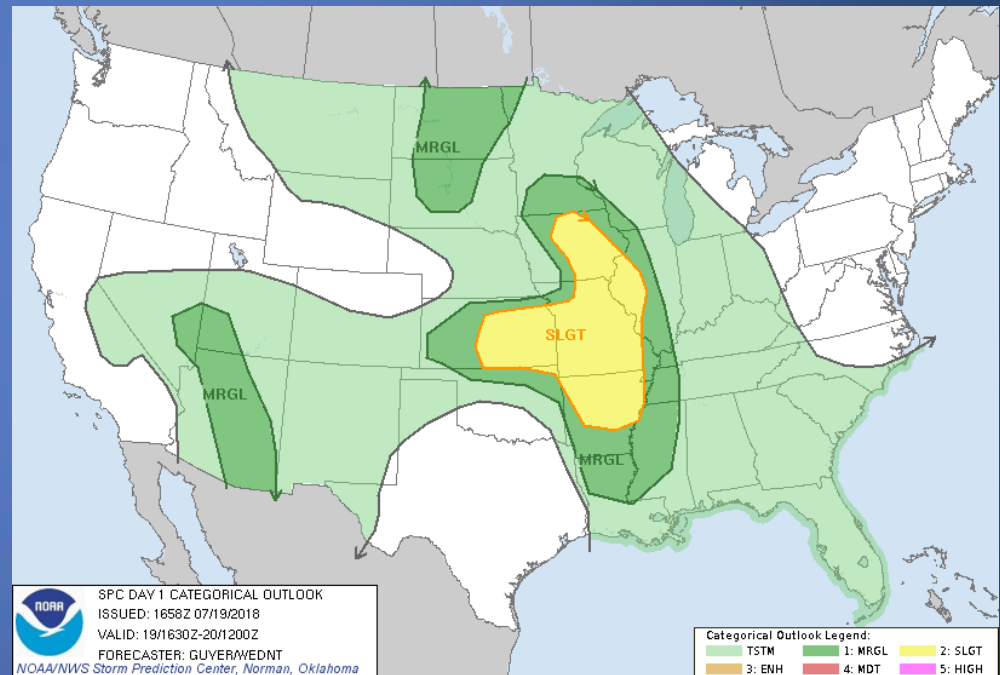




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Day 1 Convective Outlook **1158 AM**

“Expanded the Slight Risk southward across the region to account for increasing concerns that an increasingly well-organized complex of storms in central MO will continue southward across the region...”

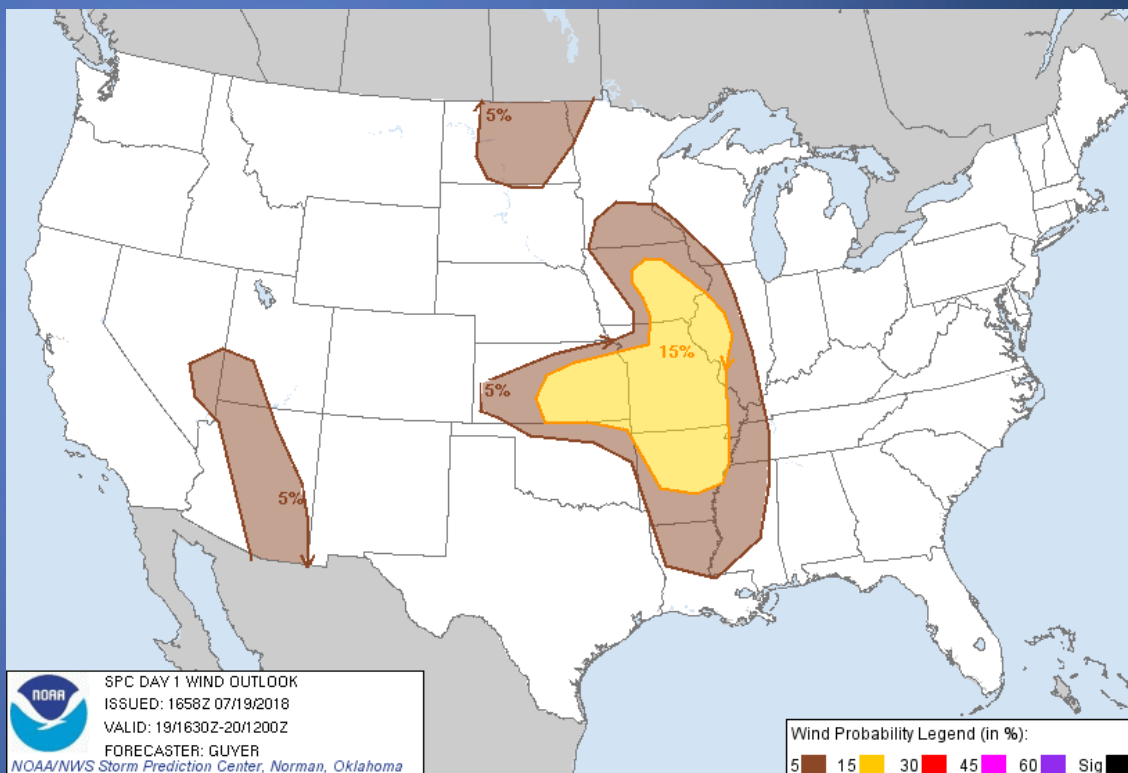




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Day 1 Convective Outlook – 1158 AM

15% wind outlook
(probability of
damaging tstm winds
or wind gusts of 50
knots or higher within
25 miles of a point)





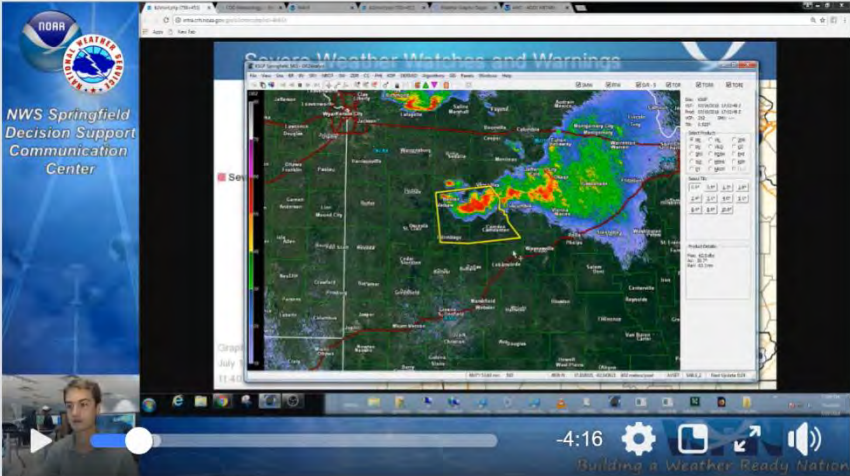
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Facebook Live

 **US National Weather Service Springfield Missouri** was live. ⋮
 Published by NWS Springfield [?] · July 19 at 12:04 PM · 🌐

*****This post is no longer valid*****

Good Afternoon,
 Mike here from the NWS Springfield to talk about the storm situation through the rest of today.



