



**NOAA**

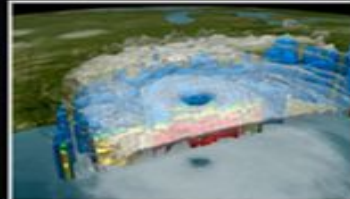
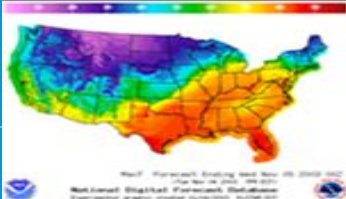
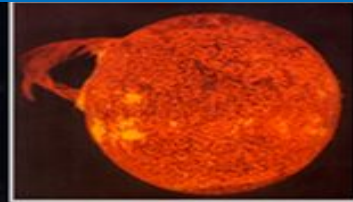
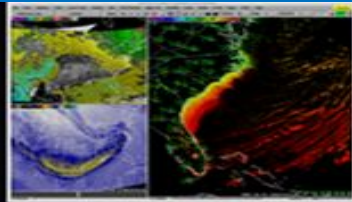
National  
Weather  
Service

# National Weather Service Severe Weather Forecasting and Data Collection

Matthew Elliott

Warning Coordination Meteorologist

NOAA/NWS Storm Prediction Center





# What is a Severe Thunderstorm?



**TORNADO**



**HAIL**

≥ 1 inch diameter



~~LIGHTNING~~



**WIND**

≥ 58 mph gusts



~~FLOODING~~

James Hobbs



Understanding  
**SEVERE  
WEATHER  
HAZARDS**



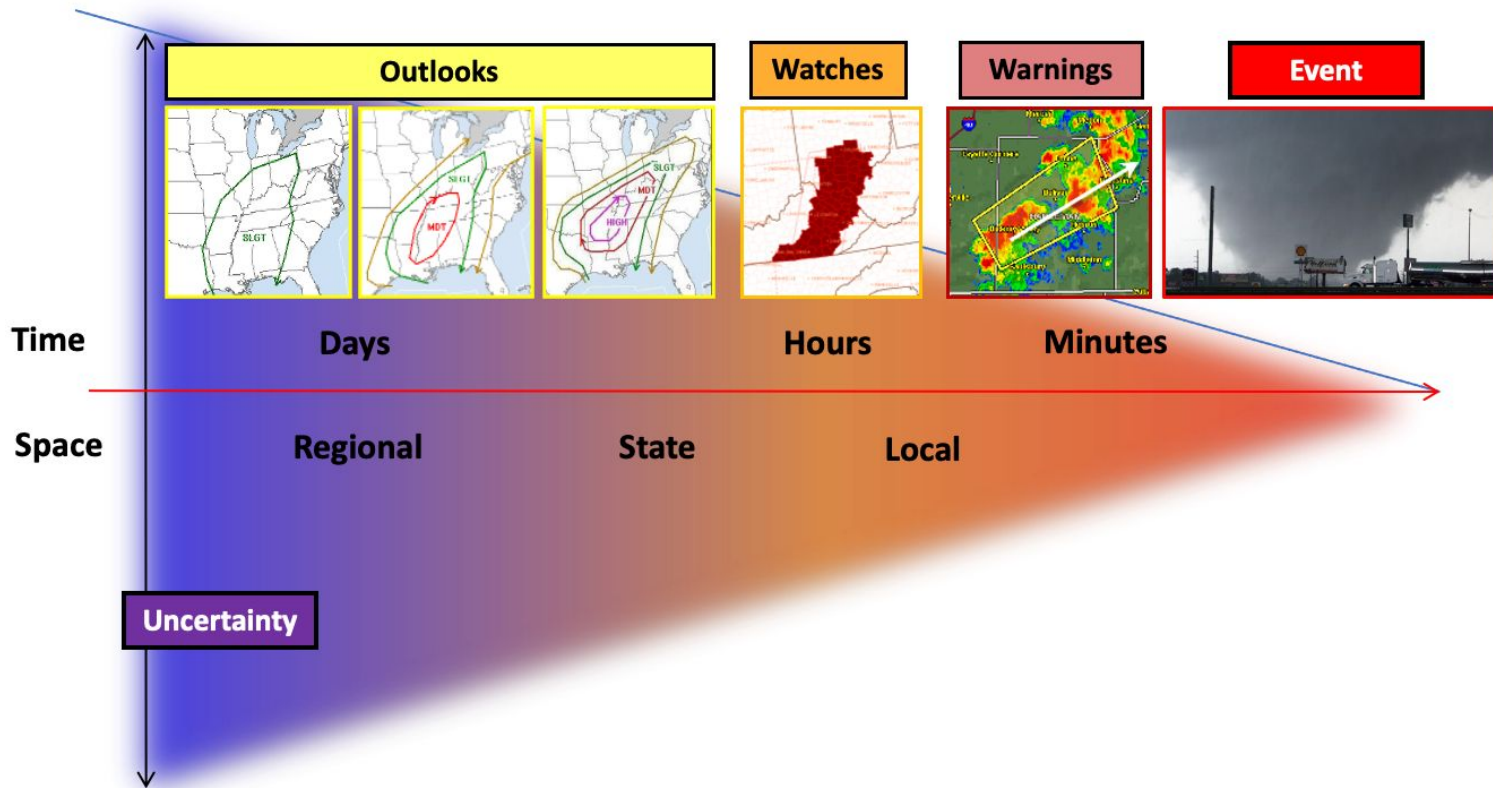


POLL

QUESTION

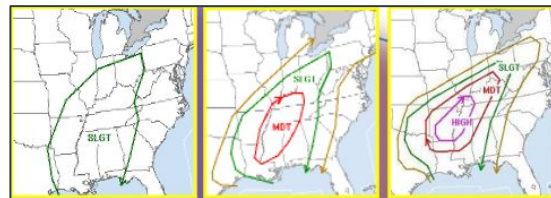








# Severe Weather Product Continuum



# Severe Products Across Time And Space

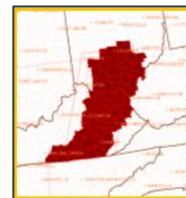
- Outlooks (Storm Prediction Center)
  - Forecasts begin “Day 8”
  - Coverage within 25 miles of a point



