
2023
SkyWarn
Storm Spotter
Training
BASIC CLASS

What is the

National Weather Service

National Weather Service

U.S. Government Agency tasked with the sole purpose of delivering weather forecasts and warnings to the United States and its territories for **the protection of life and property** and enhancement of the national economy.

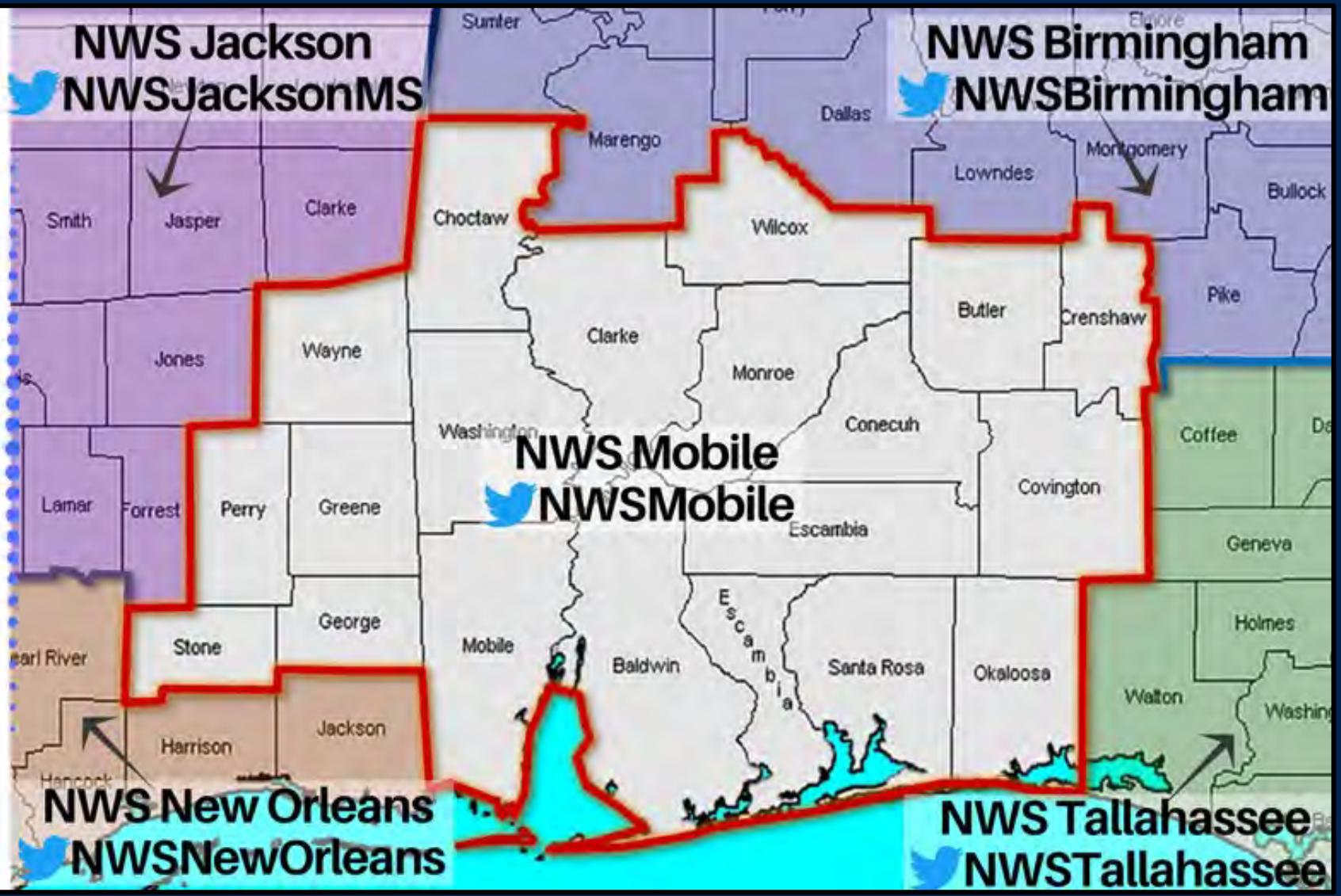
National Weather Service

National Weather Service

REGIONAL MAP

NWS

COUNTY WARNING AREAS & OFFICIAL TWITTER ACCOUNTS



National Weather Service

National Weather Service

National Weather Service

MANAGERS: 1 Meteorologist-In-Charge, 1 Warning Coordination Meteorologist, and 1 Science and Operations Officer

FORECASTERS: 5 Senior Meteorologists and 8 General Meteorologists

TECHNICIANS & OTHER STAFF: 1 Observation Program Leader, 1 Information Technology Officer, 1 Electronic System Analyst, 2 Electronic Technicians, and 1 Administrative Assistant

National Weather Service

Our Primary Mission: **Warn Public of Hazardous Weather**

Provide **WARNINGS** for hazardous weather conditions

Tornadoes, severe thunderstorms, hurricanes, flooding, extreme heat and cold

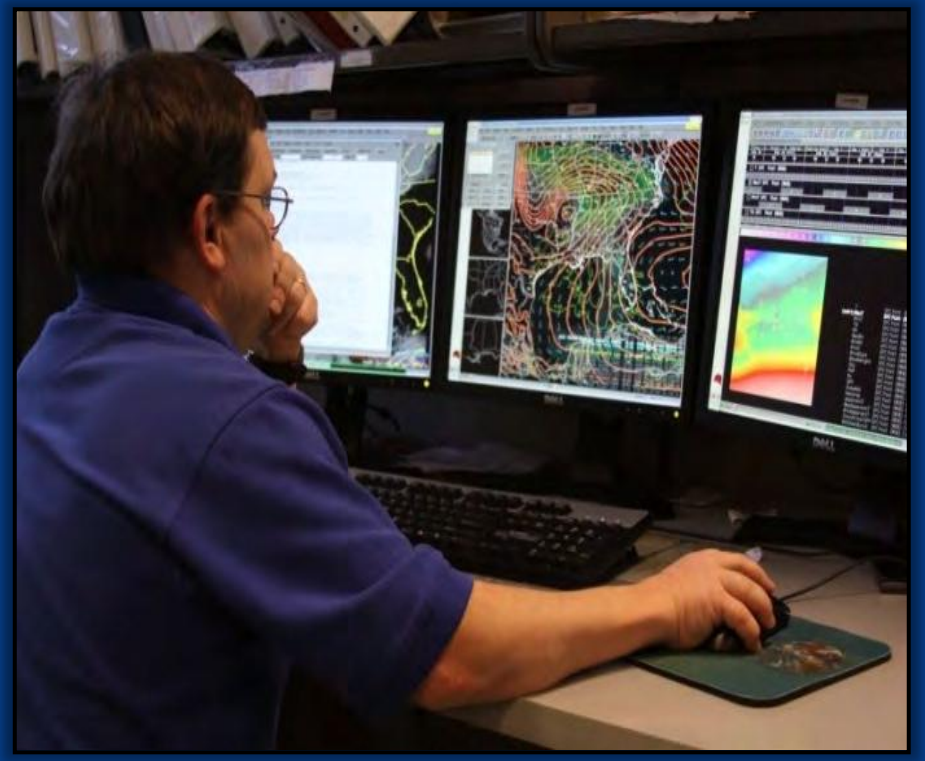
Provide weather **FORECASTS**

General 7-day forecast

Rain chance, wind, sky cover, temperature, etc.

Specialized forecasts

Fire Weather, Marine, Aviation



The Warning Process and Awareness Tools

Warning Partnership

Ways of Getting Weather Info

IMPORTANT: You need MULTIPLE WAYS of getting the warning (including while you sleep!!)

- Weather Radio
- Television
- Websites
- Cellphone Alerts
- Social Media

National Weather Service

Ways of Getting Weather Info

NOAA Weather Radio

Radio receives National Weather Service warnings, watches, forecasts and hazardous information 24 hours a day

NOAA Weather Radio Attachments

- Strobe Lights
- Bed Shakers
- Pillow Vibrators

Ways of Getting Weather Info

WIRELESS EMERGENCY ALERTS – Newer phones will alert you of warnings in your area with a unique ring tone and vibration

Carriers alert by GPS location or county

You are **NOT** charged for text-like alerts

Warning Type	WEA Message
Tsunami Warning	Tsunami danger on the coast. Go to high ground or move inland. Listen to local news. –NWS
Tornado Warning	Tornado Warning in this area til hh:mm tzT. Take shelter now. Check local media. –NWS
Extreme Wind Warning	Extreme Wind Warning this area til hh:mm tzT ddd. Take shelter. –NWS
Hurricane Warning	Hurricane Warning this area. Check local media and authorities. –NWS
Typhoon Warning	Typhoon Warning this area til hh:mm tzT ddd. Check local media and authorities. –NWS
Flash Flood Warning	Flash Flood Warning this area til hh:mm tzT. Avoid flooded areas. Check local media. –NWS
Dust Storm Warning	Dust Storm Warning in this area til hh:mm tzT ddd. Avoid travel. Check local media. –NWS

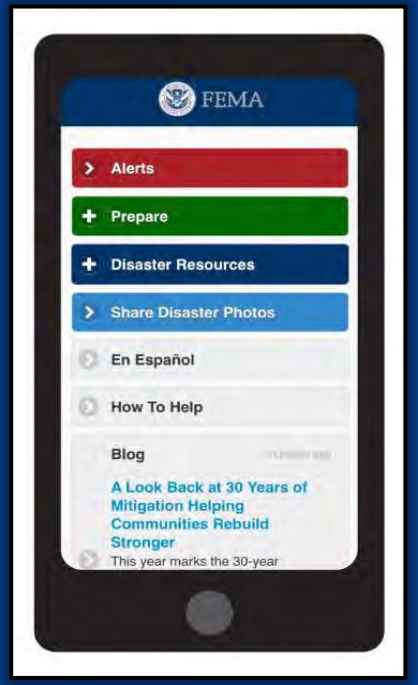
Extreme Alert
Severe Alert

Ways of Getting Weather Info

SMARTPHONE APPS

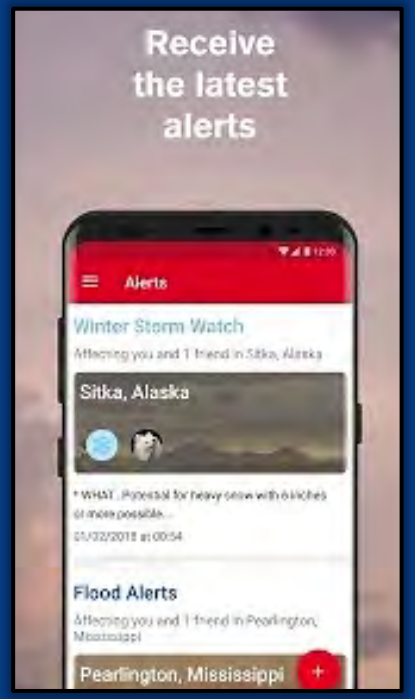
FEMA

- NWS alerts for up to 5 locations
- Weather safety tips
- Locate disaster resource centers



Red Cross

- NWS weather alerts
- Toolkit with a flashlight and strobe light
- Map with open Red Cross shelters
- Step-by-step directions on how to make a emergency plan

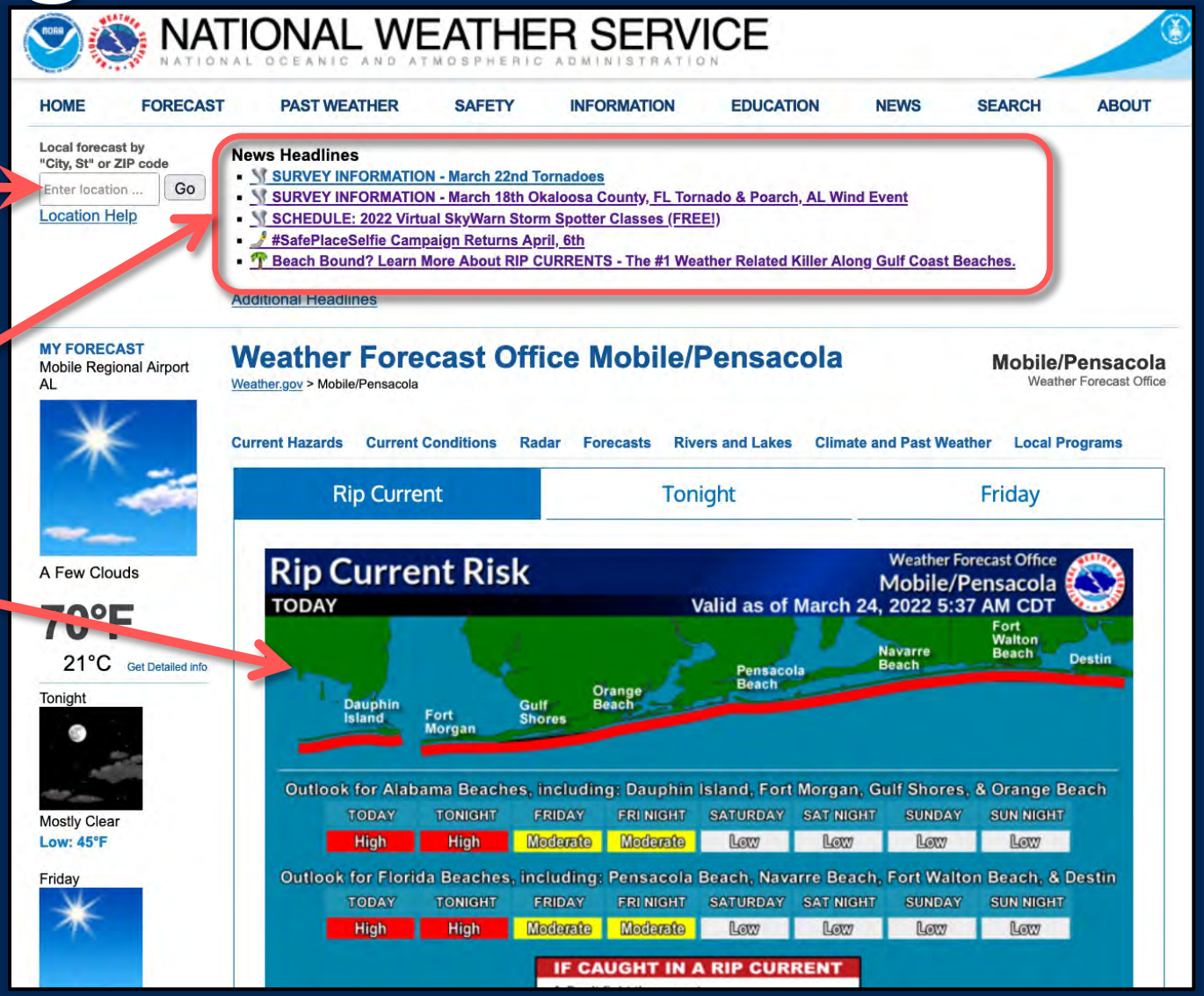


Ways of Getting Weather Info

weather.gov/mob

Enter Your Zip Code for Forecast

Latest Headlines and Severe Weather Updates



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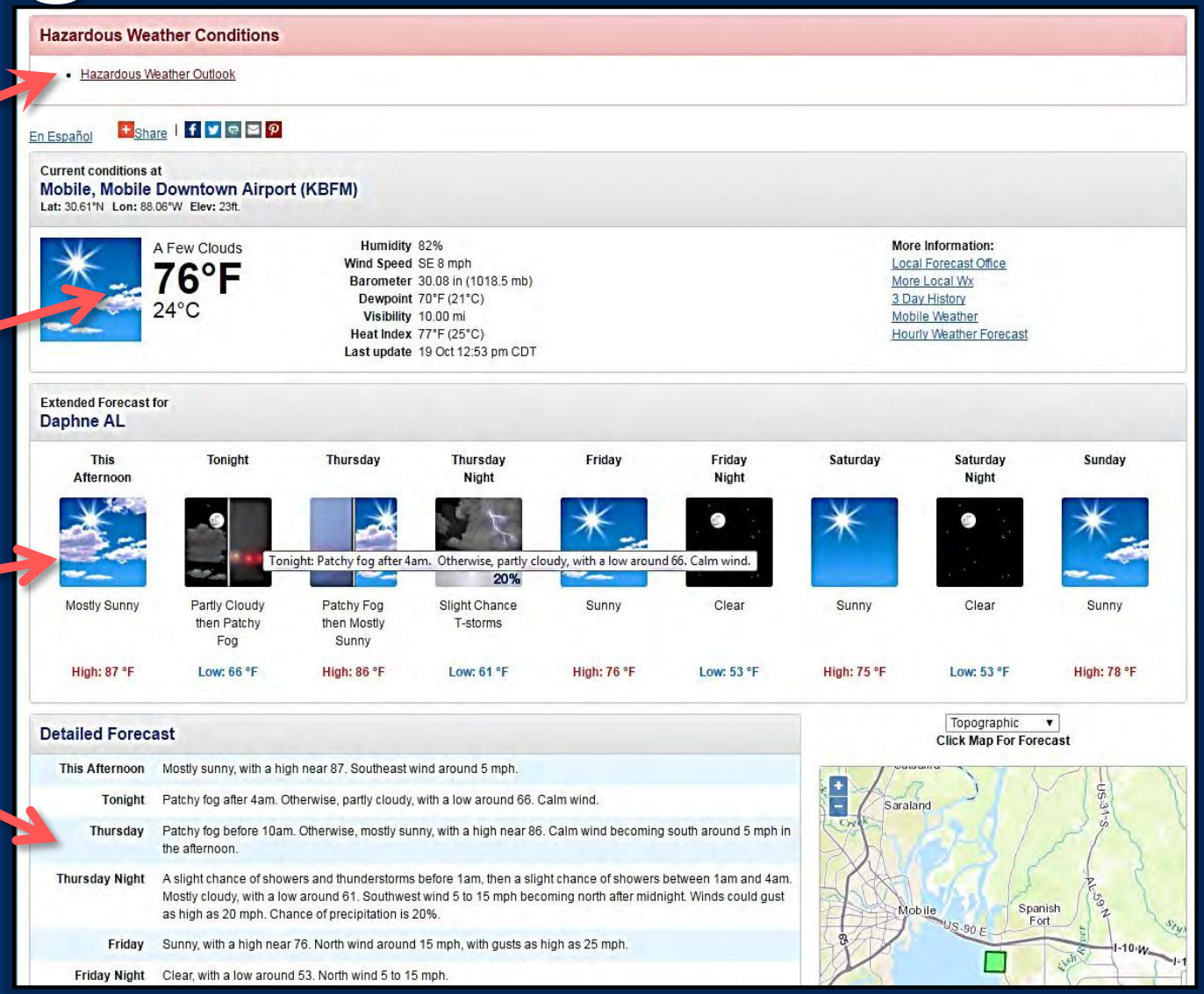
Ways of Getting Weather Info

