2011 Significant Tornado Events: Impacts and Perspectives

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NOAA/NWS Storm Prediction Center and
NOAA/OAR National Severe Storms Laboratory
Norman, Oklahoma

2011 Annual Summary

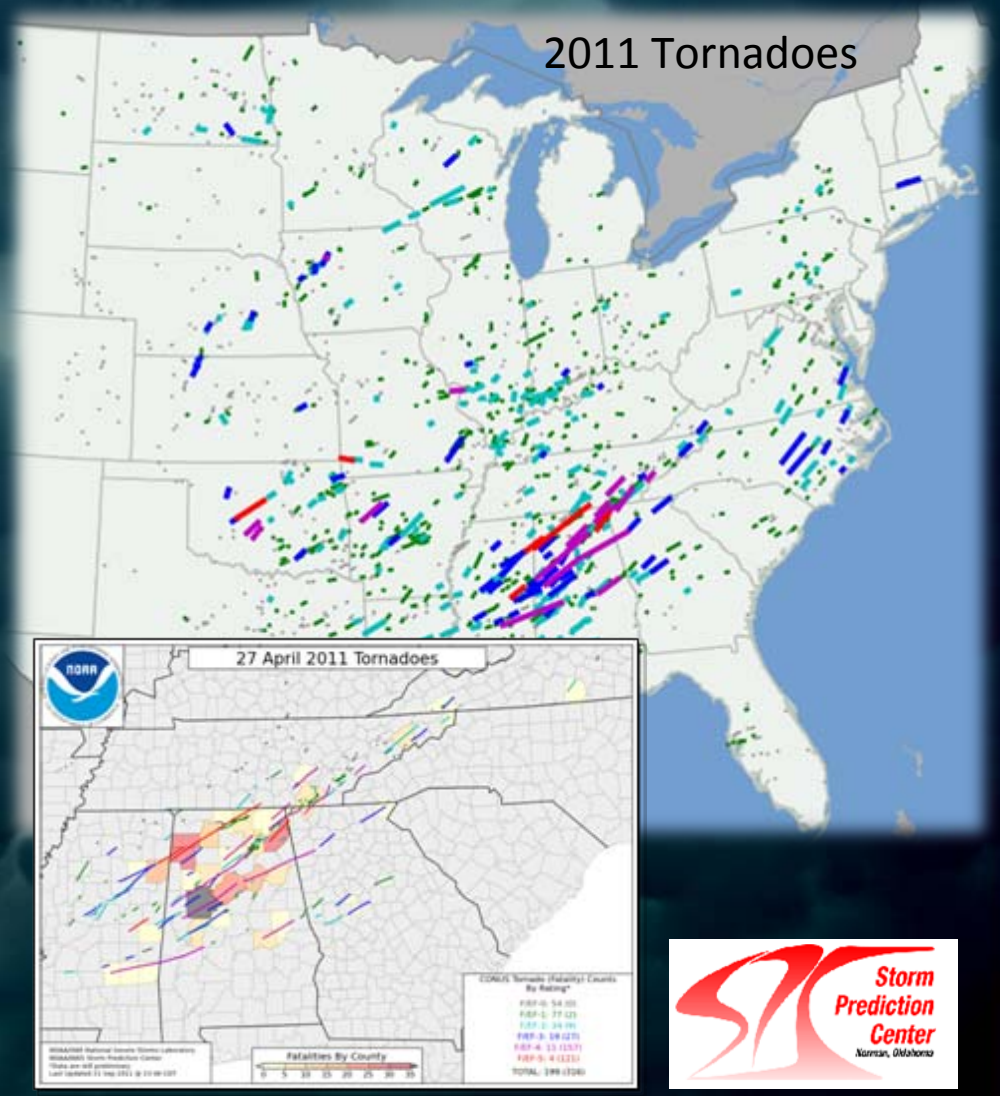
- **~ 1,700 tornadoes (2nd)** - *preliminary*
  - Current record 1,817 in 2004
- **550 direct fatalities**
  - 4th deadliest in combined record
  - NOAA + historic research
    - 551 deaths in 1917
    - 552 deaths in 1936
    - 794 deaths in 1925

April

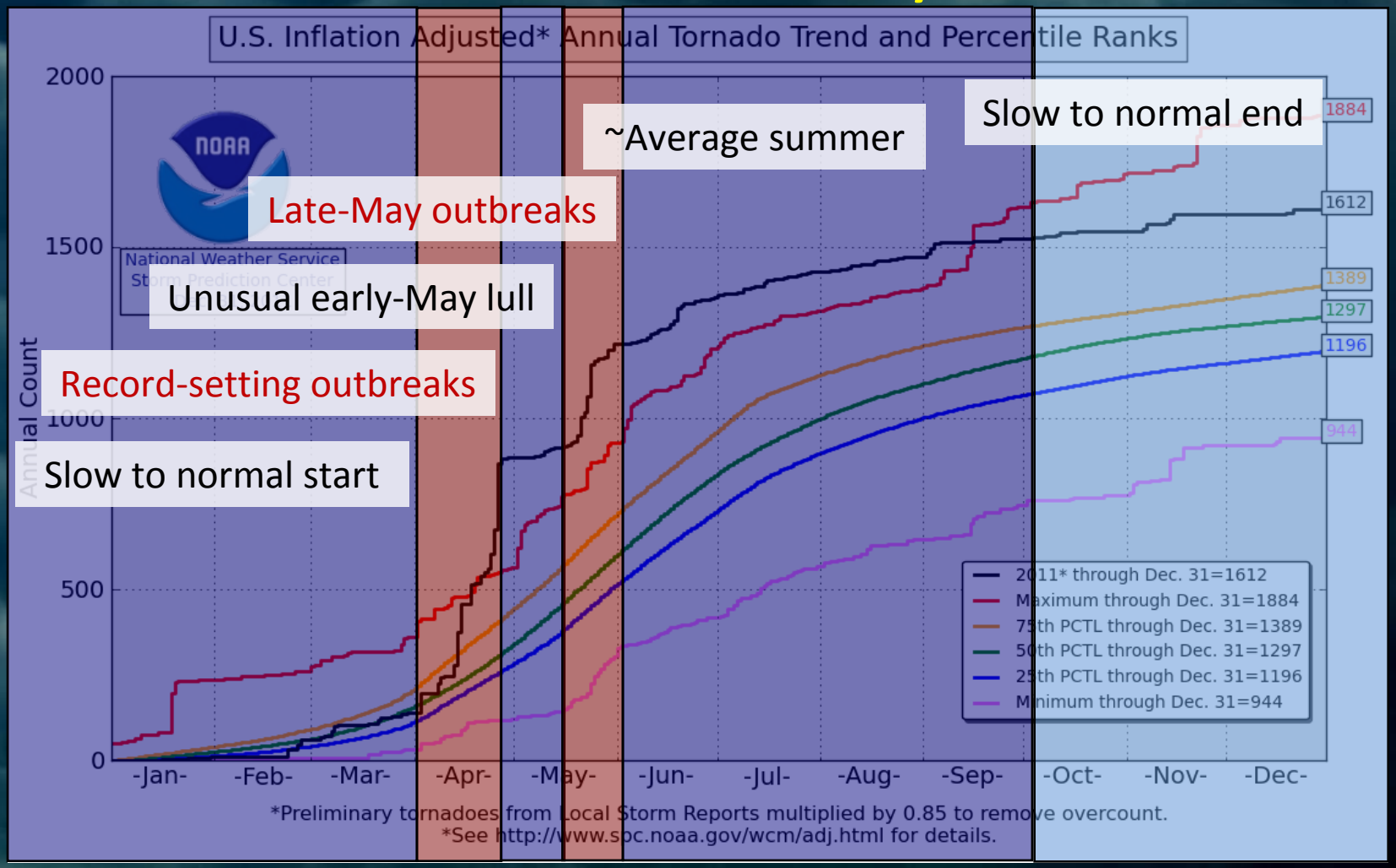
- **758 tornadoes** – New month record
  - 209 on April 27 a one day record
- **360 fatalities**
  - Most in modern era (since 1950)
  - 316 on April 27 alone

Joplin

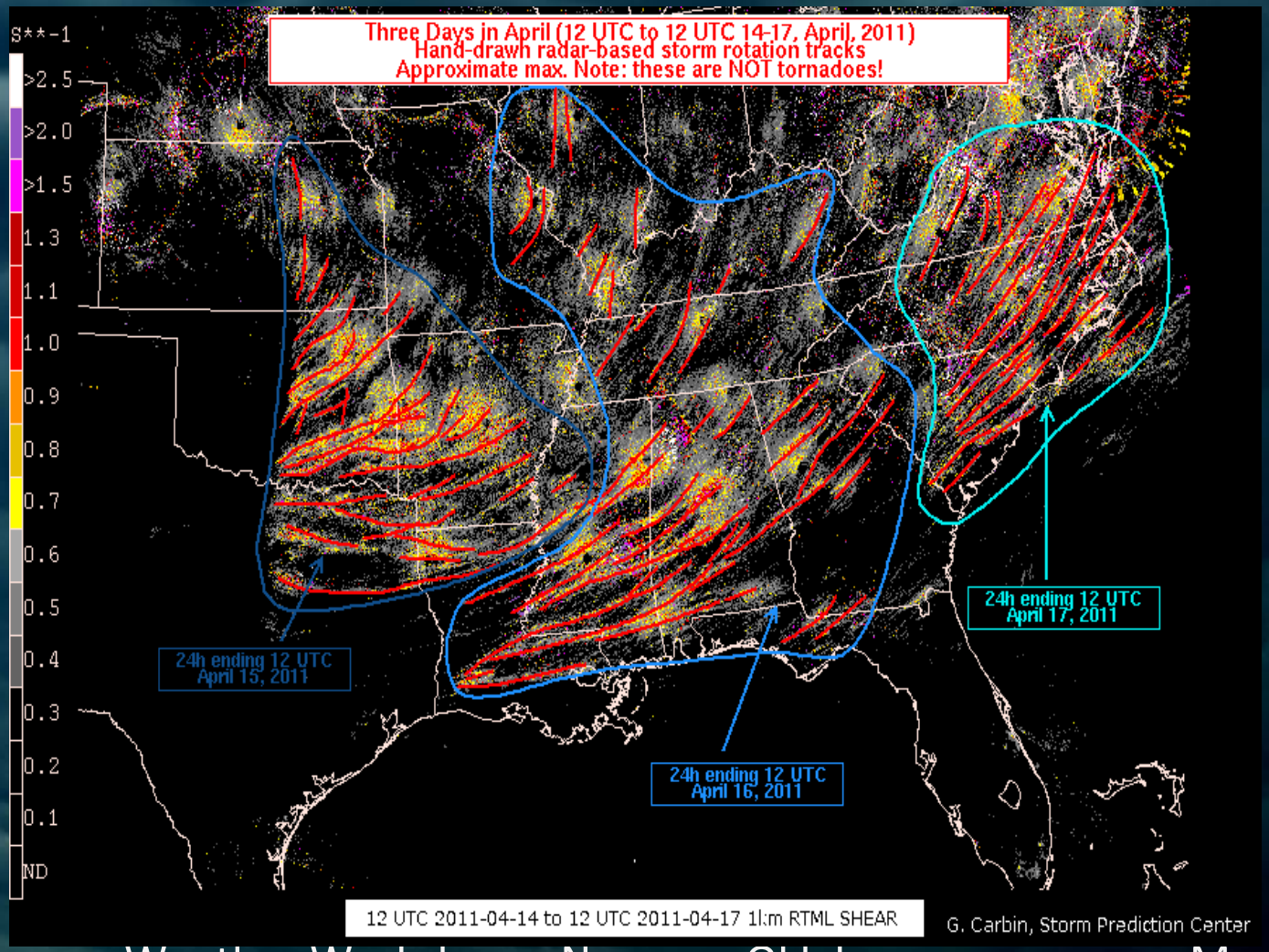
- **Deadliest tornado (158) since 1947**



How did the season and year unfold?