12:04 PM

 **US National Weather Service Springfield Missouri** was live. ⋮
 Published by NWS Springfield [?] · July 19 at 1:09 PM · 🌐

*****This post is no longer valid*****

Severe weather update and special balloon launch



 People have watched this video for a total of **1.7K minutes** [Boost Post](#)

   76 45 Comments 24 Shares 3.3K Views

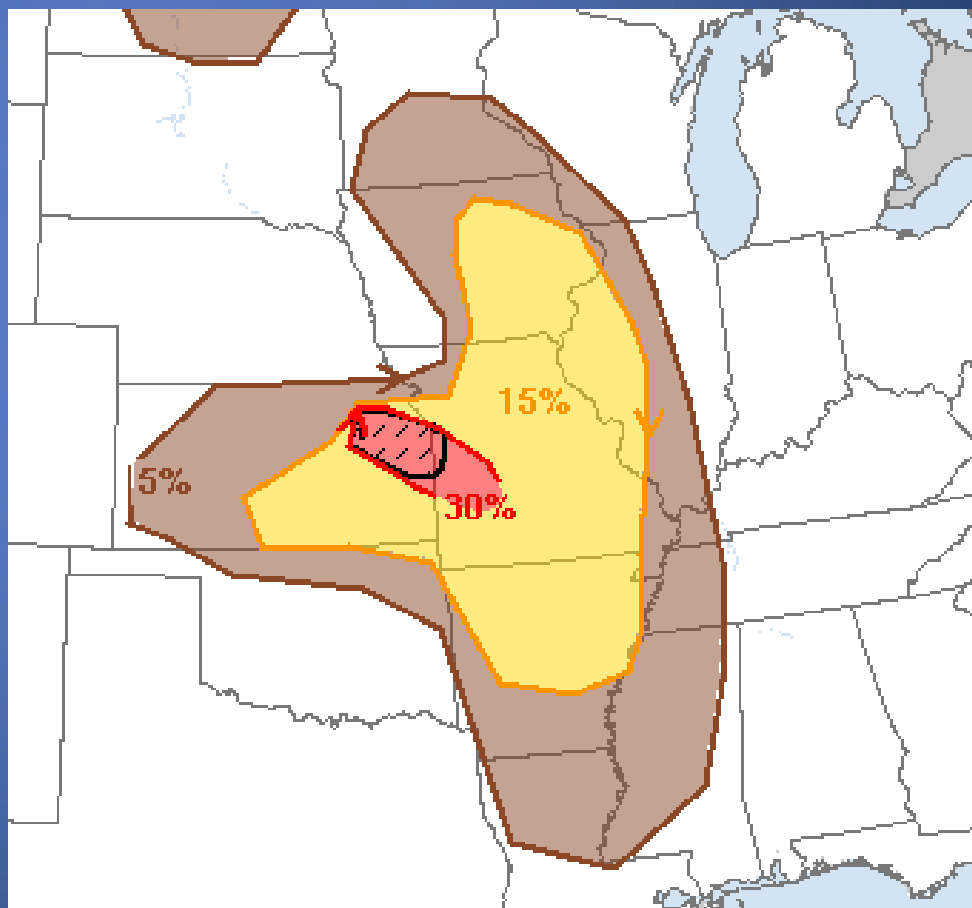
1:10 PM



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Day 1 Convective Outlook – 3 PM

“The thunderstorm cluster approaching Topeka as of 20Z (3 PM) has a **history of producing wind damage, and is moving into a hot and strongly unstable environment, with a continued threat for potentially significant wind damage.**”





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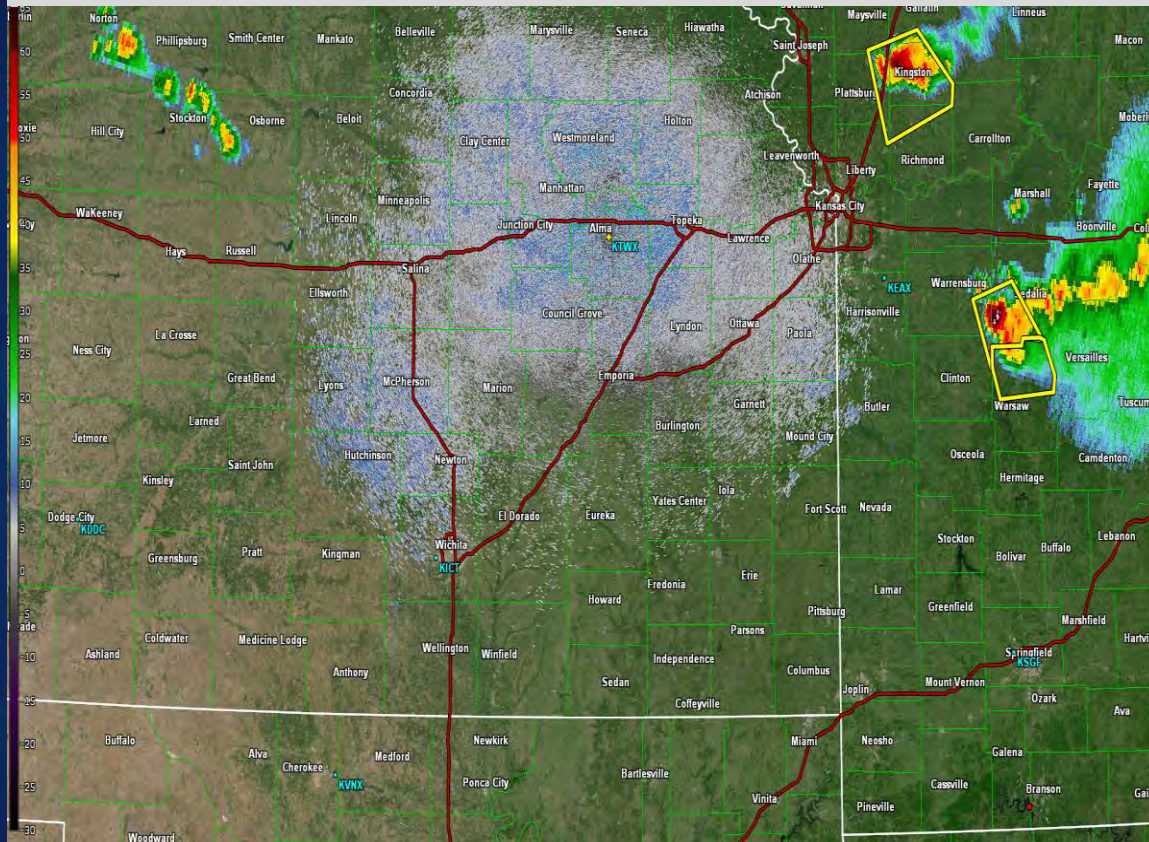
DSS Special Event – Outdoor Tent Theater at MSU

