


“We Had No Warning”

An Overview of Available Forecast Products Before and During Severe Weather Events



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Two main sources for severe weather info

- ↪ NOAA/NWS Storm Prediction Center (SPC)
 - ↪ Convective Outlooks
 - ↪ Mesoscale Discussions
 - ↪ Severe Thunderstorm and Tornado Watches
 - ↪ On the Web: <http://www.spc.noaa.gov>
- ↪ NOAA/National Weather Service (NWS) Forecast Offices
 - ↪ Severe Thunderstorm and Tornado Warnings
 - ↪ Information via NOAA Weather Radio
 - ↪ On the Web: <http://www.weather.gov>

Note: There are many sources for severe weather information, but these entities are solely responsible for issuing their respective products.




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Tornado in Miami, FL



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What is SPC’s Responsibility?






- ↪ **Forecast severe storms across the 48 contiguous states**
 - ↪ Tornadoes
 - ↪ Hail 1” diameter or larger
 - ↪ Thunderstorm winds > 58 m.p.h.
- ↪ **Also monitor for:**
 - ↪ Heavy rain
 - ↪ Winter Weather
 - ↪ Conditions favorable for wildfire initiation

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SPC Products


- ↪ Severe Weather Outlooks
 - ↪ Day 1 (today)
 - ↪ Day 2 (tomorrow)
 - ↪ Day 3 (day after tomorrow)
 - ↪ Day 4–8
- ↪ Severe Weather Watches
 - ↪ Tornado
 - ↪ Severe Thunderstorm



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More SPC Products

- ↪ Mesoscale Discussions
- ↪ Watch Status Messages
- ↪ Severe Weather Statistics
- ↪ Fire Weather Outlooks
 - ↪ Day 1 (today)
 - ↪ Day 2 (tomorrow)
 - ↪ Day 3–8



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Severe Weather Outlooks



Photo: © 2000 Star-Telegram

March 28, 2001 Fort Worth Tornado

Categorical

- Marginal
- Slight
- Enhanced
- Moderate
- High

Probabilistic

- Tornadoes
- Hail
- Convective Winds

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Categorical Outlooks

Understanding Severe Thunderstorm Risk Categories

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected Lightning/flooding threats exist with all thunderstorms	Isolated severe thunderstorms possible Limited in duration and/or coverage and/or intensity	Scattered severe storms possible Short-lived and/or not widespread, isolated intense storms possible	Numerous severe storms possible More persistent and/or widespread, a few intense	Widespread severe storms likely Long-lived, widespread and intense	Widespread severe storms expected Long-lived, very widespread and particularly intense
• Winds to 40 mph • Small hail	• Winds 40-60 mph • Hail up to 1" • Low tornado risk	• One or two tornadoes • Reports of strong winds/wind damage • Hail - 1", isolated 2"	• A few tornadoes • Several reports of wind damage • Damaging hail, 1" - 2"	• Strong tornadoes • Widespread wind damage • Destructive hail, 2"	• Tornado outbreak • Derecho

* NWS defines a severe thunderstorm as measured wind gusts to at least 58 mph, and/or hail to at least one inch in diameter, and/or a tornado. All thunderstorm categories imply lightning and the potential for flooding. Categories are also tied to the probability of a severe weather event within 25 miles of your location.

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Probability Outlooks



➤ Provide the threat of severe weather occurring within 25 miles of any point within the area

- Tornadoes
 - Large hail
 - Severe convective winds
- Also provide threat for extreme severe

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April 5, 2017 Categorical Outlook



SFC DAY 1 CATEGORICAL OUTLOOK
ISSUED: 1620Z 04/05/2017
VALID: 05/1600Z-06/01/2017
FORECASTER: COHEN

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April 5, 2017 Hail Probabilities



SFC DAY 1 HAIL OUTLOOK
ISSUED: 1620Z 04/05/2017
VALID: 05/1600Z-06/01/2017
FORECASTER: COHEN

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April 5, 2017 Wind Probabilities