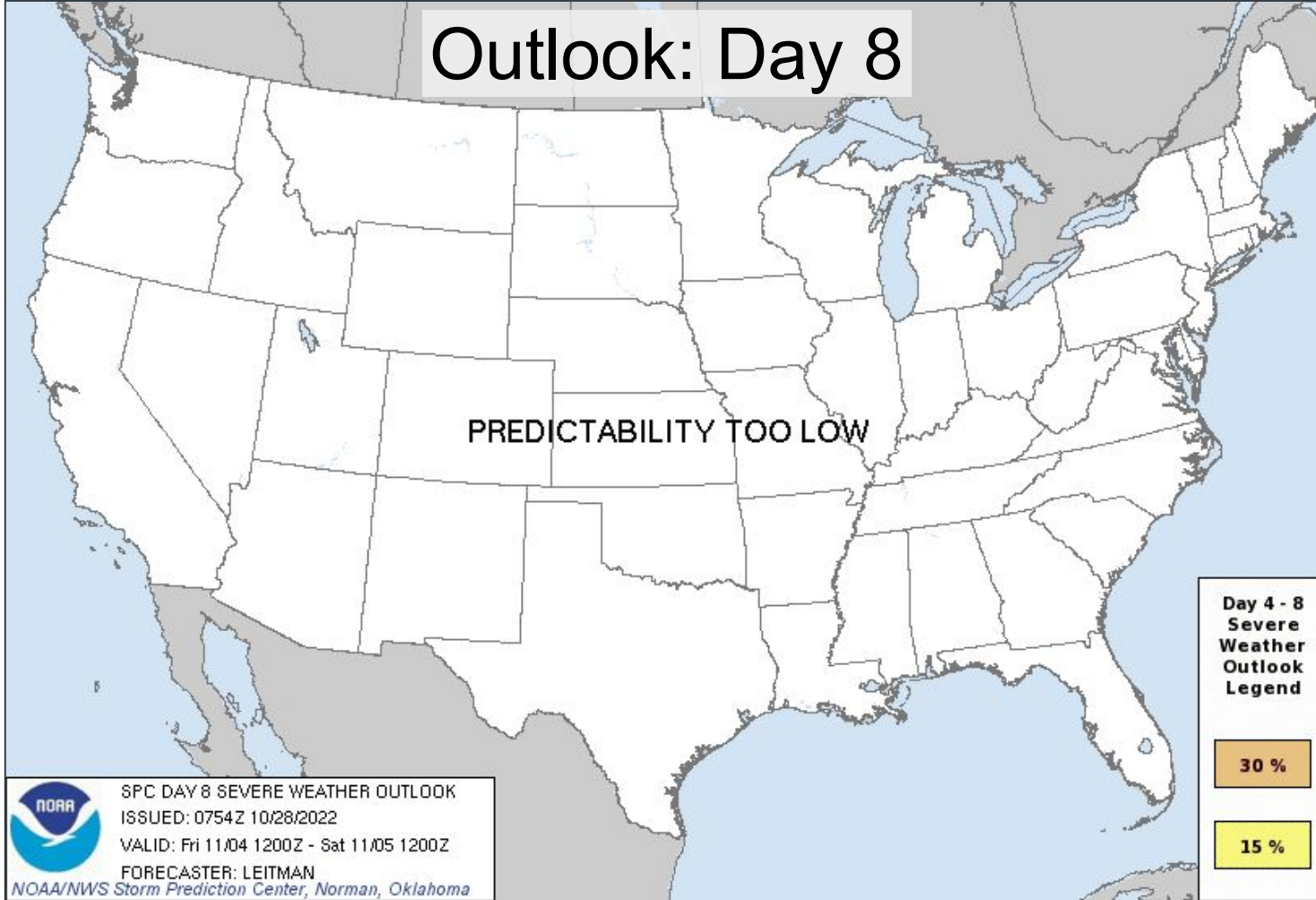
THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	Isolated severe thunderstorms possible	Scattered severe storms possible	Numerous severe storms possible	Widespread severe storms likely	Widespread severe storms expected
Lightning/flooding threats exist with <u>all</u> thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
					


# Severe Products Across Time And Space

- Outlooks (Storm Prediction Center)
  - Forecasts begin “Day 8”
  - Coverage within 25 miles of a point
- Watches (Storm Prediction Center)
  - Conditions favorable within an area
  - ~State-sized, 6 hours
- Warnings (Local Forecast Office)
  - Storm is severe (or will be)
  - ~300 sq mi., 45 minutes
- Reports/Verification (Local Forecast Office)



# Outlook: Day 8



 SPC DAY 8 SEVERE WEATHER OUTLOOK  
ISSUED: 0754Z 10/28/2022  
VALID: Fri 11/04 1200Z - Sat 11/05 1200Z  
FORECASTER: LEITMAN  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

**Day 4 - 8  
Severe  
Weather  
Outlook  
Legend**

 30 %

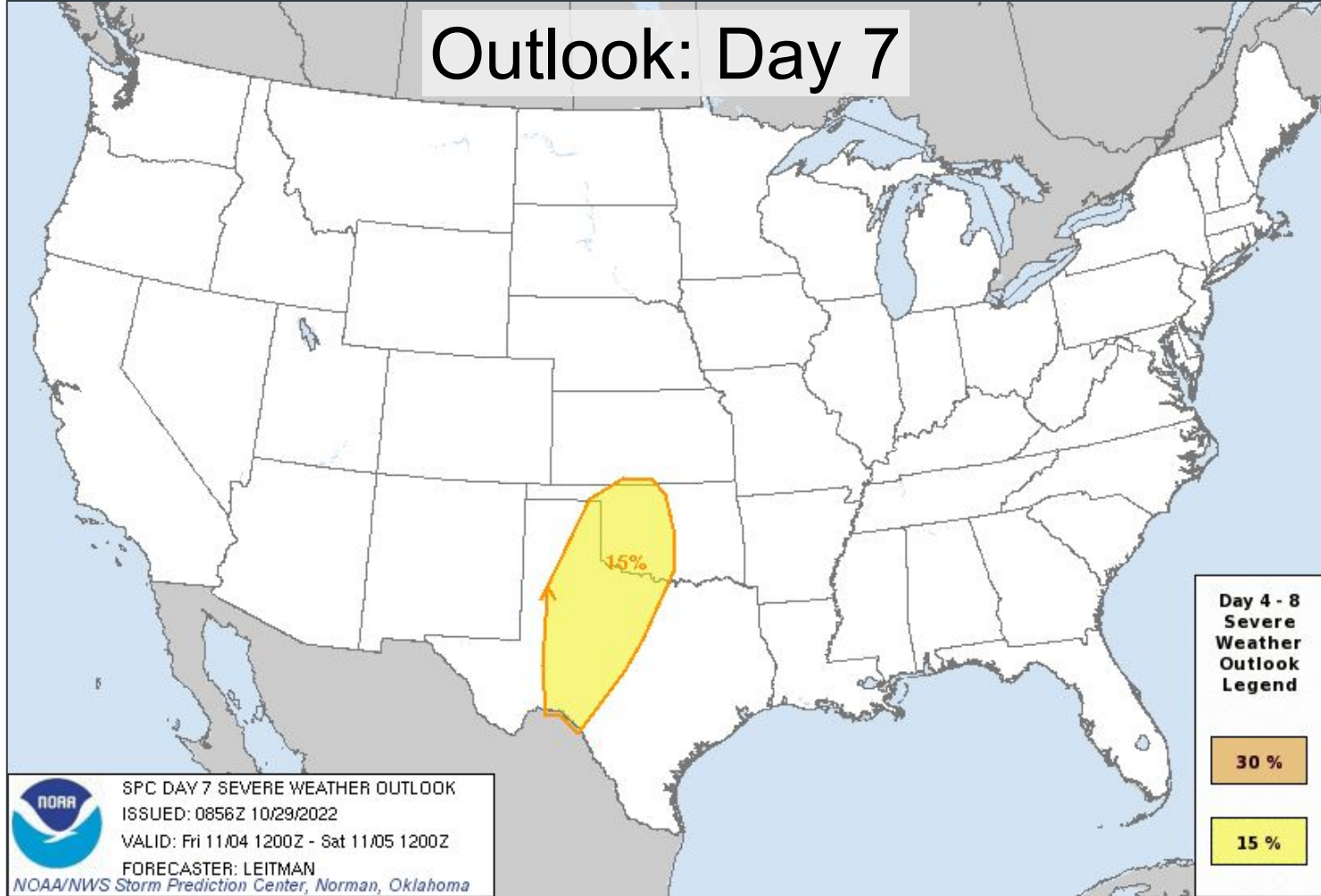
 15 %



[www.spc.noaa.gov](http://www.spc.noaa.gov)




# Outlook: Day 7



**Day 4 - 8  
Severe  
Weather  
Outlook  
Legend**

30 %

15 %

 SPC DAY 7 SEVERE WEATHER OUTLOOK  
ISSUED: 0856Z 10/29/2022  
VALID: Fri 11/04 1200Z - Sat 11/05 1200Z  
FORECASTER: LEITMAN  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