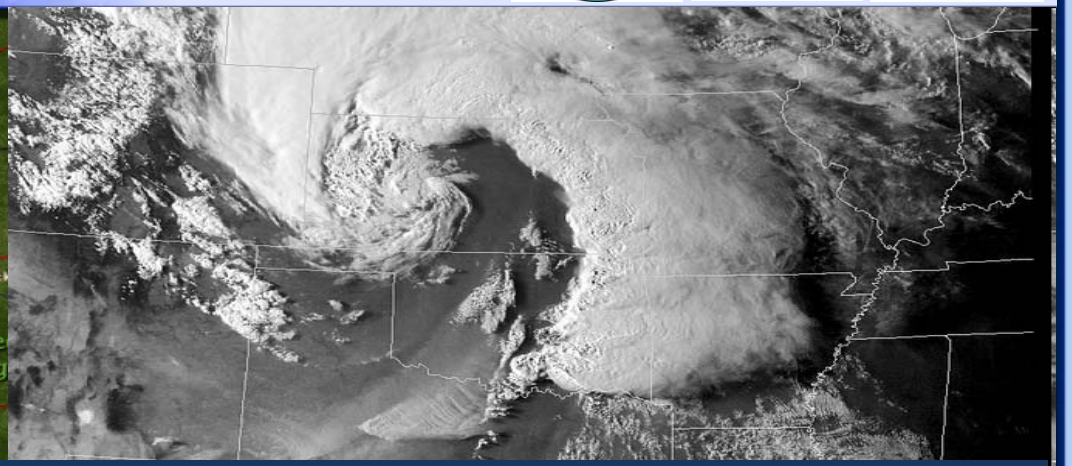


2011 Outbreak Sequence #1 – 14-16 April



NOAA's National Weather Service

Storm Prediction Center



April 14, 2011

AR-KS-OK-TX, 48 tornadoes, 2 deaths, 48 injuries, $1.1M

G. Garfield, M. Austin

SkyNews 9 KWTV-OKC

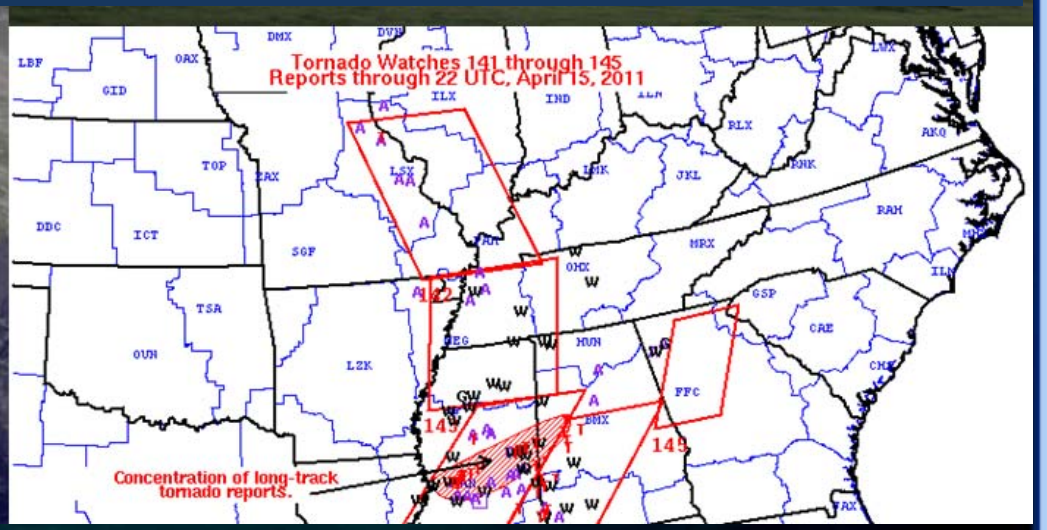
NOAA's National Weather Service

Storm Prediction Center

Earl Baumgardner

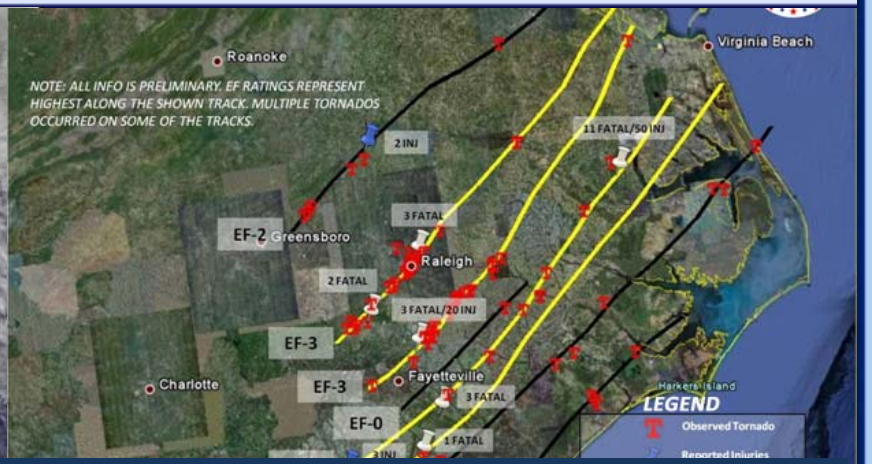
April 15, 2011

AL-AR-GA-IL-KY-MO-MS, 73 tornadoes, 10 deaths, 60 inj., $153M



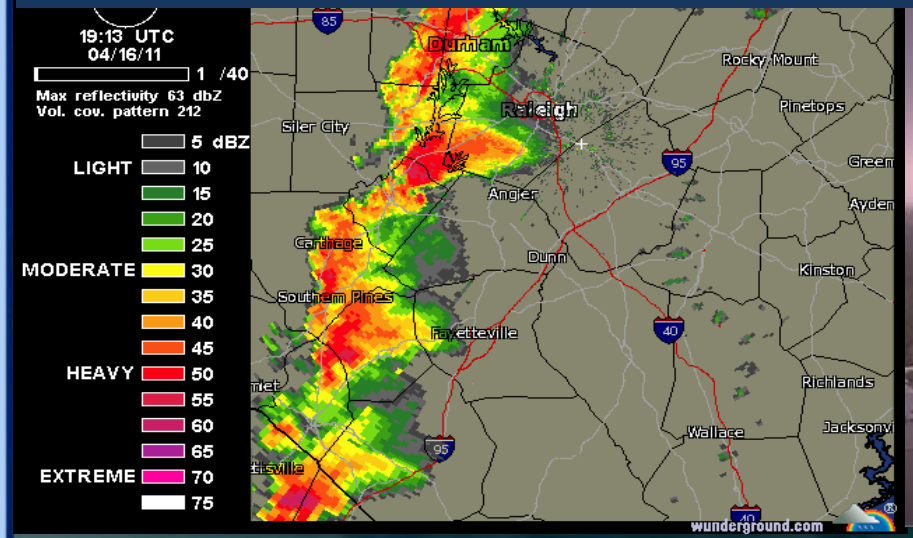
NOAA's National Weather Service

Storm Prediction Center



April 16, 2011

GA-MD-NC-PA-SC-VA, 56 tornadoes, 26 deaths, 480 injuries, $412M



NOAA's National Weather Service

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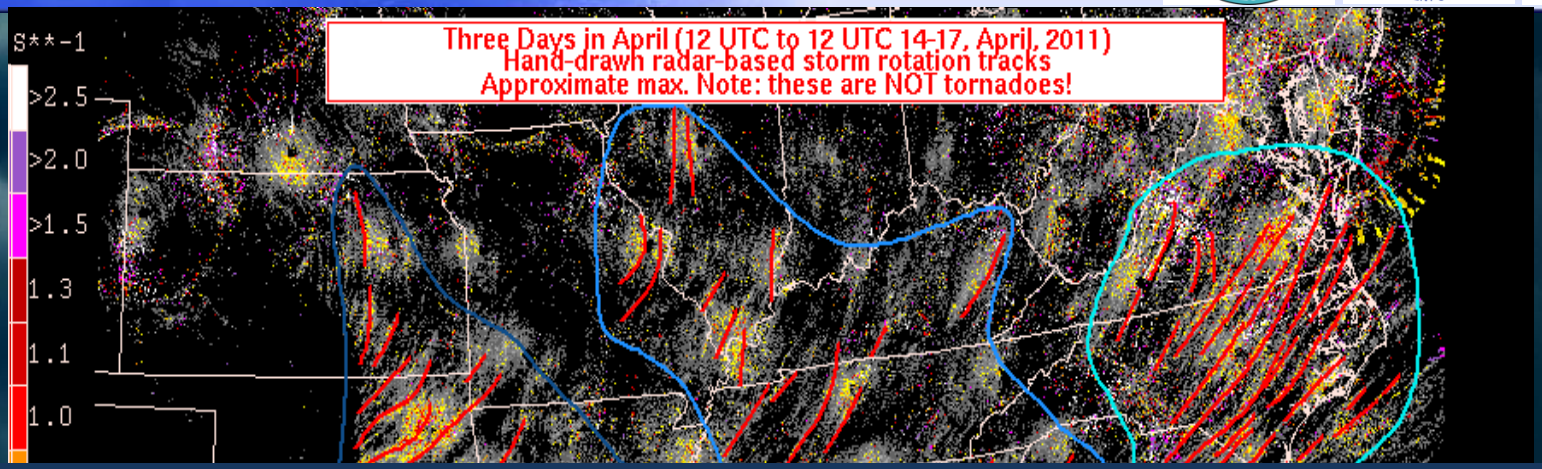
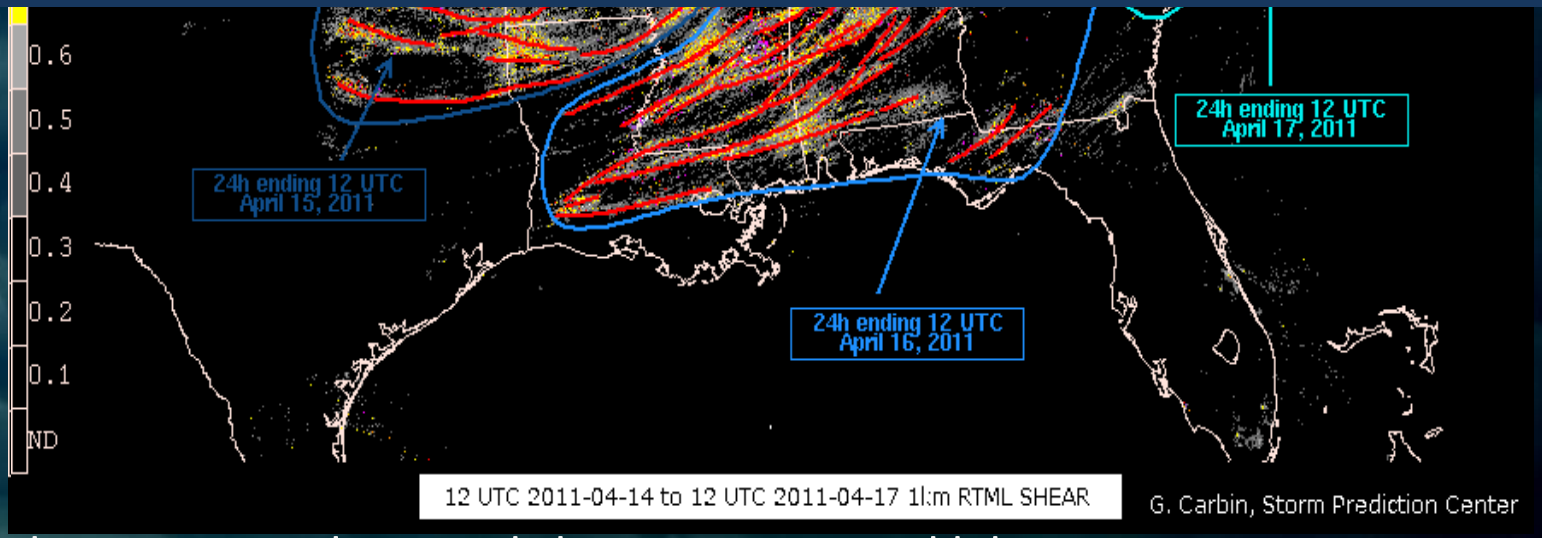
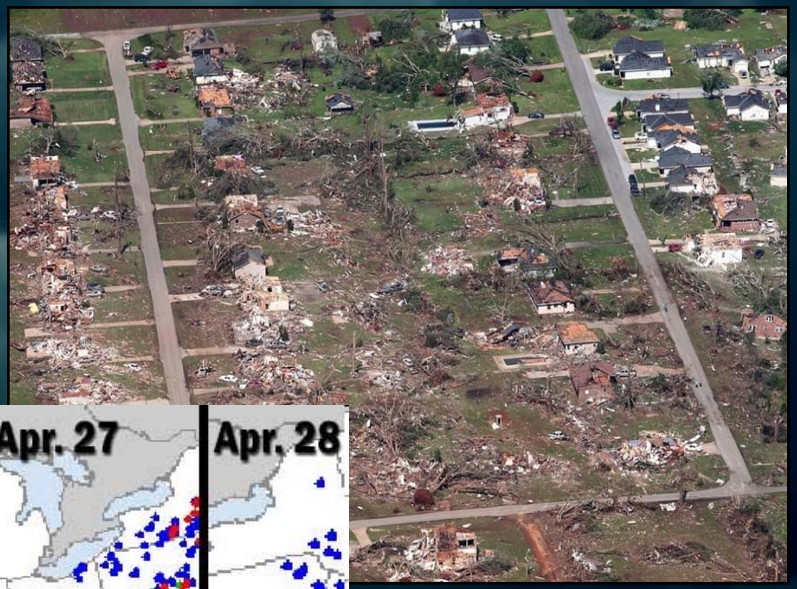


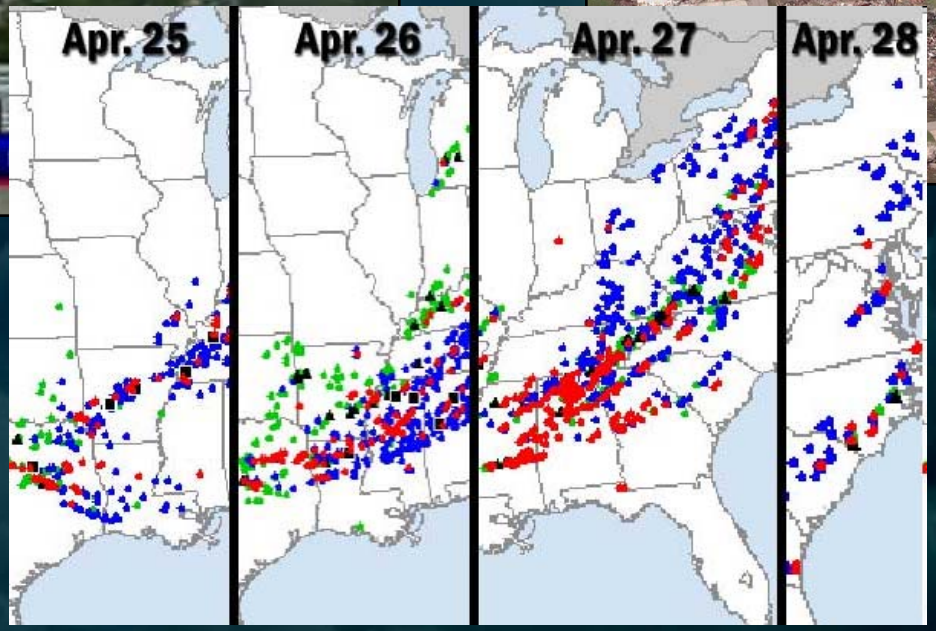
April 14-16, 2011

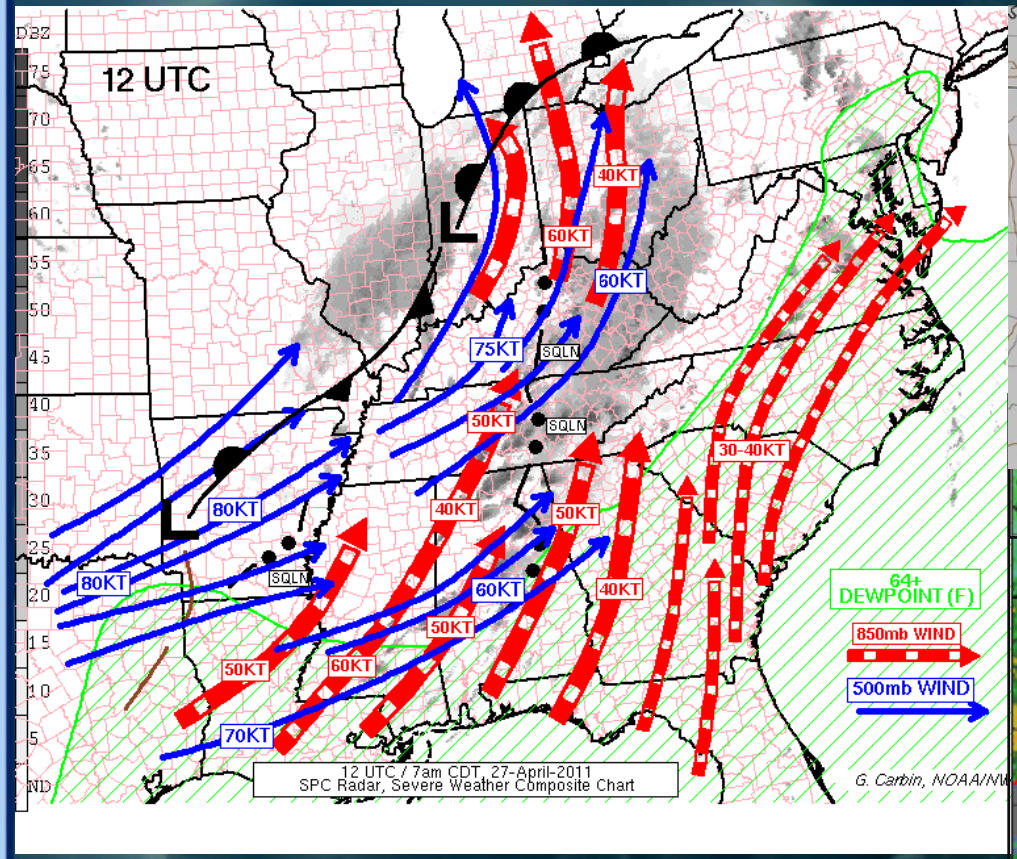
177 tornadoes, 38 deaths, 600 injuries, $0.5B damage