weather.gov/mob

Hazardous Weather Information

Current Weather

7-Day Forecast



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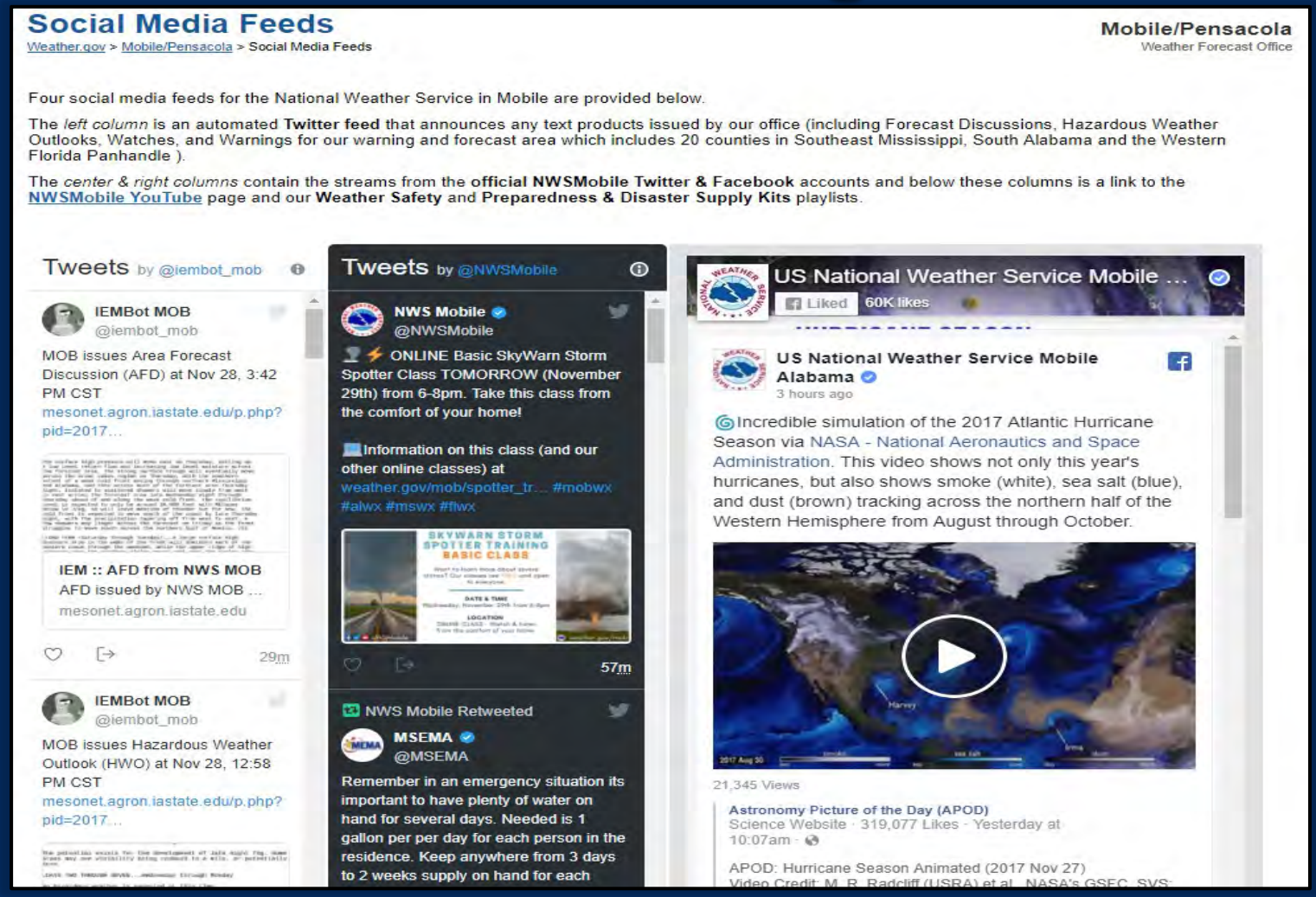
Ways of Getting Weather Info

weather.gov/mob/social



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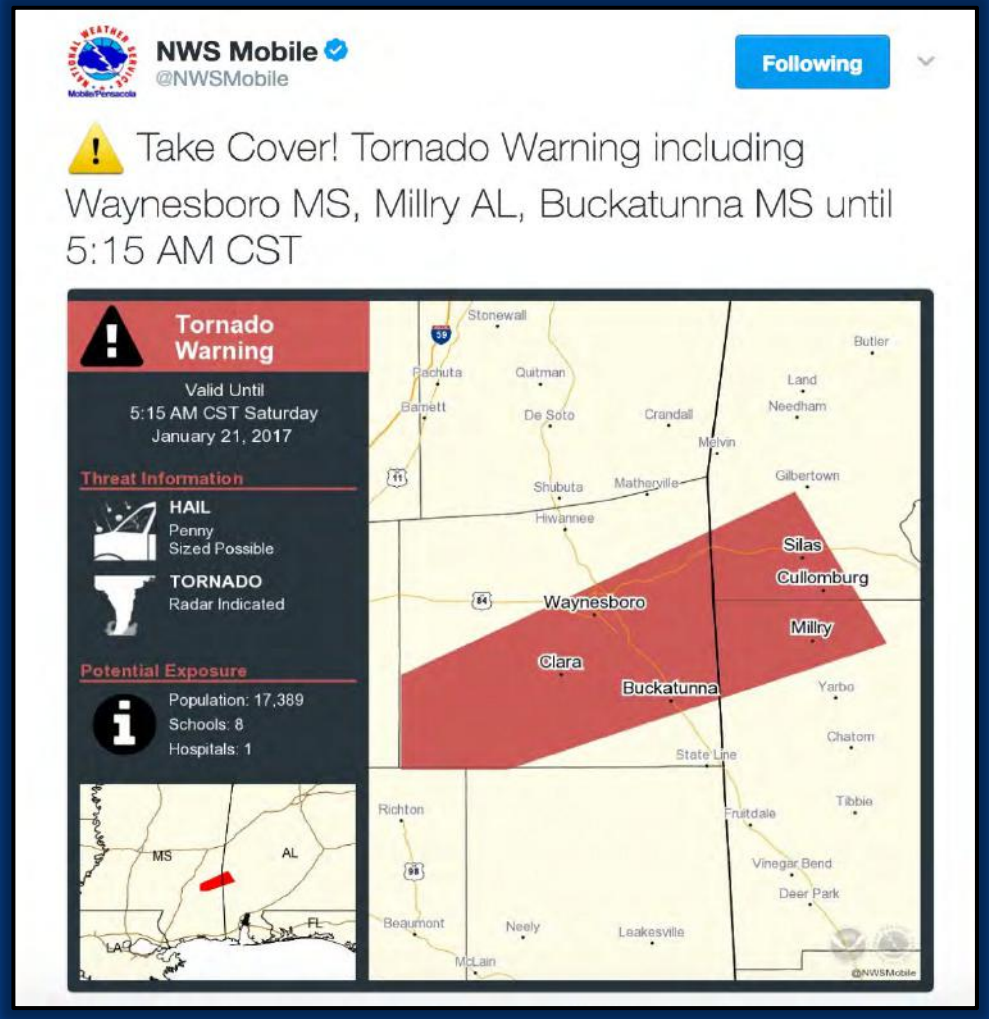
Ways of Getting Weather Info

@NWSMobile



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Ways of Getting Weather Info

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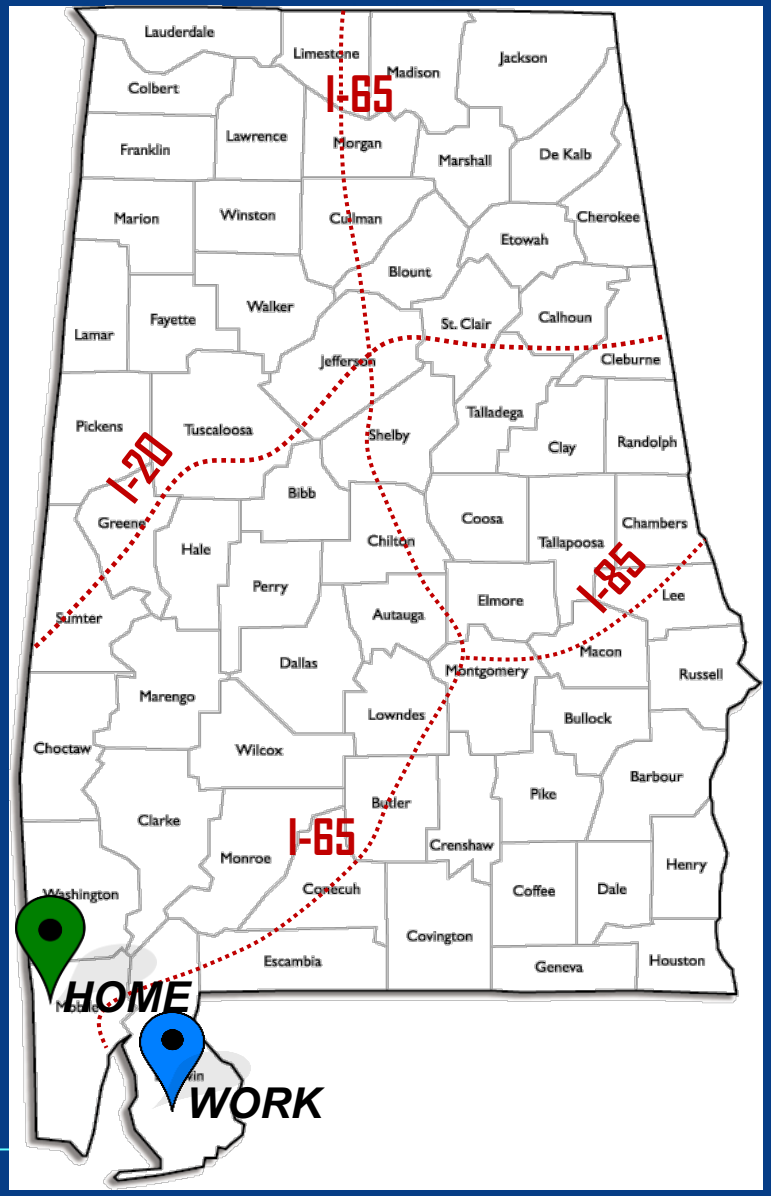
Severe Weather
and
Watches/Warnings

Know Your Location On A Map!

Your severe weather plan is NOT complete if you do not know WHERE you are on a map

Learn the location of your home and work AND surrounding counties, communities, and landmarks



Knowing your location can SAVE YOUR LIFE!

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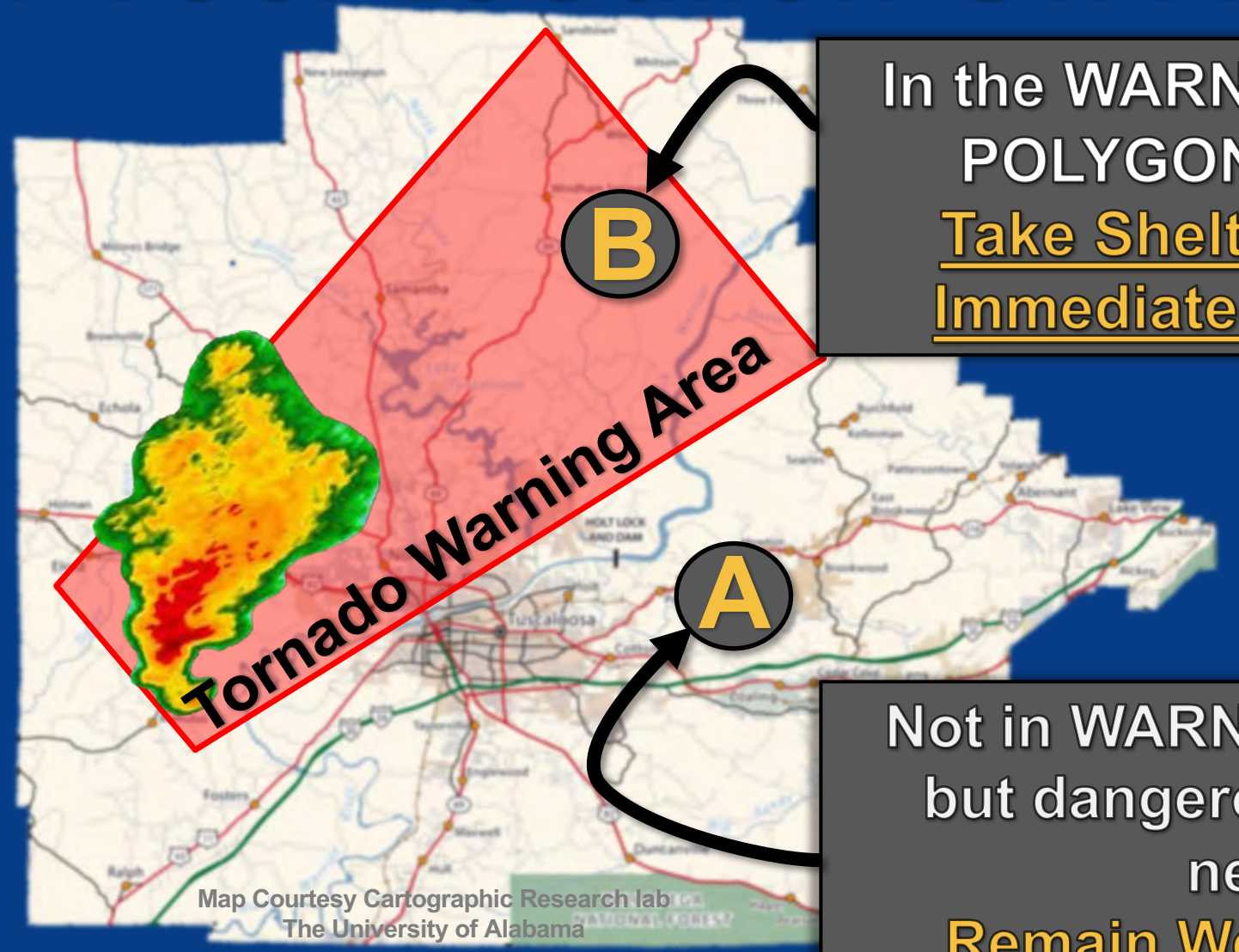
Know Your Location On A Map!



In the WARNING POLYGON!
Take Shelter Immediately!

Not in WARNING POLYGON, but dangerous weather is nearby
Remain Weather Aware!

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Severe Weather Timeline

From the Forecast To Warnings

Leading Up To The Event...

Weather forecasts (outlooks) raise your awareness for potential of severe storms in the next few days

Check For Updated Forecasts!!

Day Of The Event

WATCH

Conditions favorable for severe storms

WARNING

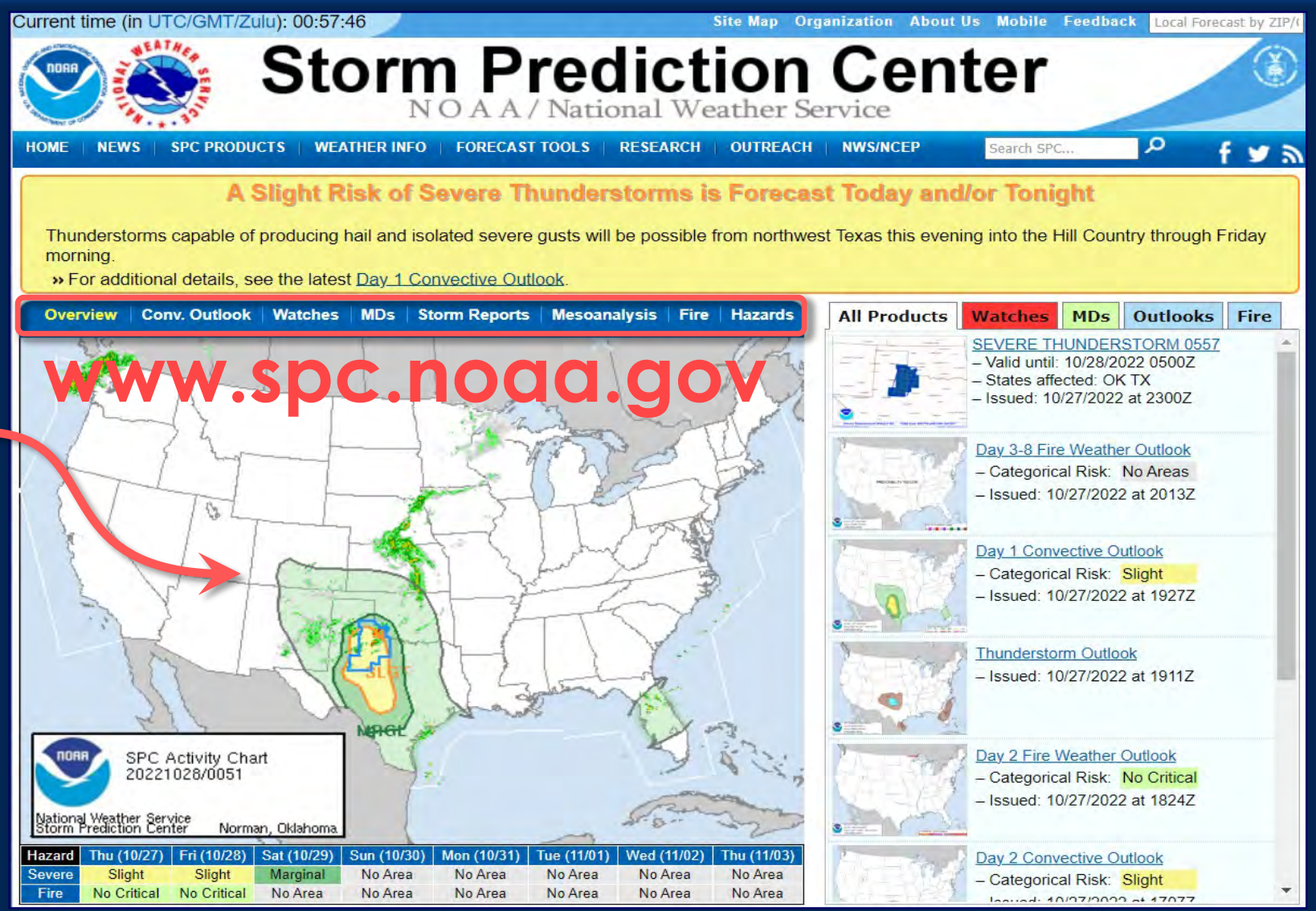
Severe thunderstorms are occurring or will very soon

National Weather Service

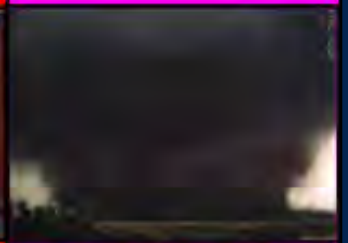
Severe Weather Outlook

NWS Storm Prediction Center

Convective Outlooks



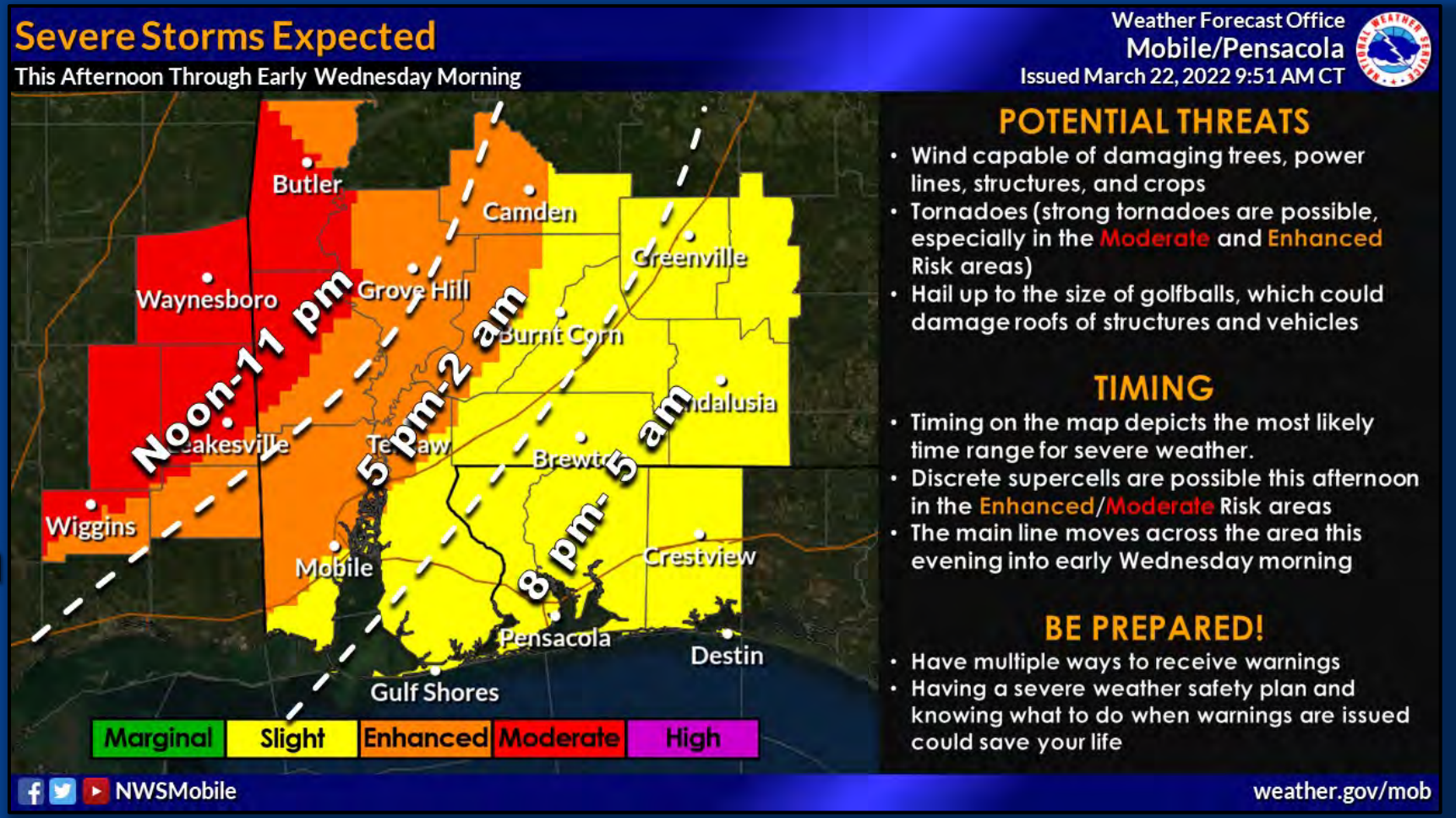
Severe Weather Outlook

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
					
• *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.