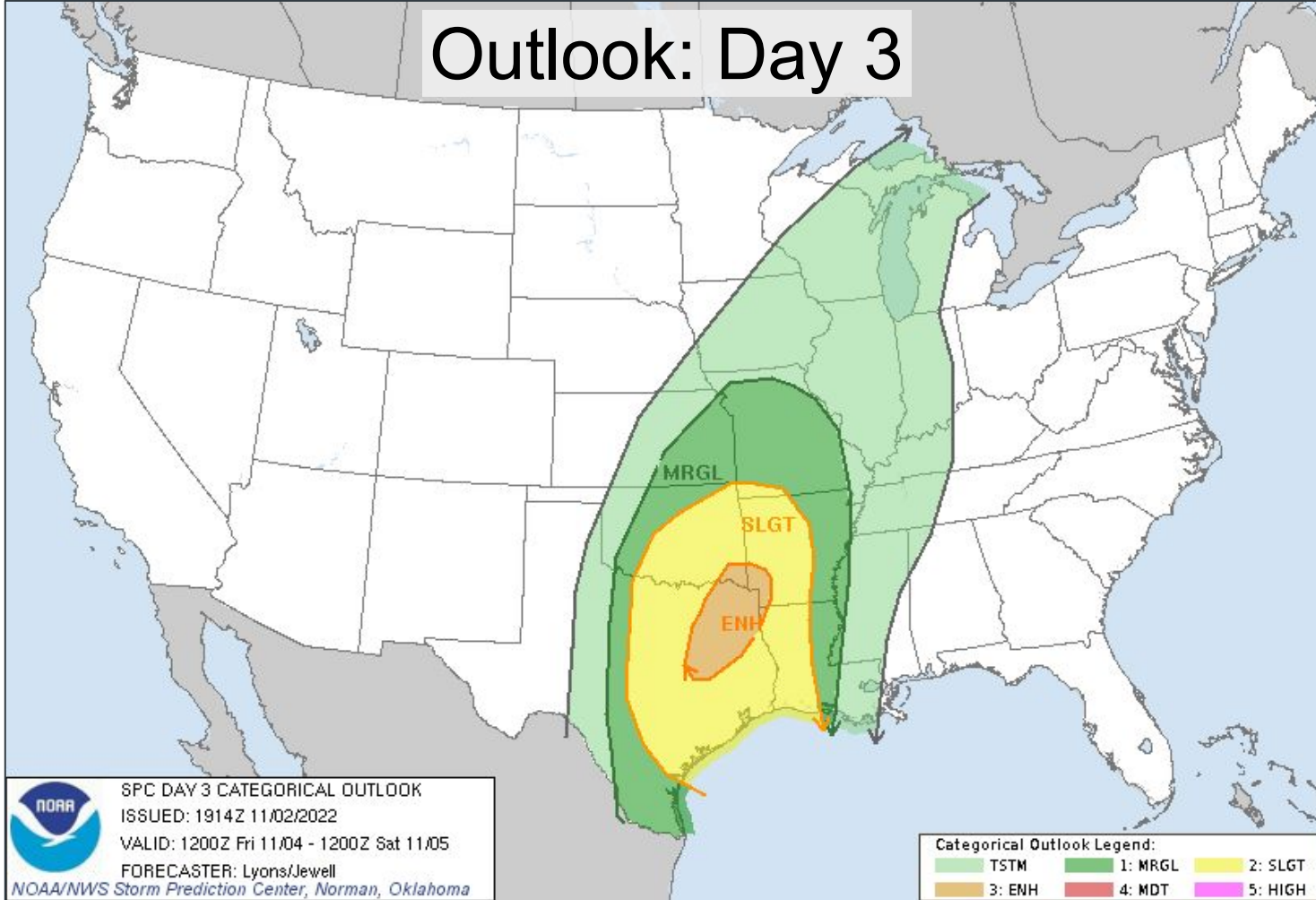



[www.spc.noaa.gov](http://www.spc.noaa.gov)





# Outlook: Day 3



 SPC DAY 3 CATEGORICAL OUTLOOK  
ISSUED: 1914Z 11/02/2022  
VALID: 1200Z Fri 11/04 - 1200Z Sat 11/05  
FORECASTER: Lyons/Jewell  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

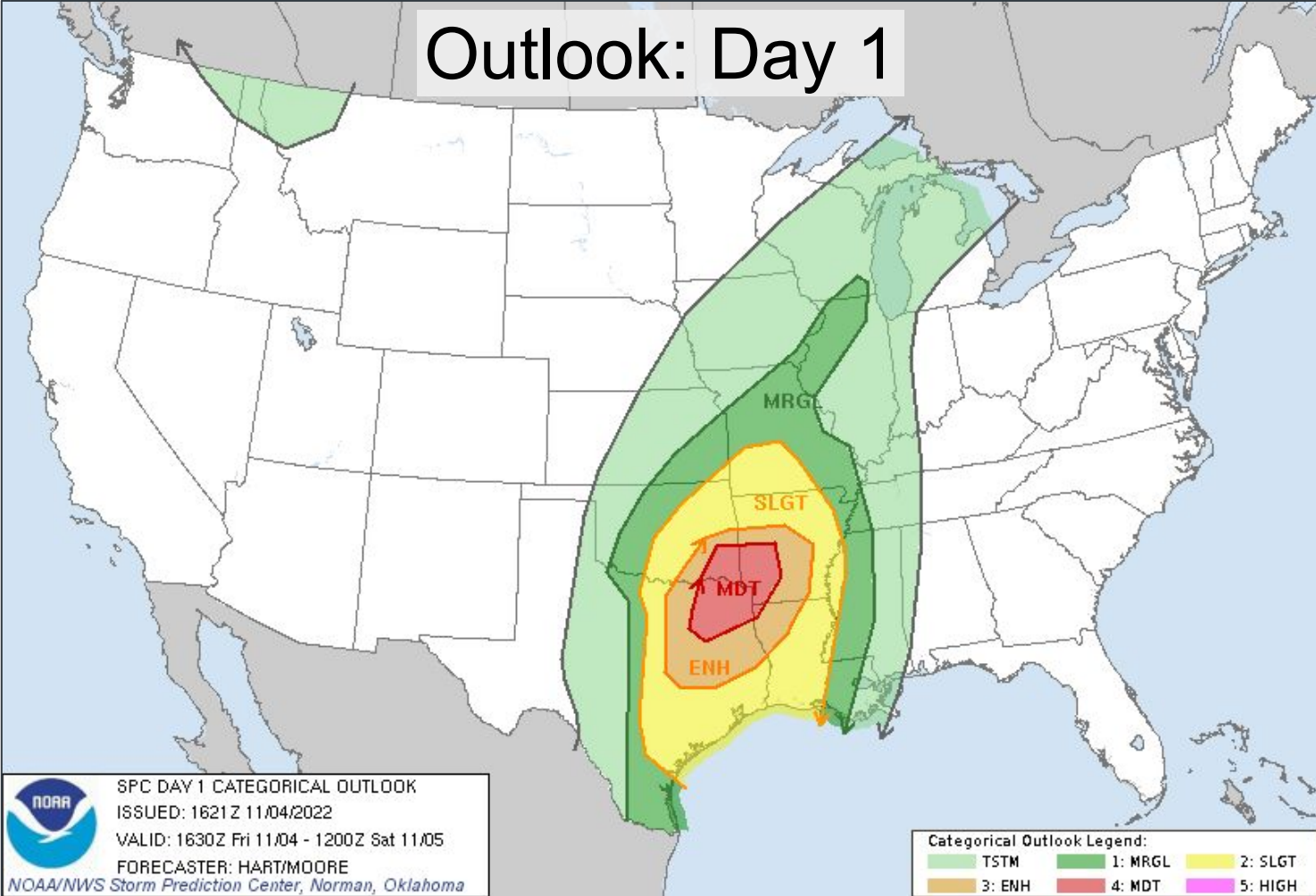
Categorical Outlook Legend:  
TSTM 1: MRGL 2: SLGT  
3: ENH 4: MDT 5: HIGH




[www.spc.noaa.gov](http://www.spc.noaa.gov)



# Outlook: Day 1



 SPC DAY 1 CATEGORICAL OUTLOOK  
ISSUED: 1621 Z 11/04/2022  
VALID: 1630Z Fri 11/04 - 1200Z Sat 11/05  
FORECASTER: HART/MOORE  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