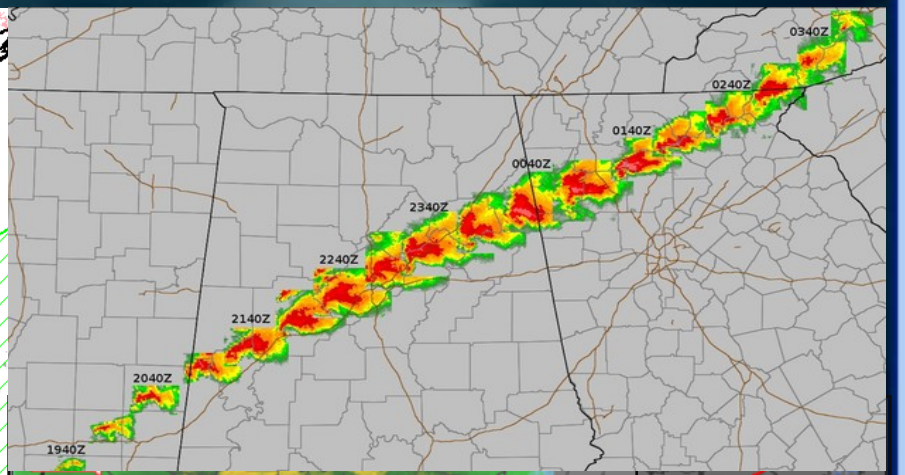


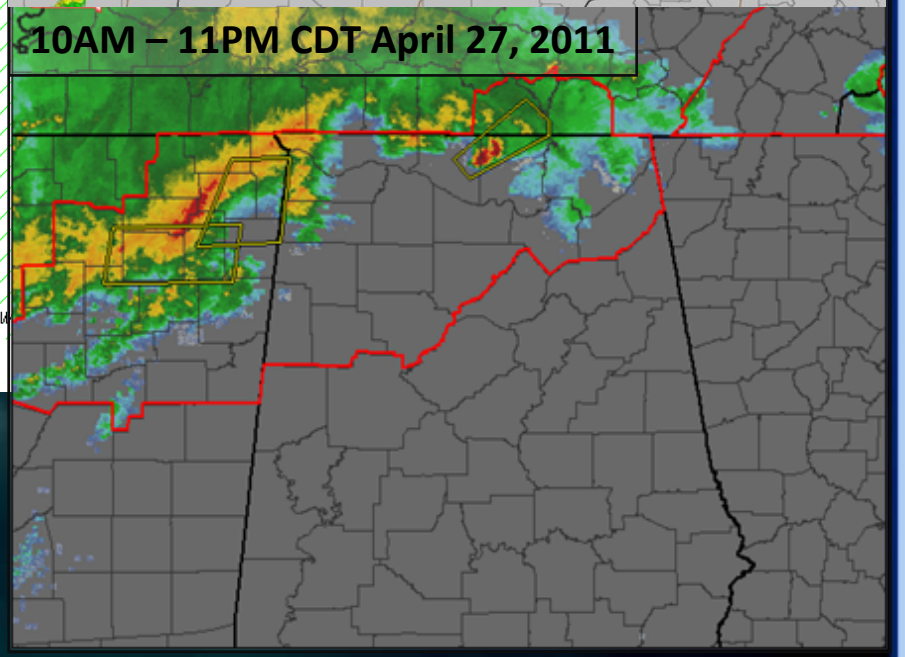
Historic Outbreak Sequence – 25-28 April



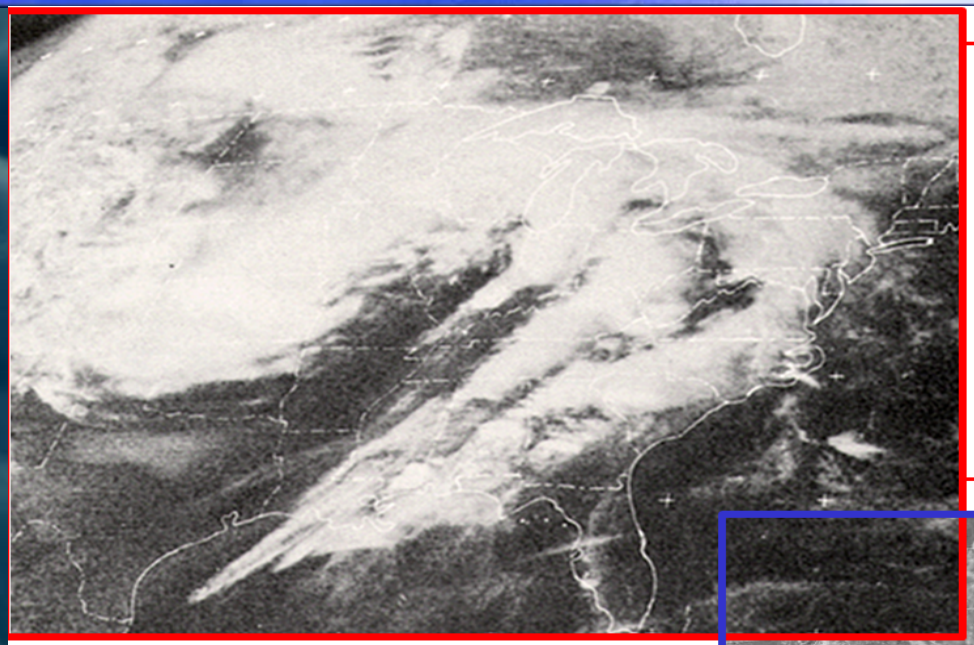






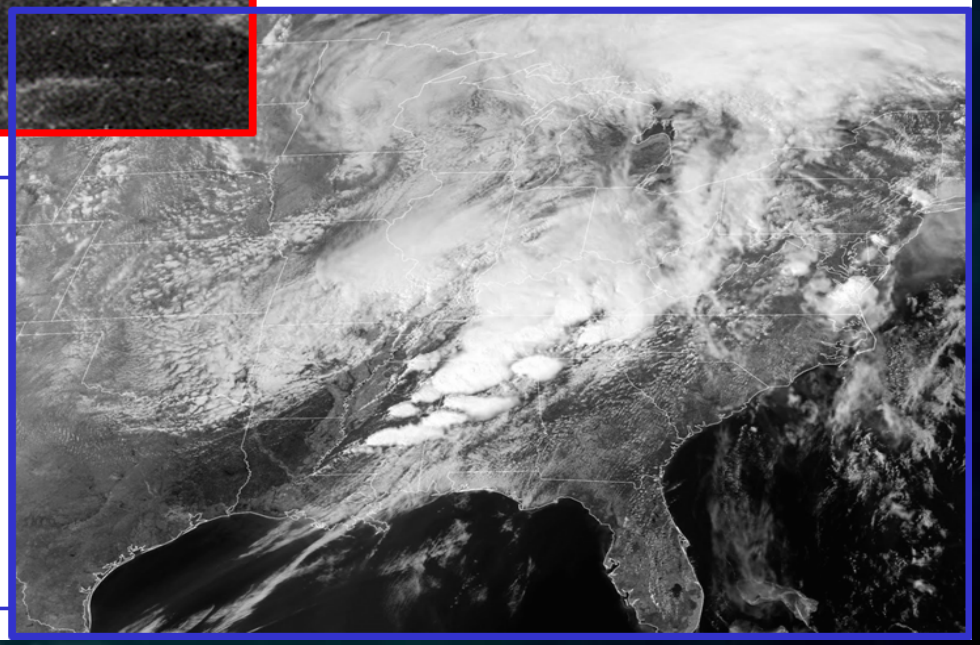


How often can we expect this kind of outbreak?



April 3-4, 1974 Super Outbreak

- 150 tornadoes across 13 states
- 6 F5 (2 in AL), 24 F4
- Fatalities: 310-319 (72-77 AL)
- **Tornado Track Length: 2500mi**
- **Tornado Time: 50 hours**



April 27-28, 2011 Super Outbreak

- 200 tornadoes across 16 states
- 4 F5 (3 in AL), 11 F4
- Fatalities: 316 (235 AL)
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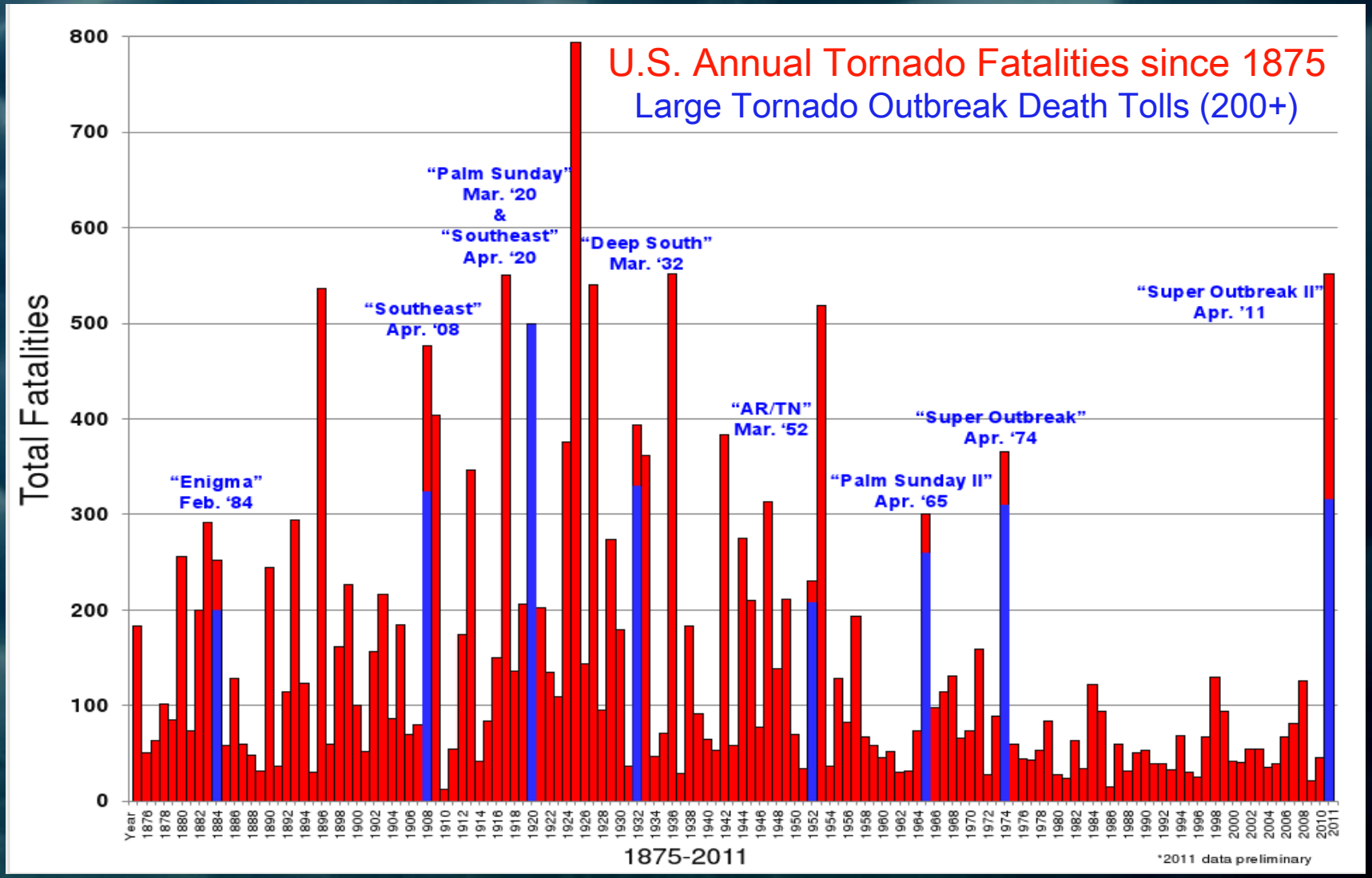
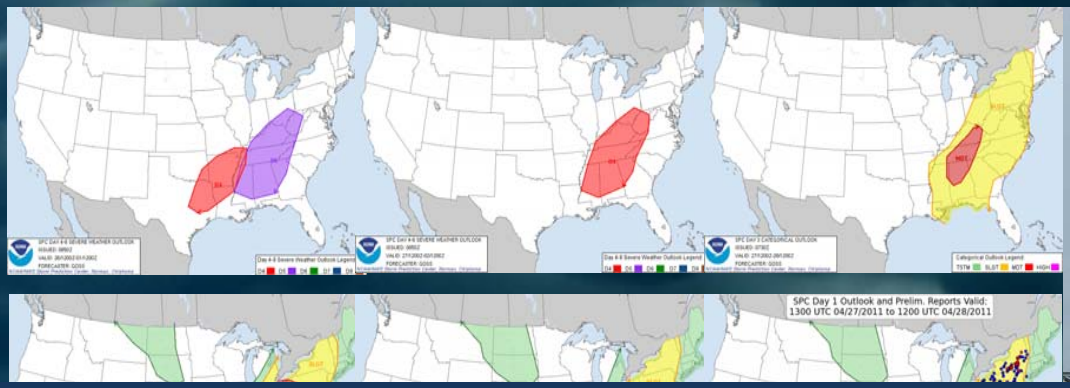
Gary Cosby Jr., The Decatur Daily