Severe Weather Outlook

Local severe graphics contain the what, when, and where details of the upcoming event along with preparedness reminders



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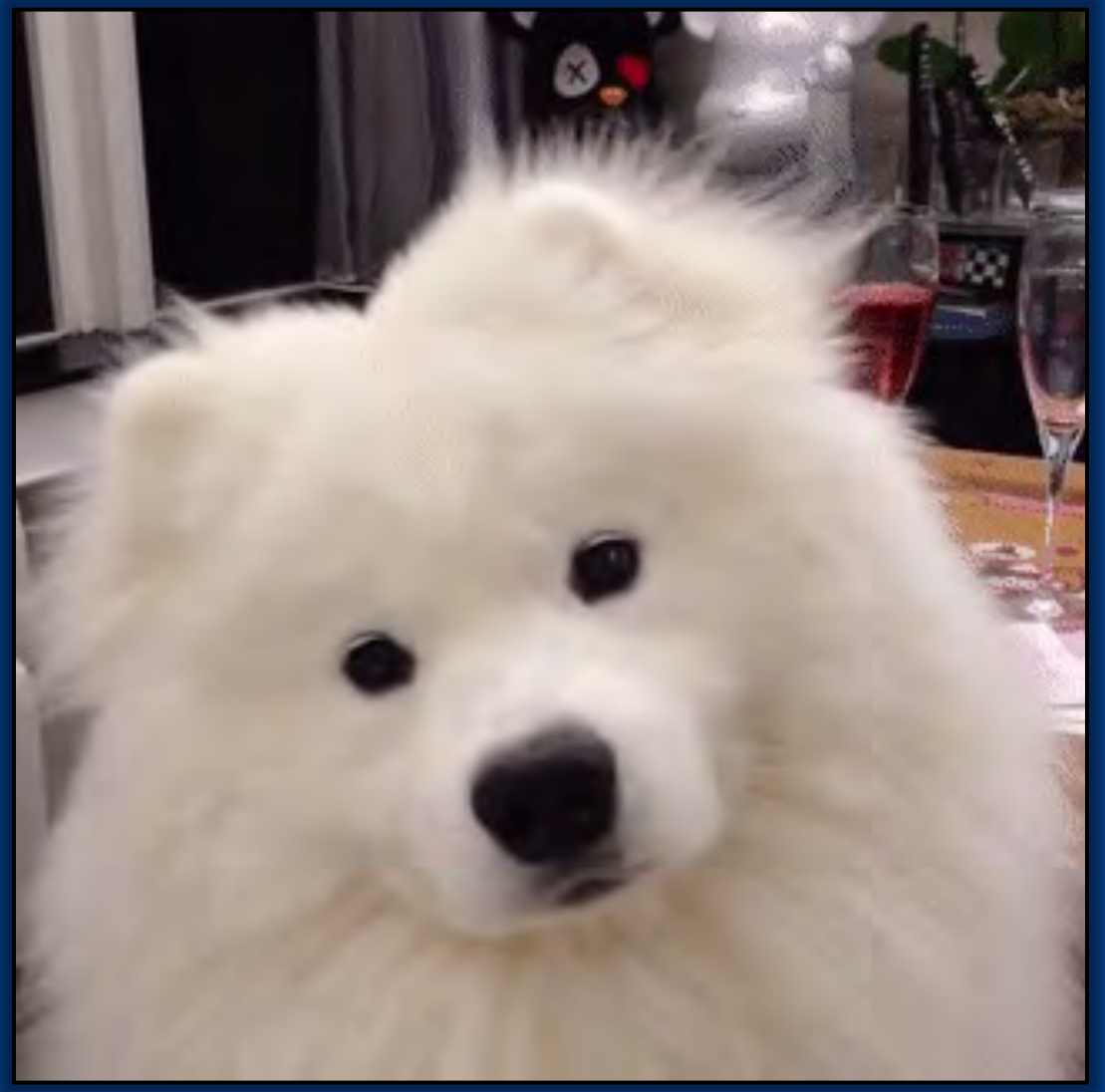
Watch or Warning

IMPORTANT – Everyone needs to know the difference between a WATCH and WARNING

That way you know the proper actions to take!!

We do not want you to hear the terms “WATCH” or “WARNING” and not know what to make of it…



Watch or Warning

WATCH

Conditions FAVORABLE for development of severe weather

Issued up to 6 hours in advance of severe storms

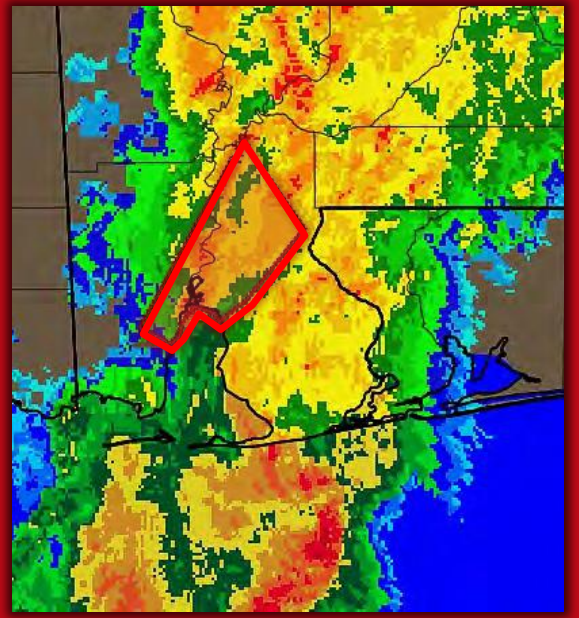
Two Word Definition:

BE ALERT

WARNING

Severe weather formed, observed or detected by radar

Issued a few minutes to an hour in advance of severe storms



Two Word Definition:

TAKE ACTION

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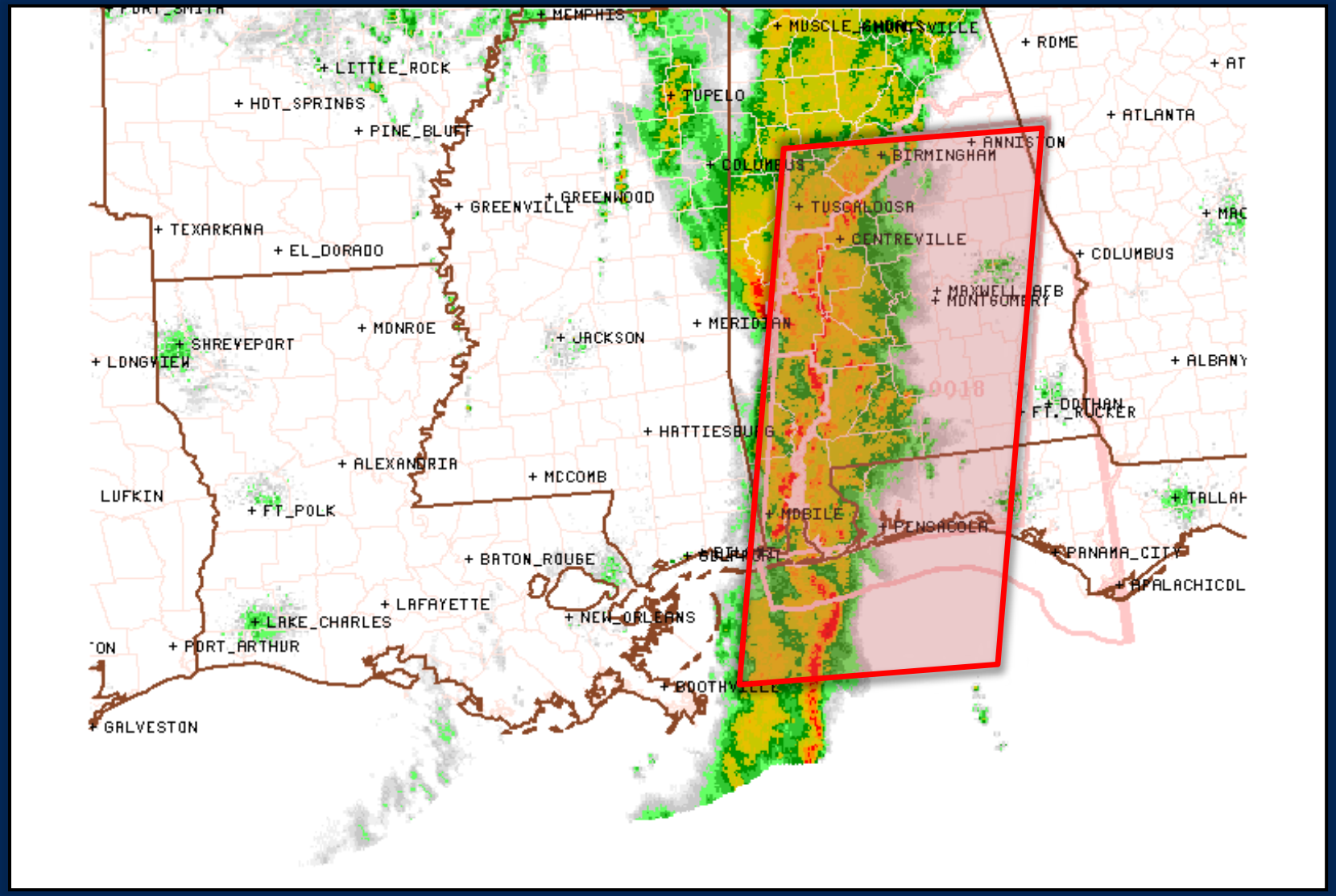
Watch or Warning

WATCH

A watch covers a large area that can span numerous counties and multiple states



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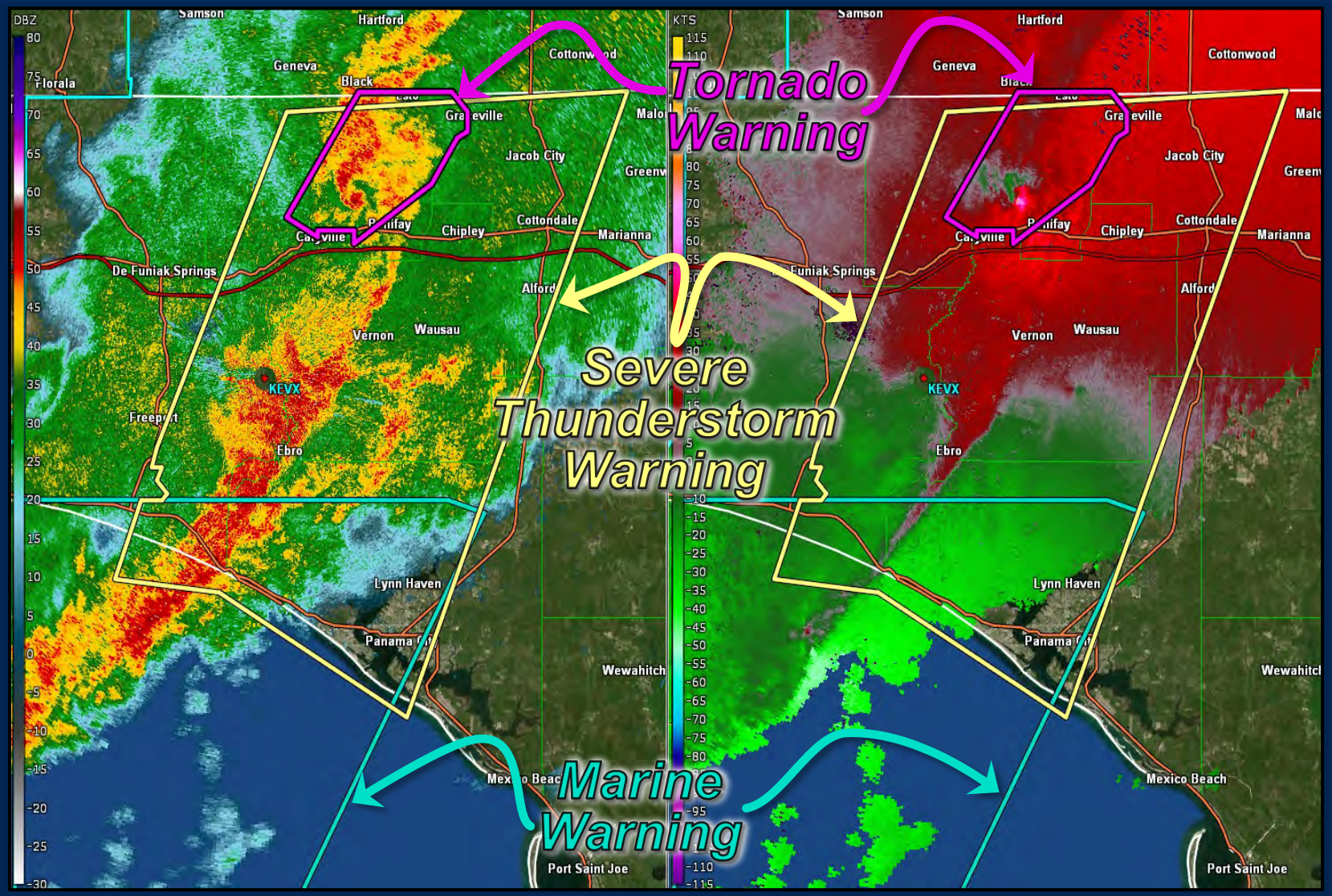
Watch or Warning

WARNING

A warning covers a much smaller area

This example shows a small Tornado Warning inside a Severe Thunderstorm Warning

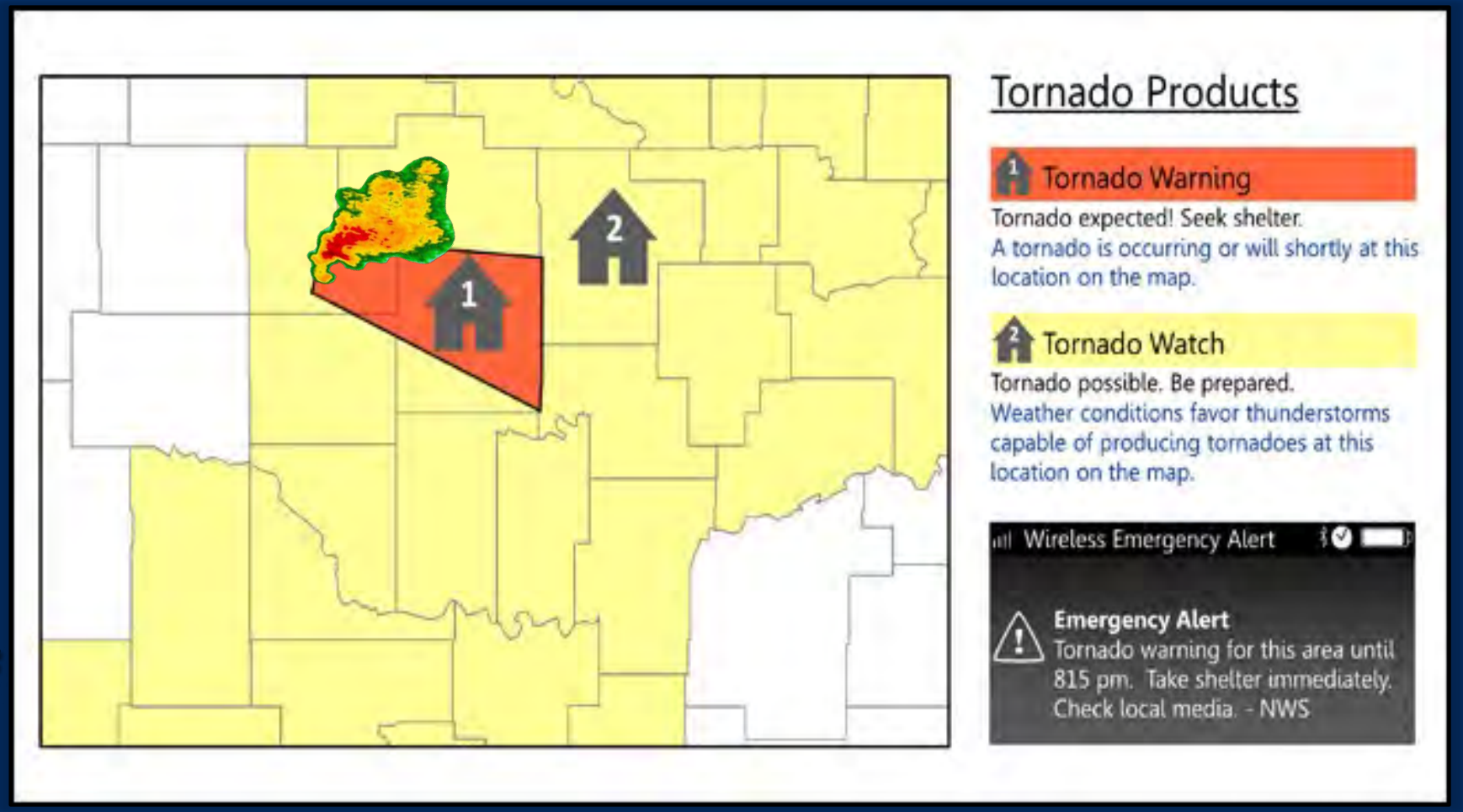


National Weather Service

Watch or Warning

This graphic shows how a Watch and Warning look together

Now let's take a look at the different levels of Warnings…



Severe Thunderstorm & Tornado Warnings

SEVERE THUNDERSTORM WARNINGS

issued when a thunderstorm is expected to produce

- Wind gusts of 58+ mph
- Hail 1+ inch (size of a quarter)

Lightning and heavy rain are NOT criteria for Severe Thunderstorm Warnings

TORNADO WARNINGS

issued when

- Radar detects a potential tornado
- Confirmation of a tornado from SkyWarn Spotters
- Debris is detected on radar

Impact Based Warnings

Our warnings now use social science approved wording to communicate the **SERIOUSNESS** of the hazard

Impact based warnings differentiate between 1. the common severe weather events and 2. the less frequent events that pose a higher threat

In the past, each of these hazards got the same type of warning:

Softball size hail and quarter size hail

90 mph winds and 60 mph winds

Strong to violent tornadoes and weak tornadoes

Severe Thunderstorm Warning

This is what a typical Severe Thunderstorm Warning looks like…

Warnings have a simple format:

Hazard
Source
Impact

Each warning contains tags at the bottom for easy recognition

```
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE MOBILE AL
629 PM CDT FRI APR 15 2011

THE NATIONAL WEATHER SERVICE IN MOBILE HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
  SOUTHEASTERN WILCOX COUNTY IN SOUTH CENTRAL ALABAMA...

* UNTIL 730 PM CDT

* AT 607 PM CDT...A SEVERE THUNDERSTORM WAS LOCATED NEAR CALEDONIA...
  AND MOVING NORTHEAST AT 35 MPH.

  HAZARD...70 MPH WIND GUSTS AND HALF DOLLAR SIZE HAIL.

  SOURCE...RADAR INDICATED.

  IMPACT...HAIL DAMAGE TO VEHICLES IS EXPECTED. EXPECT CONSIDERABLE
           TREE DAMAGE. WIND DAMAGE IS ALSO LIKELY TO MOBILE HOMES...
           ROOFS AND OUTBUILDINGS.

* LOCATIONS IMPACTED INCLUDE...
  MAINLY RURAL AREAS OF EXTREME EASTERN WILCOX COUNTY.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

PREPARE IMMEDIATELY FOR LARGE HAIL AND DAMAGING WINDS. PEOPLE OUTSIDE
SHOULD MOVE TO A SHELTER...INSIDE A STRONG BUILDING AND AWAY FROM
WINDOWS.

&&

LAT...LON 3205 8685 3196 8685 3196 8691 3184 8691
      3183 8692 3183 8703 3195 8721 3205 8711
      3205 8686
TIME...MOT...LOC 2329Z 231DEG 33KT 3206 8691

HAIL...1.25IN
WIND...70MPH
```