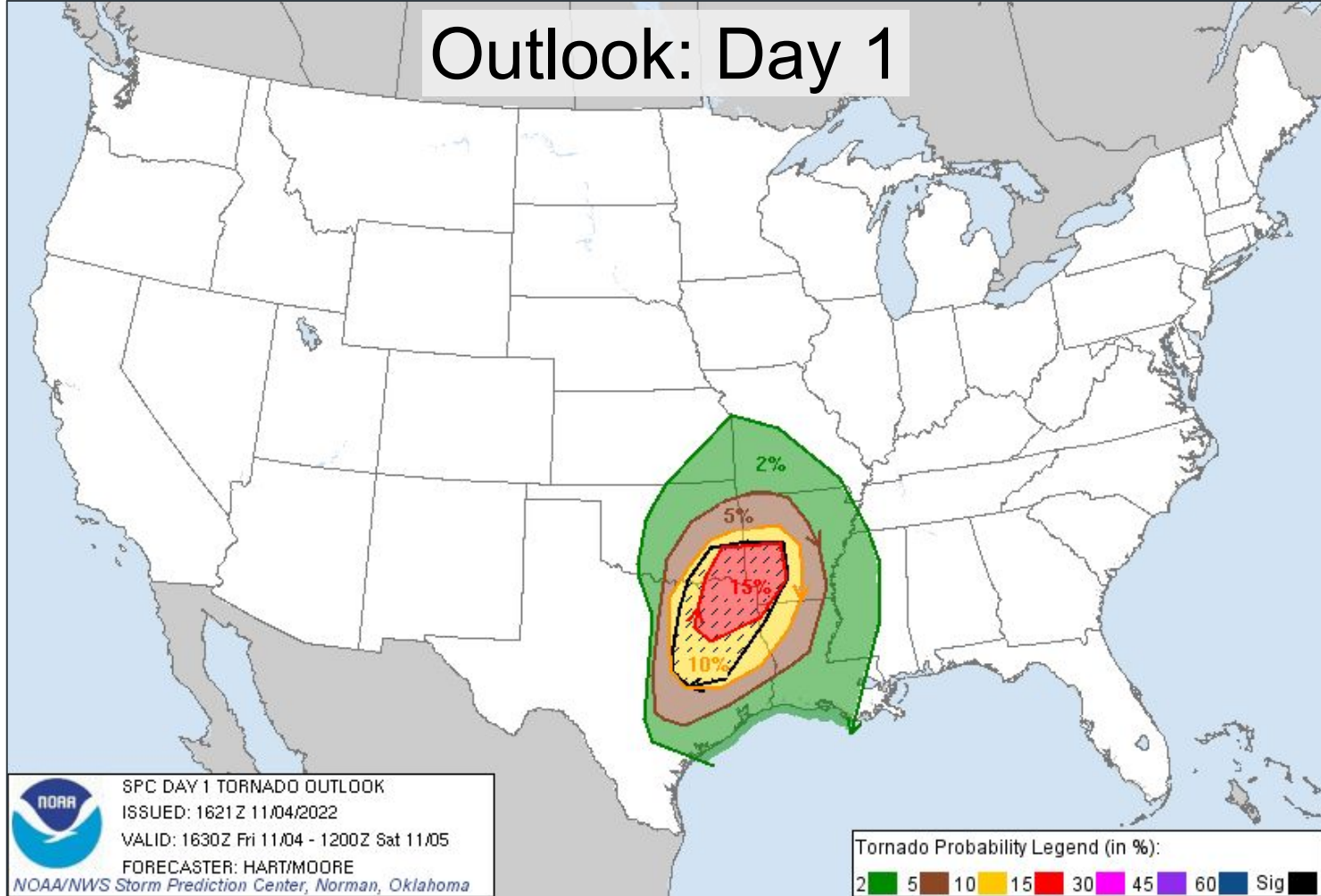
Categorical Outlook Legend:  
TSTM    1: MRGL    2: SLGT  
3: ENH    4: MDT    5: HIGH




[www.spc.noaa.gov](http://www.spc.noaa.gov)



# Outlook: Day 1



 SPC DAY 1 TORNADO OUTLOOK  
ISSUED: 1621 Z 11/04/2022  
VALID: 1630Z Fri 11/04 - 1200Z Sat 11/05  
FORECASTER: HART/MOORE  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

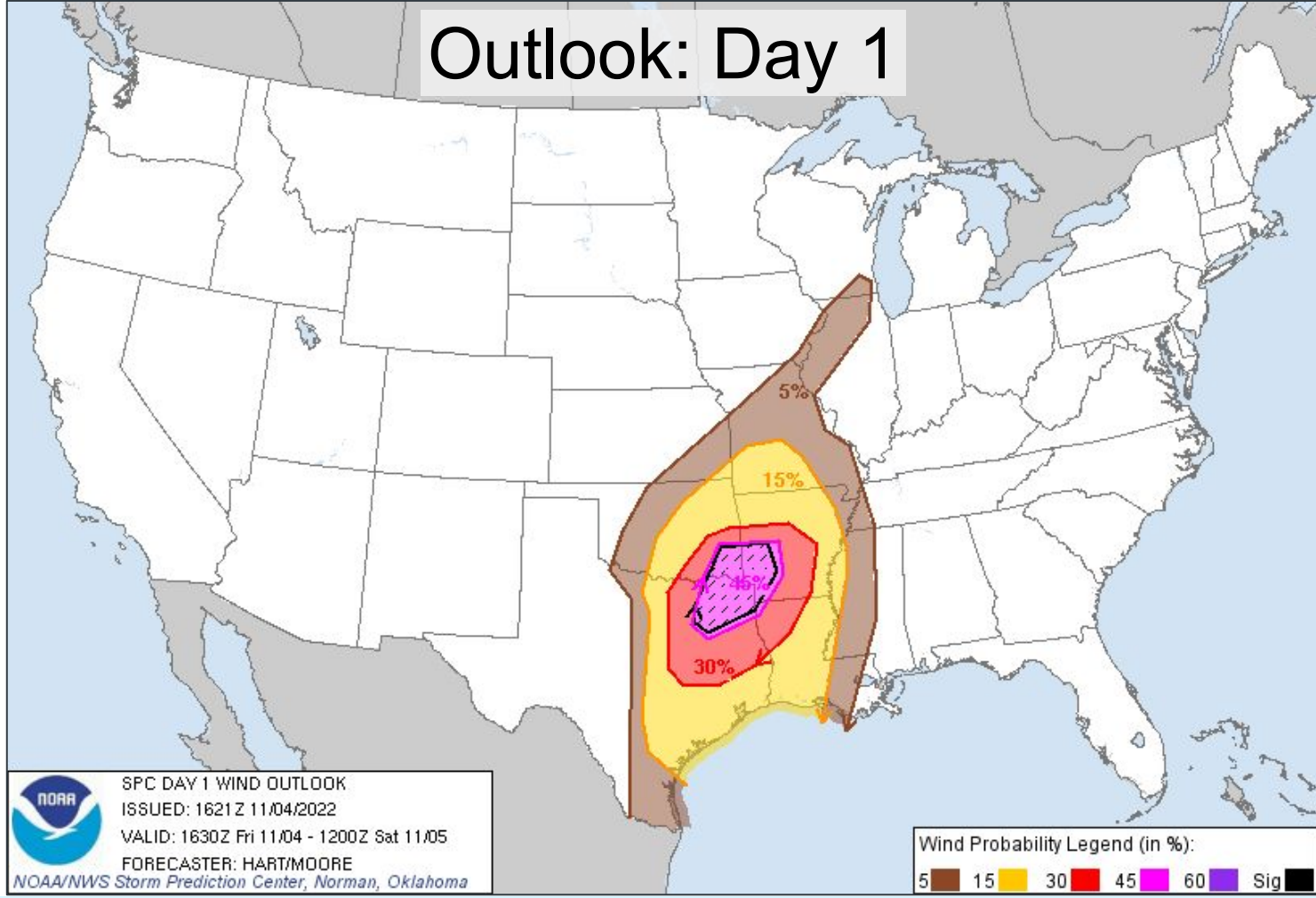
Tornado Probability Legend (in %):  
2 5 10 15 30 45 60 Sig




[www.spc.noaa.gov](http://www.spc.noaa.gov)



# Outlook: Day 1



 SPC DAY 1 WIND OUTLOOK  
ISSUED: 1621 Z 11/04/2022  
VALID: 1630Z Fri 11/04 - 1200Z Sat 11/05  
FORECASTER: HART/MOORE  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