U.S. Annual Tornado Fatalities since 1875
Large Tornado Outbreak Death Tolls (200+)
Total Fatalities
800
700
600
500
400
300
200
100
0
"Enigma" Feb. '84
"Southeast" Apr. '08
"Palm Sunday" Mar. '20 & "Southeast" Apr. '20
"Deep South" Mar. '32
"AR/TN" Mar. '52
"Palm Sunday II" Apr. '65
"Super Outbreak" Apr. '74
"Super Outbreak II" Apr. '11
Year
1875-2011
*2011 data preliminary

NOAA's National Weather Service

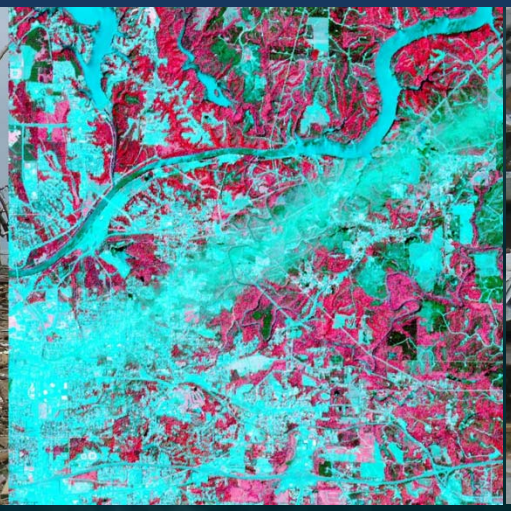
Storm Prediction Center

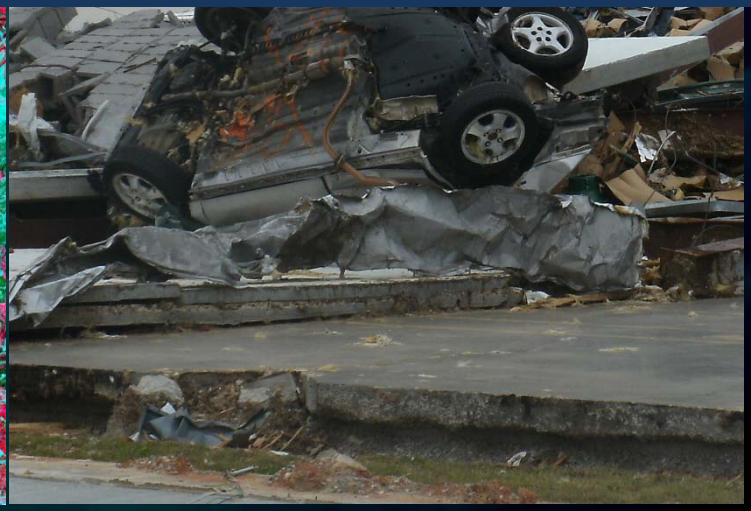


April 25-28, 2011

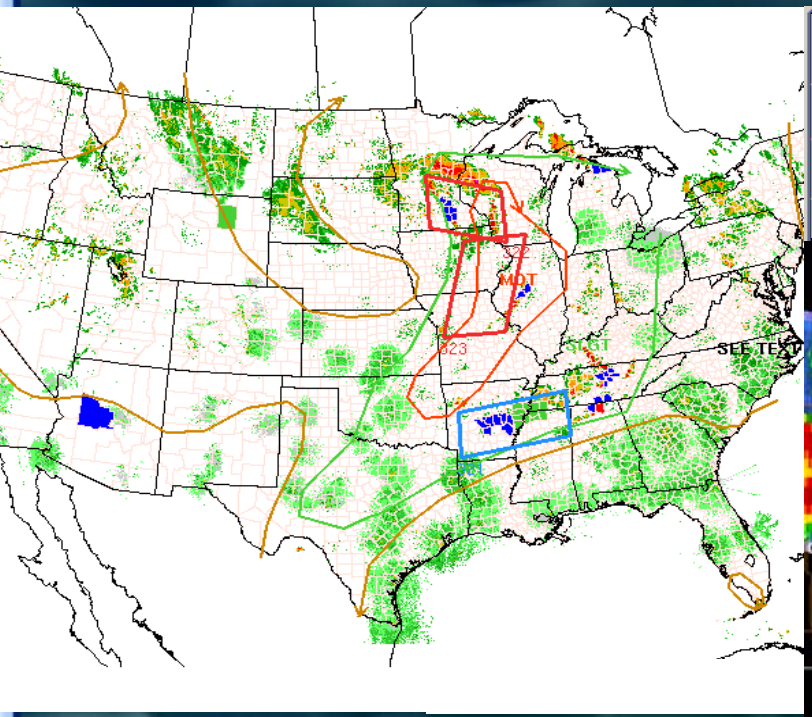
352 tornadoes (4 F5), 321 deaths, 3000 injuries, $5B damage

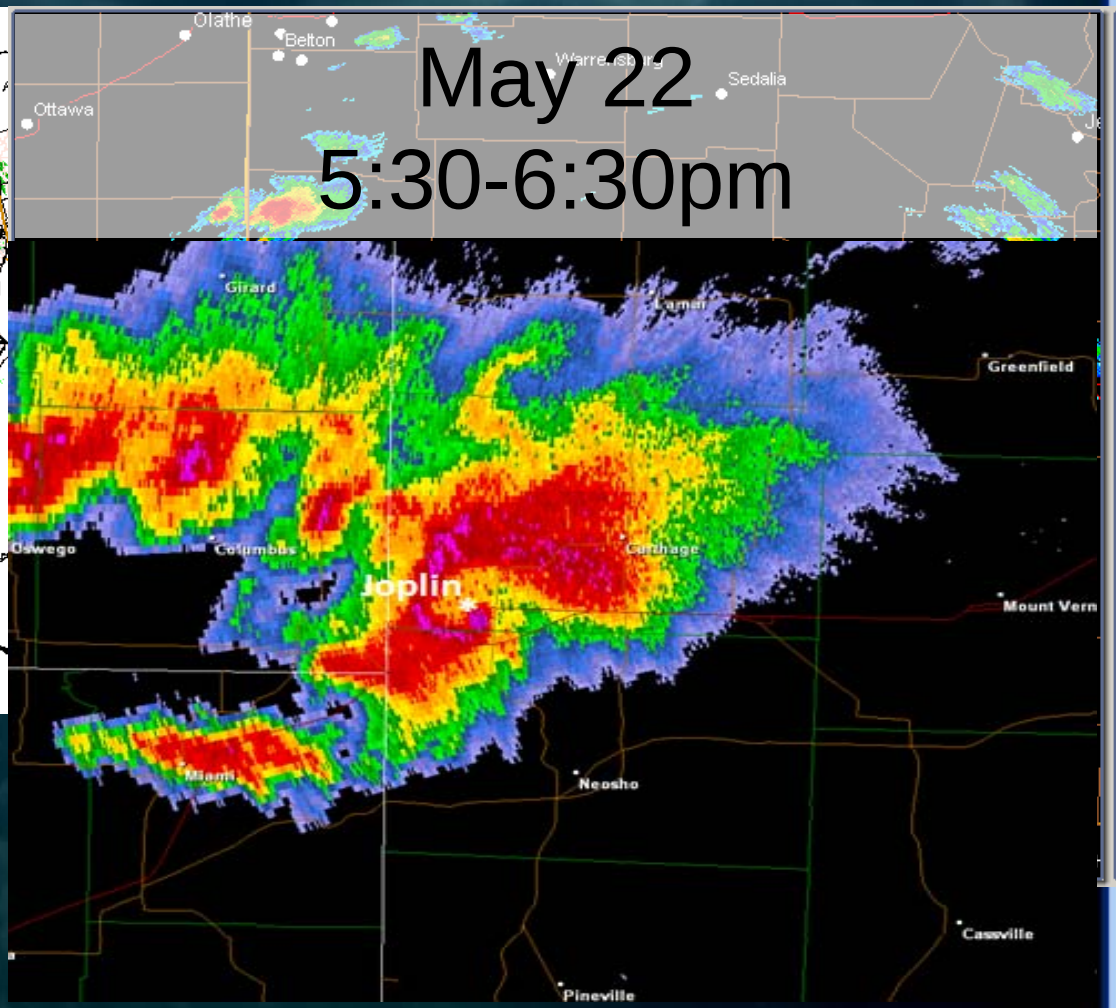
The tornado outbreak of our generation?





