



Historic Tornado Outbreak

April 27, 2011



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Meteorologist In Charge
National Weather Service Birmingham

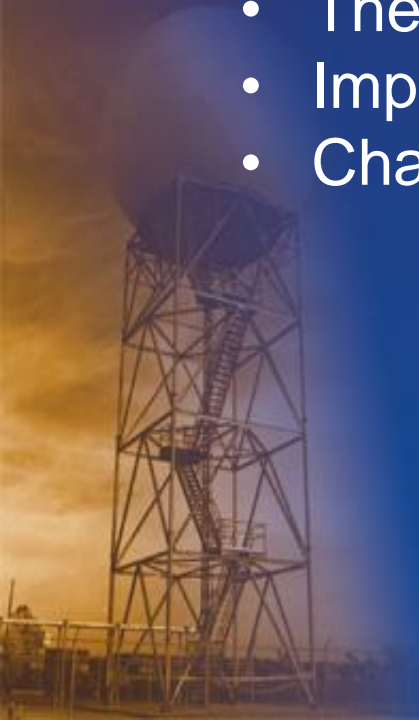




Historic Tornado Outbreak

April 27, 2011

- Atmospheric Conditions
- NWS Outlooks
- The Outbreak
- Impacts
- Challenges



Winter Airmass in upper levels

Intense
Upper
Level
Winds

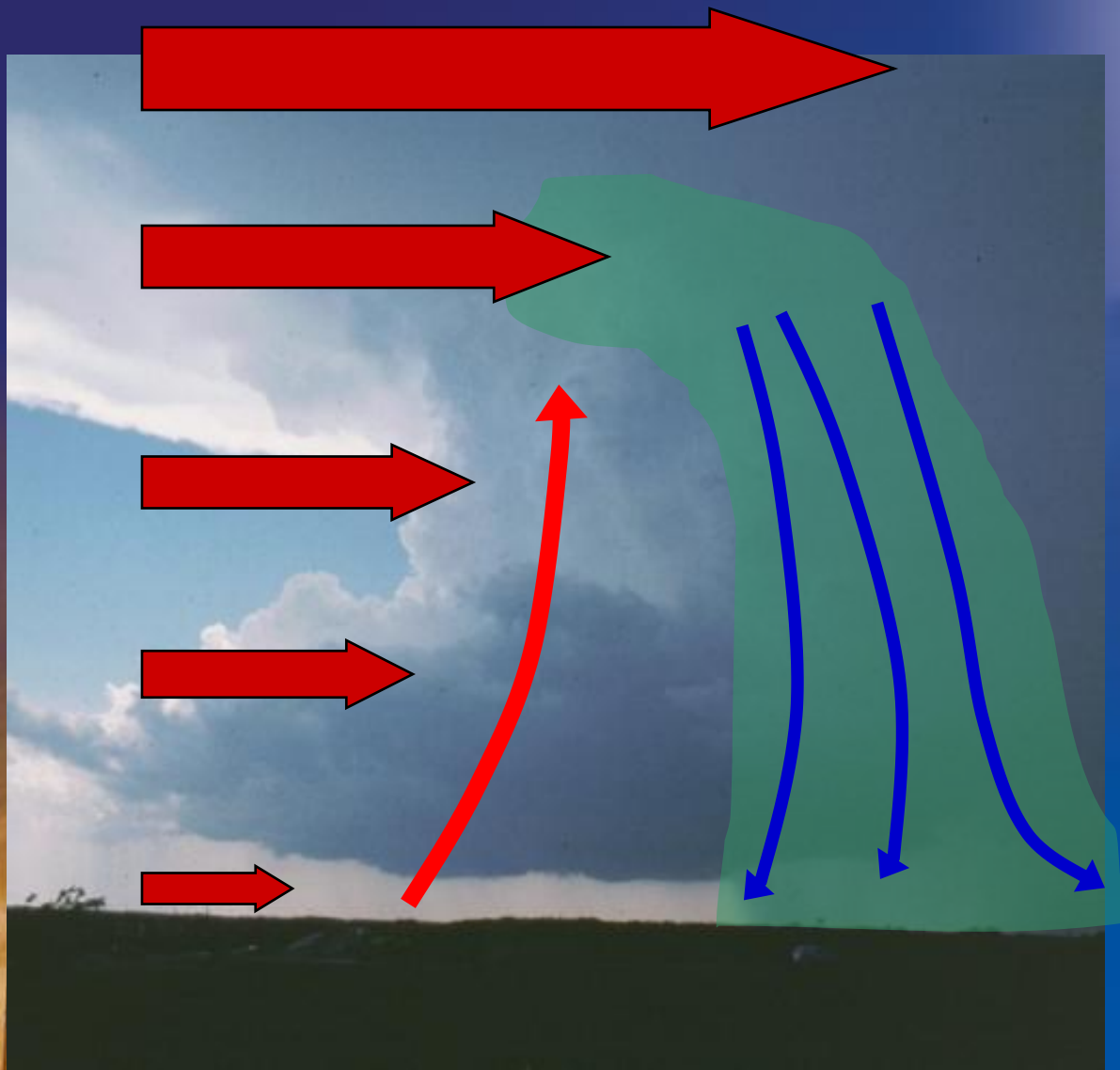