REQ: 30 minute notification for lightning within 5 miles, winds greater than 40 mph



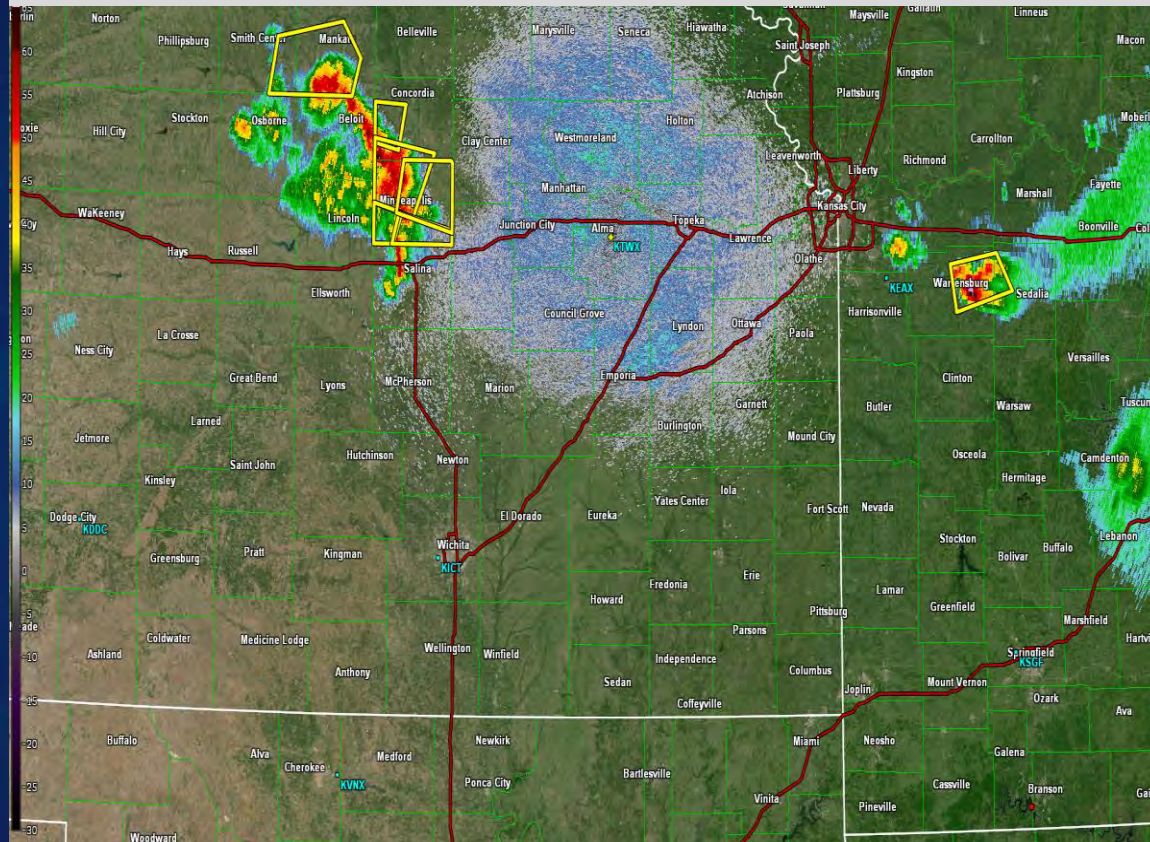
Initiation of Convection

Topeka Reflectivity Data - 1059 AM CDT