Severe Thunderstorm Warning

Particularly Dangerous Situation

This is what a **PDS Severe Thunderstorm Warning** looks like…

These higher-end Severe Thunderstorm Warnings typically have 80+ mph winds and/or baseball size hail (or larger)

Optional Tag: ***Tornado…Possible***
We use this tag if we believe a tornado may develop, but our confidence is too low to issue a Tornado Warning

```
THE NATIONAL WEATHER SERVICE IN MOBILE HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
  SOUTHEASTERN WILCOX COUNTY IN SOUTH CENTRAL ALABAMA...

* UNTIL 730 PM CDT

* AT 607 PM CDT...A SEVERE THUNDERSTORM WAS LOCATED NEAR CALEDONIA...
  AND MOVING NORTHEAST AT 35 MPH.

  THIS IS A VERY DANGEROUS STORM.

  HAZARD...80 MPH WIND GUSTS AND BASEBALL SIZE HAIL.

  SOURCE...RADAR INDICATED.

  IMPACT...FLYING DEBRIS WILL BE DANGEROUS TO THOSE CAUGHT WITHOUT
           SHELTER. MOBILE HOMES WILL BE HEAVILY DAMAGED. EXPECT
           CONSIDERABLE DAMAGE TO ROOFS...WINDOWS AND VEHICLES.
           EXTENSIVE TREE DAMAGE AND POWER OUTAGES ARE LIKELY.

* LOCATIONS IMPACTED INCLUDE...

  MAINLY RURAL AREAS OF SOUTHEASTERN WILCOX COUNTY.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

REMAIN ALERT FOR A POSSIBLE TORNADO! TORNADOES CAN DEVELOP QUICKLY
FROM SEVERE THUNDERSTORMS. IF YOU SPOT A TORNADO GO AT ONCE INTO THE
BASEMENT OR SMALL CENTRAL ROOM IN A STURDY STRUCTURE.

THIS IS AN EXTREMELY DANGEROUS SITUATION WITH TORNADO LIKE WIND
SPEEDS EXPECTED. MOBILE HOMES AND HIGH PROFILE VEHICLES ARE
ESPECIALLY SUSCEPTIBLE TO WINDS OF THIS MAGNITUDE AND MAY BE
OVERTURNED. FOR YOUR PROTECTION MOVE TO AN INTERIOR ROOM ON THE
LOWEST FLOOR OF A BUILDING. THIS STORM HAS THE POTENTIAL TO CAUSE
SERIOUS INJURY AND SIGNIFICANT PROPERTY DAMAGE.

&&

LAT...LON 3205 8685 3196 8685 3196 8691 3184 8691
      3183 8692 3183 8703 3195 8721 3205 8711
      3205 8686
TIME...MOT...LOC 2331Z 231DEG 33KT 3207 8689

TORNADO...POSSIBLE
HAIL...2.75IN
WIND...80MPH
```

Tornado Warning

This is what a typical Tornado Warning looks like…

Source states that the Tornado Warning is *Radar Indicated*

If the tornado is confirmed by a SkyWarn spotter, emergency manager, radar, etc. then the tag changes to *Tornado…Observed*

```
TORNADO WARNING
NATIONAL WEATHER SERVICE MOBILE AL
614 PM CDT FRI APR 15 2011

THE NATIONAL WEATHER SERVICE IN MOBILE HAS ISSUED A

* TORNADO WARNING FOR...
  CENTRAL CHOCTAW COUNTY IN SOUTHWEST ALABAMA...
  NORTHWESTERN CLARKE COUNTY IN SOUTHWEST ALABAMA...

* UNTIL 700 PM CDT

* AT 607 PM CDT...A SEVERE THUNDERSTORM CAPABLE OF PRODUCING A
  TORNADO WAS LOCATED NEAR LAND...AND MOVING EAST AT 45 MPH.

  HAZARD...TORNADO AND QUARTER SIZE HAIL.

  SOURCE...RADAR INDICATED ROTATION.

  IMPACT...FLYING DEBRIS WILL BE DANGEROUS TO THOSE CAUGHT WITHOUT
           SHELTER. MOBILE HOMES WILL BE DAMAGED OR DESTROYED. DAMAGE
           TO ROOFS...WINDOWS AND VEHICLES WILL OCCUR. TREE DAMAGE IS
           LIKELY.

* THIS DANGEROUS STORM WILL BE NEAR...
  BUTLER AROUND 620 PM CDT.
  MT STERLING AND ARARAT AROUND 625 PM CDT.
  MORVIN AROUND 635 PM CDT.
  BASHI AROUND 645 PM CDT.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

TAKE COVER NOW. MOVE TO AN INTERIOR ROOM ON THE LOWEST FLOOR OF A
STURDY BUILDING. AVOID WINDOWS. IF IN A MOBILE HOME...A VEHICLE OR
OUTDOORS...MOVE TO THE CLOSEST SUBSTANTIAL SHELTER AND PROTECT
YOURSELF FROM FLYING DEBRIS.

&&

LAT...LON 3214 8804 3208 8804 3206 8806 3207 8810
      3205 8811 3200 8810 3201 8809 3199 8807
      3200 8767 3188 8766 3192 8847 3211 8845
      3215 8802
TIME...MOT...LOC 2314Z 266DEG 40KT 3202 8829

TORNADO...RADAR INDICATED
HAIL...1.00IN
```

Tornado Warning
Considerable Threat

This is what a higher-end **Tornado Warning** looks like…

The **Considerable Tag** is included when there is credible evidence that a **STRONG Tornado (EF2+)**, capable of producing considerable damage, is imminent or ongoing

The warning states that this is a ***Particularly Dangerous Situation***

```
THE NATIONAL WEATHER SERVICE IN MOBILE HAS ISSUED A

* TORNADO WARNING FOR...
  CENTRAL CHOCTAW COUNTY IN SOUTHWEST ALABAMA...
  NORTHWESTERN CLARKE COUNTY IN SOUTHWEST ALABAMA...

* UNTIL 700 PM CDT

* AT 607 PM CDT...A CONFIRMED LARGE AND EXTREMELY DANGEROUS TORNADO
  WAS LOCATED NEAR LAND...AND MOVING EAST AT 50 MPH.

  THIS IS A PARTICULARLY DANGEROUS SITUATION.

  HAZARD...DAMAGING TORNADO.

  SOURCE...RADAR CONFIRMED TORNADO.

  IMPACT...YOU ARE IN A LIFE THREATENING SITUATION. FLYING DEBRIS
           WILL BE DEADLY TO THOSE CAUGHT WITHOUT SHELTER. MOBILE
           HOMES WILL BE DESTROYED. CONSIDERABLE DAMAGE TO HOMES...
           BUSINESSES AND VEHICLES IS LIKELY AND COMPLETE DESTRUCTION
           POSSIBLE.

* THE TORNADO WILL BE NEAR...
  LAVACA AROUND 630 PM CDT.
  MORVIN AROUND 635 PM CDT.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

TO REPEAT...A LARGE...EXTREMELY DANGEROUS AND POTENTIALLY DEADLY
TORNADO IS ON THE GROUND. TO PROTECT YOUR LIFE...TAKE COVER NOW. MOVE
TO AN INTERIOR ROOM ON THE LOWEST FLOOR OF A STURDY BUILDING. AVOID
WINDOWS. IF IN A MOBILE HOME...A VEHICLE OR OUTDOORS...MOVE TO THE
CLOSEST SUBSTANTIAL SHELTER AND PROTECT YOURSELF FROM FLYING DEBRIS.

&&

LAT...LON 3217 8801 3215 8801 3214 8804 3208 8804
      3206 8806 3207 8810 3205 8811 3200 8810
      3201 8809 3199 8807 3200 8767 3191 8766
      3194 8829 3212 8833
TIME...MOT...LOC 2321Z 261DEG 42KT 3205 8819

TORNADO...OBSERVED
TORNADO DAMAGE THREAT...CONSIDERABLE
HAIL...1.00IN
```

Tornado Warning

Considerable Threat

Here's an example from 2016 of a tornado that occurred in the Pensacola metro area after we issued the initial Tornado Warning and upgraded that warning to contain a **Considerable Tag**…

National Weather Service

Tornado Warning

Considerable Threat

Location: Pensacola, FL

Classification: EF-3

Max Winds: 155 mph

Path Length: 8 miles

Max Width: 300 yards

Fatalities: 0

Injuries: 3

National Weather Service

Tornado Warning

Catastrophic Situation

This is what the very rare, highest-end **Tornado Warning** looks like…

The **Catastrophic Tag** is included when a severe threat to human life and catastrophic damage from a **VIOLENT Tornado (EF4+)** is occurring

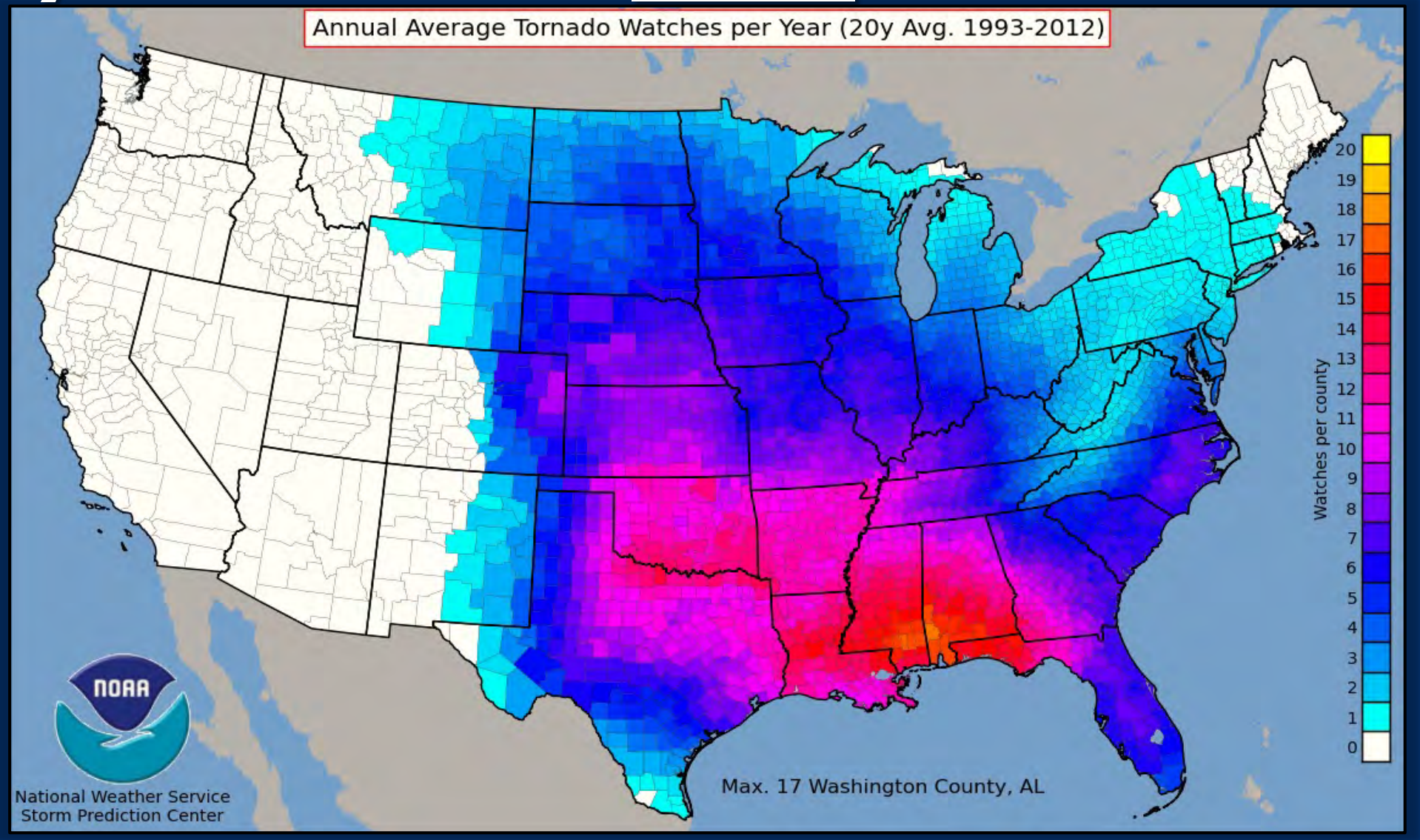
The warning states that this is a ***Tornado Emergency***

```
...TORNADO EMERGENCY FOR CENTRAL CHOCTAW AND NORTHWESTERN CLARKE
COUNTIES IN SOUTHWEST ALABAMA...

THE NATIONAL WEATHER SERVICE IN MOBILE HAS ISSUED A

* TORNADO WARNING FOR...
  CENTRAL CHOCTAW COUNTY IN SOUTHWEST ALABAMA...
  NORTHWESTERN CLARKE COUNTY IN SOUTHWEST ALABAMA...

* UNTIL 715 PM CDT

* AT 607 PM CDT...A CONFIRMED LARGE...VIOLENT AND EXTREMELY DANGEROUS
  TORNADO WAS LOCATED NEAR GILBERTOWN...AND MOVING EAST AT 50 MPH.

  THIS IS A TORNADO EMERGENCY FOR CENTRAL CHOCTAW AND NORTHWESTERN
  CLARKE COUNTIES IN SOUTHWEST ALABAMA. TAKE COVER NOW. THIS IS A
  PARTICULARLY DANGEROUS SITUATION.

  HAZARD...DEADLY TORNADO.

  SOURCE...EMERGENCY MANAGEMENT CONFIRMED TORNADO.

  IMPACT...YOU ARE IN A LIFE THREATENING SITUATION. FLYING DEBRIS
           WILL BE DEADLY TO THOSE CAUGHT WITHOUT SHELTER. MOBILE
           HOMES WILL BE DESTROYED. CONSIDERABLE DAMAGE TO HOMES...
           BUSINESSES AND VEHICLES IS LIKELY AND COMPLETE DESTRUCTION
           POSSIBLE.

* THE TORNADO WILL BE NEAR...
  MORVIN AROUND 635 PM CDT.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

TO REPEAT...A LARGE...EXTREMELY DANGEROUS...AND POTENTIALLY DEADLY
TORNADO IS ON THE GROUND. TO PROTECT YOUR LIFE...TAKE COVER NOW. MOVE
TO AN INTERIOR ROOM ON THE LOWEST FLOOR OF A STURDY BUILDING. AVOID
WINDOWS. IF IN A MOBILE HOME...A VEHICLE OR OUTDOORS...MOVE TO THE
CLOSEST SUBSTANTIAL SHELTER AND PROTECT YOURSELF FROM FLYING DEBRIS.

&&

LAT...LON 3217 8801 3215 8801 3214 8804 3208 8804
      3206 8806 3207 8810 3205 8811 3200 8810
      3201 8809 3199 8807 3200 8767 3191 8766
      TIME...MOT...LOC 2326Z 261DEG 42KT 3205 8813

TORNADO...OBSERVED
TORNADO DAMAGE THREAT...CATASTROPHIC
HAIL...1.50IN
```

The Importance Of

SkyWarn Storm Spotters

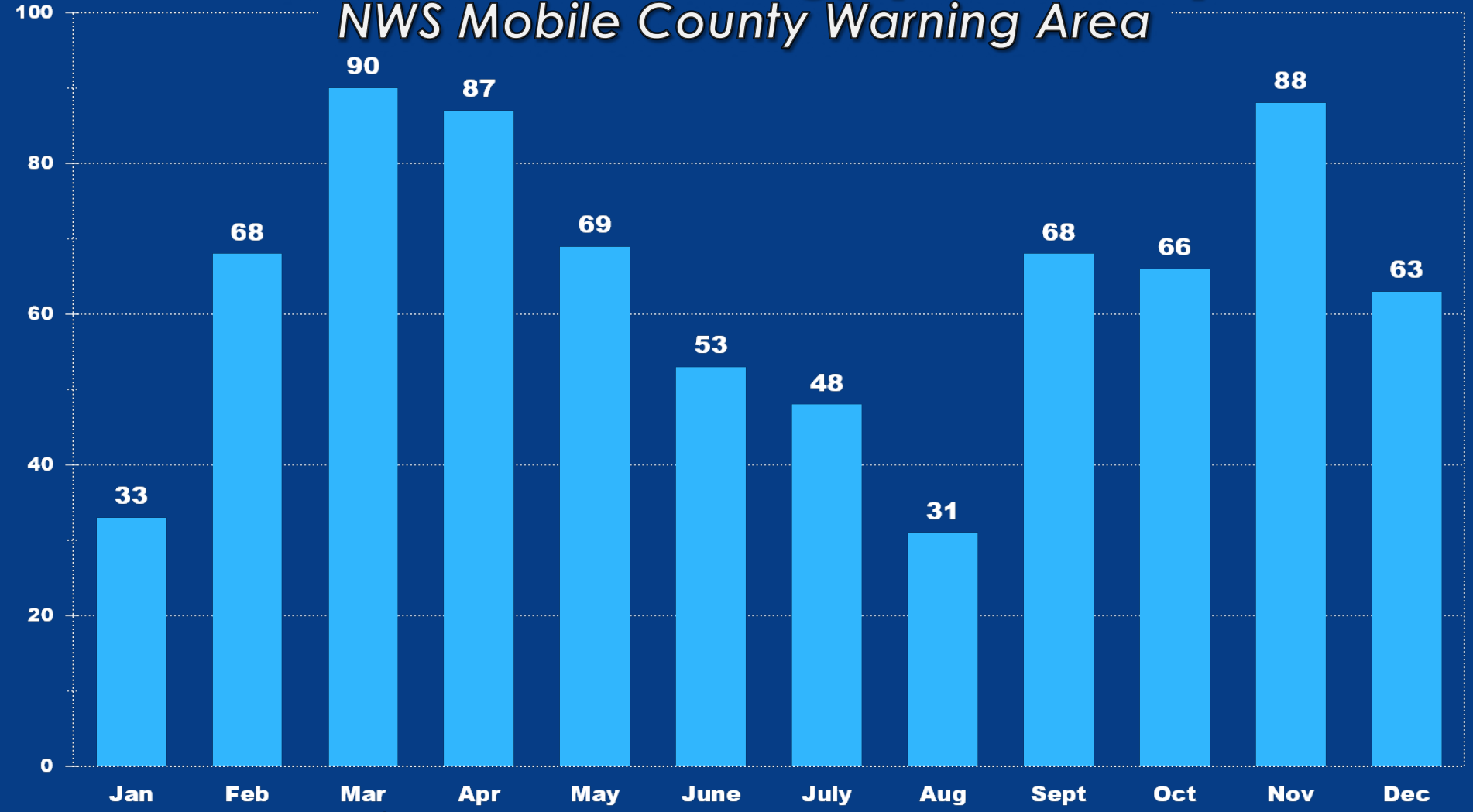
Why We Need YOU



Why We Need YOU

Tornado Climatology (1950–2016)