Summer Airmass at Surface





High-Shear Thunderstorms



**-Stronger winds
in mid-upper
levels**

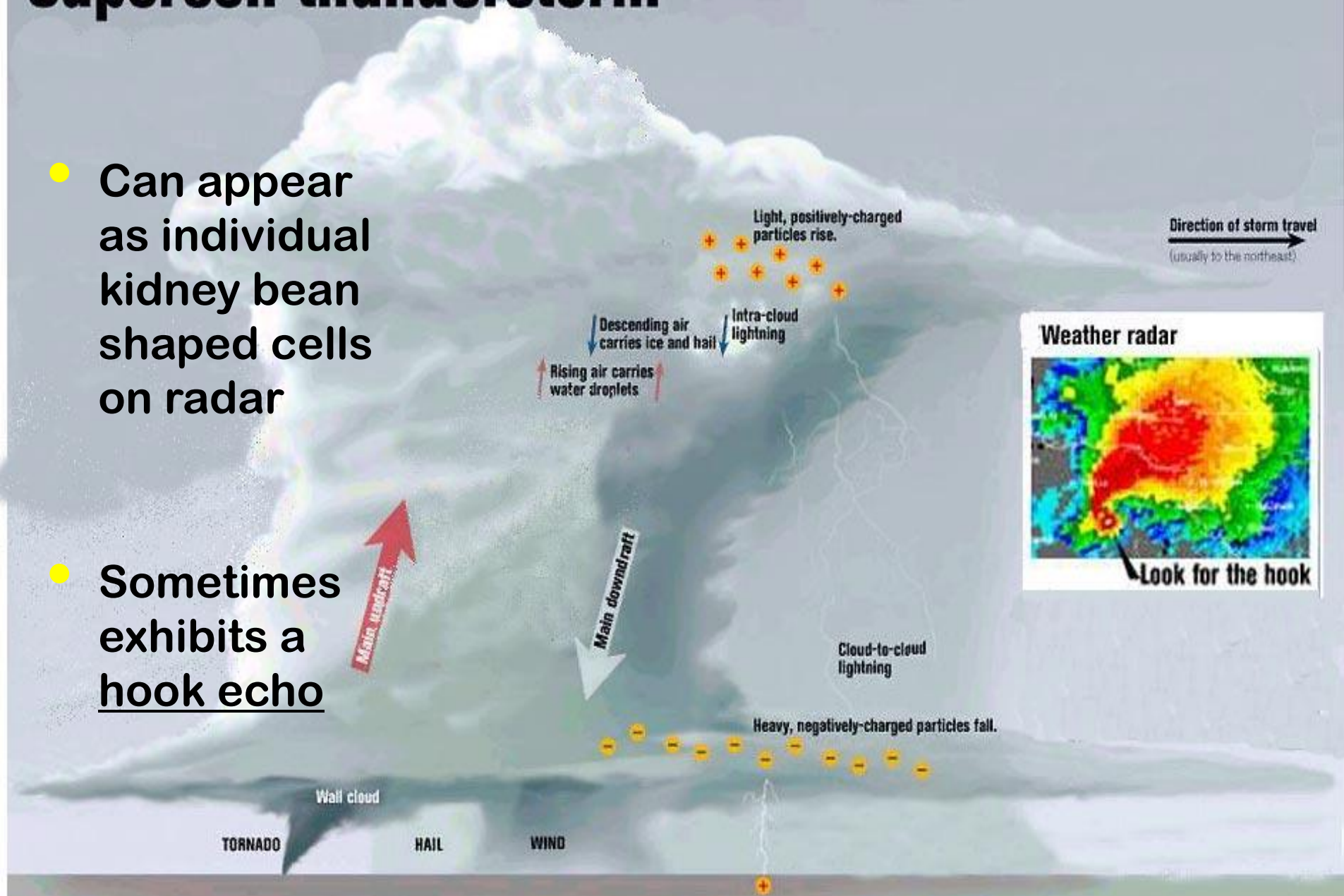
**-Ventilates storm
updraft area**

**-Updrafts and
downdrafts can
last longer**

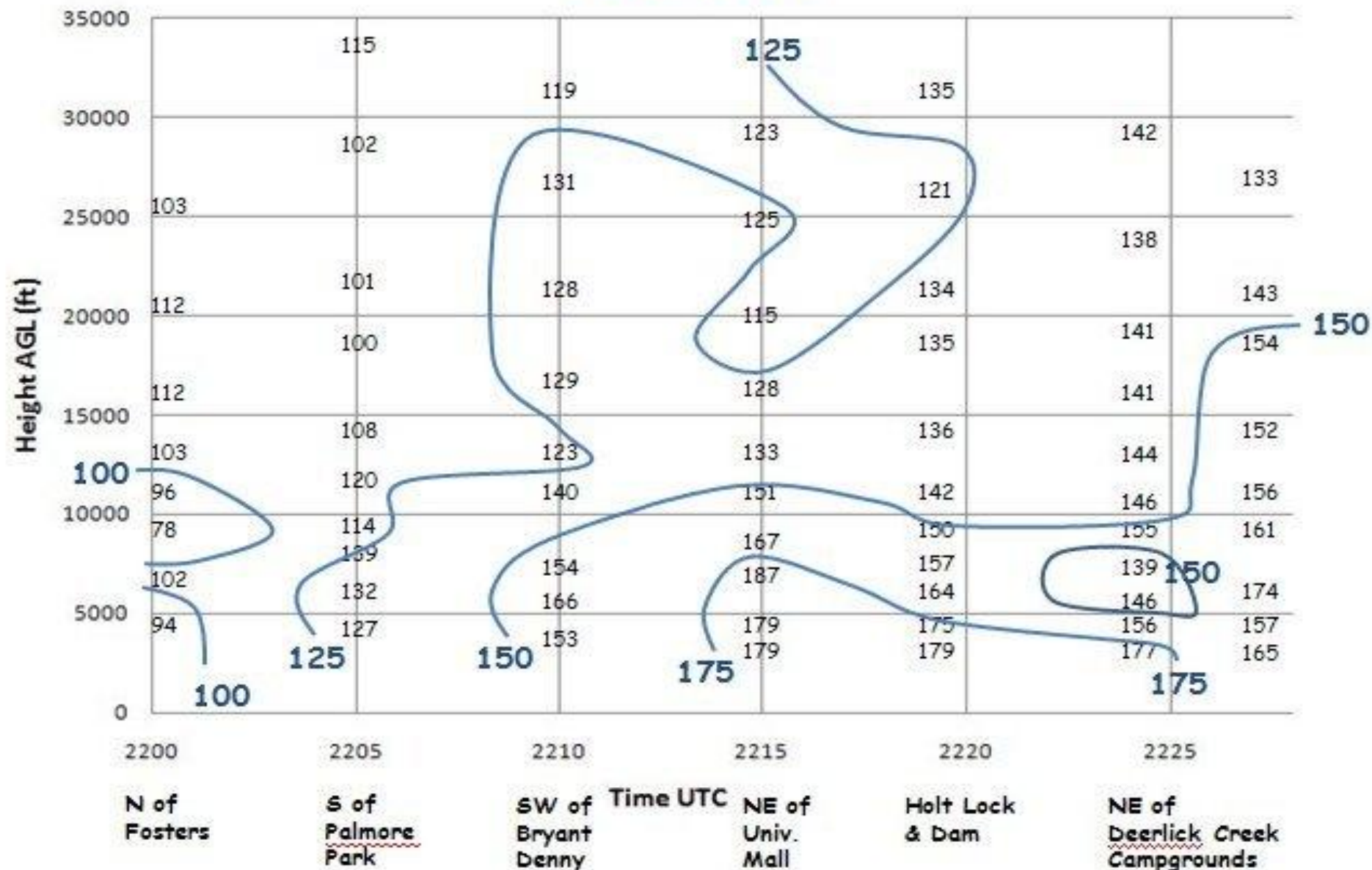
**-Can help
generate mid-
level rotation**

Supercell thunderstorm

- Can appear as individual kidney bean shaped cells on radar
- Sometimes exhibits a hook echo