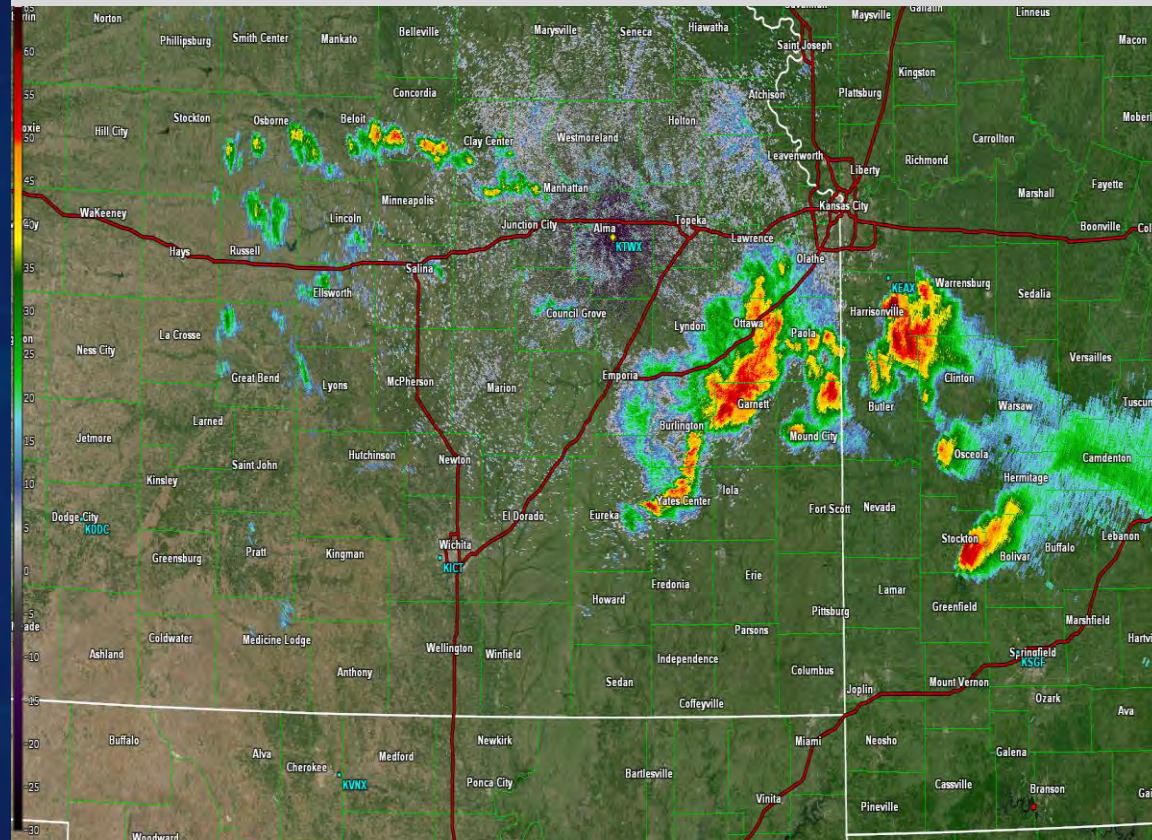
“MCS” Storm Development

Topeka Reflectivity Data - 102 PM CDT

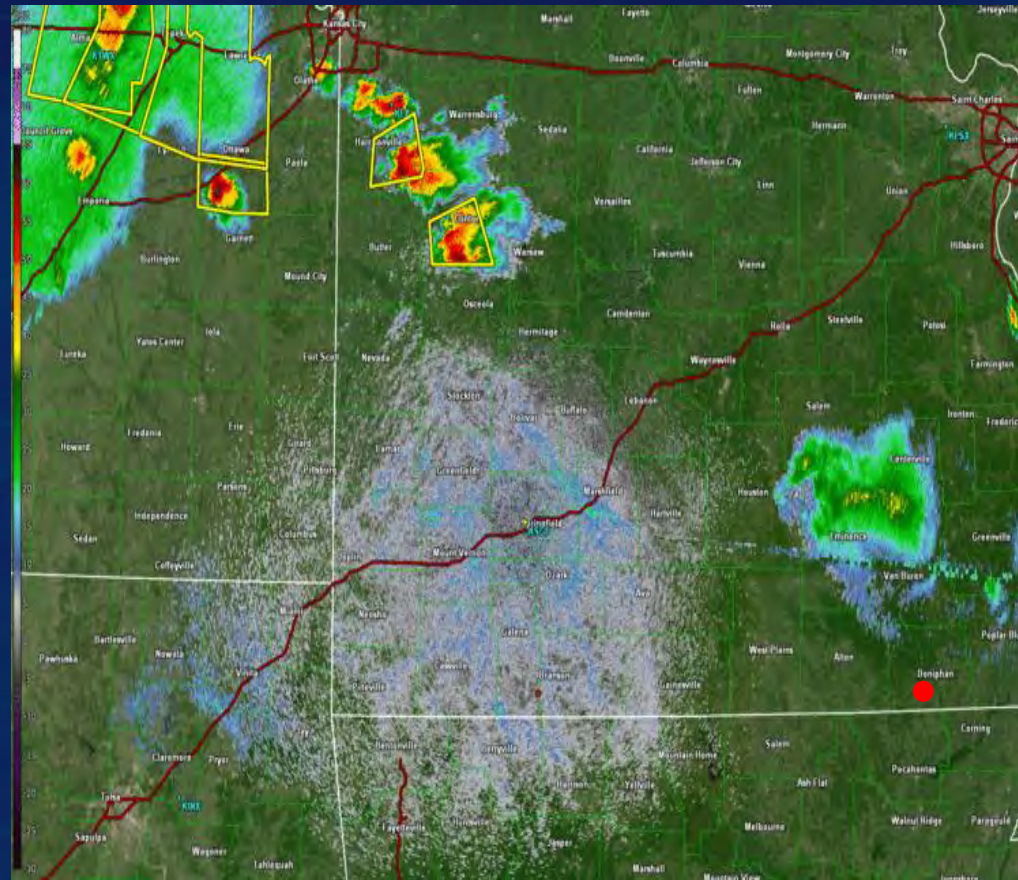


Mature Bowing Segment

Topeka Reflectivity Data - 405 PM CDT