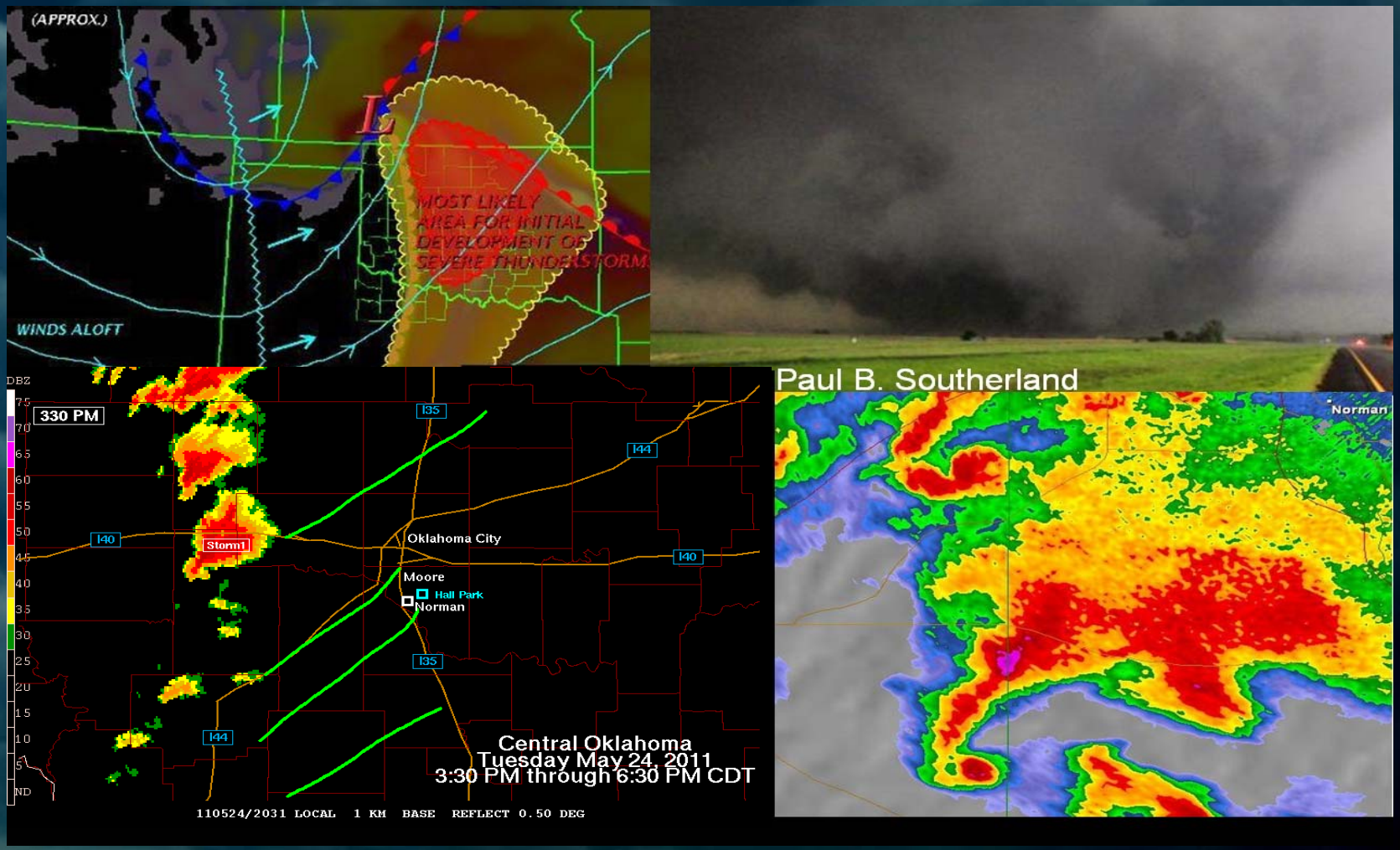
Late May Sequence – 22-24 May





Joplin, Missouri tornado, with 158 fatalities, is the deadliest tornado in the U.S. since 1947.

Two Days After Joplin – 24 May, Oklahoma



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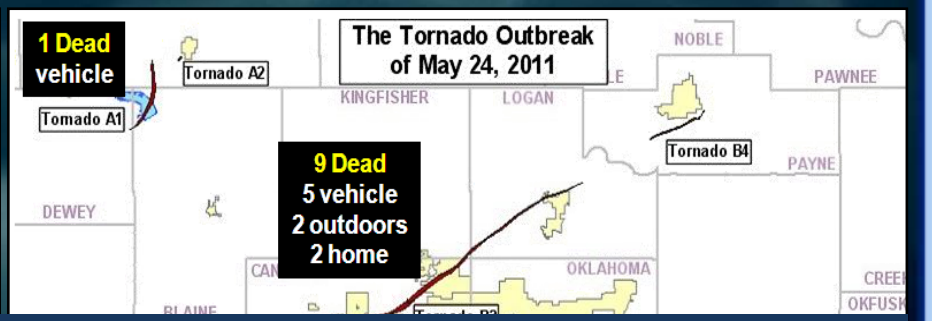
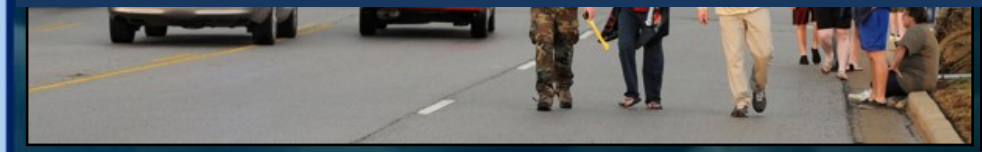
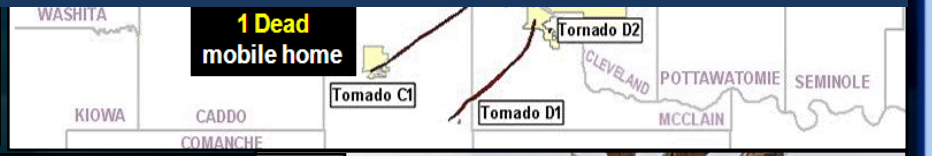


A violent and deadly end to May…
113 tornadoes (2 F5), 177 deaths, 1600 injuries, $6-7B damage





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June 1, 2011 – Now we've seen everything!

BOSTON Herald.com NEWS & OPINION

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Meteorologists thrown for loop

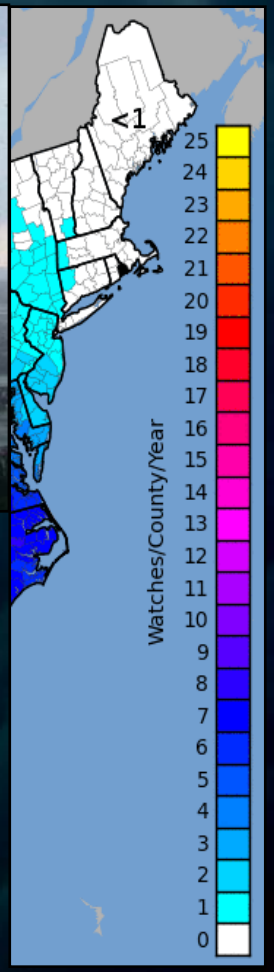
By Natalie Sherman

Friday, June 3, 2011 - Added 2 months ago

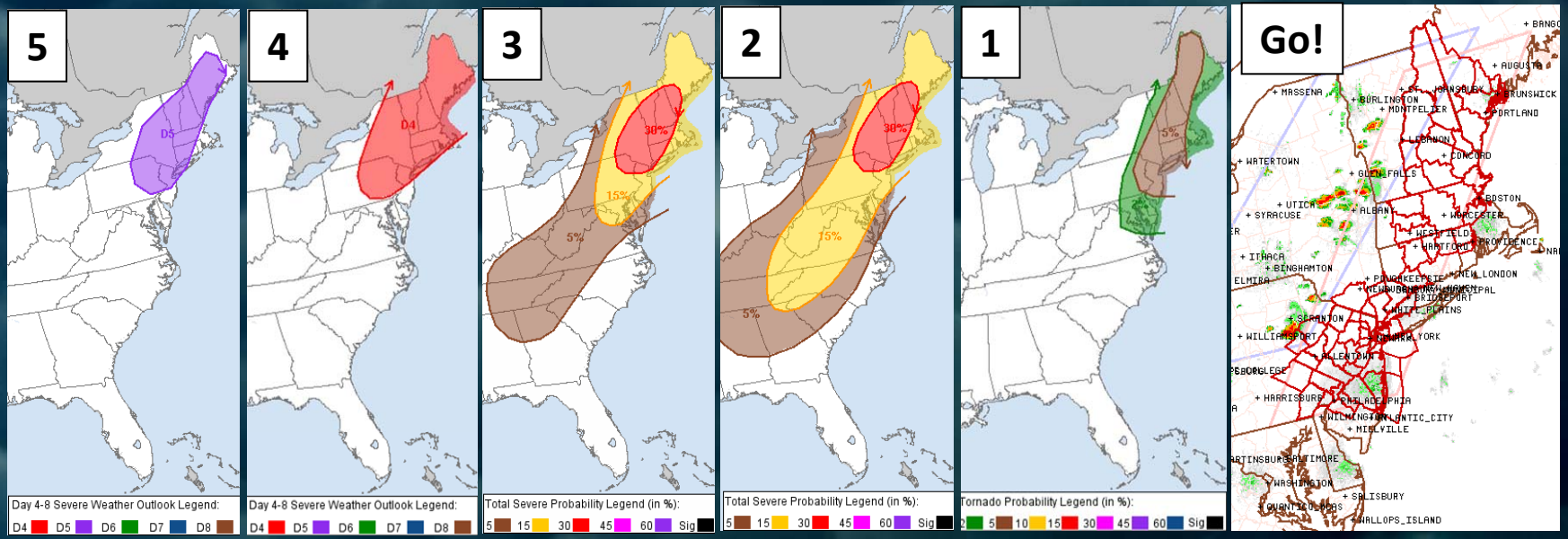
E-mail | Print | (8) Comments | Text size | Share | Like

The tornadoes that churned through Massachusetts on Wednesday were rare for the state, surprising even local meteorologists who had been tracking the weather for days.