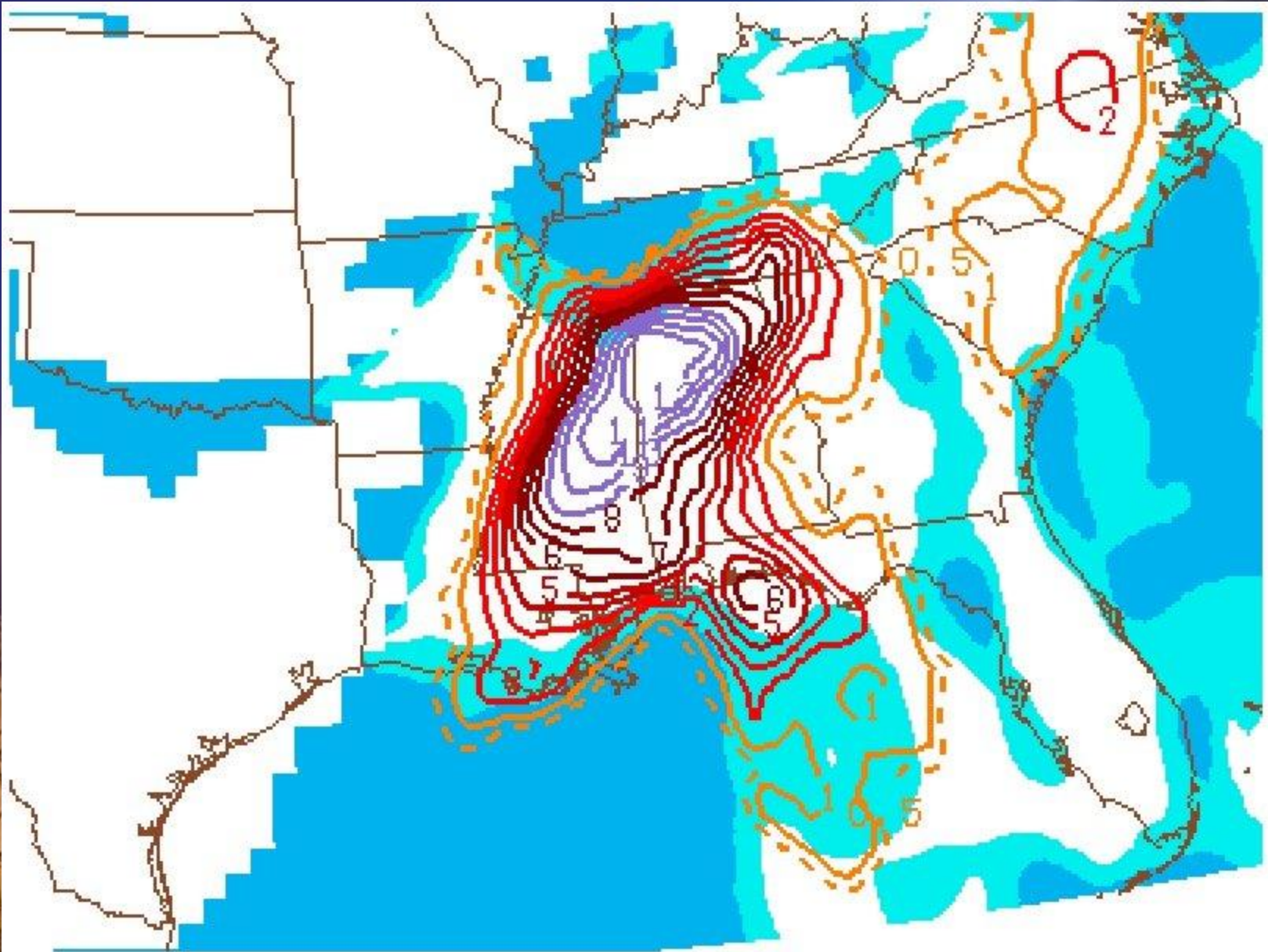


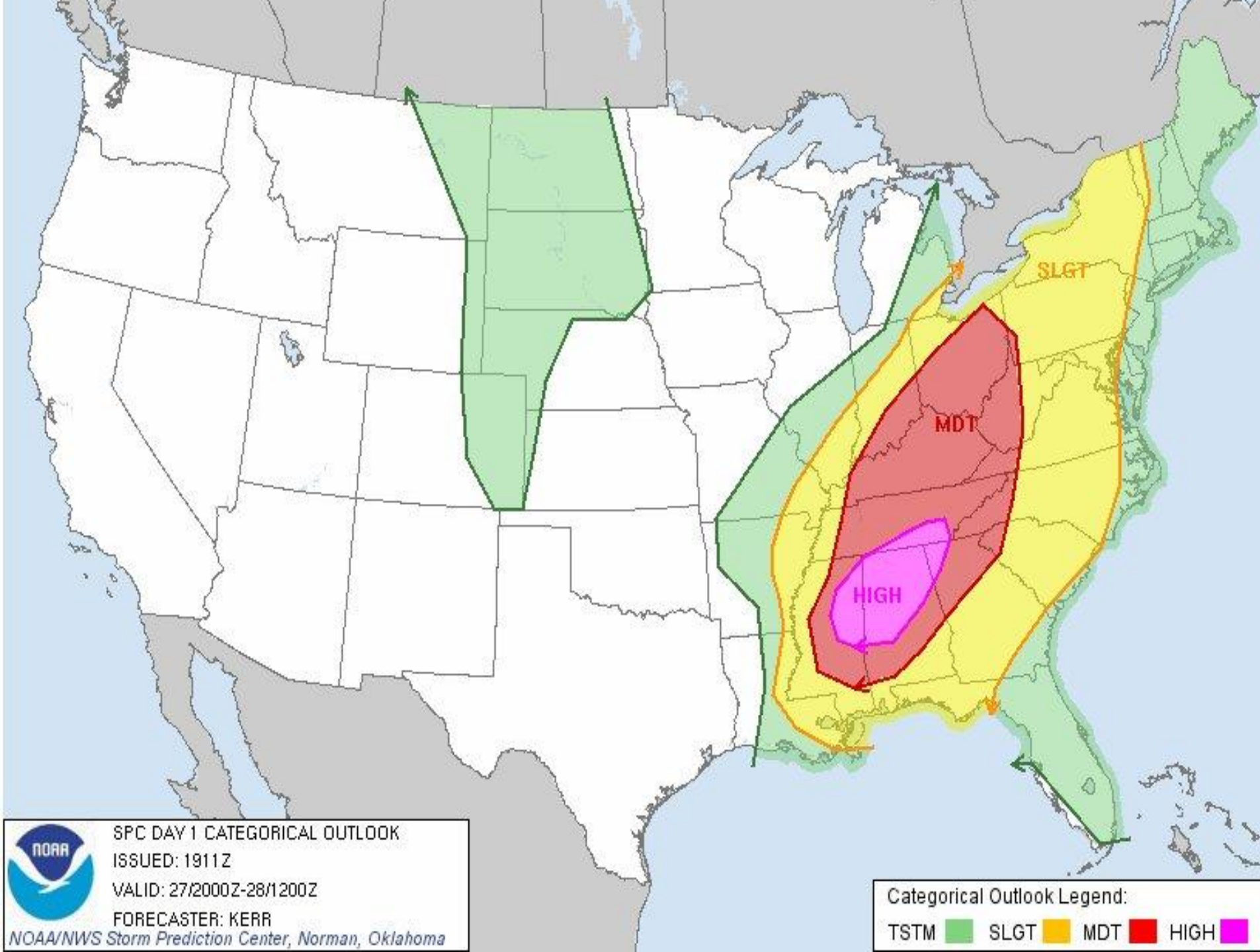
Time-Height Section of Delta Velocities (knots) of the Tuscaloosa Tornado 27 April 2011