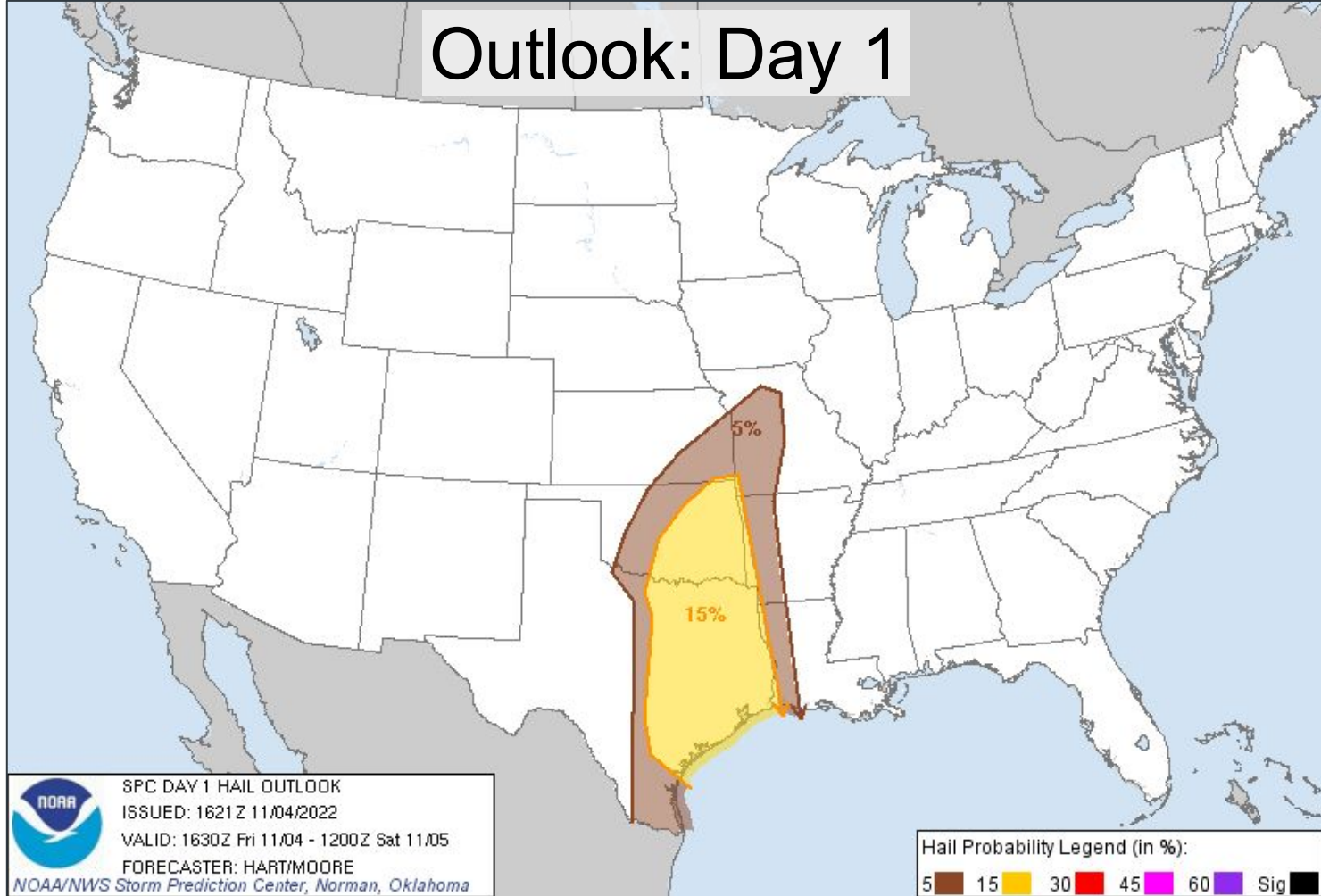
Wind Probability Legend (in %):  
5 15 30 45 60 Sig




[www.spc.noaa.gov](http://www.spc.noaa.gov)



# Outlook: Day 1



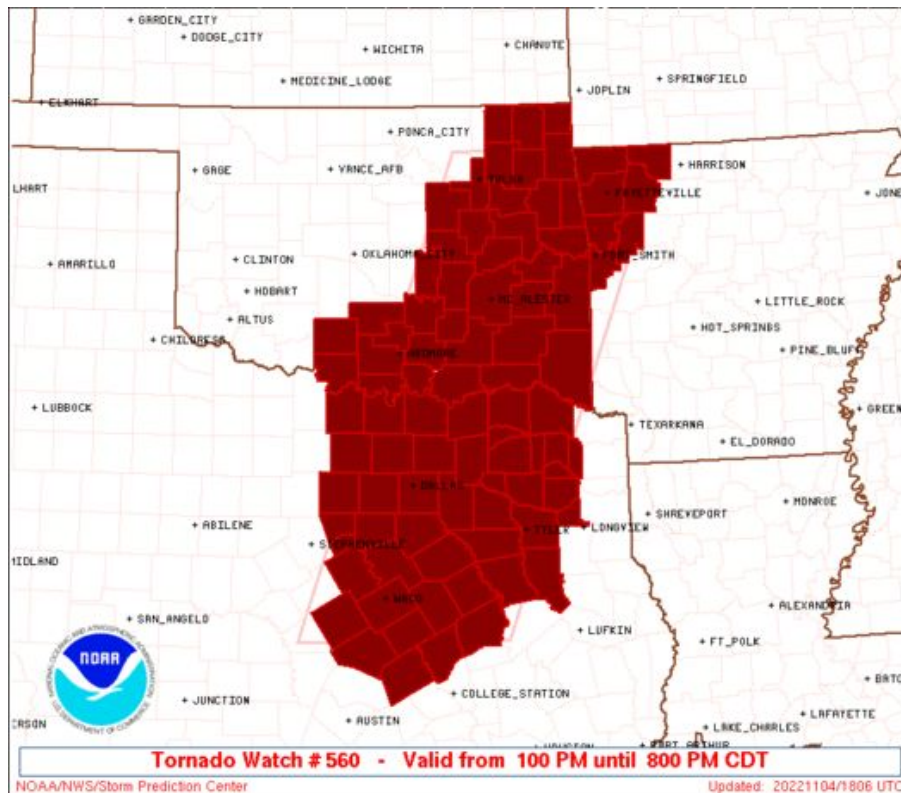
 SPC DAY 1 HAIL OUTLOOK  
ISSUED: 1621 Z 11/04/2022  
VALID: 1630Z Fri 11/04 - 1200Z Sat 11/05  
FORECASTER: HART/MOORE  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma

Hail Probability Legend (in %):  
5 15 30 45 60 Sig



[www.spc.noaa.gov](http://www.spc.noaa.gov)





Hazard	Tornadoes	EF2+ Tornadoes	Severe Wind	65 kt+ Wind	Severe Hail	2"+ Hail
Likelihood	High	Moderate	High	Moderate	Moderate	Moderate



www.spc.noaa.gov



# Tornado Emergency

Valid Until  
7:15 PM CDT Friday  
November 4, 2022

## Threat Information



### TORNADO

Damaging Tornado



### HAIL

Two Inch  
Sized Possible

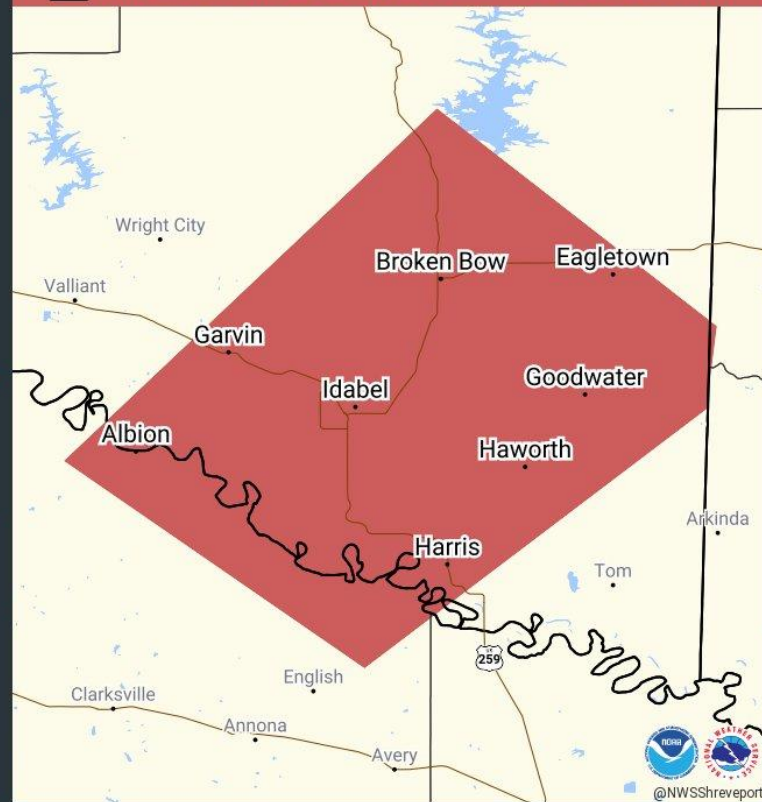
## Potential Exposure



Population: 23,972  
Schools: 19  
Hospitals: 1



*This is a life threatening situation. Seek shelter now!*




[www.weather.gov](http://www.weather.gov)