SFC DAY 1 WIND OUTLOOK
ISSUED: 1620Z 04/05/2017
VALID: 05/1600Z-06/01/2017
FORECASTER: COHEN

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April 5, 2017 Tornado Probabilities



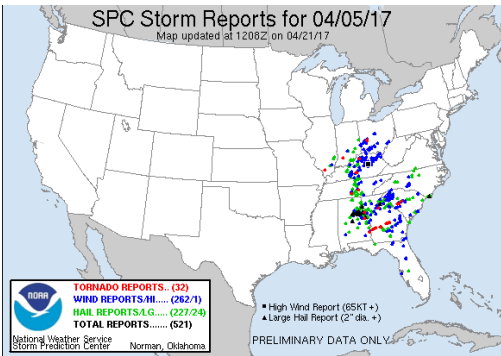
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April 5, 2017 Tornado Probabilities



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April 5, 2017 Storm Reports



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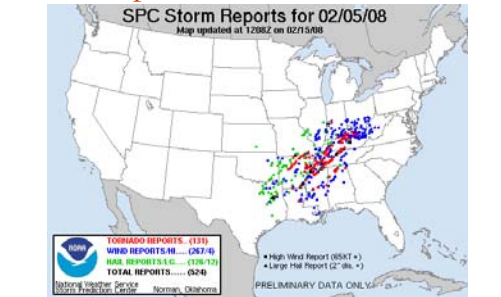
Day 4-8 Severe Outlook



☞ A severe weather area depicted in the Day 4-8 period indicates a 30% or higher probability for severe thunderstorms within 25 miles of any point.

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Storm Reports on Feb 5, 2008



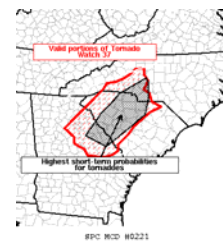
☞ SPC made a great forecast six days in advance!

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Mesoscale Discussions:

Technical discussions of developing mesoscale features and their impact on hazardous weather

- ☞ What, when, where, why
- ☞ Emphasis on the short term outlook
 - ☞ Written in plain language
 - ☞ Geared for professional meteorologists
- ☞ Winter weather
 - ☞ Freezing rain, rapidly accumulating snow, blizzards
- ☞ Heavy rainfall
- ☞ Severe thunderstorm potential/Outlook upgrade
 - ☞ 1-2 hours prior to a watch
 - ☞ 2-3 hour cycle during watch
 - ☞ Change in convective outlook category
- ☞ Thunderstorms not expected to become severe



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Weather Watches

- Issued when the risk of a hazardous weather or hydrologic event has increased significantly but its **occurrence, location, and/or timing is still uncertain**.
- A watch is intended to provide enough lead time so that those who need to set their plans in motion can do so (e.g., emergency managers, television meteorologists, spotters, schools, anyone planning outdoor activities, etc.).

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Tornado Watches

- Issued when strong/violent tornado (EF2–EF5) damage is possible
- Multiple weak tornadoes are possible
- Not all tornadoes will occur within a watch!



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“Particularly Dangerous Situation” Watches



KFOR-TV
May 3, 1999 Moore, Oklahoma Tornado

- PDS Tornado watches**
 - Multiple strong or violent (EF2–EF5 damage) events
- PDS Severe Thunderstorm Watches**
 - Long-lived wind systems with possible widespread damage (derechoes)

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ZCZC MKCSEL9 ALL 250500;365,0980 321,0985 321,1013 365,1004;
WWLUS9 KMKC 242144
MKC WW 242144
OKZ000-TXZ000-250500-

URGENT - IMMEDIATE BROADCAST REQUESTED
TORNADO WATCH NUMBER 49
STORM PREDICTION CENTER NORMAN OK
344 PM CST THU FEB 24 2000

THE STORM PREDICTION CENTER HAS ISSUED A
TORNADO WATCH FOR PORTIONS OF

WESTERN OKLAHOMA
NORTHWESTERN TEXAS

EFFECTIVE THIS THURSDAY AFTERNOON AND EVENING FROM 430 PM UNTIL
1100 PM CST.