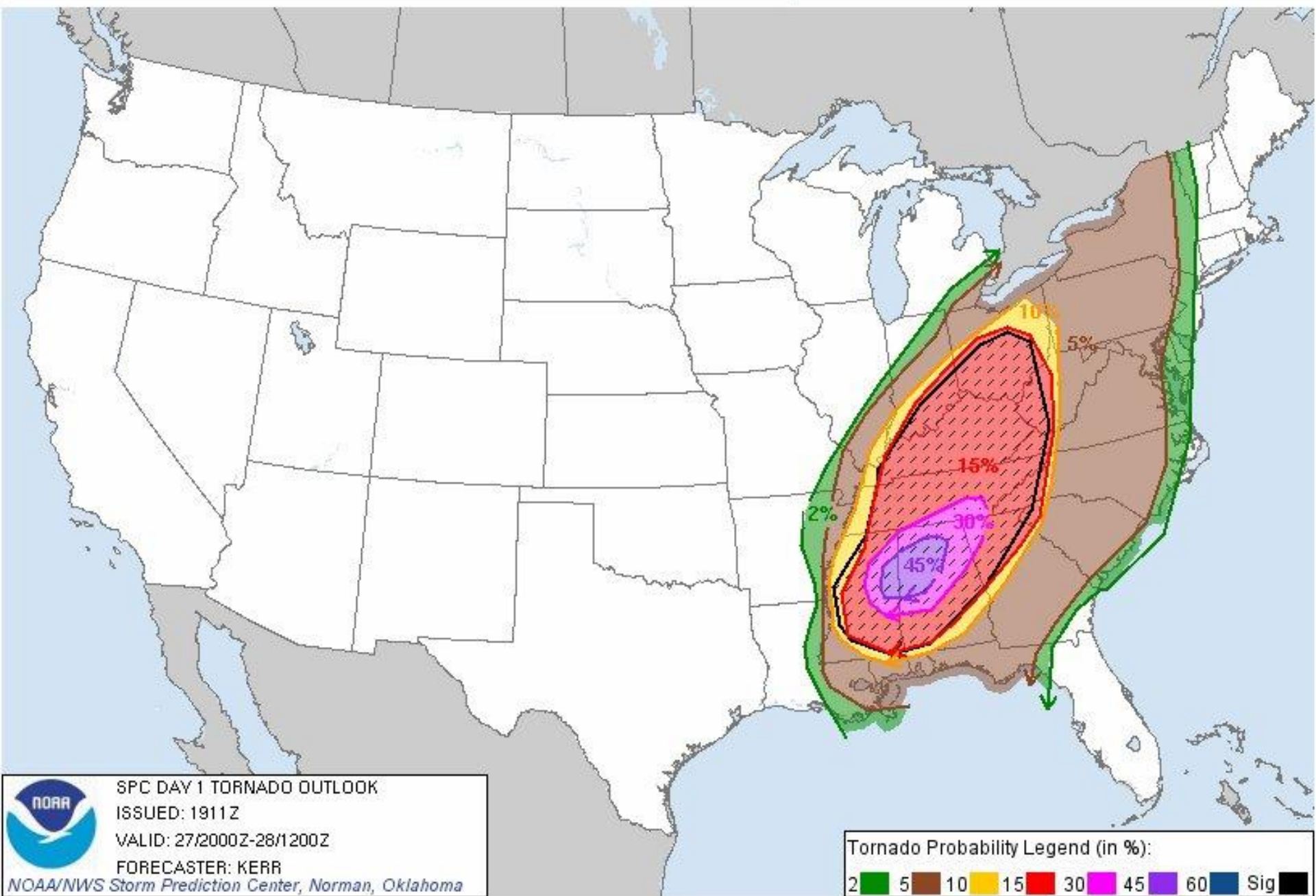


Significant Tornado Parameter

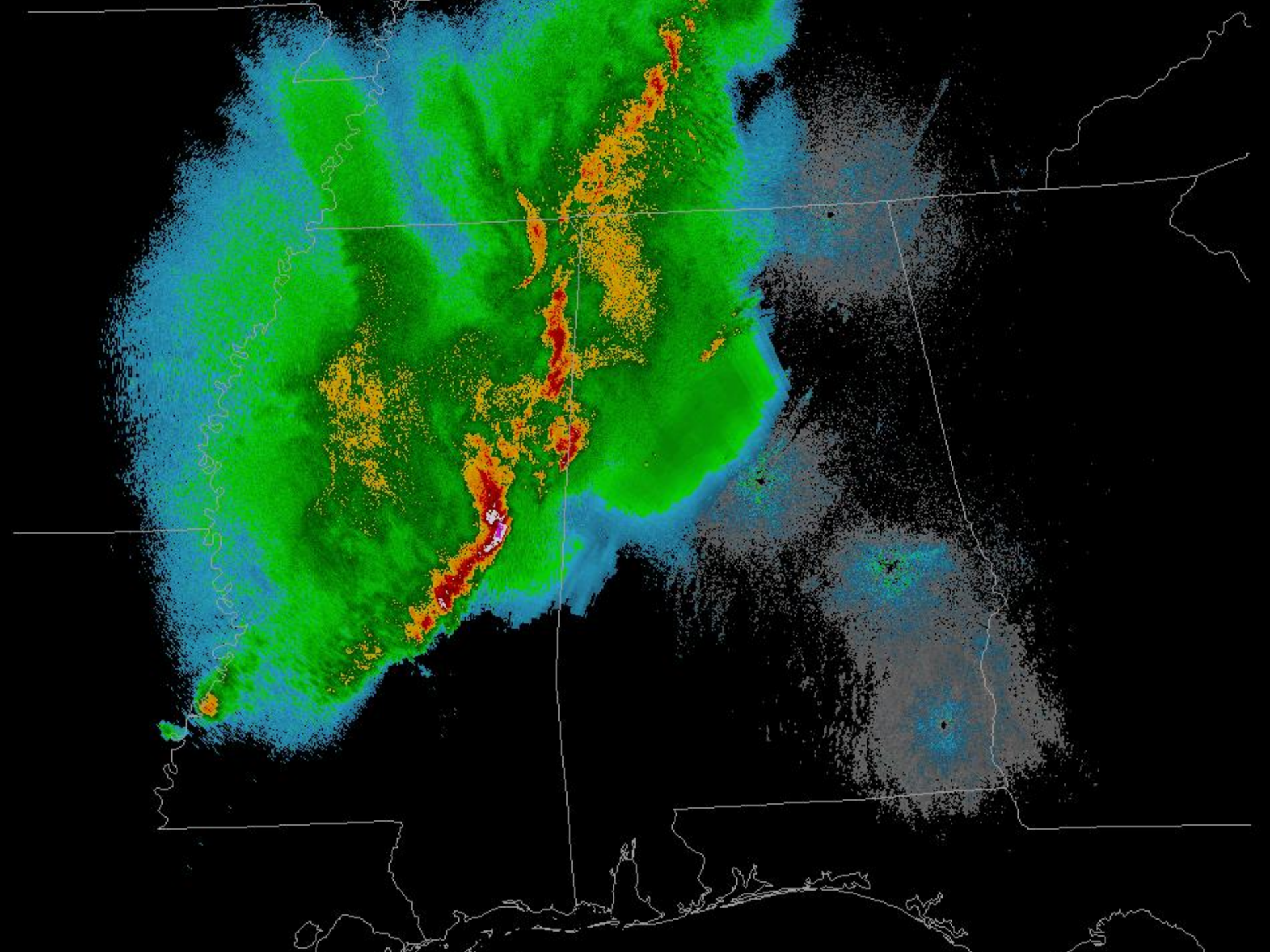


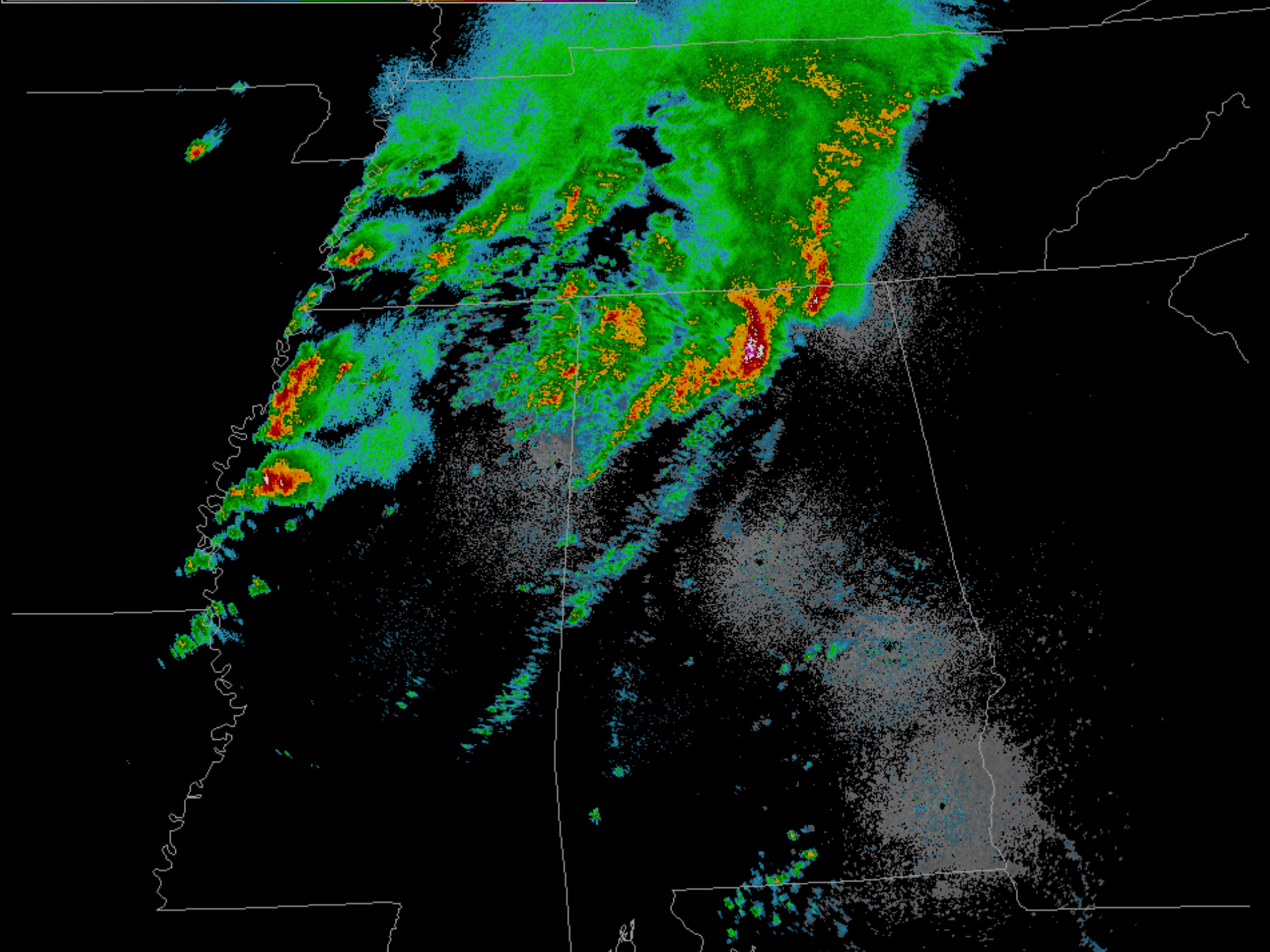


Probabilistic Tornado Graphic



Probability of a tornado within 25 miles of a point.
Hatched Area: 10% or greater probability of EF2 - EF5 tornadoes within 25 miles of a point.