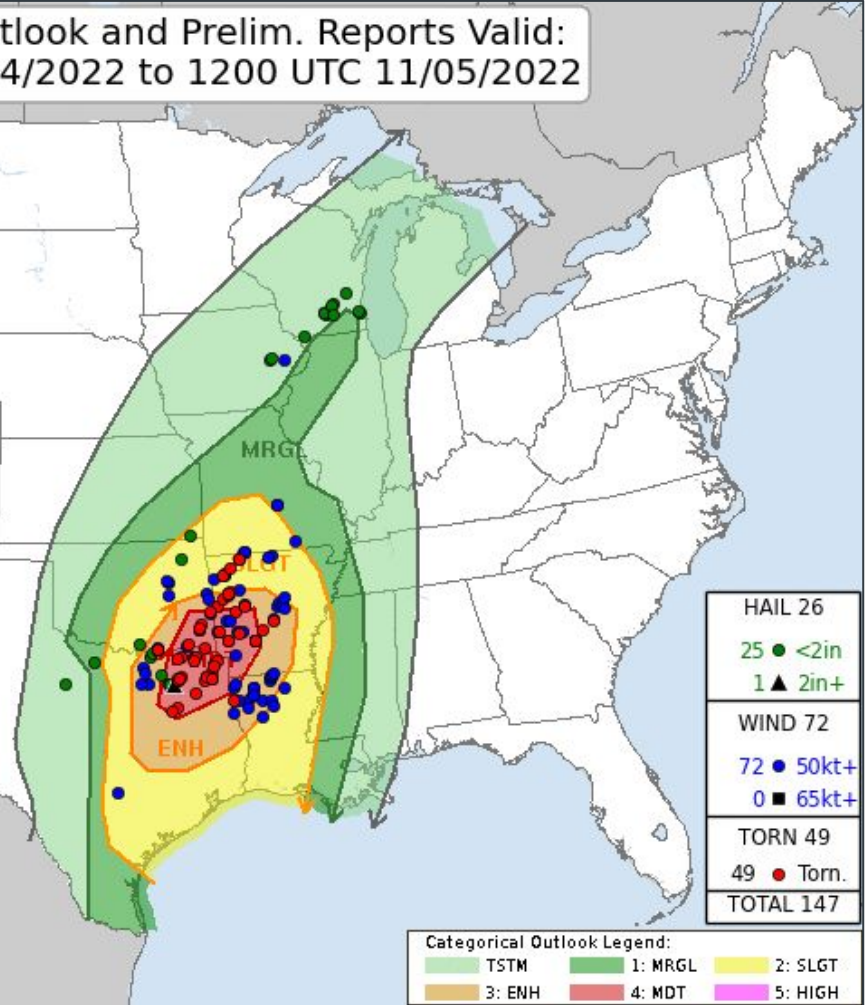


SPC Day 1 Outlook and Prelim. Reports Valid:  
1630 UTC 11/04/2022 to 1200 UTC 11/05/2022



Tornado Near Sulphur Springs, TX  
Video from Brayden Siau

 SPC DAY 1 CATEGORICAL OUTLOOK  
ISSUED: 1621 Z 11/04/2022  
VALID: 1630Z Fri 11/04 - 1200Z Sat 11/05  
Preliminary Subjective Verification  
NOAA/NWS Storm Prediction Center, Norman, Oklahoma



HAIL 26	
25 ●	<2in
1 ▲	2in+
WIND 72	
72 ●	50kt+
0 ■	65kt+
TORN 49	
49 ●	Torn.
TOTAL 147	

Categorical Outlook Legend:

	TSTM		1: MRGL		2: SLGT
	3: ENH		4: MDT		5: HIGH



www.spc.noaa.gov







POLL

QUESTION





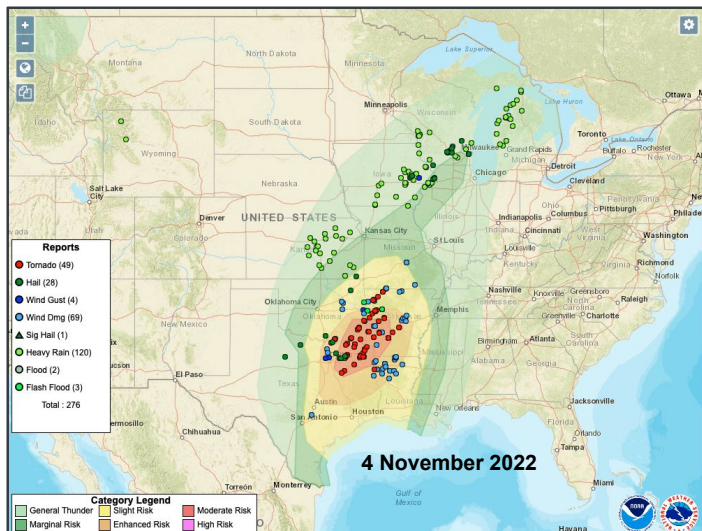


# Episode vs Event



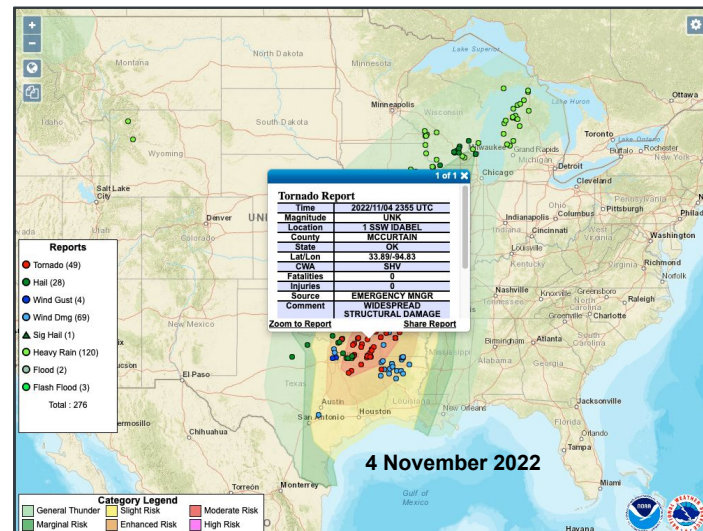
## Episode

- Entire storm system
- Can contain many events



## Event

- Individual type of storm event (e.g., hail, tornado)