THIS IS A PARTICULARLY DANGEROUS SITUATION.

DESTRUCTIVE TORNADOES...LARGE HAIL TO 2 INCHES IN DIAMETER...
THUNDERSTORM WIND GUSTS TO 70 MPH...AND DANGEROUS LIGHTNING ARE
POSSIBLE IN THESE AREAS.

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Severe Thunderstorm Watch



(c) 1999 Keith B. Brown

- Organized severe storms**
 - Supercells
 - Squall lines
 - Multicell complexes
- Extreme severe storms**
 - Wind gusts > 64 kt (73 m.p.h.)
 - Damage to permanent structures
 - Hail > 2" diameter

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Watch By County

- Watch area is based on individual counties



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Watch Probabilities

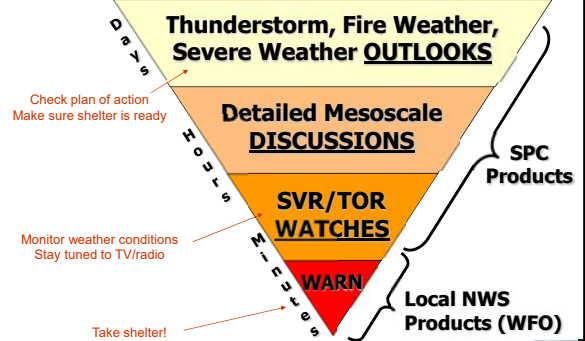
Severe Thunderstorm Watch 688 Probability Table



Tornadoes	
Probability of 2 or more tornadoes	Low (10%)
Probability of 1 or more strong (F2-F4) tornadoes	Low (<5%)
Wind	
Probability of 10 or more severe wind events	Mod (60%)
Probability of 1 or more wind event - 65 knots	Low (10%)
Hail	
Probability of 10 or more severe hail events	Low (10%)
Probability of 1 or more hailstones >2 inches	Low (<5%)
Combined Severe Hail/Wind	
Probability of 6 or more combined severe wind/hail events	Mod (60%)

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The Watch/Warning Funnel Concept



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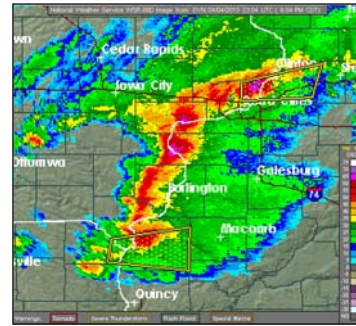
Weather Warnings

- Issued when a hazardous weather or hydrologic event **is occurring, is imminent, or has a very high probability of occurring.**
- A warning is used for conditions posing a threat to life or property.
- Warnings are issued by a local NOAA/ National Weather Service Forecast Office*

*Exception: Hurricane warnings are issued by the NOAA/National Hurricane Center

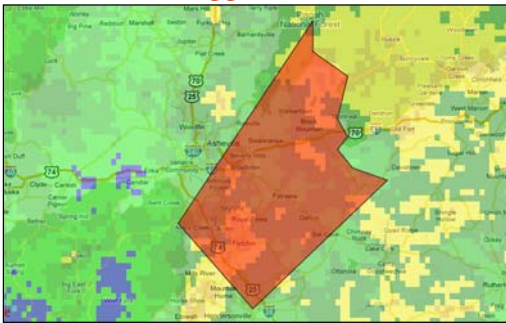
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Severe thunderstorm, tornado, and flash flood warnings appear on NWS radar images



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Tornadoes can happen in the mountains...



Tornado warning for Buncombe and Henderson Counties, 24 January 2010

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What is the best way to receive warnings?

- NOAA Weather Radio is the best means to receive warnings from the National Weather Service



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