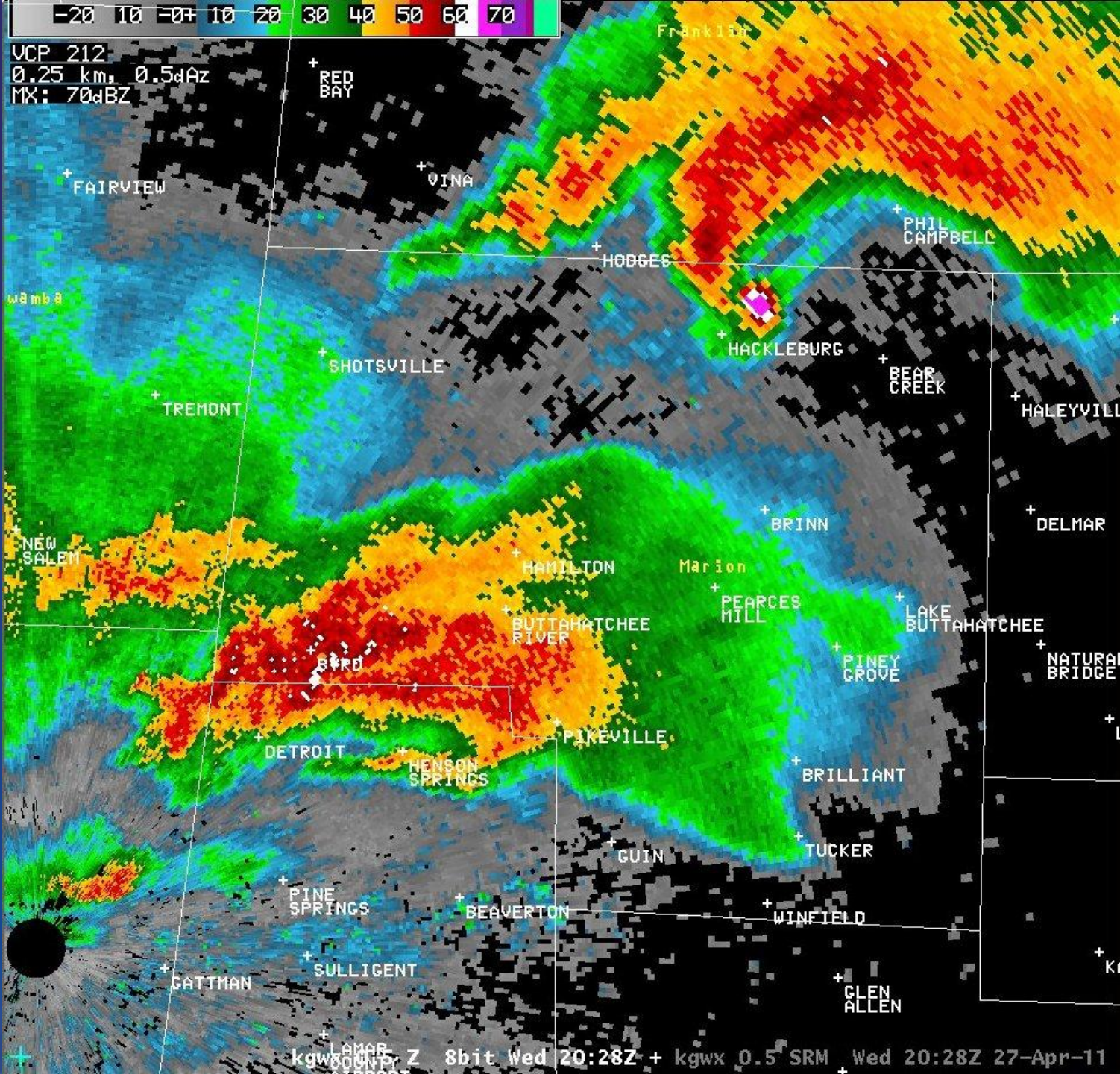


Hackleburg Tornado

305 p.m.

-

328 p.m.



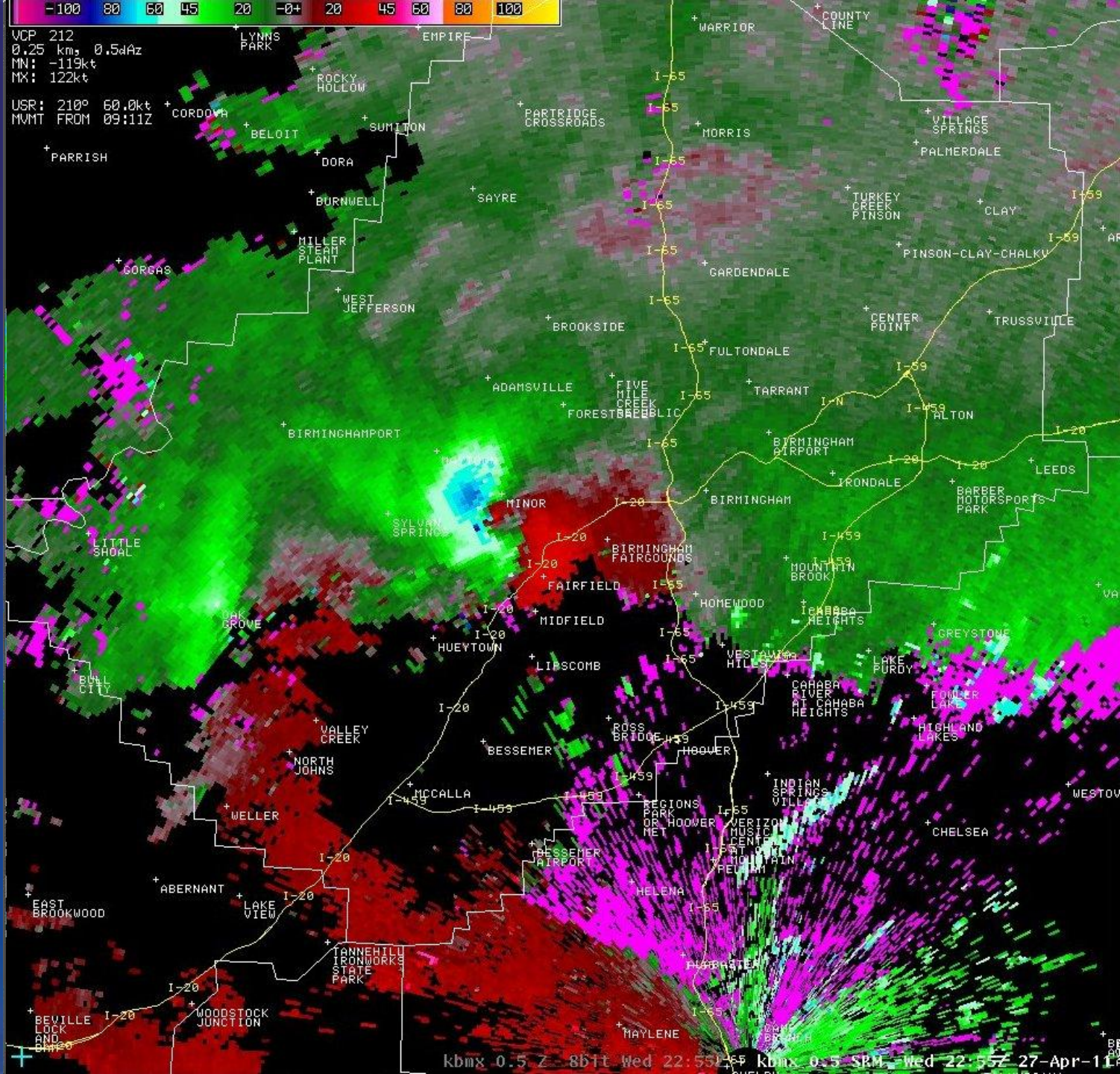


Tuscaloosa/ Birmingham Tornado

443 p.m.