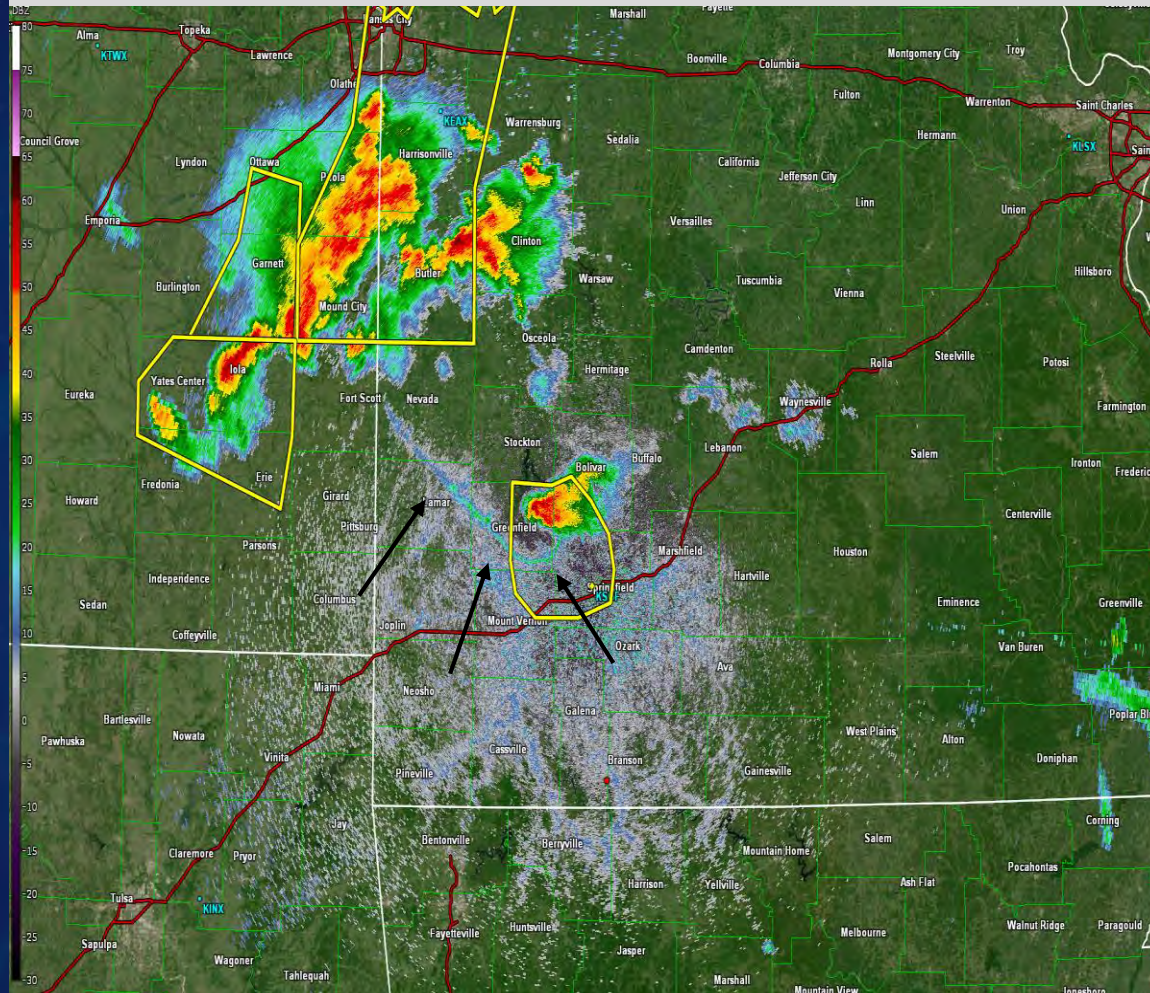


Springfield Reflectivity Loop: 3 to 730 PM

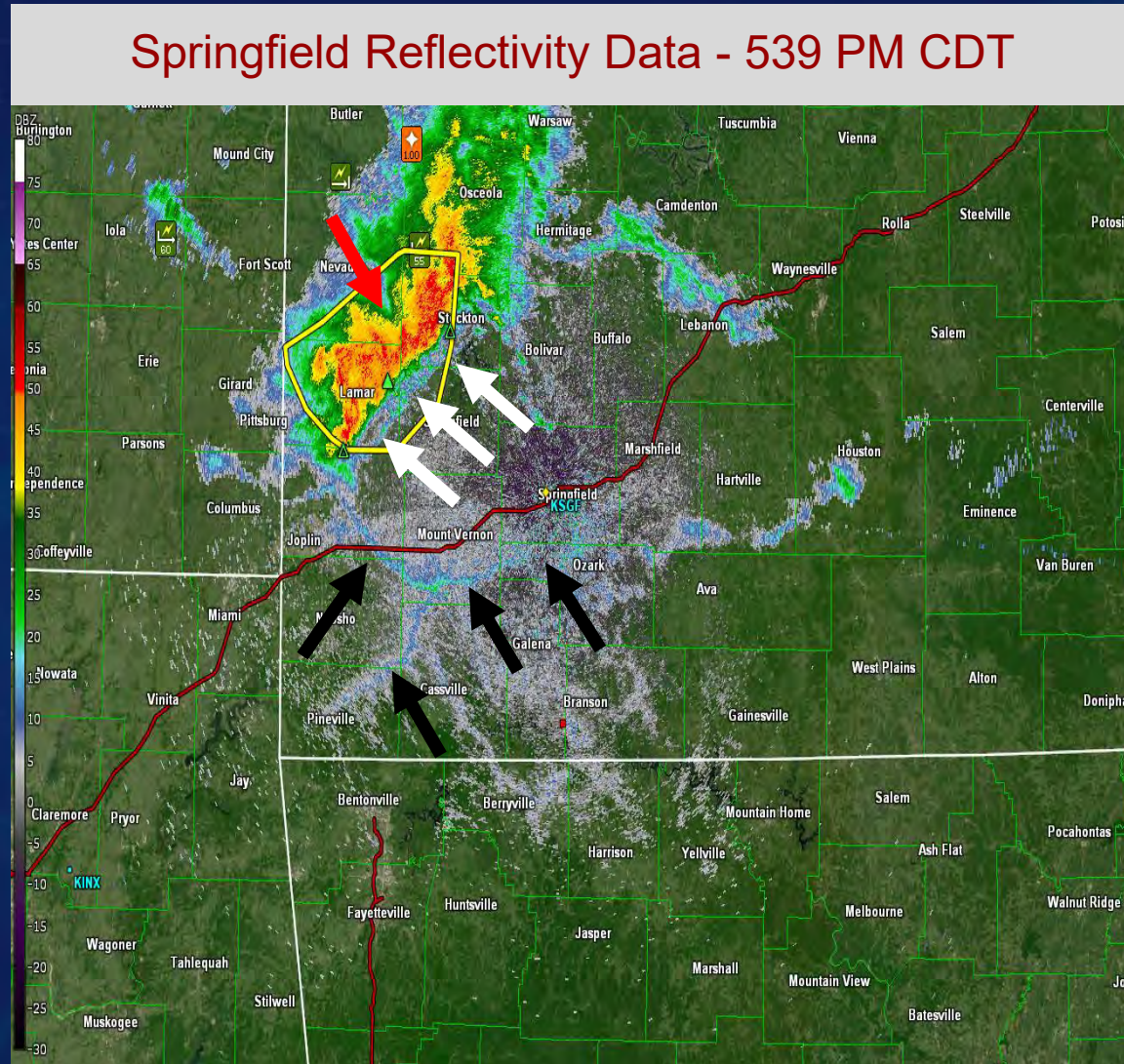


Line of Storms Moving into Missouri

Springfield Reflectivity Data - 430 PM CDT