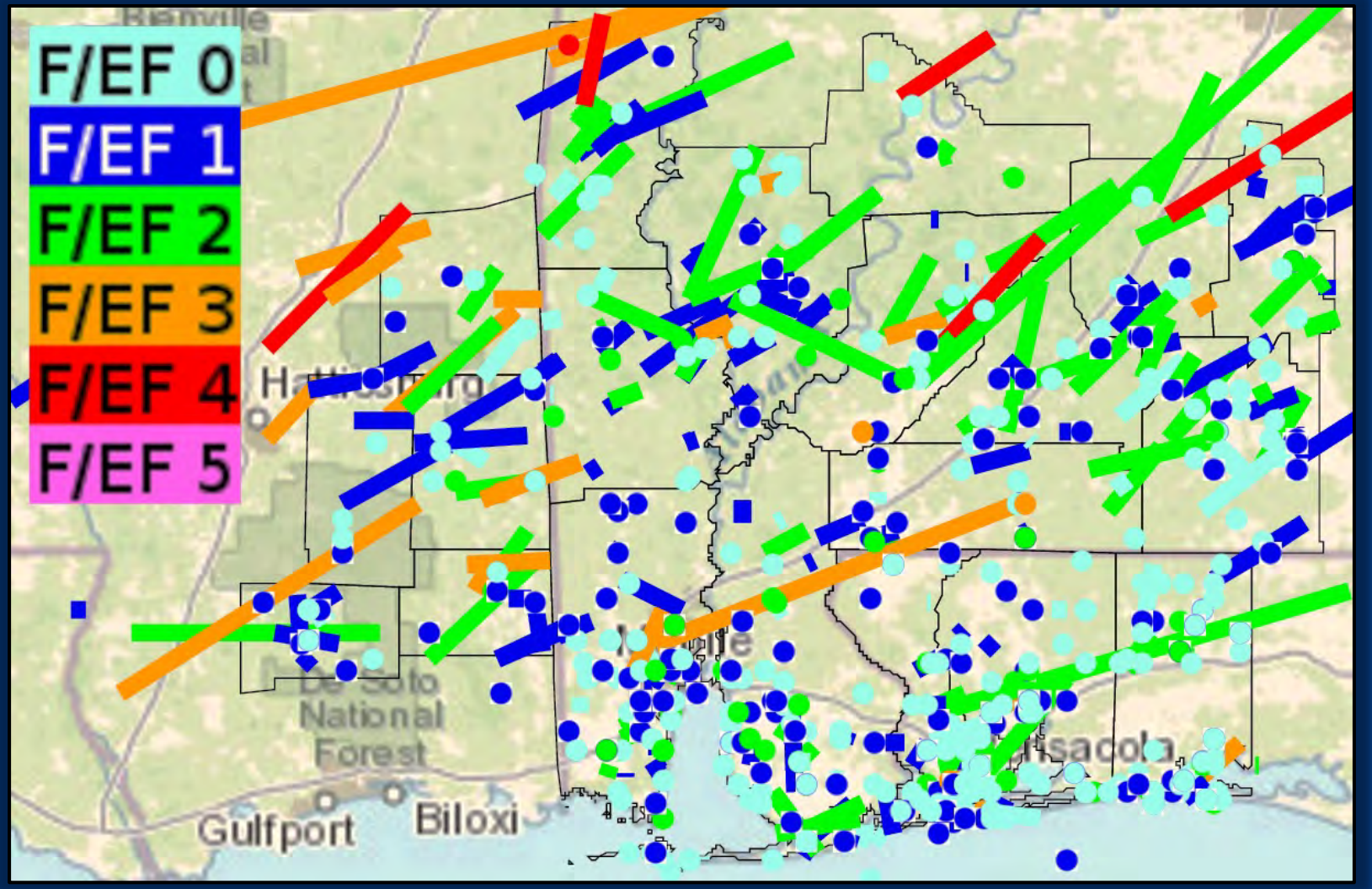
NWS Mobile County Warning Area



National Weather Service

Why We Need YOU

100s of tornadoes since 1950

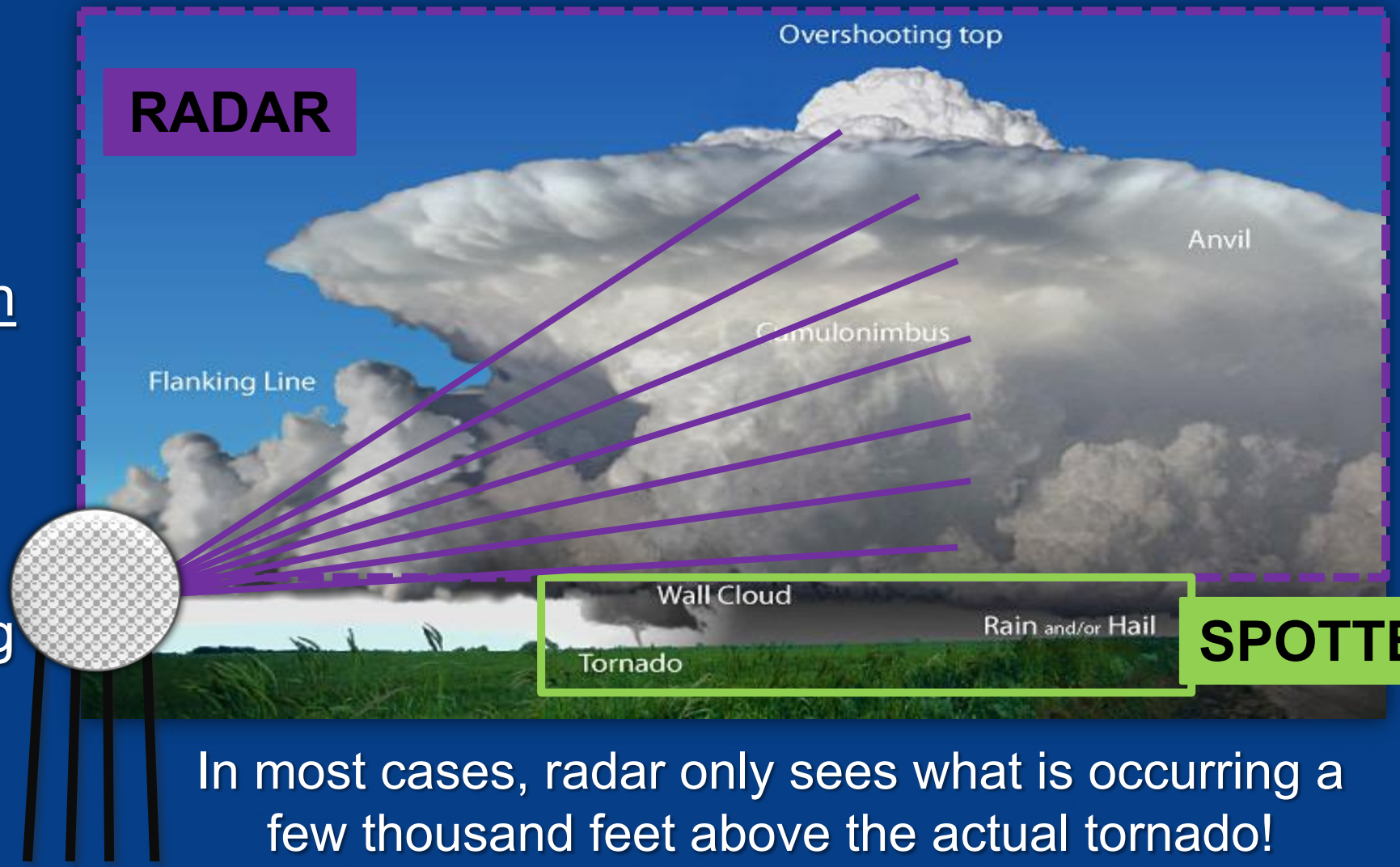


National Weather Service

Radar Does NOT See Everything

RADAR tells us a storm is capable of producing strong winds, hail, flooding, or a tornado – but can NOT always *confirm*

SPOTTERS *confirm* if a storm is producing strong winds, hail, flooding, or a tornado

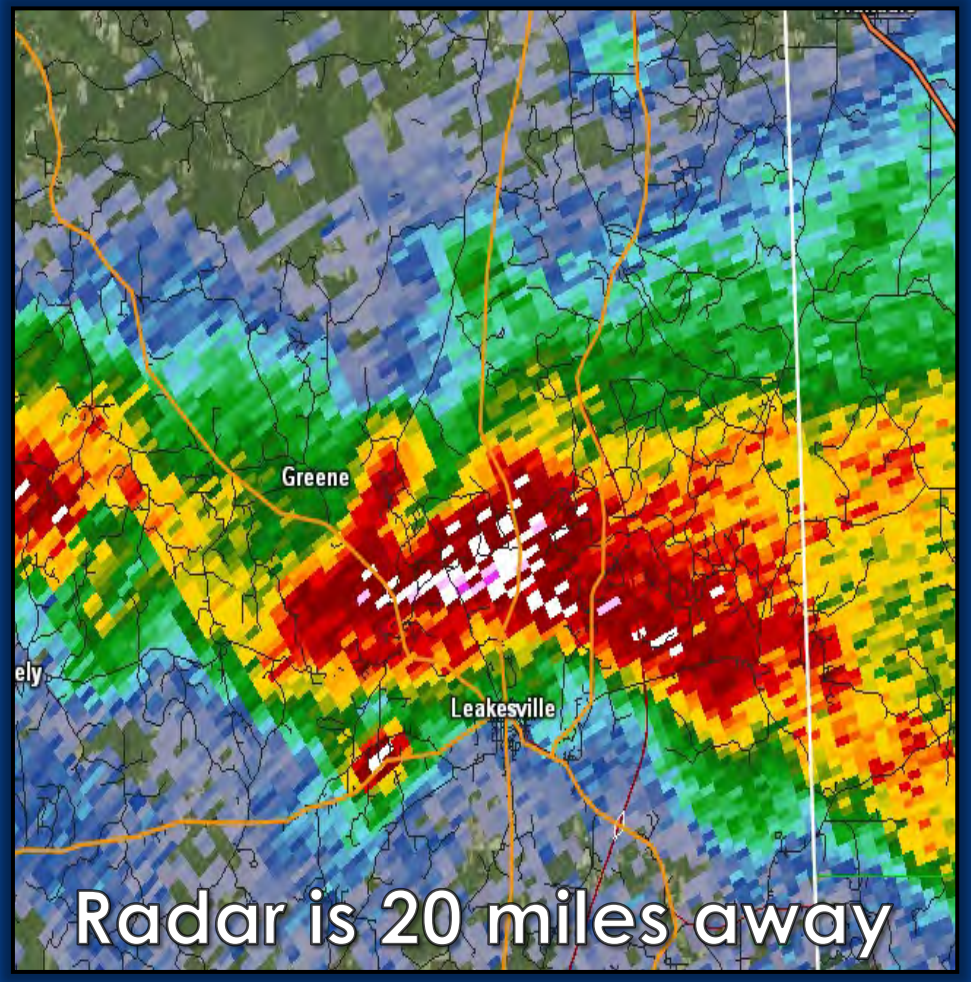


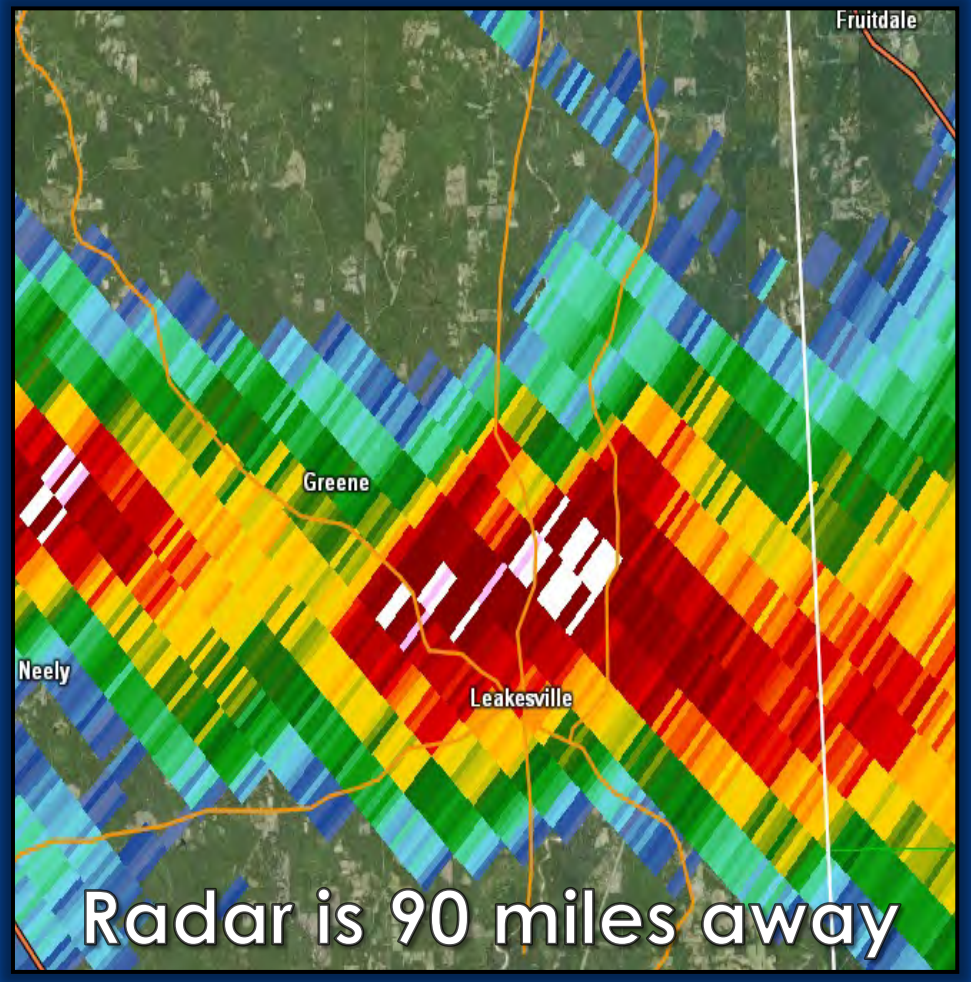
In most cases, radar only sees what is occurring a few thousand feet above the actual tornado!

National Weather Service

Why We Need YOU

Radar Beam Width Vs. Effective Resolution

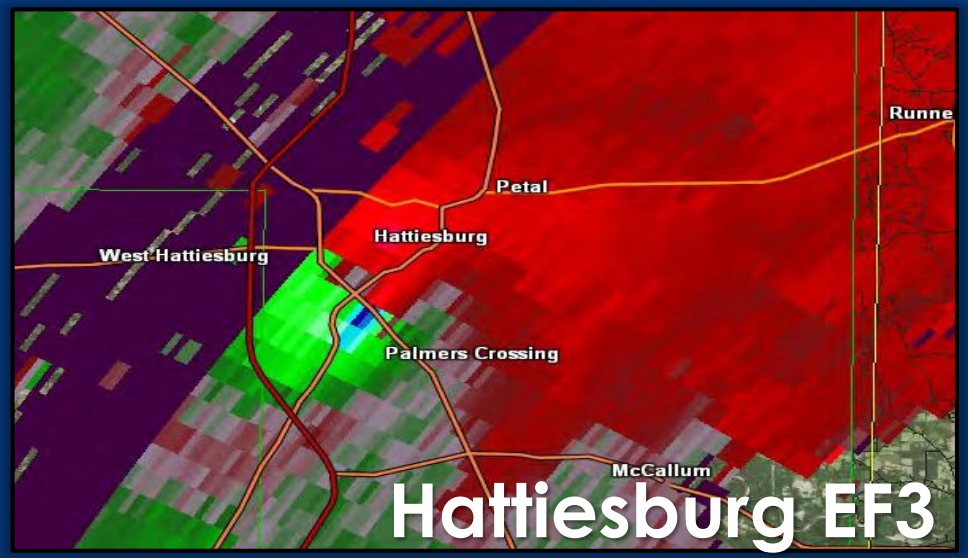


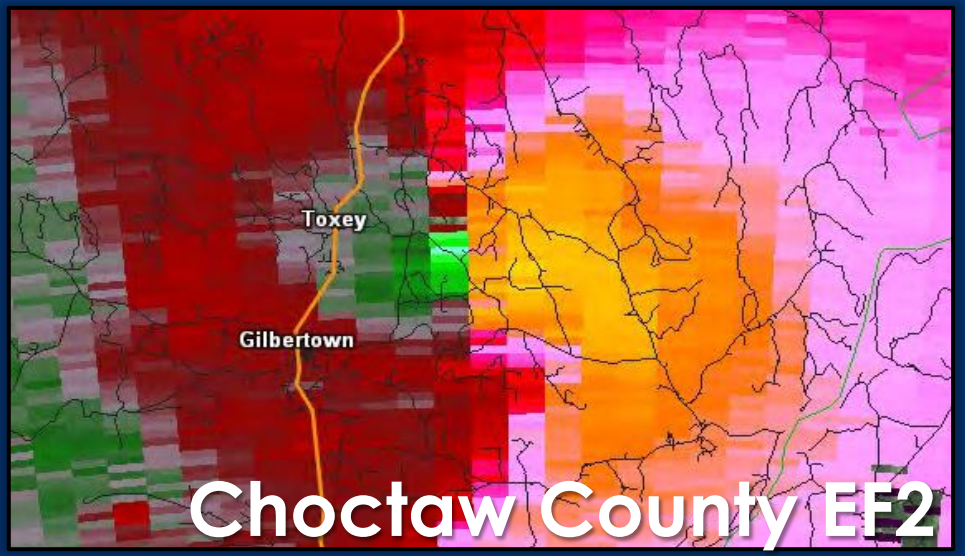


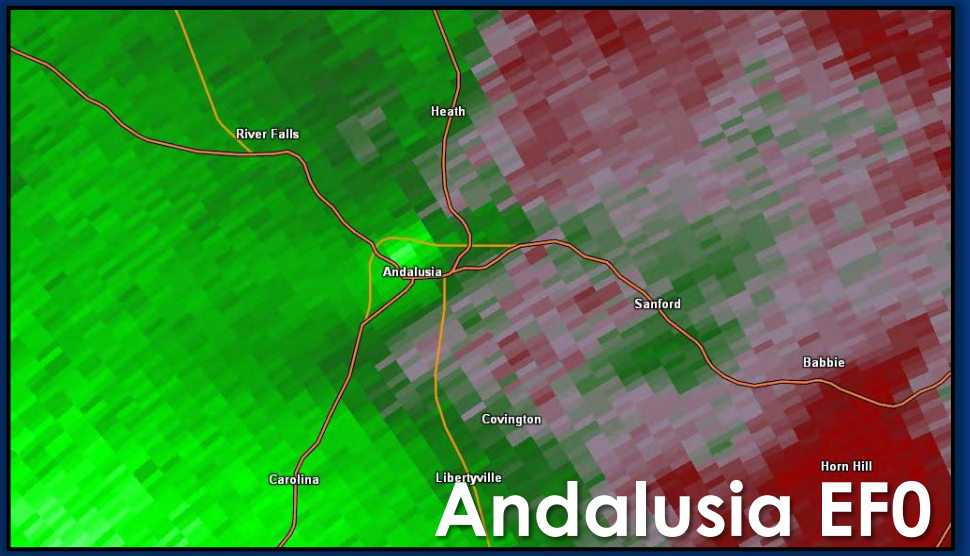
National Weather Service

Why We Need YOU

Which circulation produced a tornado?







National Weather Service

Why We Need YOU

Ground truth information from SkyWarn spotters helps NWS forecasters assess the environment

Most tornadoes are weak and hard to detect on radar

Your observation can add a level of certainty and verification to the warning – increasing urgency in the public's mind

This information can help save the lives of your neighbors and people in the next town!

Storm Observation Reporting Procedures

Report What You Observe

Report to your local Emergency Management Agency

Report to the National Weather Service Mobile Office
Toll Free Number: **1-800-284-9059**

Online Storm Report Form

Submit your report &/or pictures to our Social Media pages

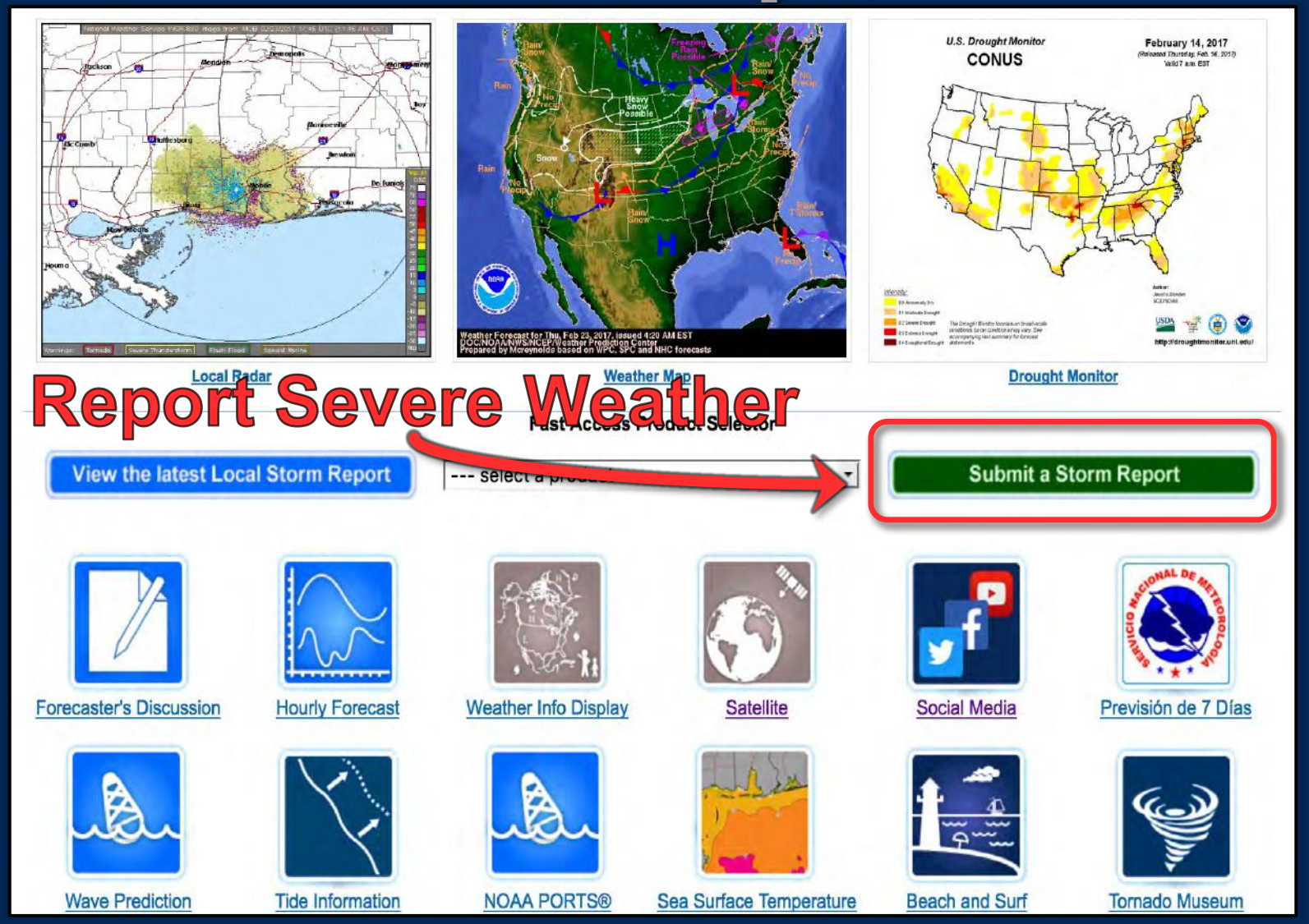
Twitter

twitter.com/NWSMobile

Facebook

facebook.com/NWSMobile

Submit a Storm Report Online!