-

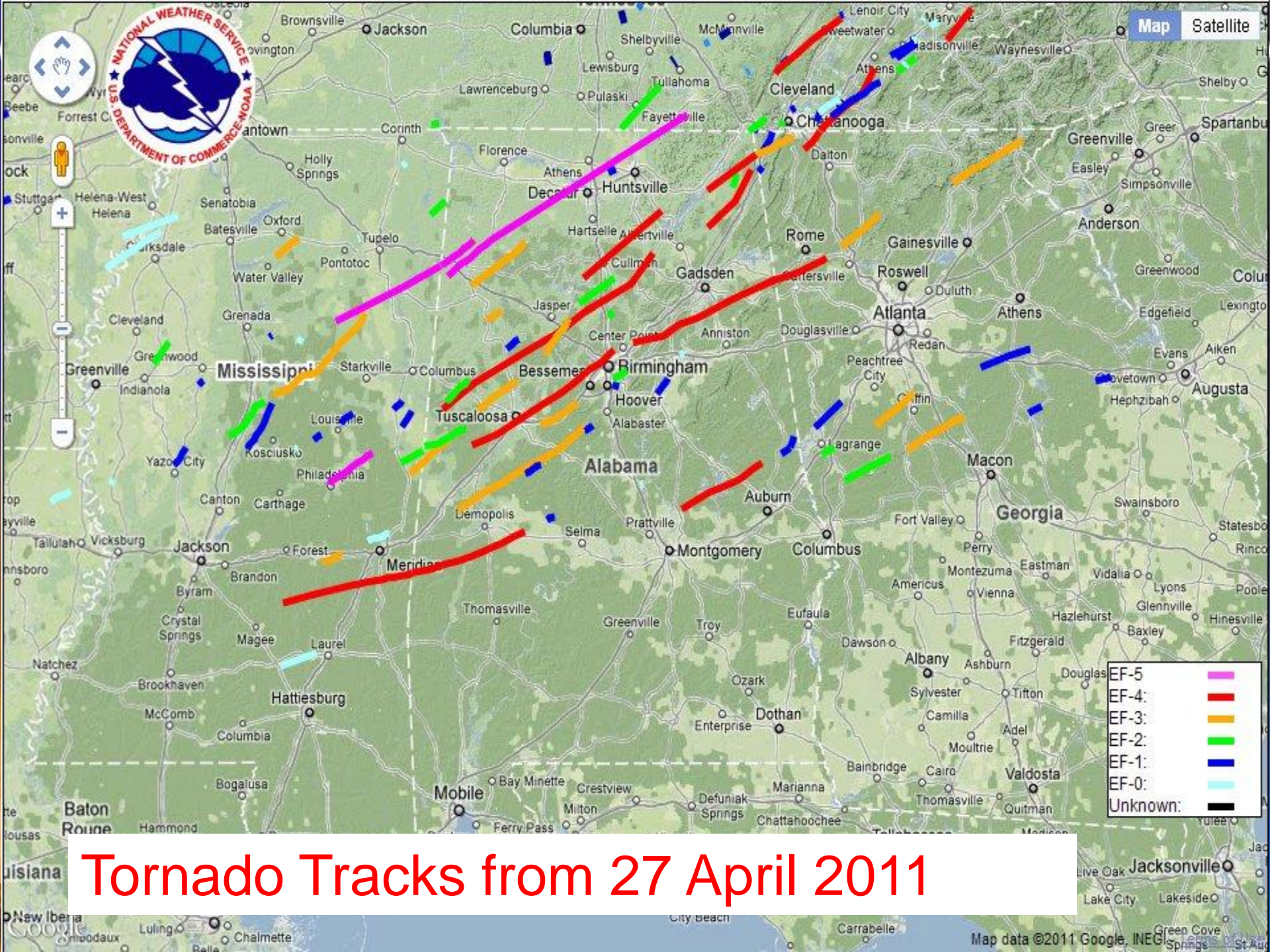
614 p.m.





Apr 28, 2011 8:59:36 am





SPC Storm Reports for 04/27/11

Map updated at 1211Z on 05/07/11

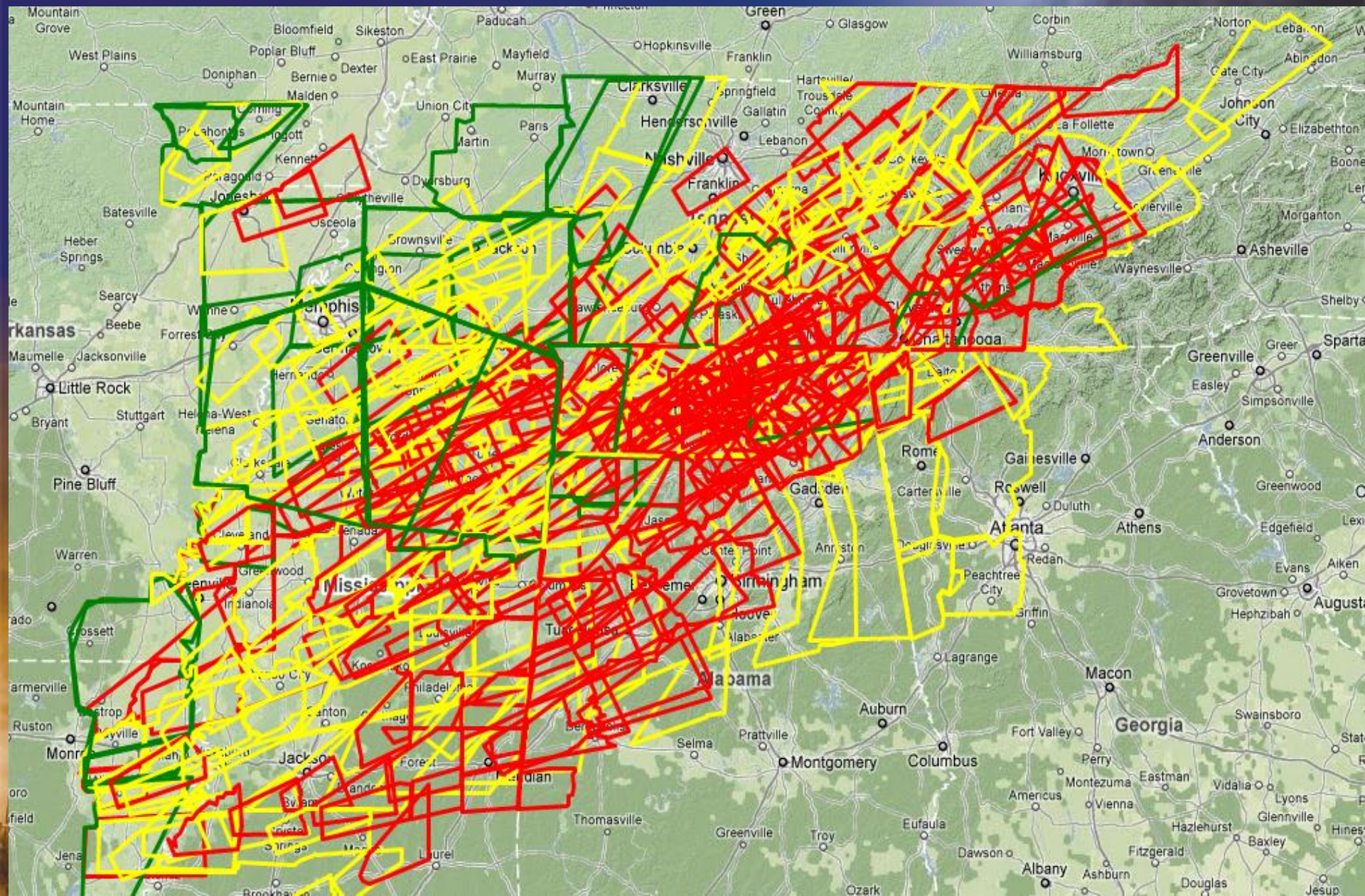
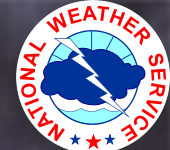


TORNADO REPORTS.. (292)
WIND REPORTS/HI..... (438/2)
HAIL REPORTS/LG..... (207/24)
TOTAL REPORTS..... (937)

National Weather Service
Storm Prediction Center Norman, Oklahoma

- High Wind Report (65KT +)
- ▲ Large Hail Report (2" dia. +)

PRELIMINARY DATA ONLY





2011 Tornado Statistics Alabama

30 Year Average (1981-2010)	37
April 2011	103*
Year to Date	115*
Previous Record	94 in 2008

There were more F4/EF4 Tornadoes in 2011 than through the entire period from 2000-2010.

This year now holds the record for the MOST F4/EF4 (9) and F5/EF5 Tornadoes (2) in a single year.



2011 Tornado Statistics Nationwide

Average per year	1200
April 2011 (record)	875
Year to Date	1445

There were more F4/EF4 Tornadoes in 2011 than through the entire period from 2000-2010.





Record Tornado Statistics Fatalities

- **Single Tornado:**

➤ <i>Joplin, MO</i>	<i>151</i>	<i>22 May</i>
<i>(deadliest on record)</i>		

- **Single Day:**

➤ <i>Alabama+</i>	<i>313</i>	<i>27 April</i>
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28 Damage Indicators

Table 3.