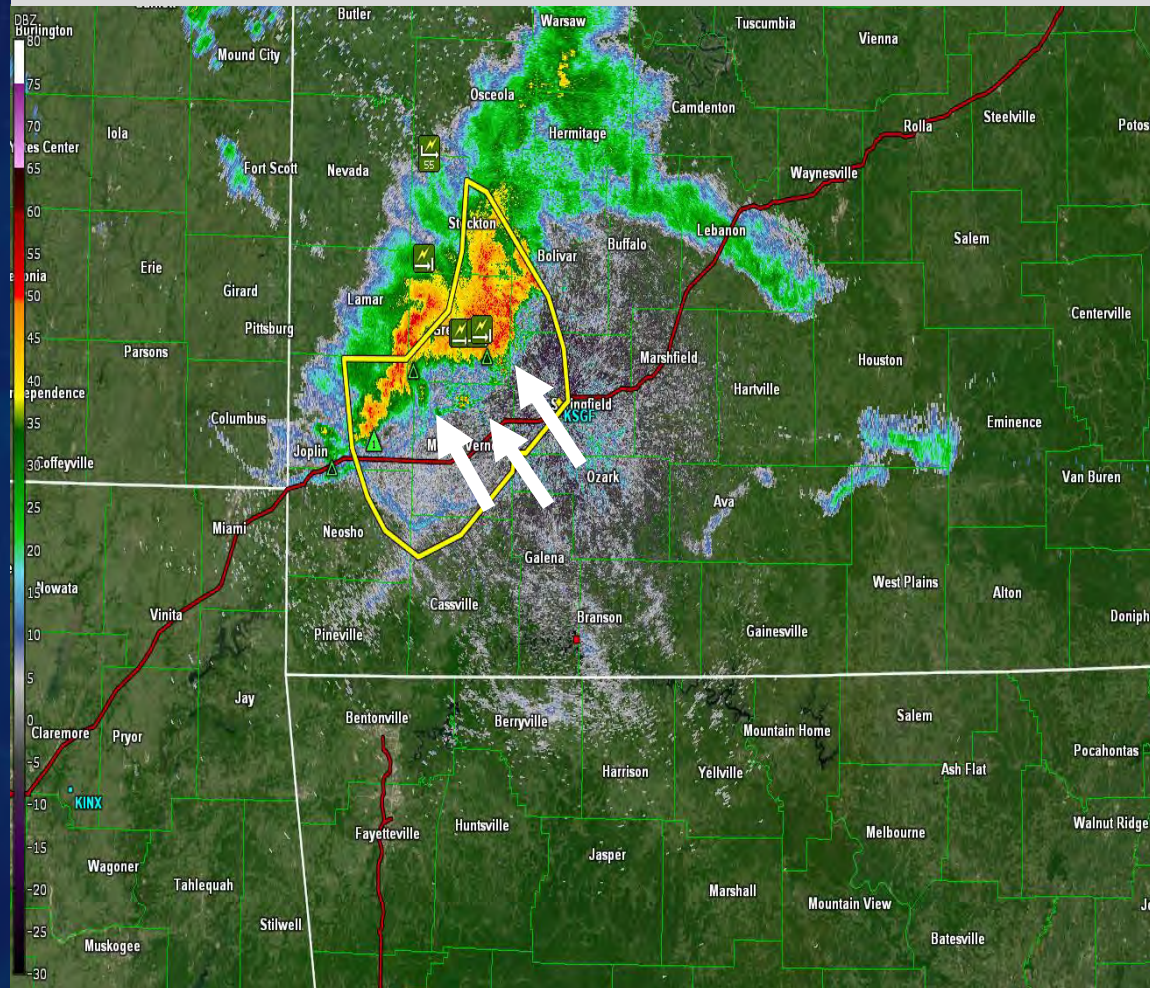


Line of Storms and Outflow – Approaching SGF



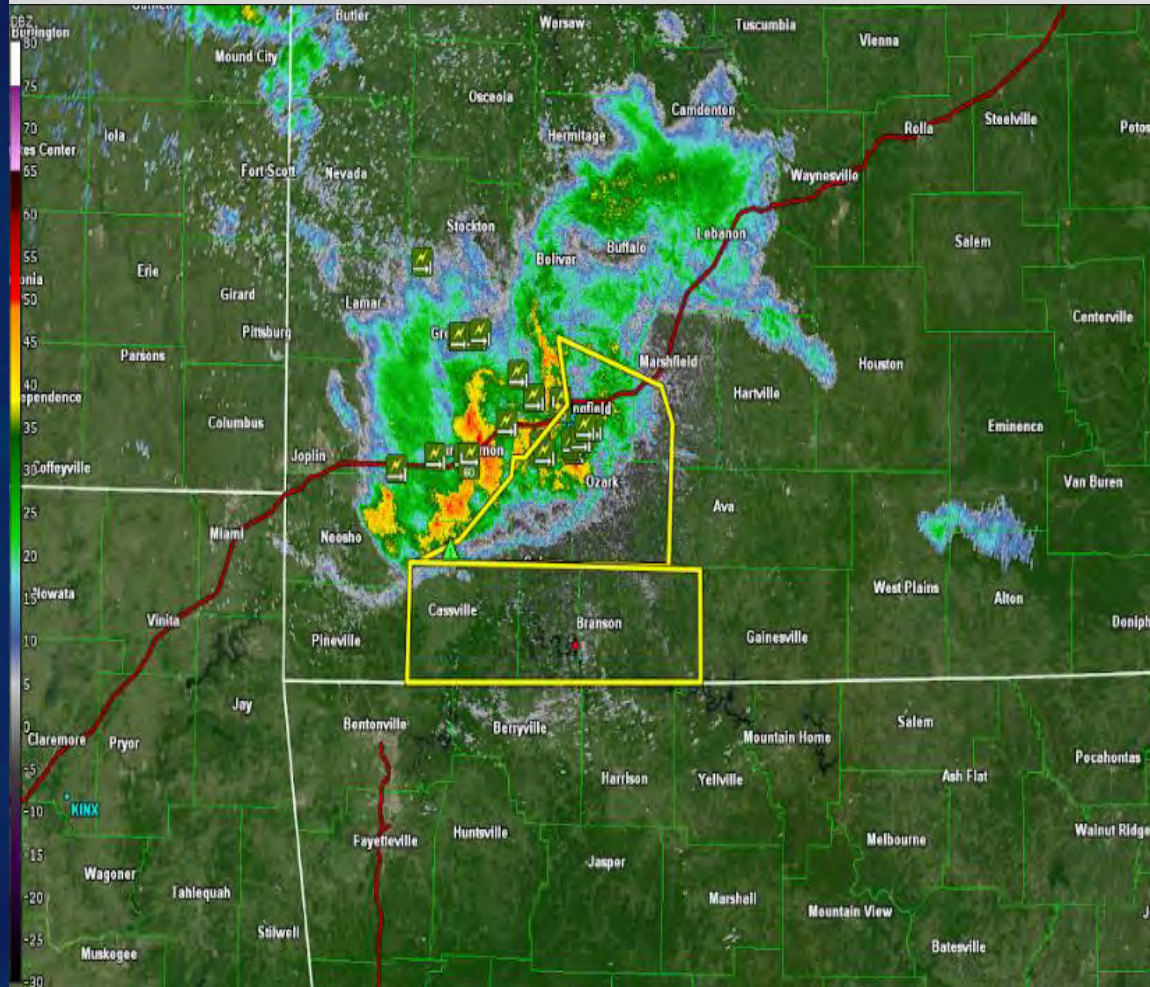
Signs of Decreasing Organization

Springfield Reflectivity Data - 601 PM CDT