# Preliminary LSR vs Final Reports

## Preliminary



- Available in real-time
- Little QC

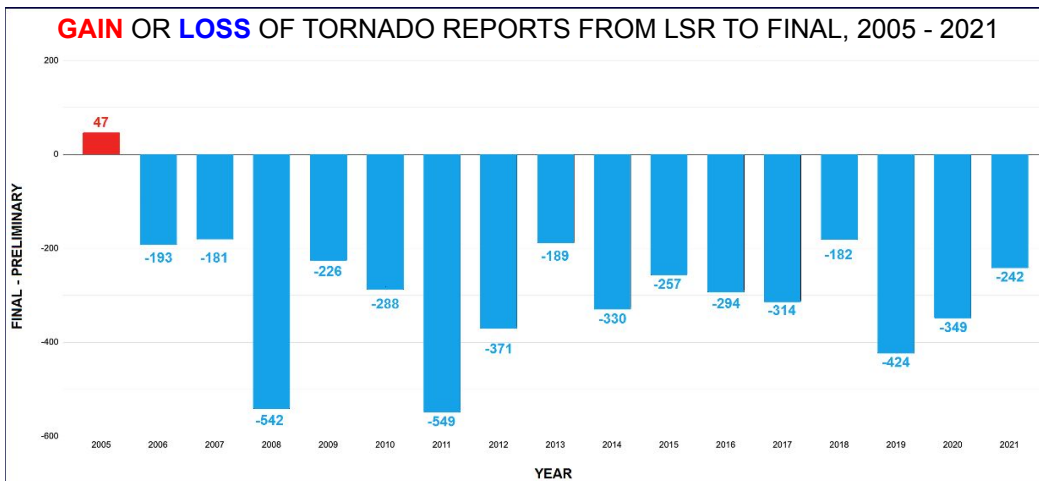
<https://www.spc.noaa.gov/climo/online/>

## Final (Storm Data)



- ~75 days after end of month
- QC'ed

<https://www.ncdc.noaa.gov/stormevents/>



***Please use Final Data  
instead of the  
Preliminary Reports  
for scientific papers!***

# Storm Data Tornadoes vs SPC OneTor Data

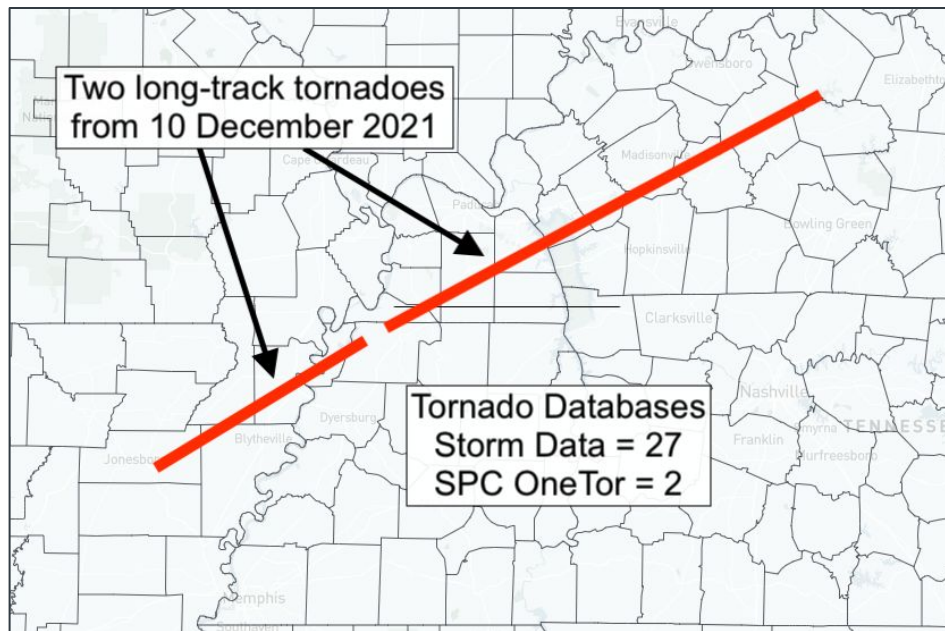
Storm Data tornadoes  
are segmented by county



Storm Data overestimates  
tornado count



Use SPC OneTor for  
tornado counts



**SPC OneTor Database**

<https://www.spc.noaa.gov/wcm/#data>





# NWS Damage Assessment Toolkit (DAT)

<https://apps.dat.noaa.gov/stormdamage/damageviewer/>



- Data collected in real-time during NWS Post-Event Damage Surveys
- Data is QC'ed...but is still preliminary
- Not standardized at all local forecast offices
- Not all tornadoes entered





# Hail Reports



Which one of these hail sizes is reported the most?



1.00"



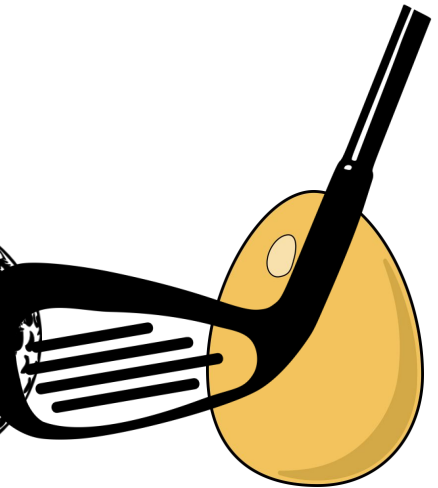
1.25"



1.50"



1.75"



2.00"

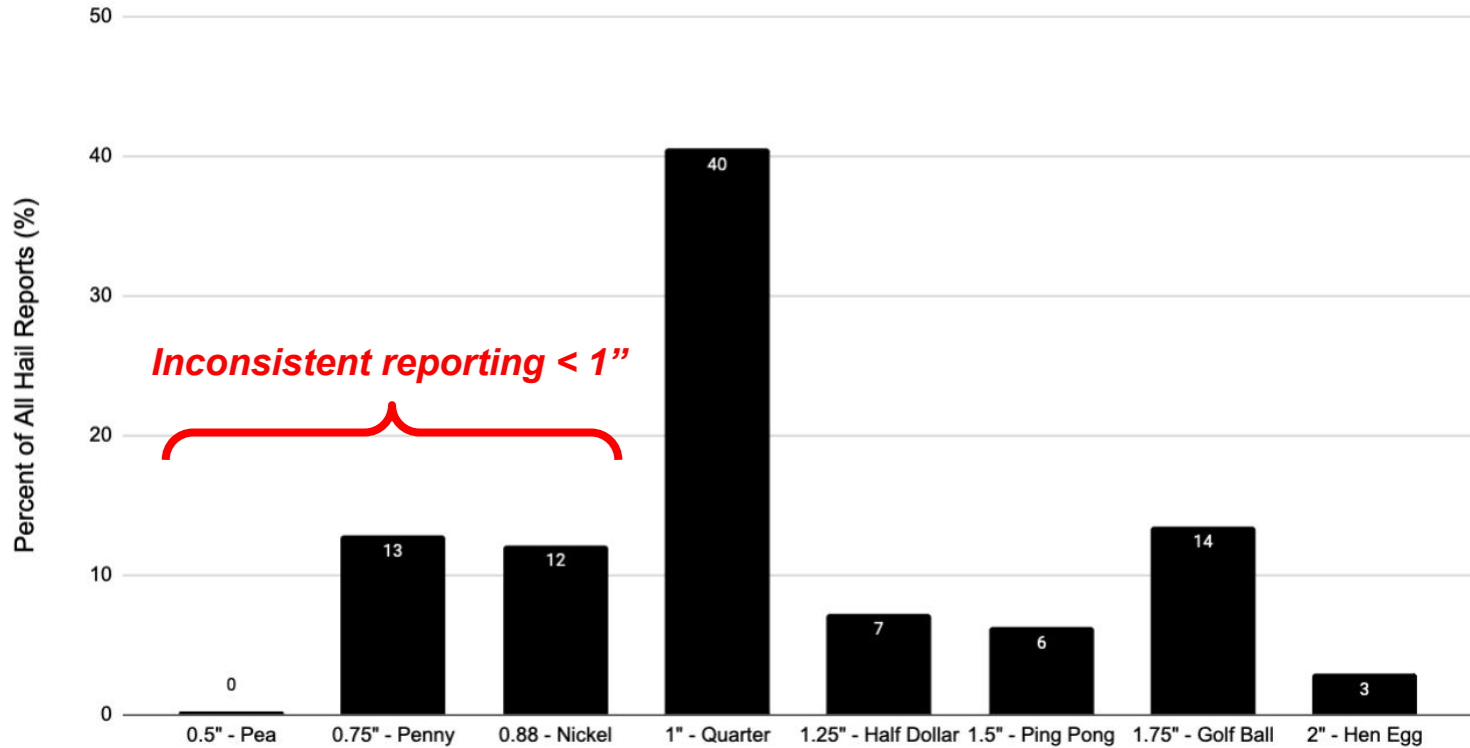




# Hail Reports



Hail Reports  $\leq$  2 Inches (2010 - 2021)