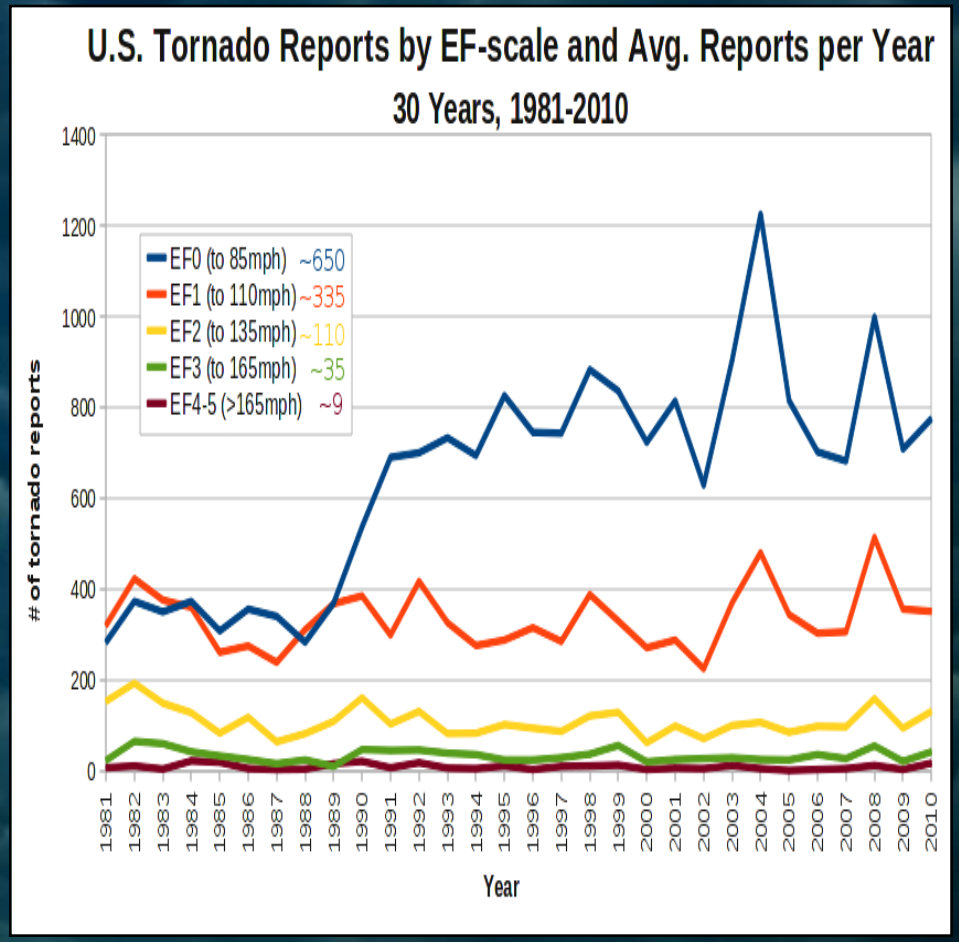
"It's New England — how many tornadoes do we get?" Fox-25 news meteorologist Kevin Lemanowicz said. "You're seeing rotation on the radar, and you're not quite sure how to handle that. It was not at all surprising that we had severe weather. It's always a surprise when a tornado drops down."