National Weather Service

Submit a Storm Report Online!

NWS Mobile Damage Report Form

The following form was designed to collect storm reports across the National Weather Service in Mobile/Pensacola's CWA. Please use the form to submit any storm reports by filling out the following information including the date and time, storm damage type, who is reporting, details, photos and location of any storm damage that has occurred.

Credit: National Weather Service Office in Mobile/Pensacola

Date and Estimated Time*

Please enter the date and best estimated time that the damage occurred.

10/27/2022 09:41 PM

Report Type*

Please select a report type.

-Please select-

Who is reporting?*

Please select your affiliation. Example: Spotter, Public, Emergency Manager...

-Please select-

Damage Details*

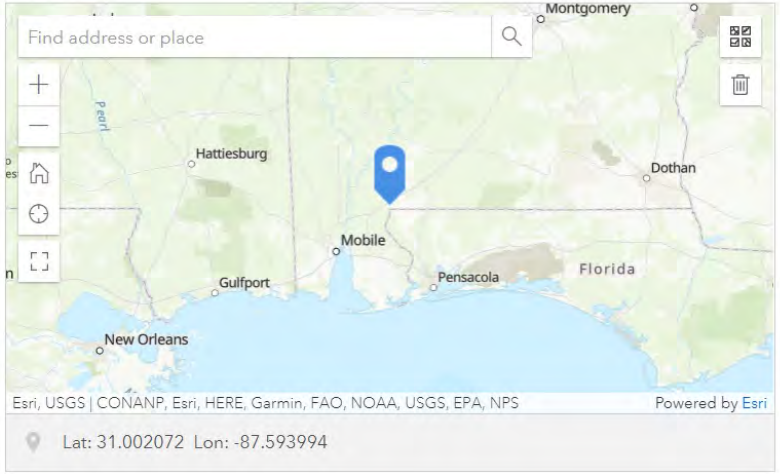
If you can, please provide some details on the extent of the damage.

Example: Several large trees down in my yard.
3 to 4 inches of rain has fallen in the last hour
Road has been washed out.

1000

Location of Damage*

Please put the locator close to the location of the damage. (We do not need exact addresses/ or location just within a couple of miles).



Lat: 31.002072 Lon: -87.593994

Picture

If you have a picture of the damage please upload here.

If you choose to take a picture please use caution and do not leave your safe place until after the storm has passed. Reports are valuable, but your safety is more important.

1 Drop image here or select image (number of files allowed: 1 - 10)

Submit

National Weather Service

Storm Reporting Procedure

Effective Spotter Report

Remain calm, speak clearly, and DO NOT EXAGGERATE

Express your uncertainty

Information

WHO you are: *trained spotter*

WHAT you witnessed: *specific weather event*

WHEN event occurred: *NOT the time of the report*

WHERE event occurred: *direction and distance from your location using well known roads and landmarks*

What To Report – Hail

Measure hail with common items such as a ruler, coins, baseball, etc.

Report the size of the largest hailstone - at least 1 inch in diameter (roughly the size of a quarter)

What NOT To Report – Hail

Hail The Size Of…

M&Ms (plain/peanut)	Meatballs	Avocado
Red beans	Fried shrimp	Ice Cube
Jalapeño	Radish	Barley
Half-sucked jawbreaker	Hominy	Bird seed
End of my finger	Cat Head	Hockey Puck
Hummingbird Egg	Eyeball	Squirrel head
Bantam Hen Egg	Field mouse	Pheasant Egg

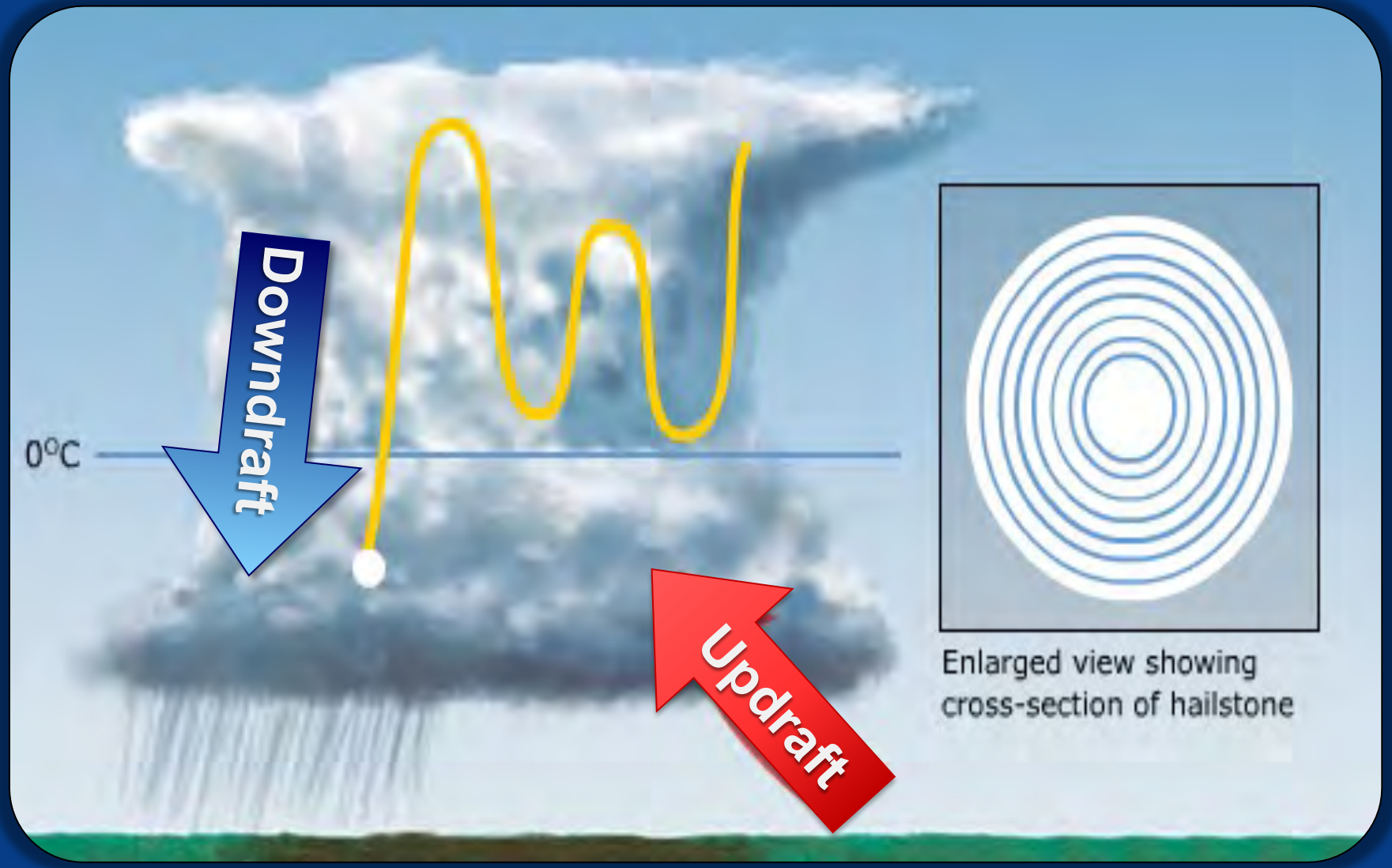
These were REAL hail reports received by NWS offices

National Weather Service

What To Report – Hail

HAIL gets lofted up and down in a storm until it finally falls to the ground

The SIZE of the hailstone indicates the STRENGTH of the storm's updraft – that's why we want to know the hail size!



What To Report – Wind

30-44 mph: *Trees in motion, lawn furniture tossed*

45-57 mph: *Large trees bend, small branches break, old/weak structures have minor damage*

58-74 mph: *Large limbs break (3+" diameter), large semi truck trailers toppled, shingles and awnings removed from houses. Power lines brought down by large limbs*

75-89 mph: *Widespread tree damage, significant damage to manufactured homes, severe damage to weak structures*

90+ mph: *Large trees broken in half or uprooted, moderate to severe damage to houses, roofs peeled off buildings, moving automobiles pushed off roads*

What To Report – Wind

TAKE SEVERE THUNDERSTORMS SERIOUSLY!

Tornado Damage

Straight Line Wind Damage

Why should you seek shelter during **Severe Thunderstorm Warnings**?
Straight line winds can cause just as much damage as tornadoes!

NWSMobile

weather.gov/mob

What To Report – Tornado

Funnel Cloud

Wall Cloud

Watch for rotation around a vertical axis

Watch for debris rising from the ground at the base of the funnel cloud

Determine the direction of movement
…make sure it is not coming toward you!

Safety Tips – Tornado

PLAN AHEAD – Think where you will be and where you can seek shelter

GET IN. GET DOWN. COVER UP.

Go to the lowest floor of a building (if possible, use an underground shelter or basement) and shelter in an interior room with NO windows

Get under sturdy furniture like a table or a stairwell

Cover up with blankets/pillows

If you live in a mobile home or a home on stilts, **GET OUT**

National Weather Service

Safety Tips – Tornado

THINGS TO THINK ABOUT…

SHOES – Put shoes on when sheltering; you do not want to walk on debris in your bare feet

WHISTLE – May need a whistle to attract attention to be rescued

HELMET – Use a bike/football/softball helmet to protect your head

HEADLAMP – For when the power goes out

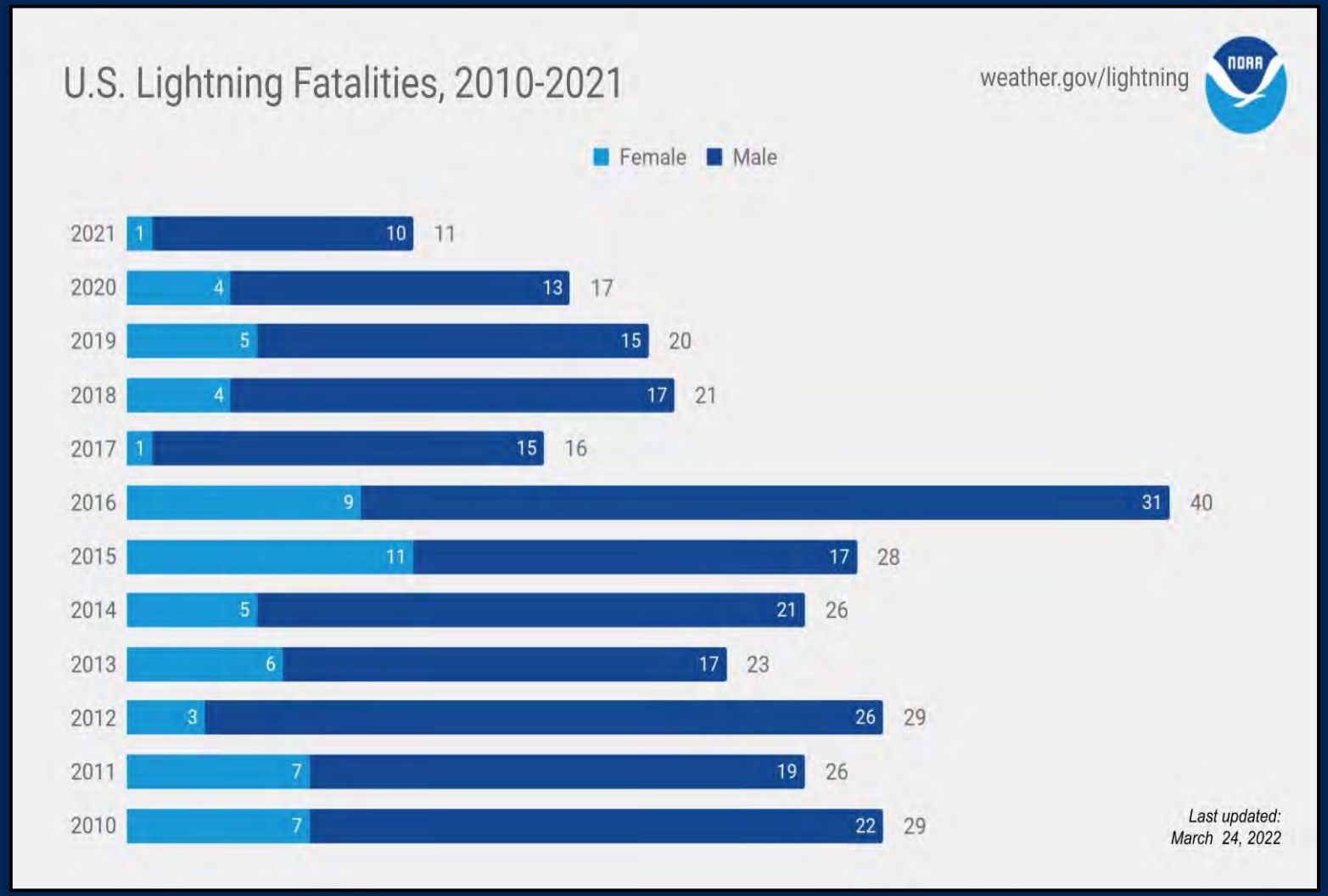
CHARGE DEVICES – Charge your cellphone, laptop, tablet, etc.

WALLET/KEYS – Grab them before seeking shelter

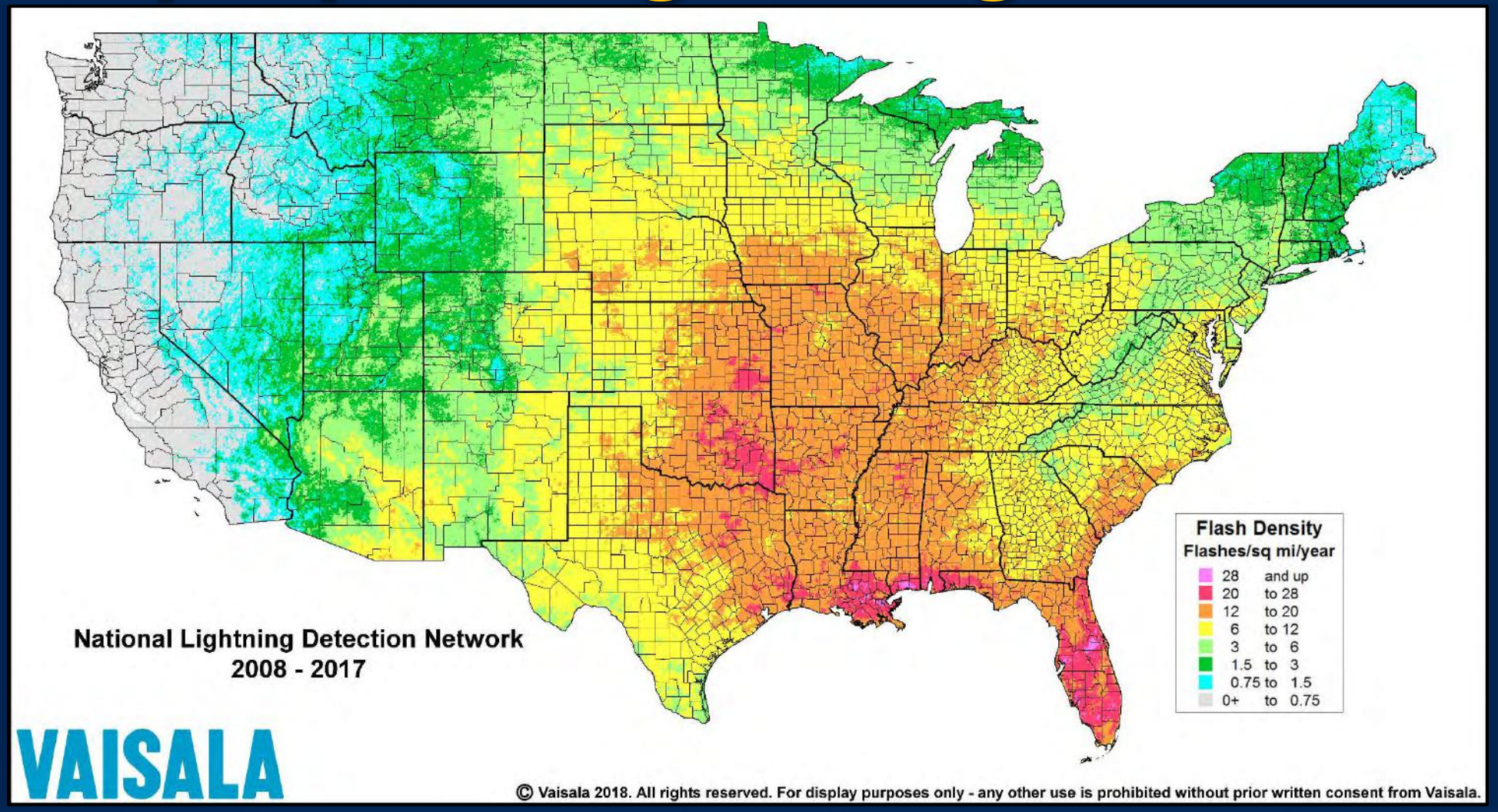
What To Report – Lightning

Buildings on fire and/or damage to structures due to lightning

Injuries or deaths



Safety Tips – Lightning



Notice the high lightning density along the Gulf Coast!!

Safety Tips – Lightning

Thunderstorms produce lightning that can strike up to 10 miles away!