Damage Indicators for EF Scale

DI No.	Damage indicator (DI)
1	Small Barns or Farm Outbuildings (SBO)
2	One- or Two-Family Residences (FR12)
3	Manufactured Home – Single Wide (MHSW)
4	Manufactured Home – Double Wide (MHDW)
5	Apartments, Condos, Townhouses [3 stories or less] (ACT)
6	Motel (M)
7	Masonry Apartment or Motel Building (MAM)
8	Small Retail Building [Fast Food Restaurants] (SRB)
9	Small Professional Building [Doctor's Office, Branch Banks] (SPB)
10	Strip Mall (SM)
11	Large Shopping Mall (LSM)
12	Large, Isolated Retail Building [K-Mart, Wal-Mart] (LIRB)
13	Automobile Showroom (ASR)
14	Automobile Service Building (ASB)
15	Elementary School [Single Story; Interior or Exterior Hallways] (ES)
16	Junior or Senior High School (JHSH)
17	Low-Rise Building [1-4 Stories] (LRB)
18	Mid-Rise Building [5-20 Stories] (MRB)
19	High-Rise Building [More than 20 Stories] (HRB)
20	Institutional Building [Hospital, Government or University Building] (IB)
21	Metal Building System (MBS)
22	Service Station Canopy (SSC)
23	Warehouse Building [Tilt-up Walls or Heavy-Timber Construction](WHB)
24	Transmission Line Towers (TLT)
25	Free-Standing Towers (FST)
26	Free-Standing Light Poles, Luminary Poles, Flag Poles (FSP)
27	Trees: Hardwood (TH)
28	Trees: Softwood (TS)

Residences

Commercial/retail
structures

Schools

Professional
buildings

Metal
buildings/canopies

Towers/poles

Vegetation

Objectives: 3, EF-Scale structure



Degrees of Damage

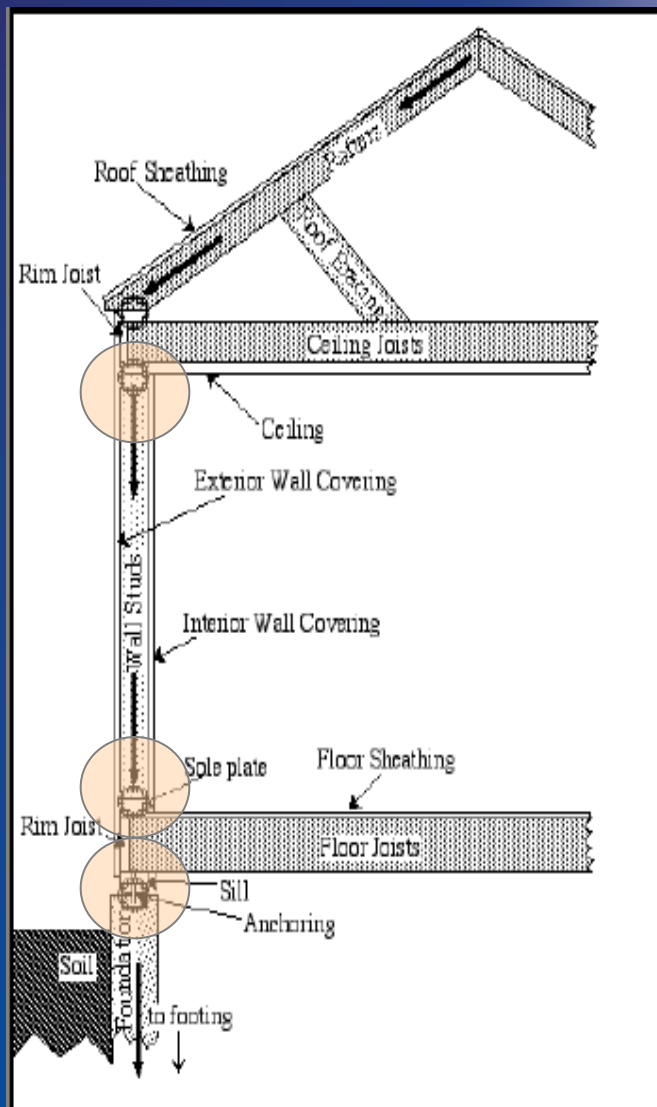
DOD	Damage Description	EXP	LB	UB
1	Threshold of visible damage	63	53	80
2	Loss of roof covering material (<20%), gutters and/or awning; loss of vinyl or metal siding	79	63	97
3	Broken glass in doors and windows	96	79	114
4	Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward or outward; failure of porch or carport	97	81	116
5	Entire house shifts off foundation	121	103	141
6	Large sections of roof structure removed; most walls remain standing	122	104	142
7	exterior walls collapsed	132	113	153
8	Most walls collapsed except small interior rooms.	152	127	178
9	All walls collapsed	170	142	198
10	Destruction of engineered and/or well constructed residence; slab swept clean	200	162	220