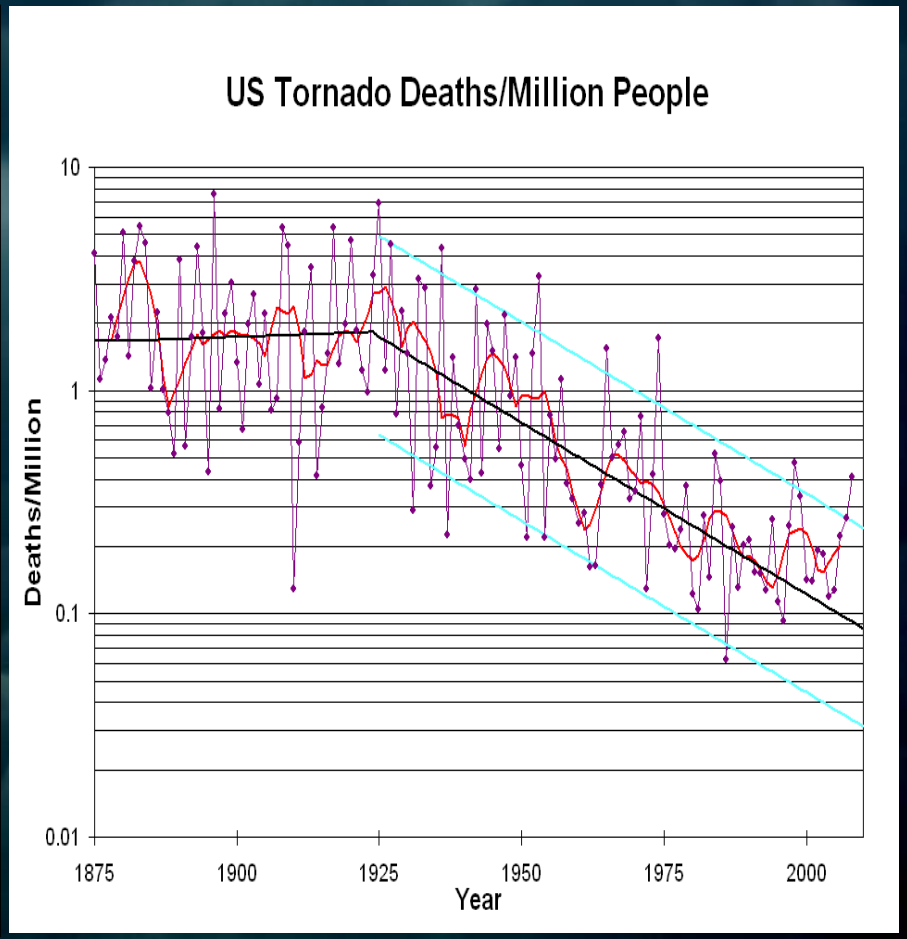


SPC Outlooks – May 28-June 1 & Tornado Watch, June 1

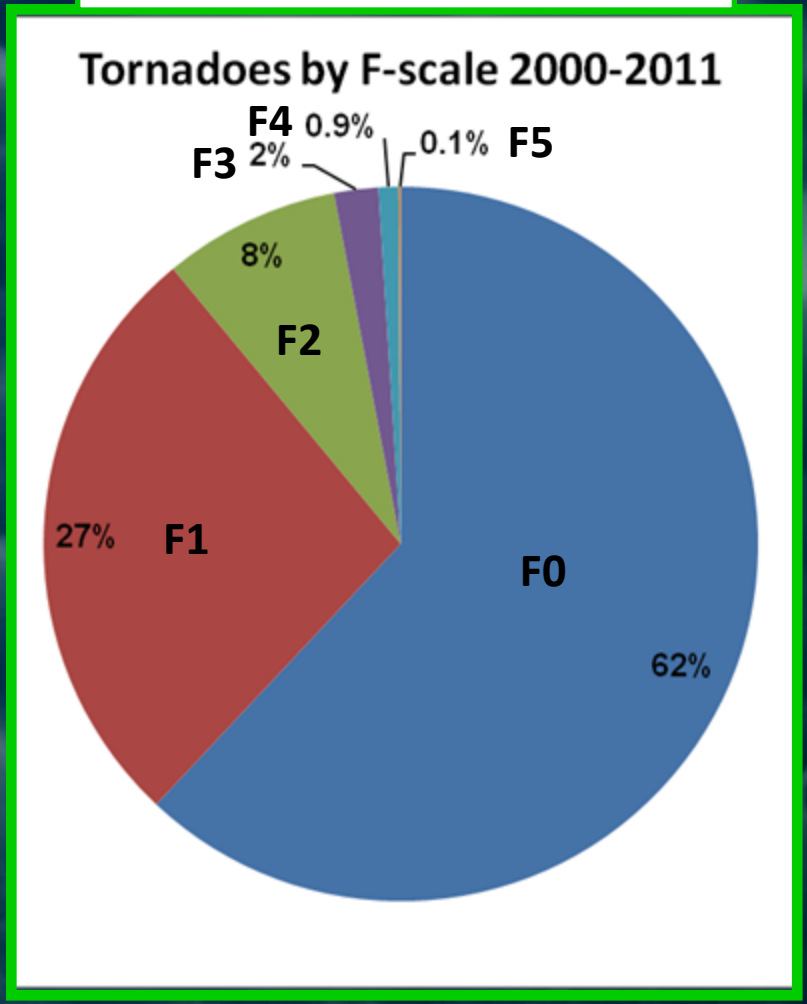


Tornado Trends in Perspective

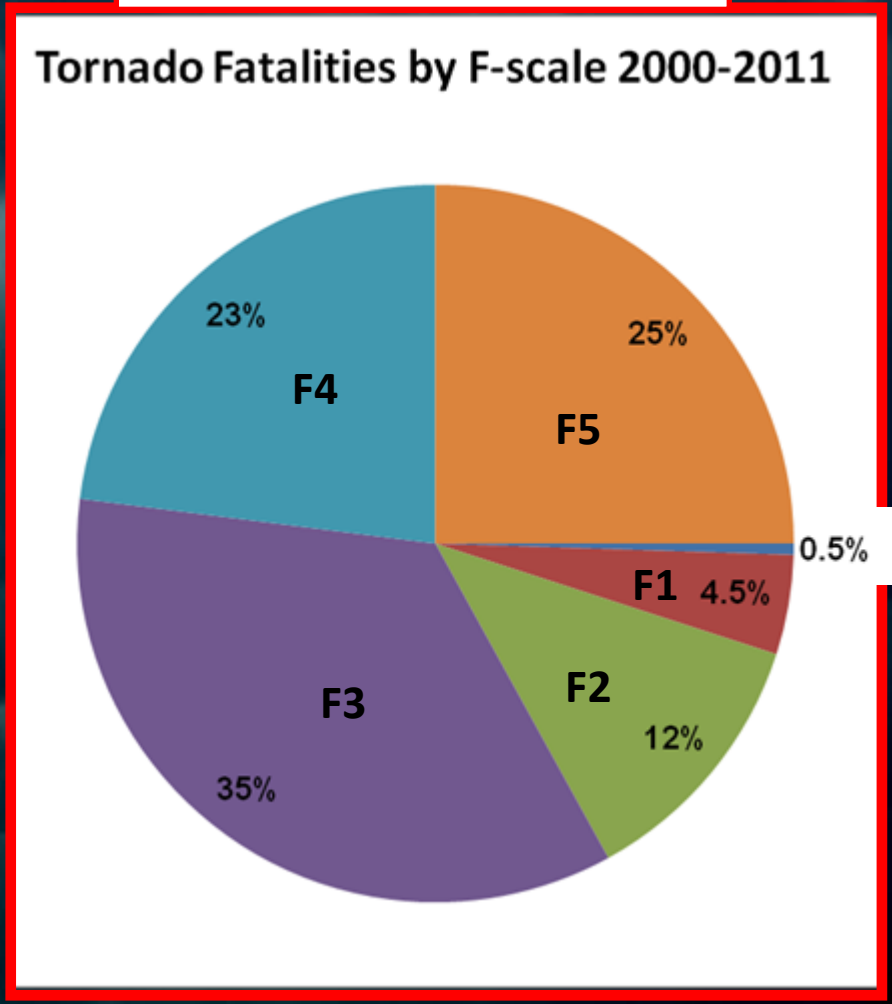




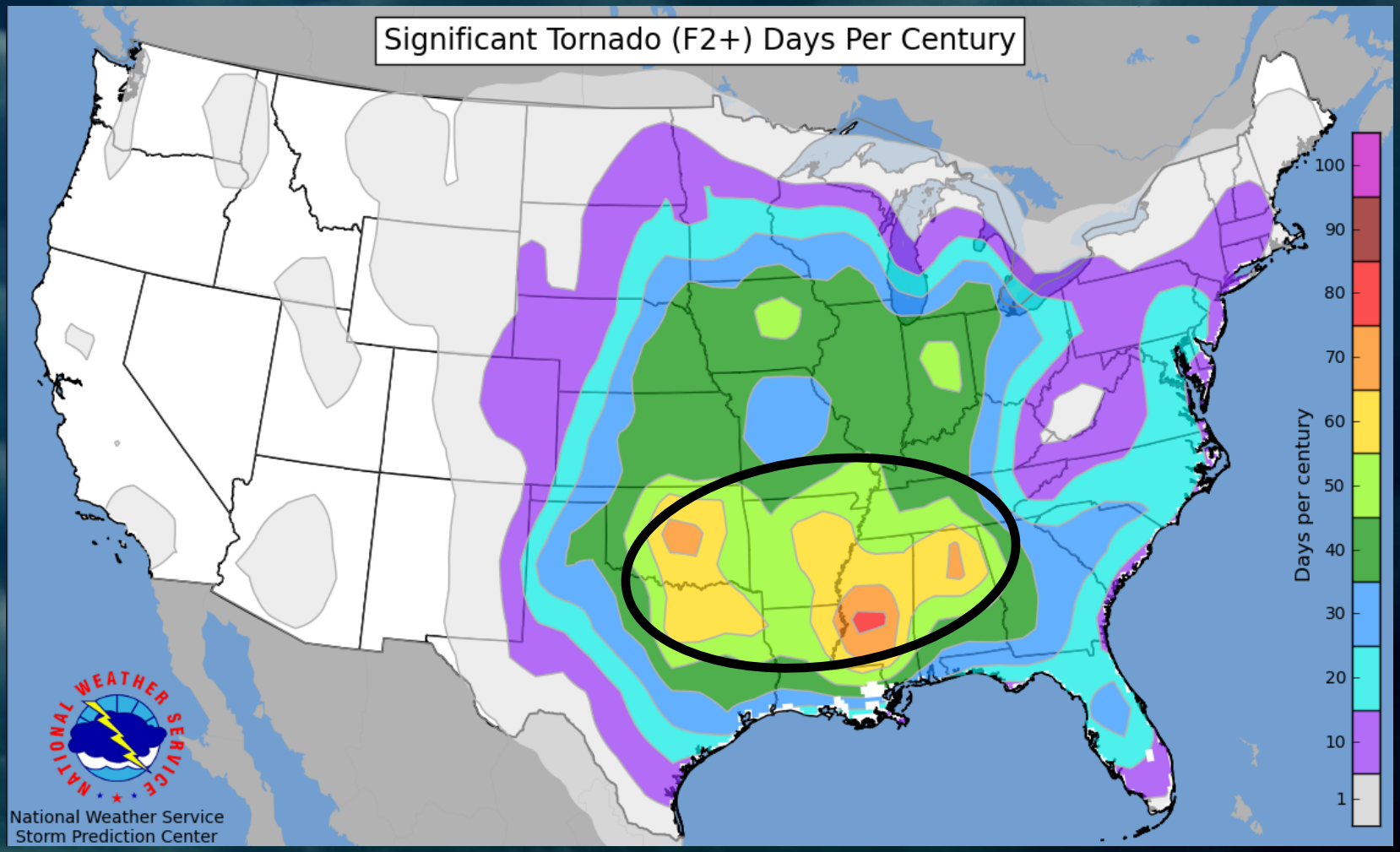
~90% of tornadoes <F2



~90% of fatalities >F2



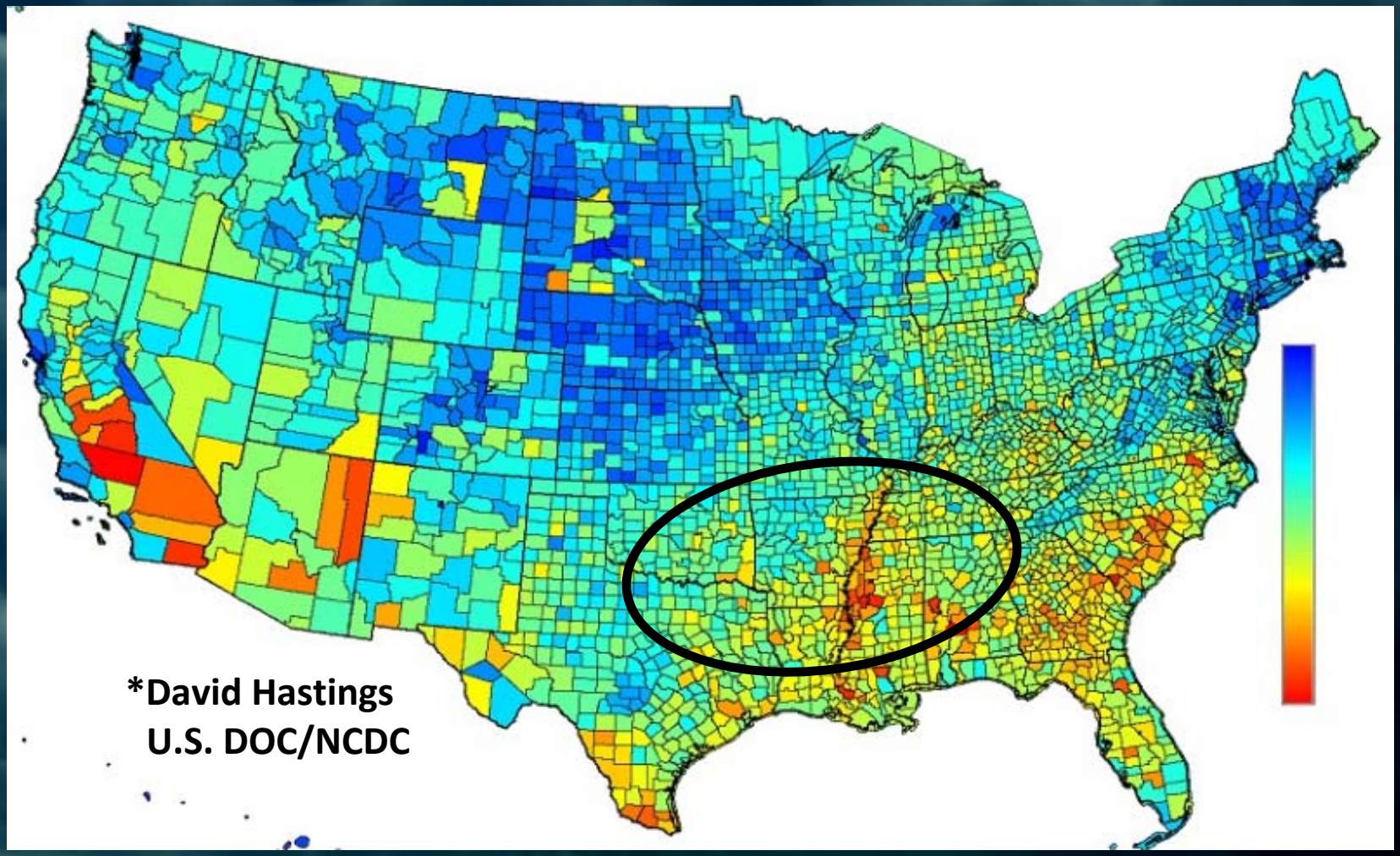
"Bad" Tornado Frequency (within 25 miles)



"Human Security" Index

Human Security Index USA Version 0.1: ~35 input data sets / indicators			
Input fields	*[source]*	*Components*	*Index*
Poverty	[Census SAIPE 2008]	**Economic Fabric Index**	*Human Security Index*
Unemployment (~U3)	[BLS LAU 2010]		
Median Household Income, C.O.L[26] adjusted	[Census ACS 2008] C.O.L derived from several source data sets		
Inequality (Gini Coefficient)	[Burkey NCAT.edu after Census]		
% of population on "food stamps"	[USDA – New York Times]		
Particulate days > EPA threshold	[HHS]	**Environmental Fabric Index**	
Ozone days > EPA threshold	[HHS]		
CO_2 emissions	[VULCAN project Purdue.edu]		
Natural Amenity Index	[modified from USDA ERS]		
Population change 2000-2009	[derived from Census data]		
High School diploma %	[Census]	*Education subcomponent* ***Social Fabric Index***	
Some college incl. Associates Degree %	[Census]		
Undergrad degree+ %	[Census]		
Adult Literacy (below BPLS)	[DoEd NCES]		
% 5+ y.o. less than good English	[Census 2000]		