If you hear thunder, you are close enough to be struck by lightning

Even if it is NOT raining and beneath a clear sky

Activities on large fields or wide open areas are especially vulnerable to lightning

What To Report – Rainfall

Report your rainfall amounts to the NWS

Indicate the duration of rainfall and time the observation was taken

If it is still raining, report:
"this amount of rainfall since xx:yy time"

www.cocorahs.org

What To Report – Flooding

Water covering roads or water that is entering homes and businesses

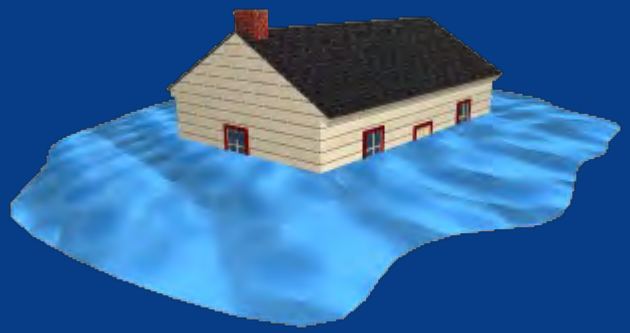
Moving water has a lot of power – Turn Around, Don't Drown

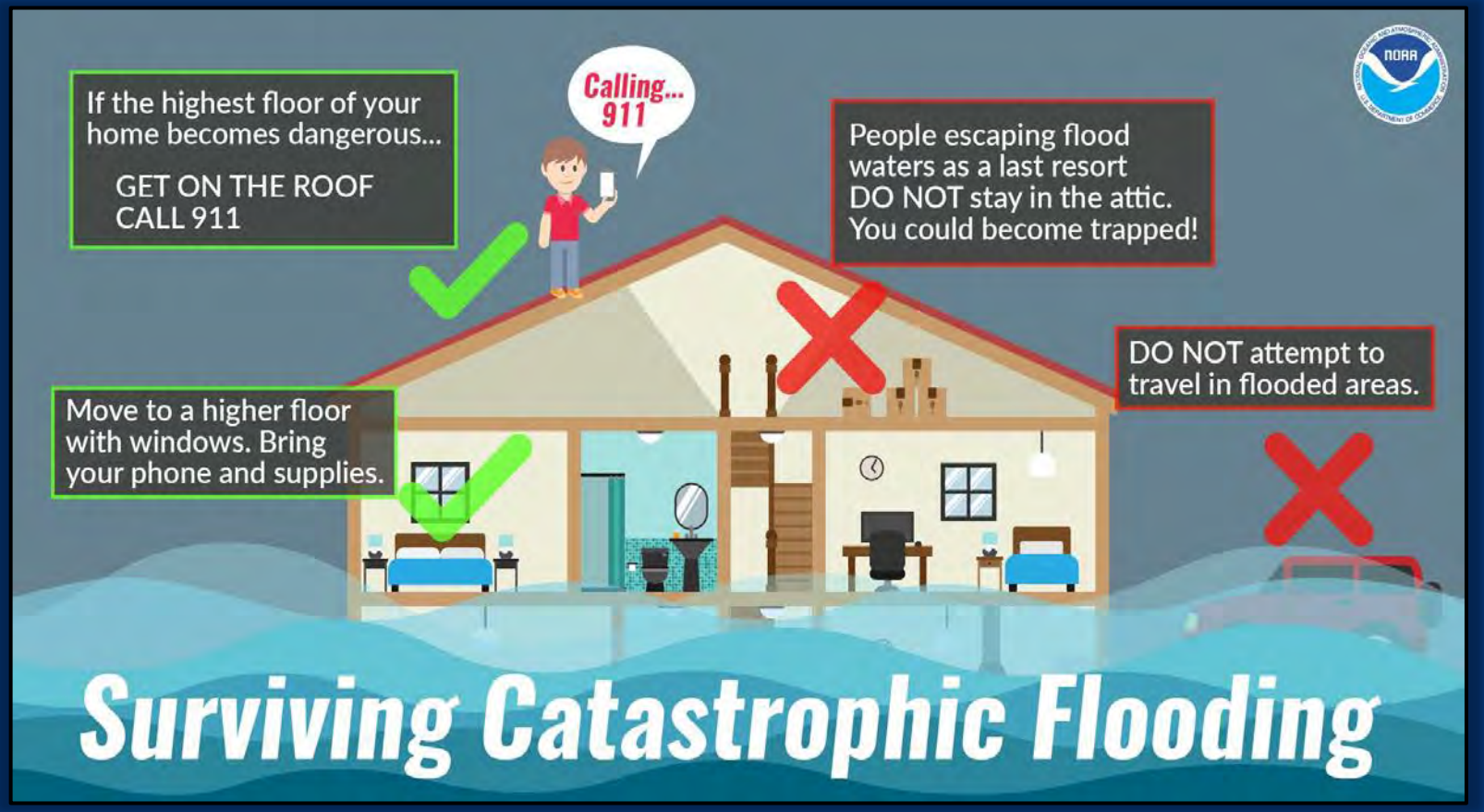
Safety Tips – Flooding

Seek higher ground if under a WARNING

Told to evacuate?
Do it immediately!

NEVER underestimate the power of water!





Safety Tips – Flooding

12 INCHES

of rushing water

can carry away a

SMALL CAR

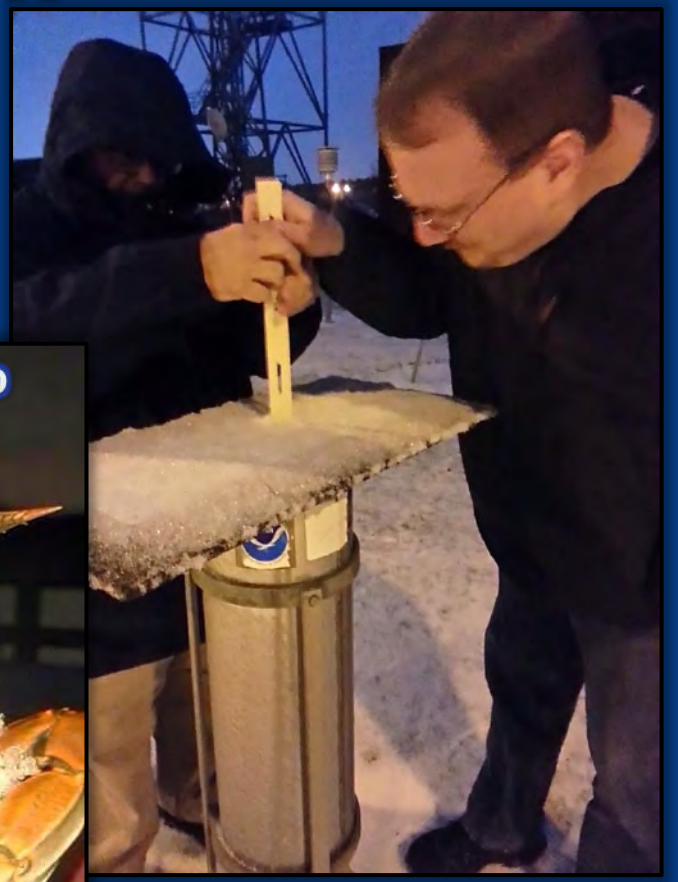
What To Report – Snowfall

Report snowfall, sleet, and freezing rain amounts to us

It's also important for us to know when the event started/ended

Report road conditions like snow, freezing rain, or ice accumulating on roads and/or bridges

Tips on how to accurately measure snowfall: **www.cocorahs.org** (click on the training slideshows)

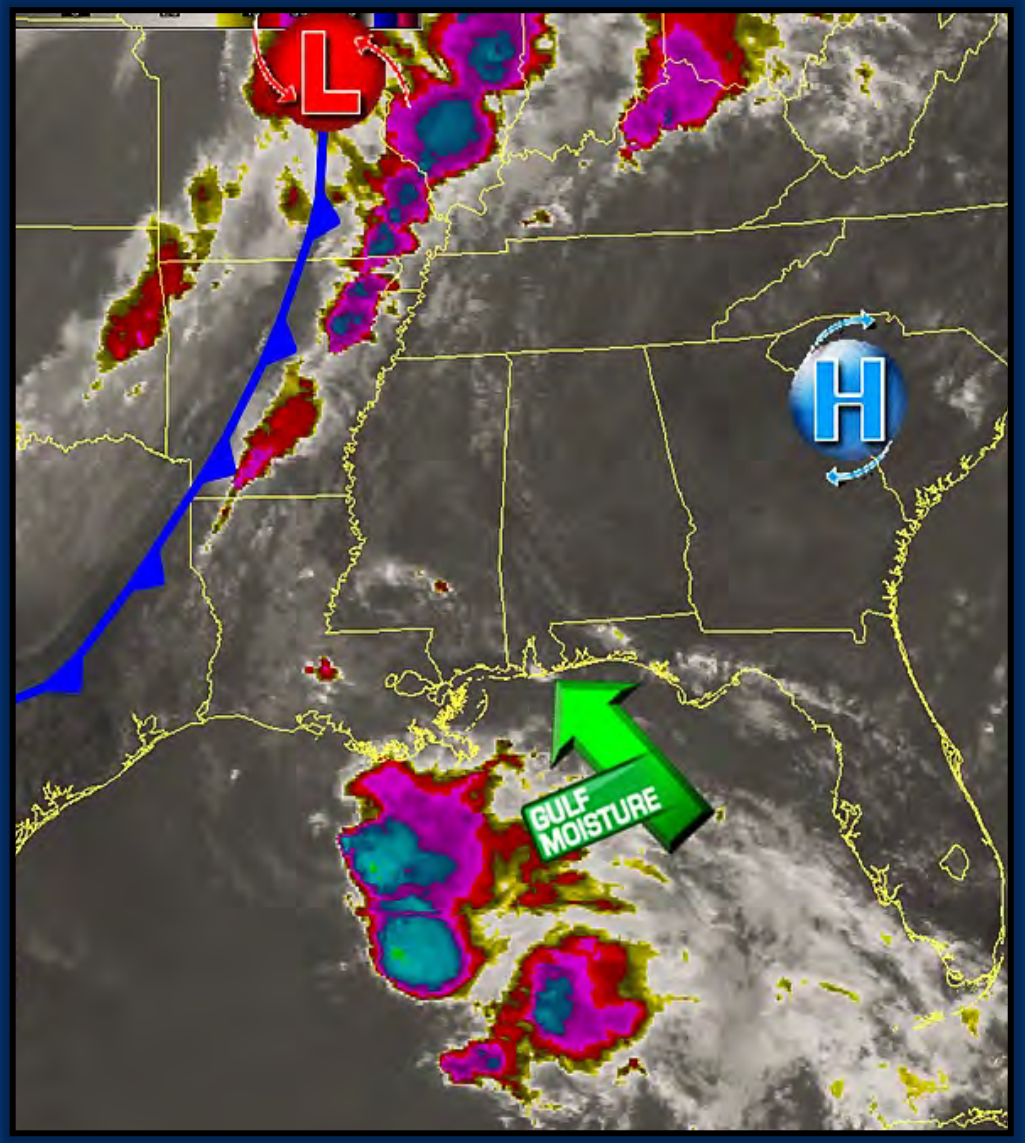



Thunderstorm Life Cycle
and
Severe Storm Structure

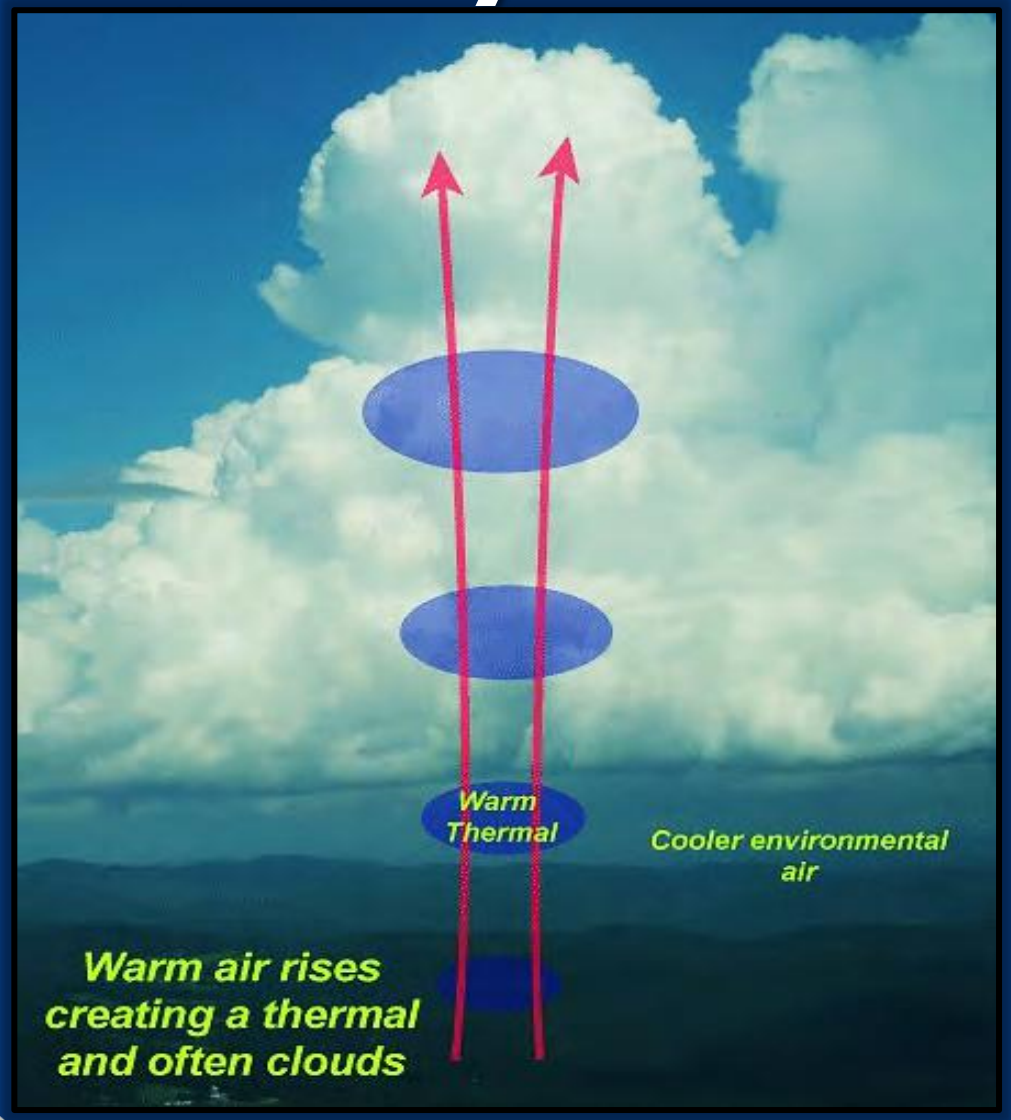
Primary Storm Ingredients

1. **MOISTURE**
   Forms the clouds and precipitation
   Primary local source:
      Gulf of Mexico

2. **LIFT (or TRIGGER)**
   Provides mechanism for the air to rise, which starts the thunderstorm process
   Primary sources:
      Cold fronts
      Warm fronts
      Outflow boundaries



Primary Storm Ingredients



3. **INSTABILITY**

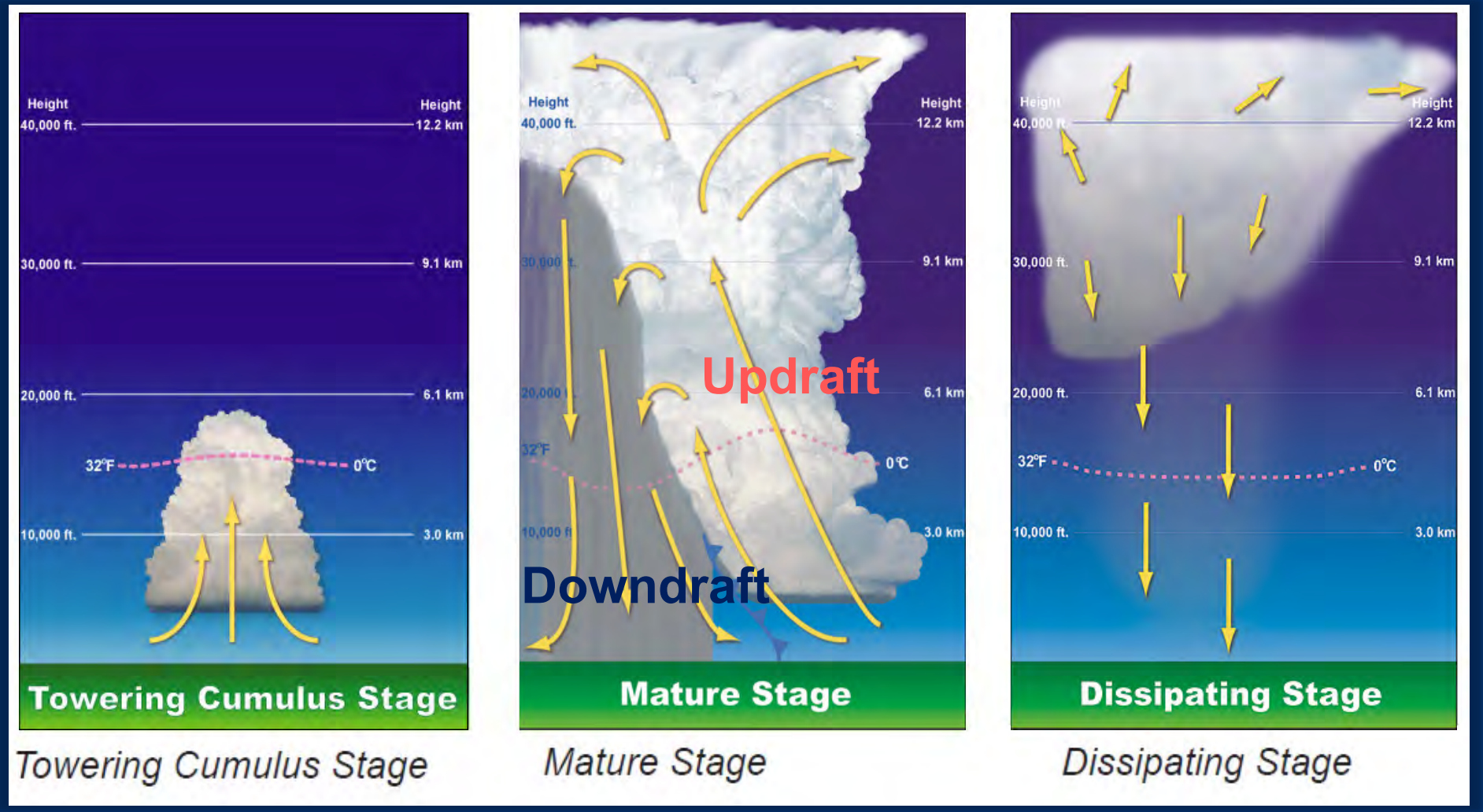
Measure of the atmosphere's tendency to enhance or deter vertical motion

Instability favors storm updrafts and the eventual downdrafts

Higher instability results in stronger updrafts…resulting in a higher potential for severe storms

Thunderstorm Life Cycle

Updraft = rising air
Downdraft = sinking air



Towering Cumulus Stage *Mature Stage* *Dissipating Stage*

Storm Types

Vary based on the time of year

SUMMER:

Pulse Thunderstorms: Short lived; Would not expect tornadoes

Multicells: Not organized (messy looking on radar)

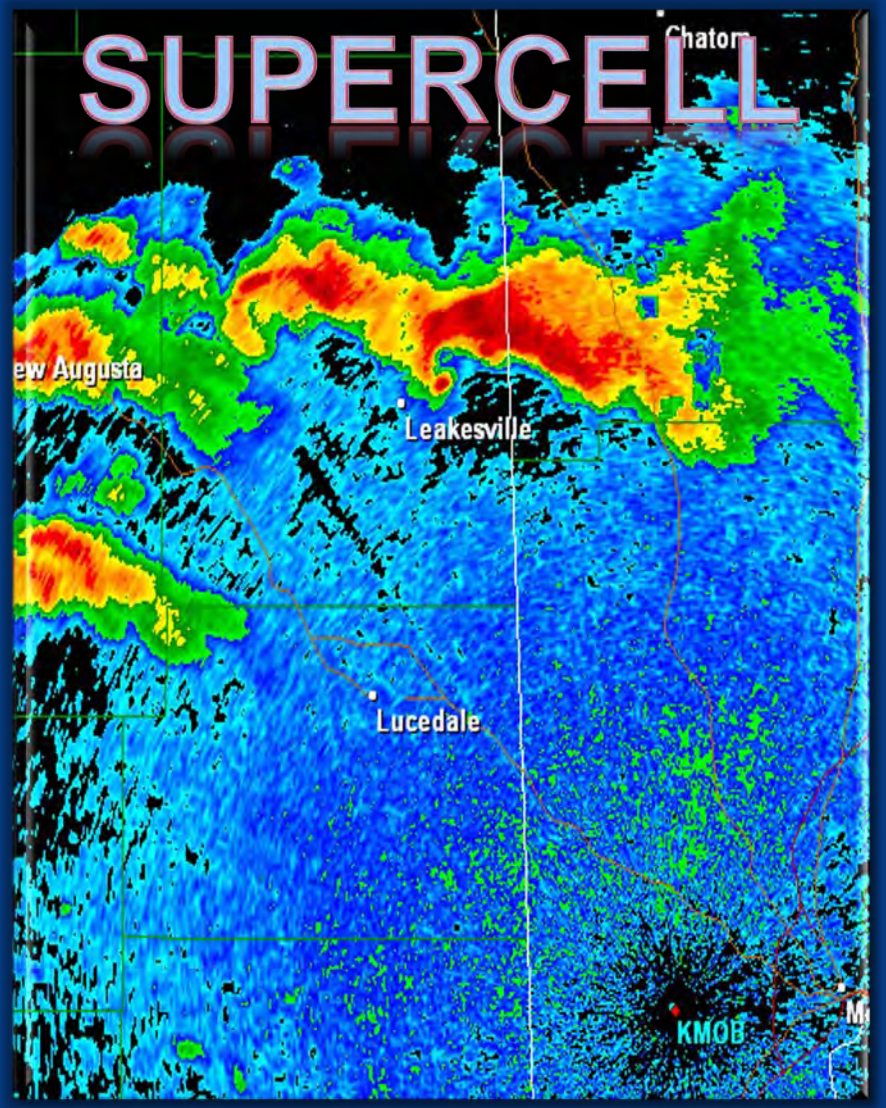
TRANSITION Seasons (Fall/Spring):