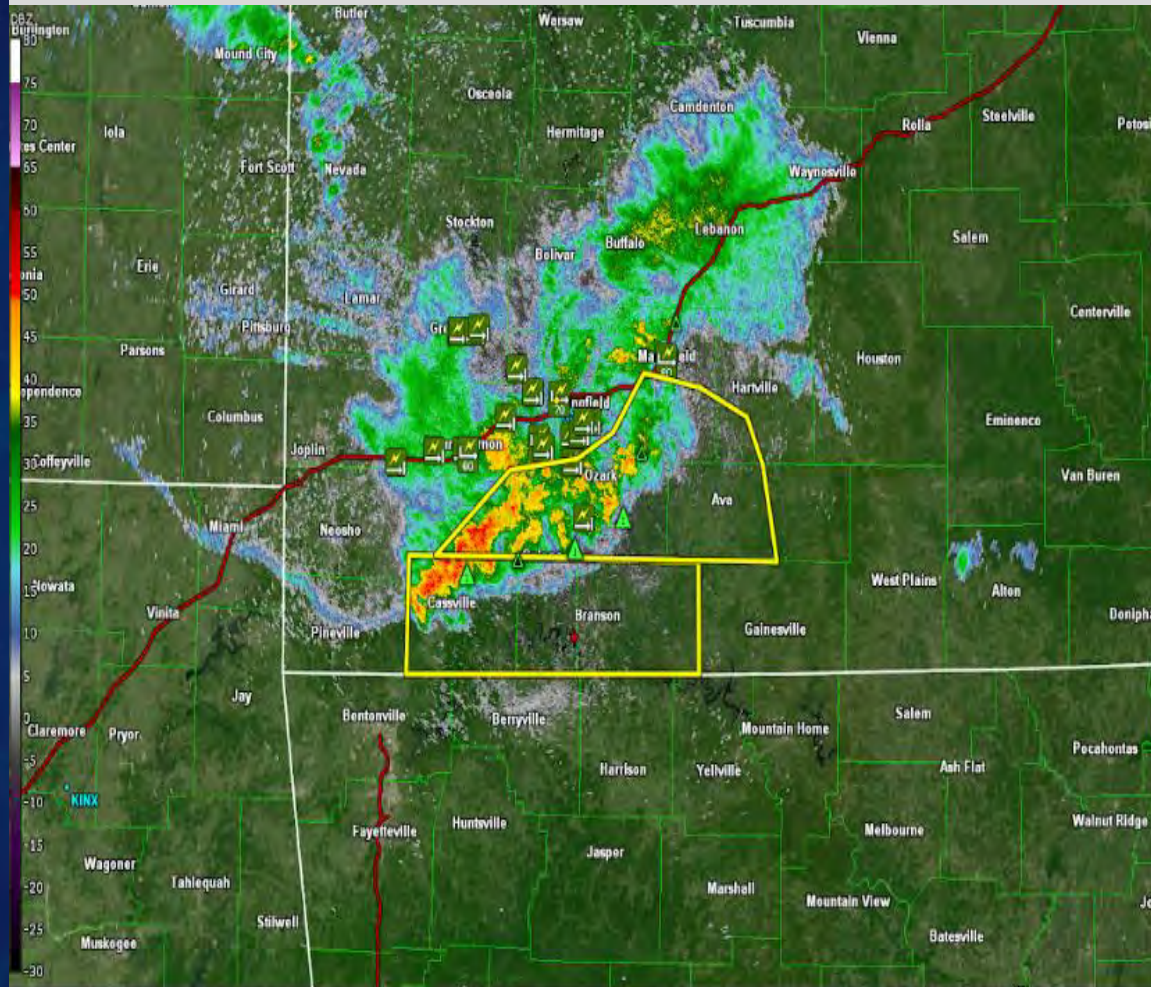
Broken Linear Phase

Springfield Reflectivity Data - 633 PM CDT



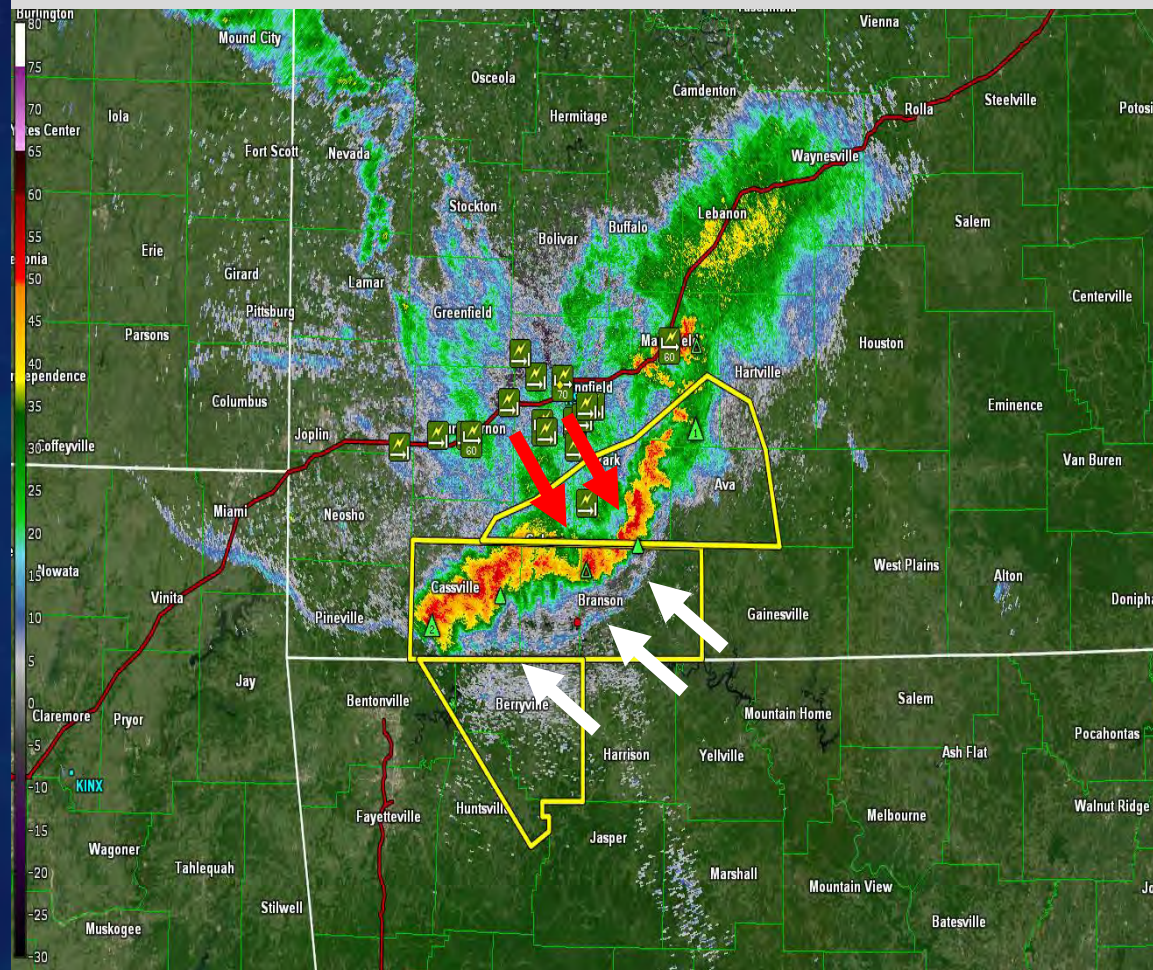
Broken Linear Phase - Re-intensification