Example DODs for a Framed House



Construction Variations

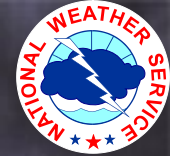
Failing



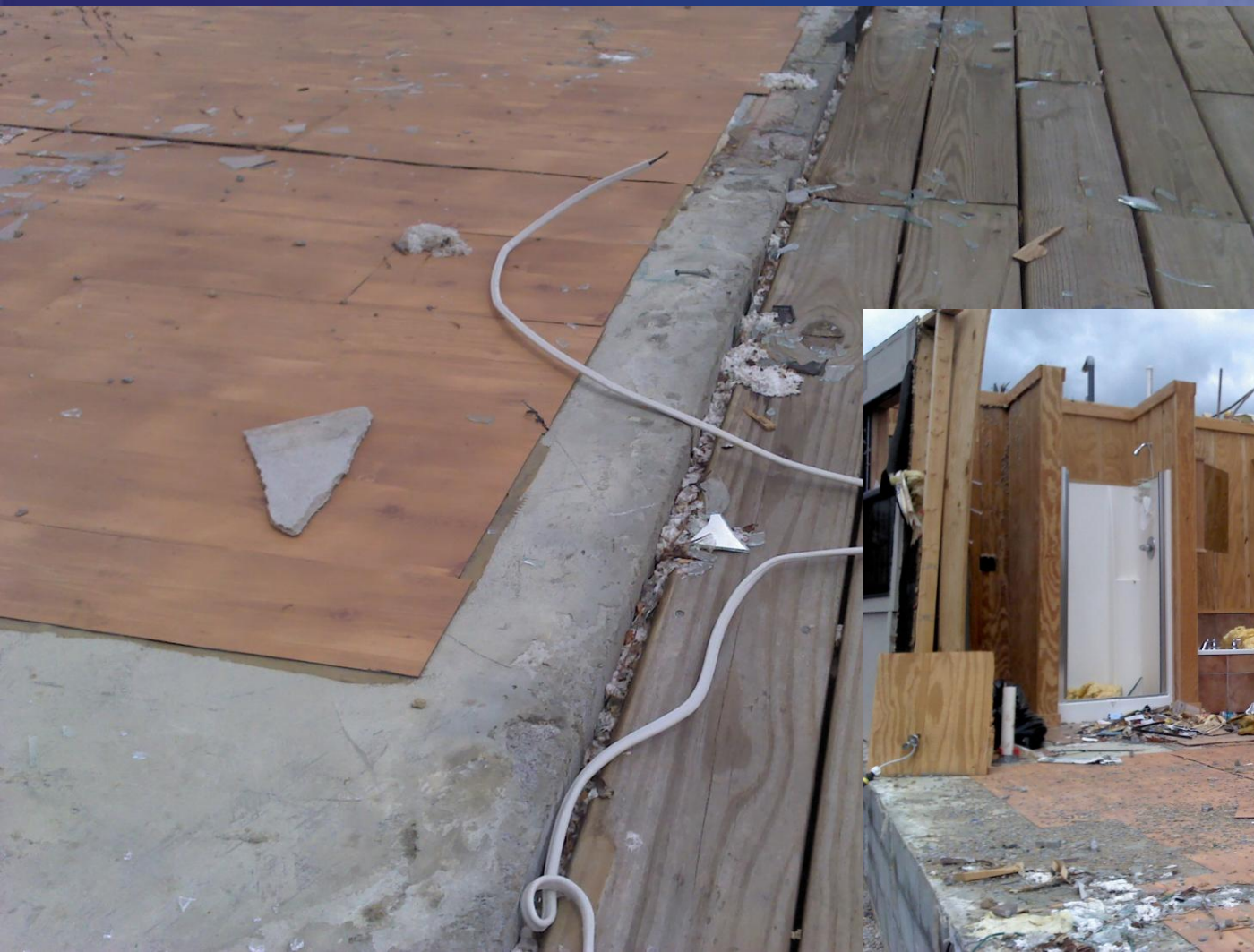
Exceeding



Photographs ©Tim Marshall



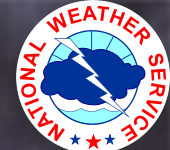
Note the Nails in Concrete





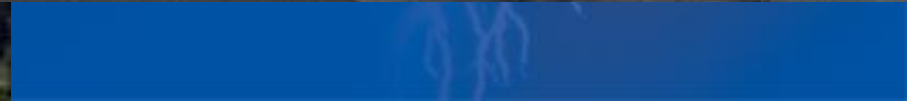
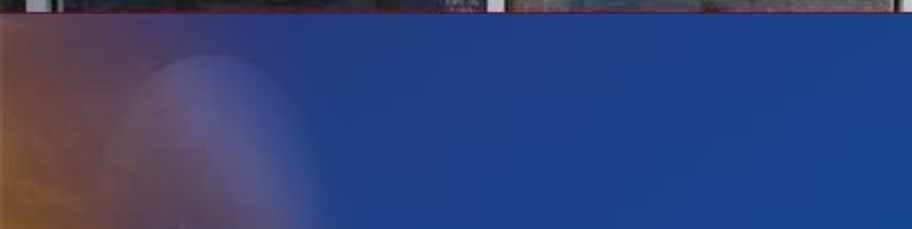
**FACT: ~16% of all residences in AL are
manufactured homes
EF-3 Damage:**







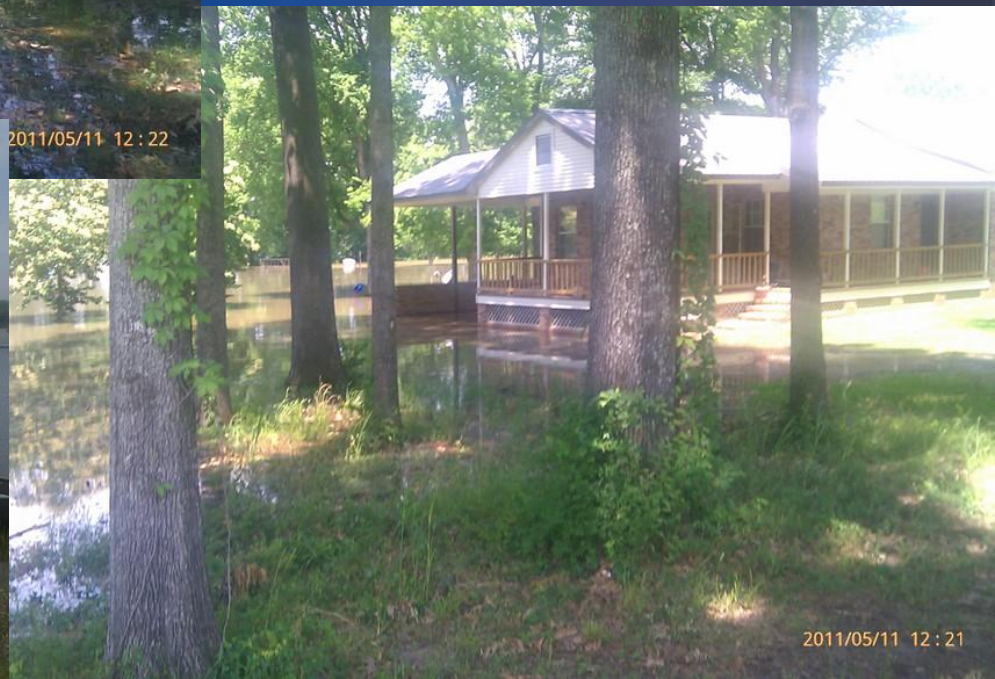
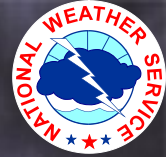
Dilemma for Schools



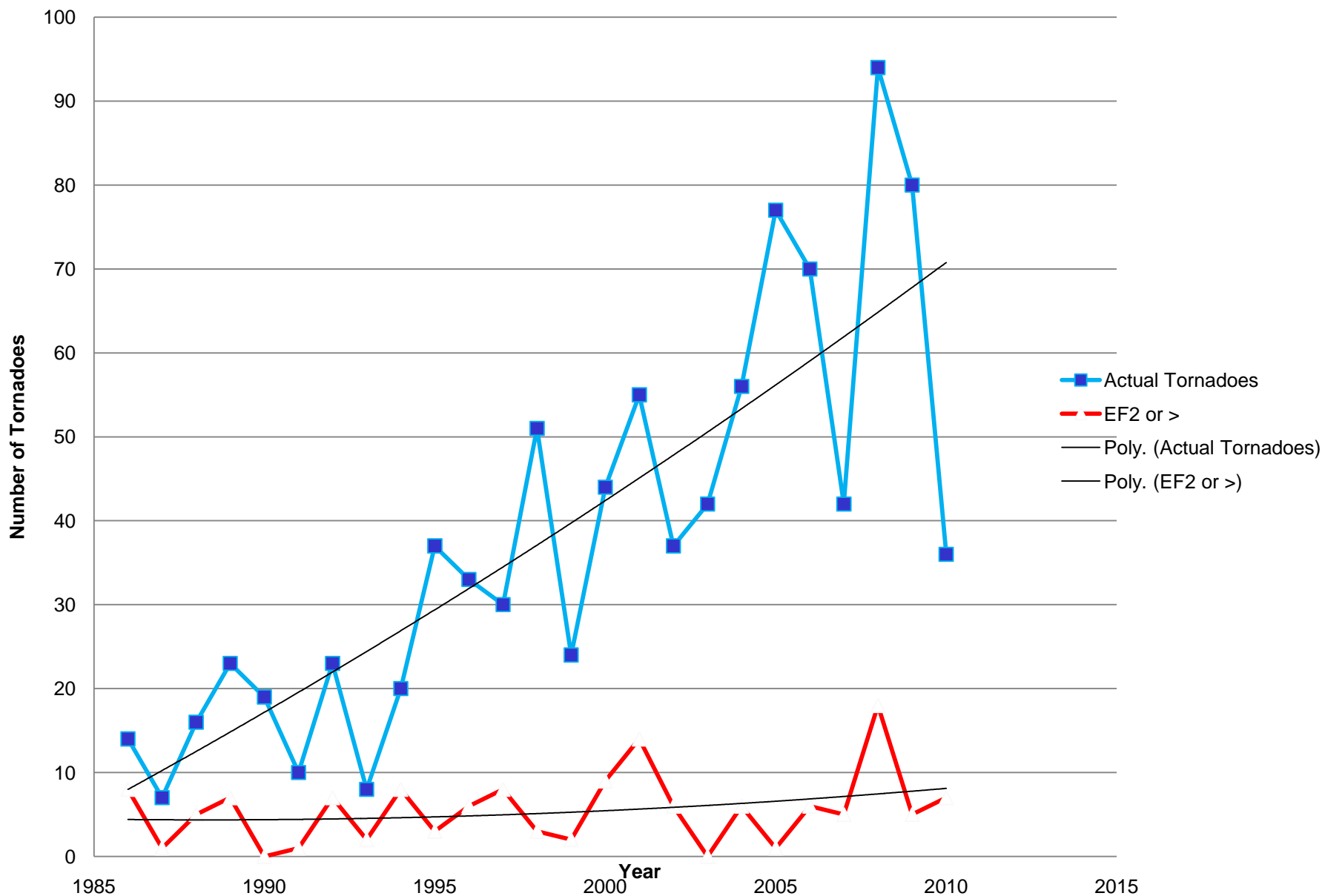


It's about Education

Example - 100 Year Flood



Number of Tornadoes in Alabama by Year





Summary

- ~84 % of all tornadoes EF0-1, ~15% are EF2-3
- Most tornadoes are survivable “if” there are proper shelters/actions taken
- This was a very rare, historic event, BUT...

IT'S NOT A QUESTION “IF” IT WILL HAPPEN AGAIN, IT’S “WHEN” AND “WHERE”