# Severe Wind Reports



## Plains

Measured > Damage



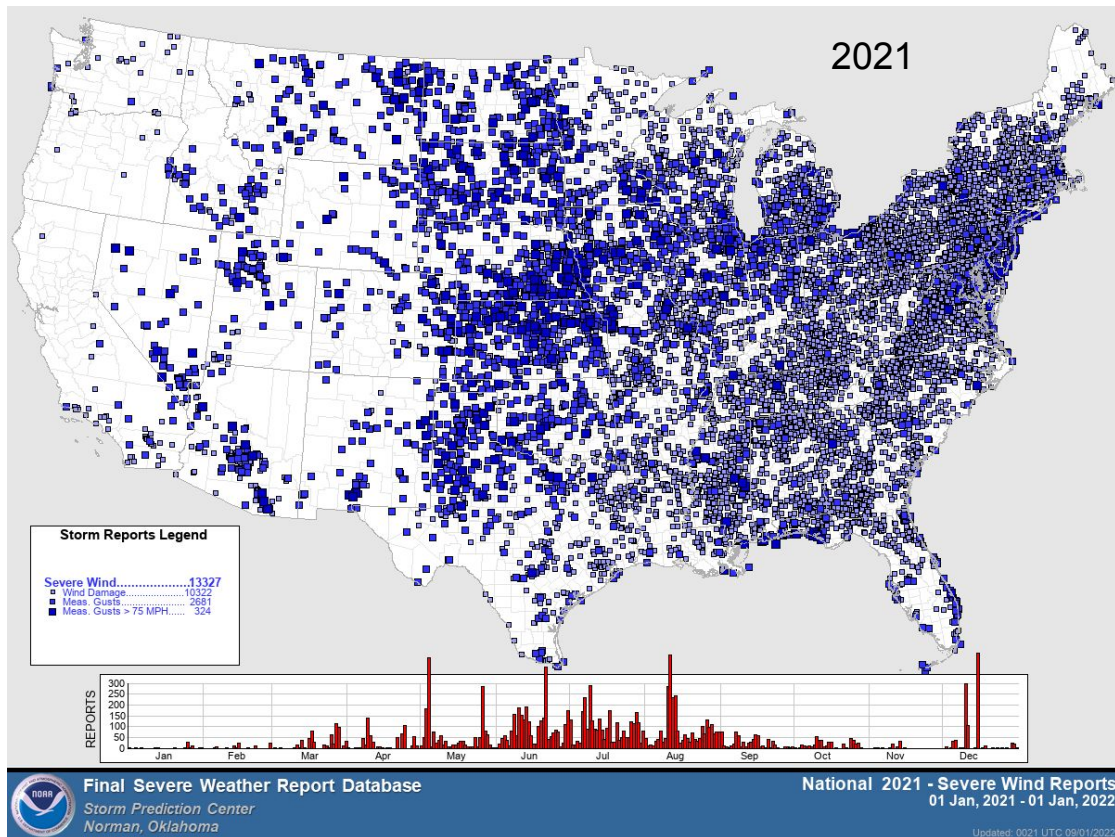
## East

Damage > Measured

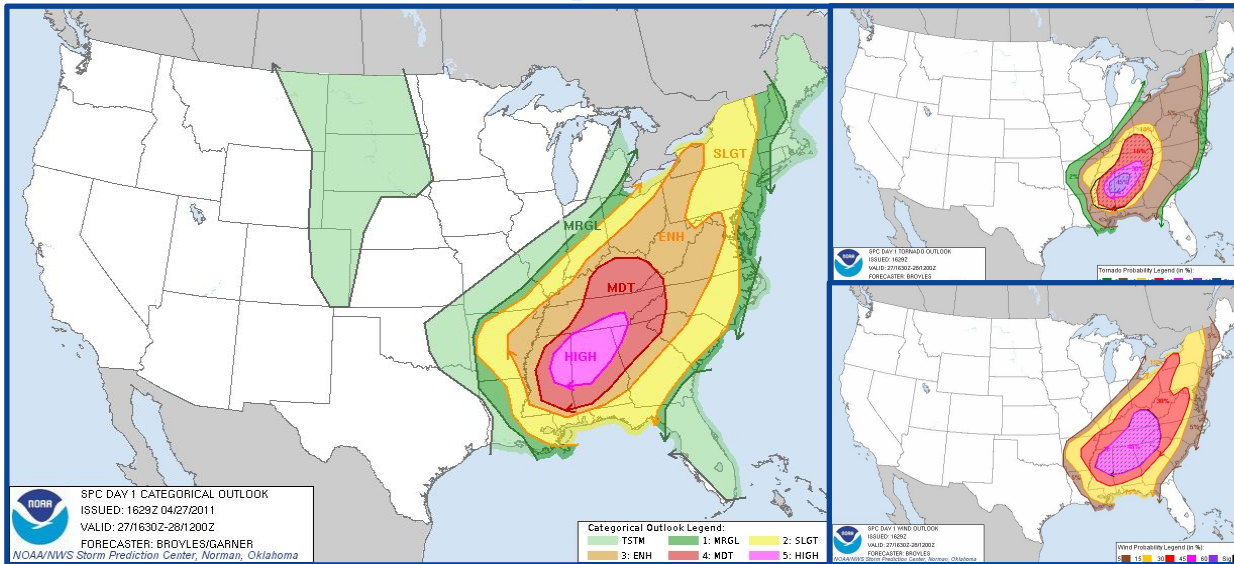


### Important

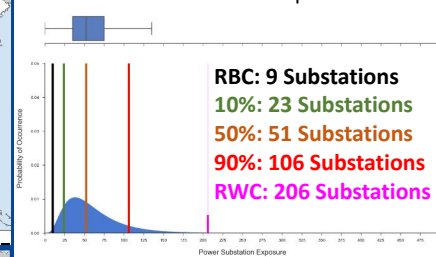
Some significant ( $\geq 74$  mph) wind reports may only appear in the Final Data!



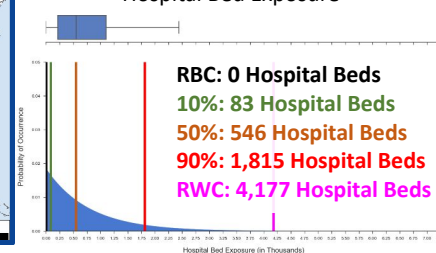
# Quantitative Impact Decision Support Services



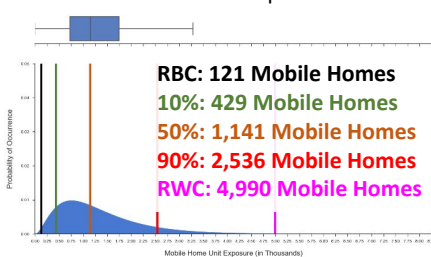
Power Substation Exposure



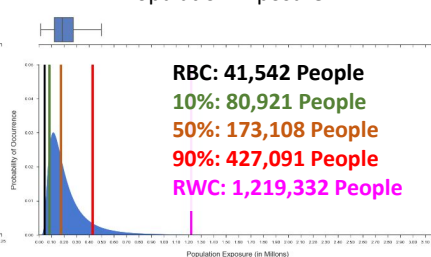
Hospital Bed Exposure



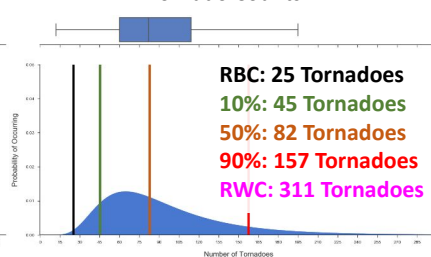
Mobile Home Exposure



Population Exposure



Tornado Counts



**Severe Weather  
 27 April 2011**