Springfield Reflectivity Data - 646 PM CDT



Strong Winds Racing Ahead of Storms

Springfield Reflectivity Data - 701 PM CDT



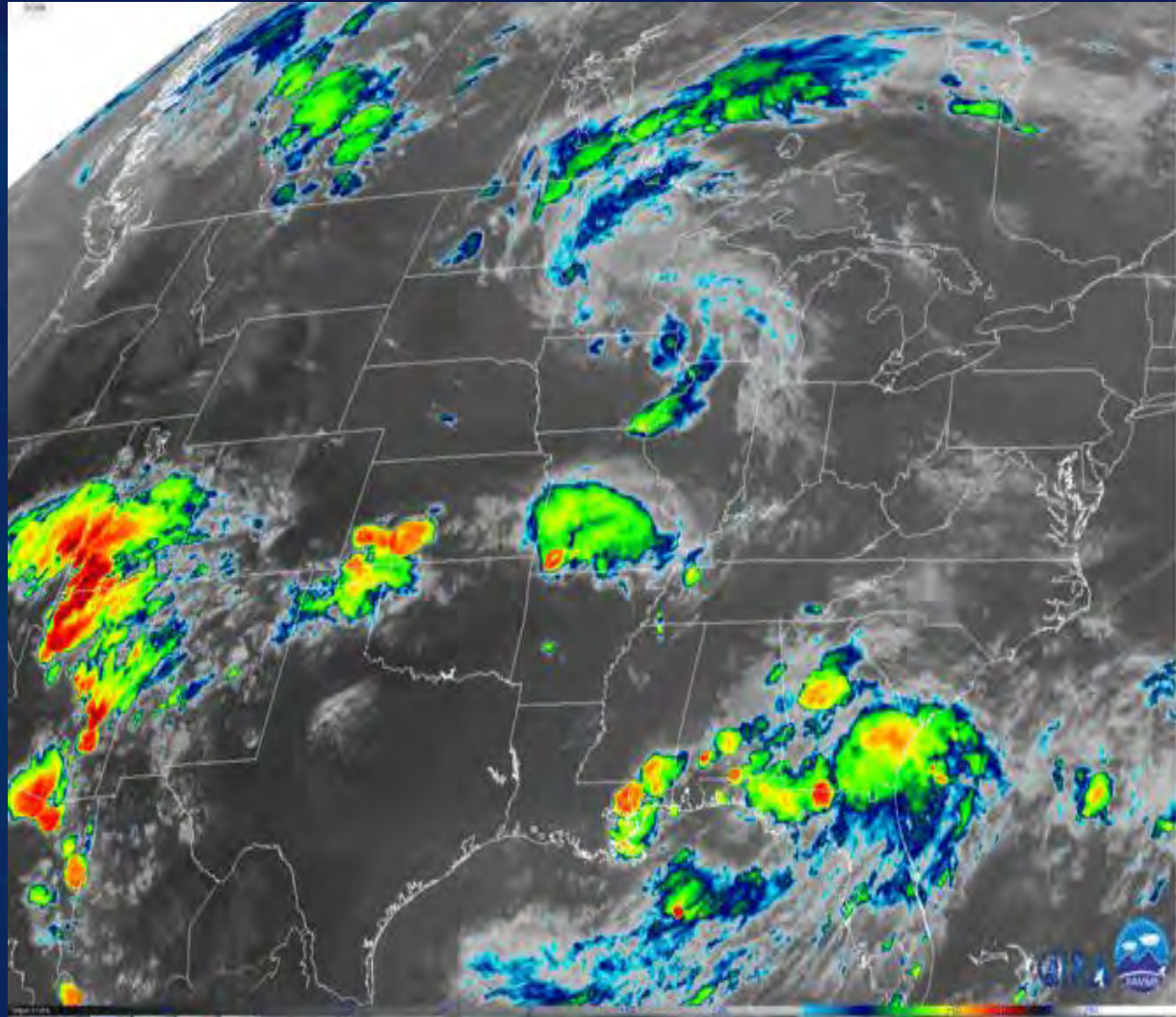
Visible Satellite Loop: 1:00 to 7:45 PM

- Line of storms clearly intensifies as it approaches Table Rock Lake
- Rapid growth of 'overshooting tops' in southwest Missouri indicative of intensification



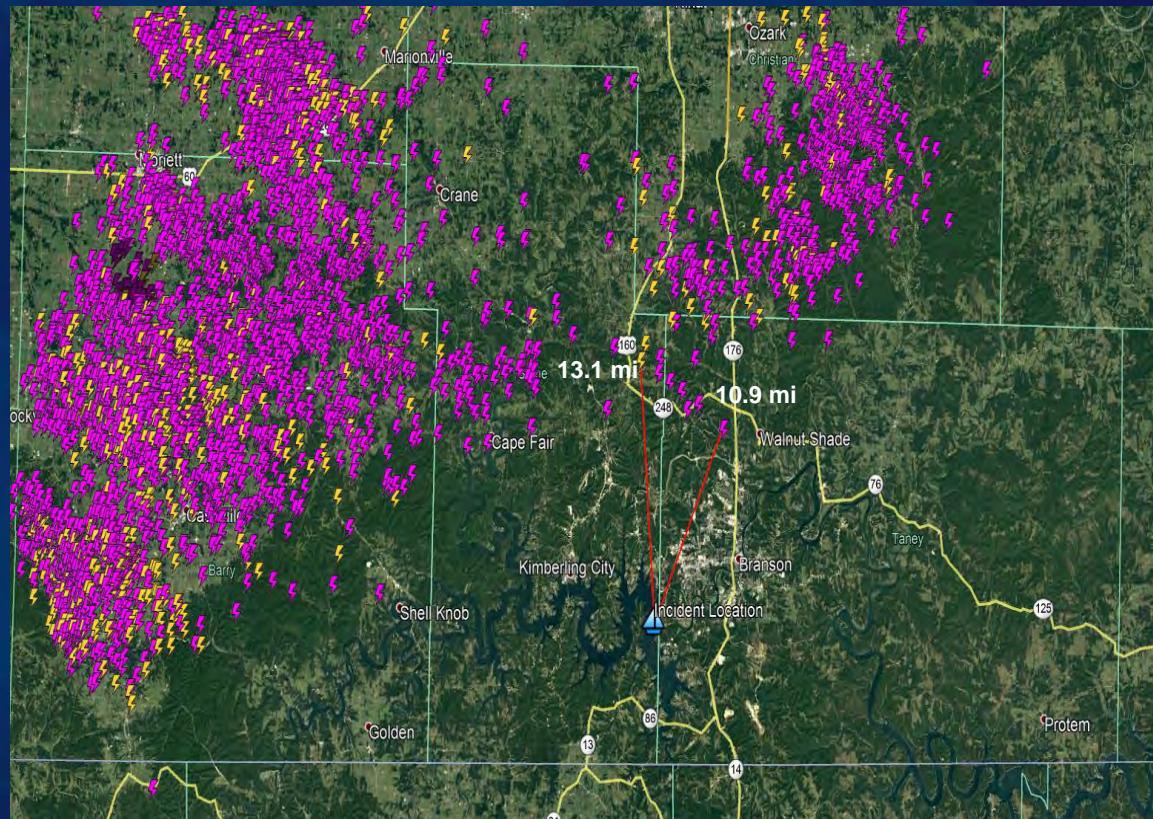
Infrared Satellite Loop: Noon – 9 PM

- Very cold cloud tops in eastern Kansas warm substantially as line moves into west central MO
- Explosive cloud top cooling occurs rapidly as storms re-intensify across SW MO



Lightning Flashes as Storms Approach Table Rock Lake

- Outflow reached the lake at ~700 PM CDT
- Nearest lightning flashes over the previous 30-minutes had been:
 - Cloud-to-ground - 13 miles away
 - In-cloud flash - 10.9 miles away



Purple Flashes - In-cloud Lightning
Orange Flashes - Cloud-to-ground Lightning



Building a Weather-Ready Nation

Your Partnership is Critical

**Pre-Event
“Ready”
Aware**

**Near Event
“Set”
Alert**

**Event
“Go”
Action**

“All organizations are perfectly prepared to get the results they get.”



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