M&F Life Expectancy at Birth	[Murray et al HHS mortality data]	*Health subcomponent* **Social Fabric Index**	
Lesser of F or M LE change 1999-1983	[Ezzati et al PLoS Medicine]		
YPLL premature death rate	[HHS]		
% obesity	[HHS]		
Motor vehicle mortality rate	[HHS]		
Chlamydia rate	[HHS]		
Adult uninsured	[Census SAHIE]		
Adult insured (<200% of poverty level)	[Census SAHIE]		
Healthy food access index	[HHS]		
Violent crimes per 10000 population	[Census]	*Crime & Punishment subcomponent* ***Social Fabric Index***	
Property crimes per 10000 population	[Census]		
Incarceration	[BJS & Census]		
Child poverty rate	[USDA ERS]	*"Social Stress" subcomponent* **Social Fabric Index**	
Mentally unhealthy days	[HHS]		
Teen birth rate	[HHS]		
Mortgage foreclosure rate	[HUD]		
Housing vacancy rate (excl. vacation/seasonal vacancies)	[Census]		
"Inadequate social support" %	[HHS]		
Grandparent performing parental role %	[Census 2000]		
"Creative Class" %	[USDA ERS]		
Commute Index (%DriveAlone*CommuteTime)	[derived fr Census]		

"Human Security" Index*



Goal: reduce the **loss of life** and **mitigate** the **social and economic impacts** of severe weather

http://www.joss.ucar.edu/events/2011/weather_ready/

Thank you and please enjoy the 2012 National Severe Weather Workshop!

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www.spc.noaa.gov