Organized Thunderstorms: Enhanced threat of tornadoes & severe weather

- Supercells
- Squall Lines

Storm Types

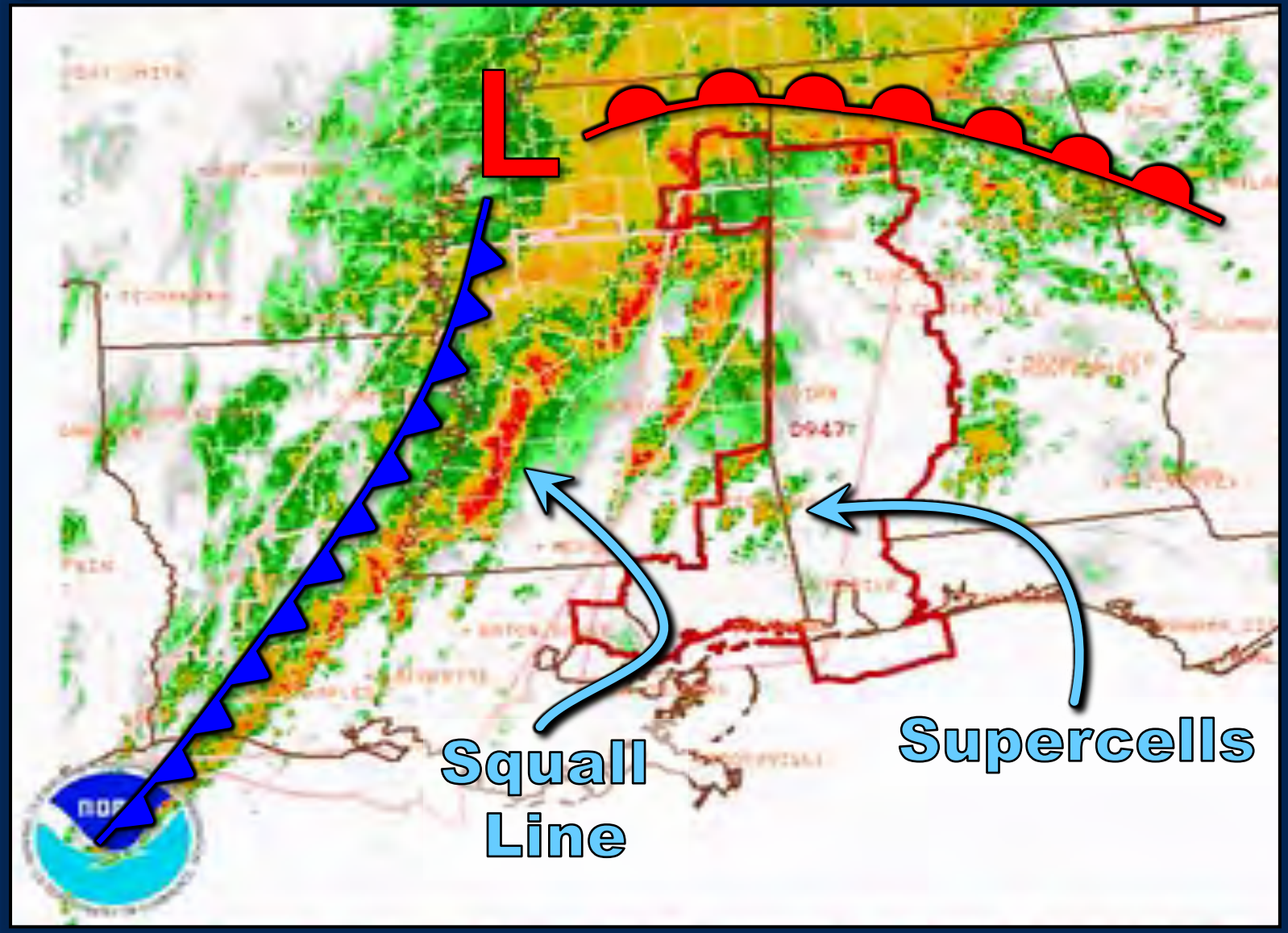
The two main storm types that produce tornadoes are squall lines and supercells…



Storm Types

A typical set-up in the transition seasons (fall and spring) is shown in this graphic

Many times, a squall line will develop ahead of a cold front with supercells forming in the warm sector



Storm Types

Squall Line

Heavy rain

Based on speed of motion

Damaging straight line winds

60 to 90 mph

Dime to quarter size hail

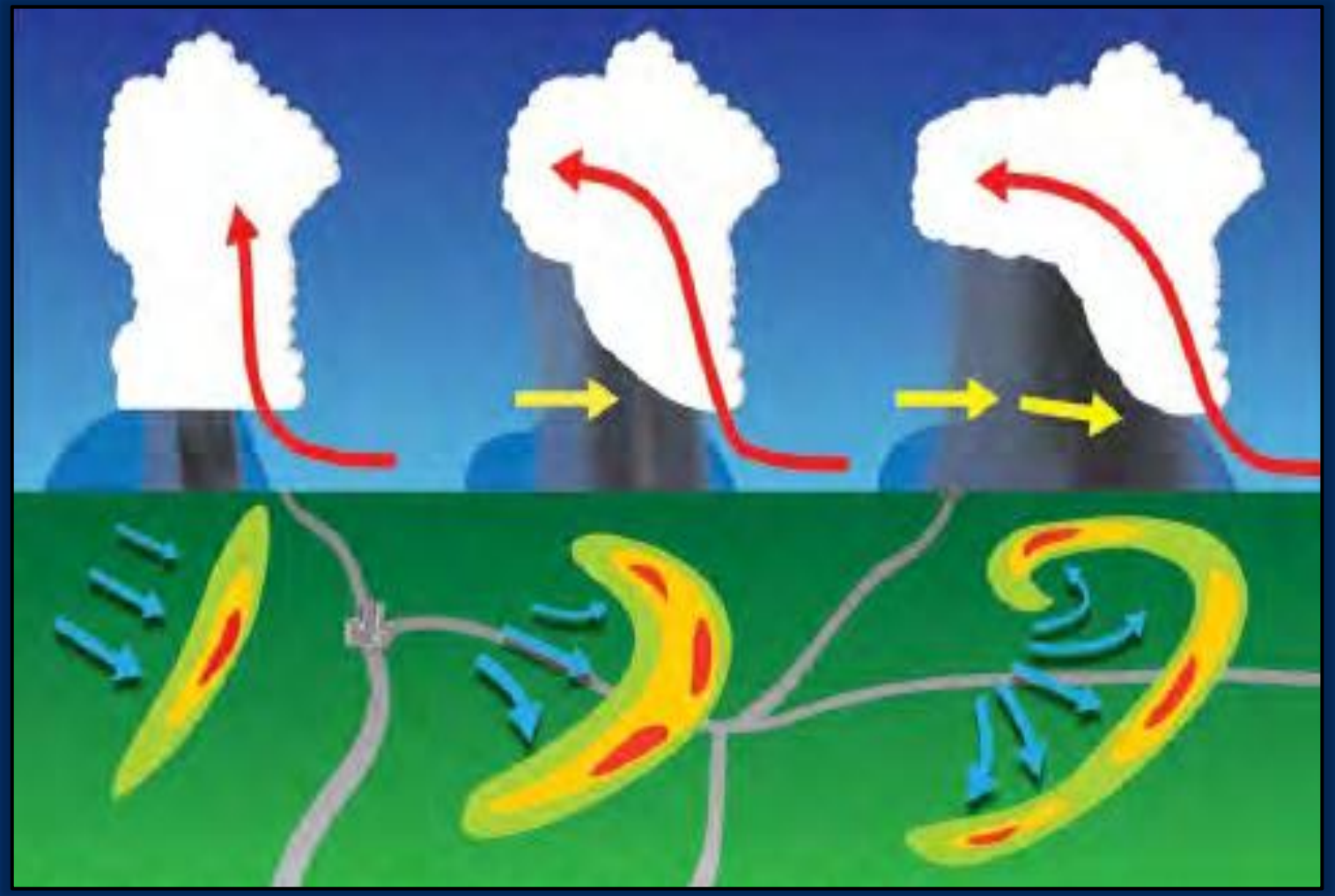
Flash flooding possible if the line stalls and “trains” (moves over the same location)

Storm Types

Squall Line: Bow Echo
Bow-shaped line of cells

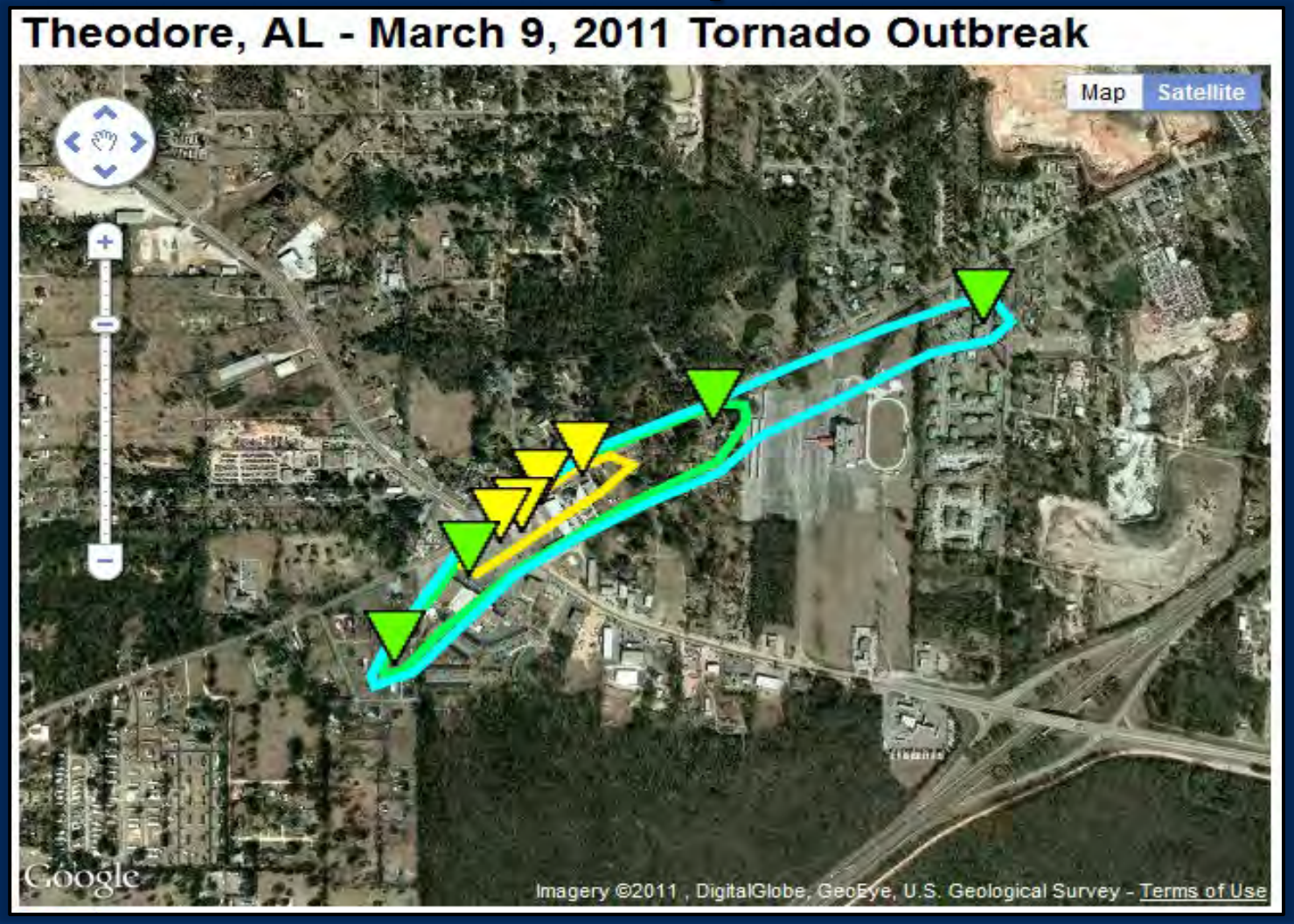
Associated with swaths of straight line wind damage

Tornadoes are possible at apex of bow



Theodore, AL Tornado

Tornado Produced in a Squall Line



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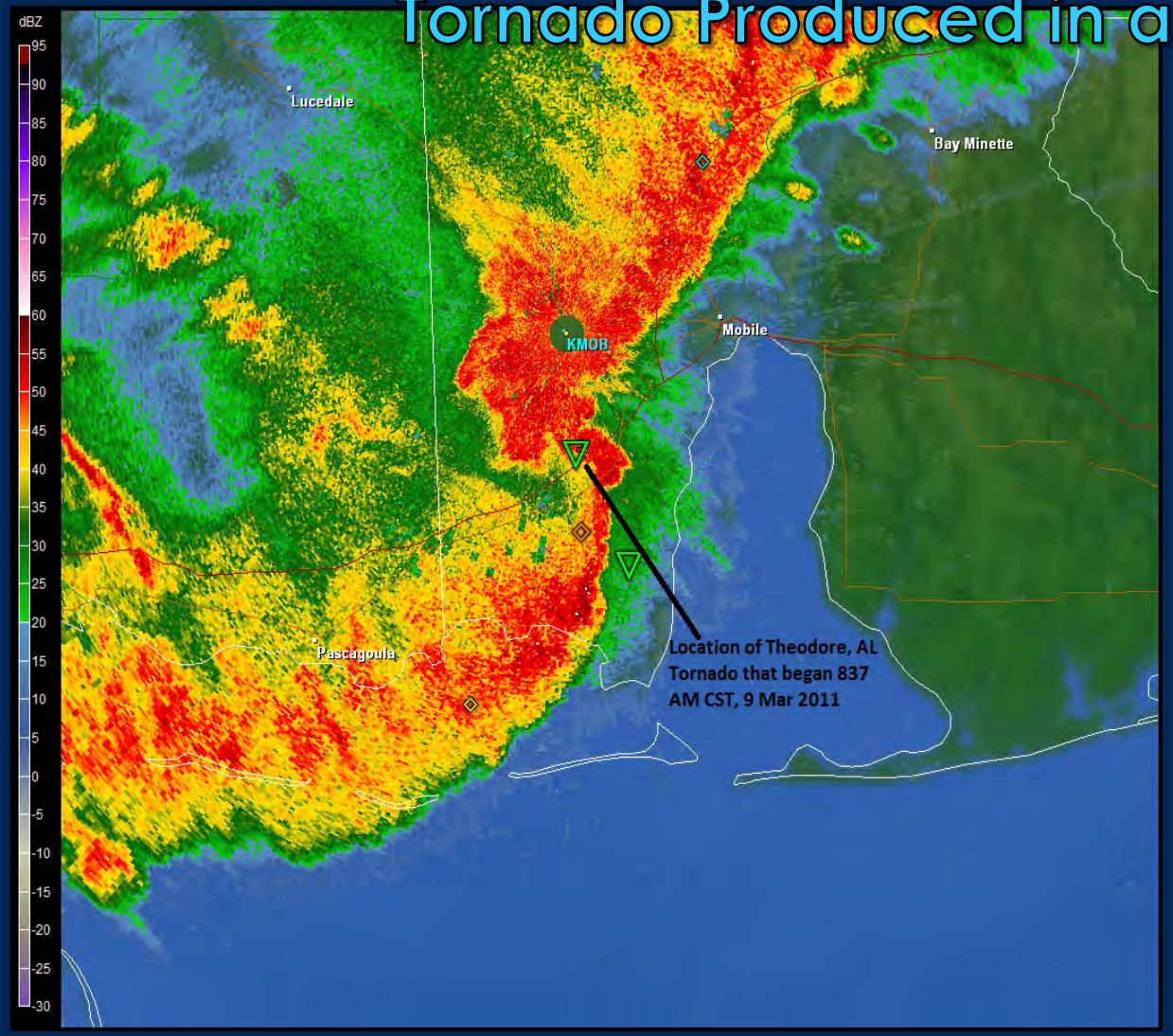
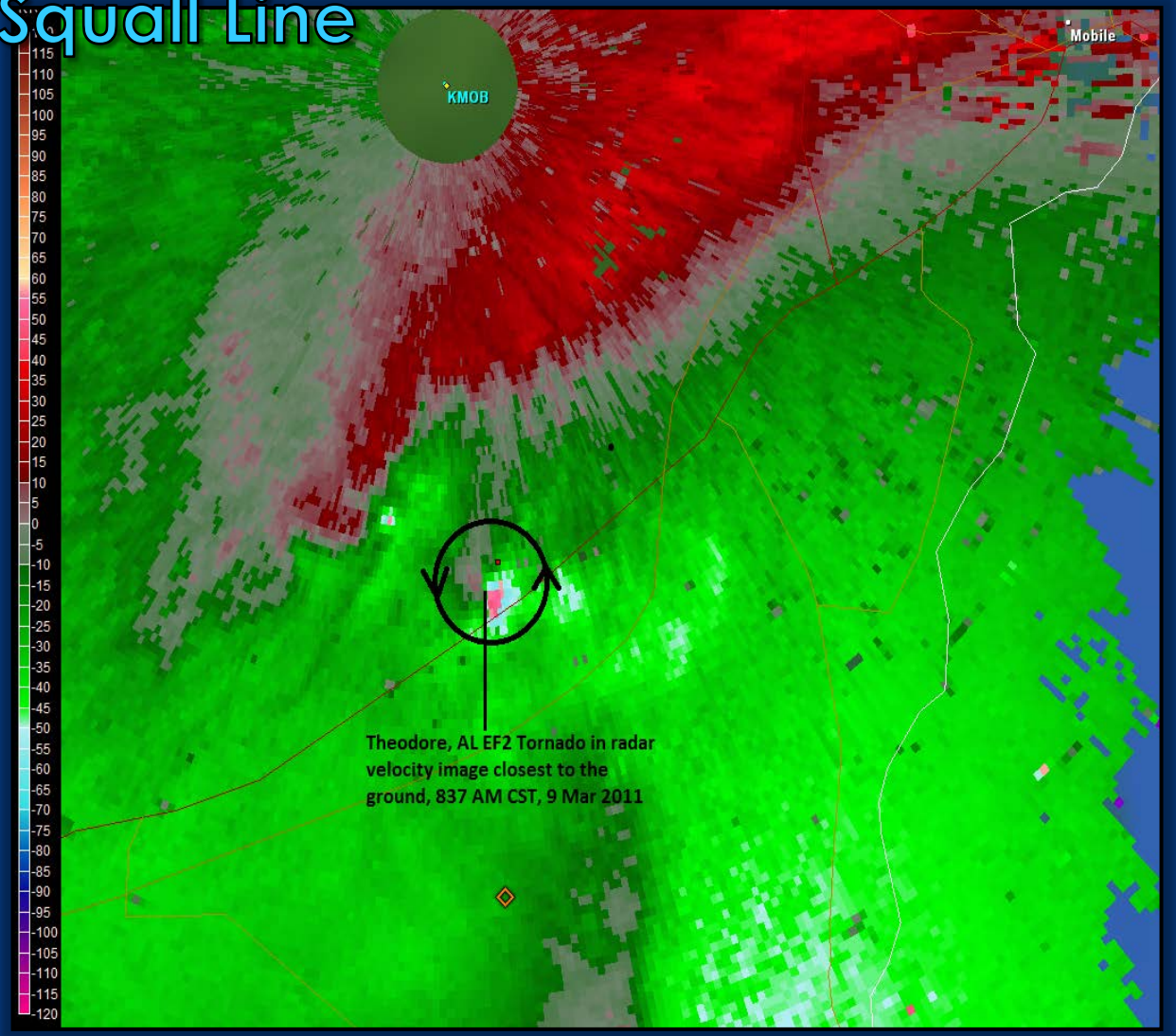




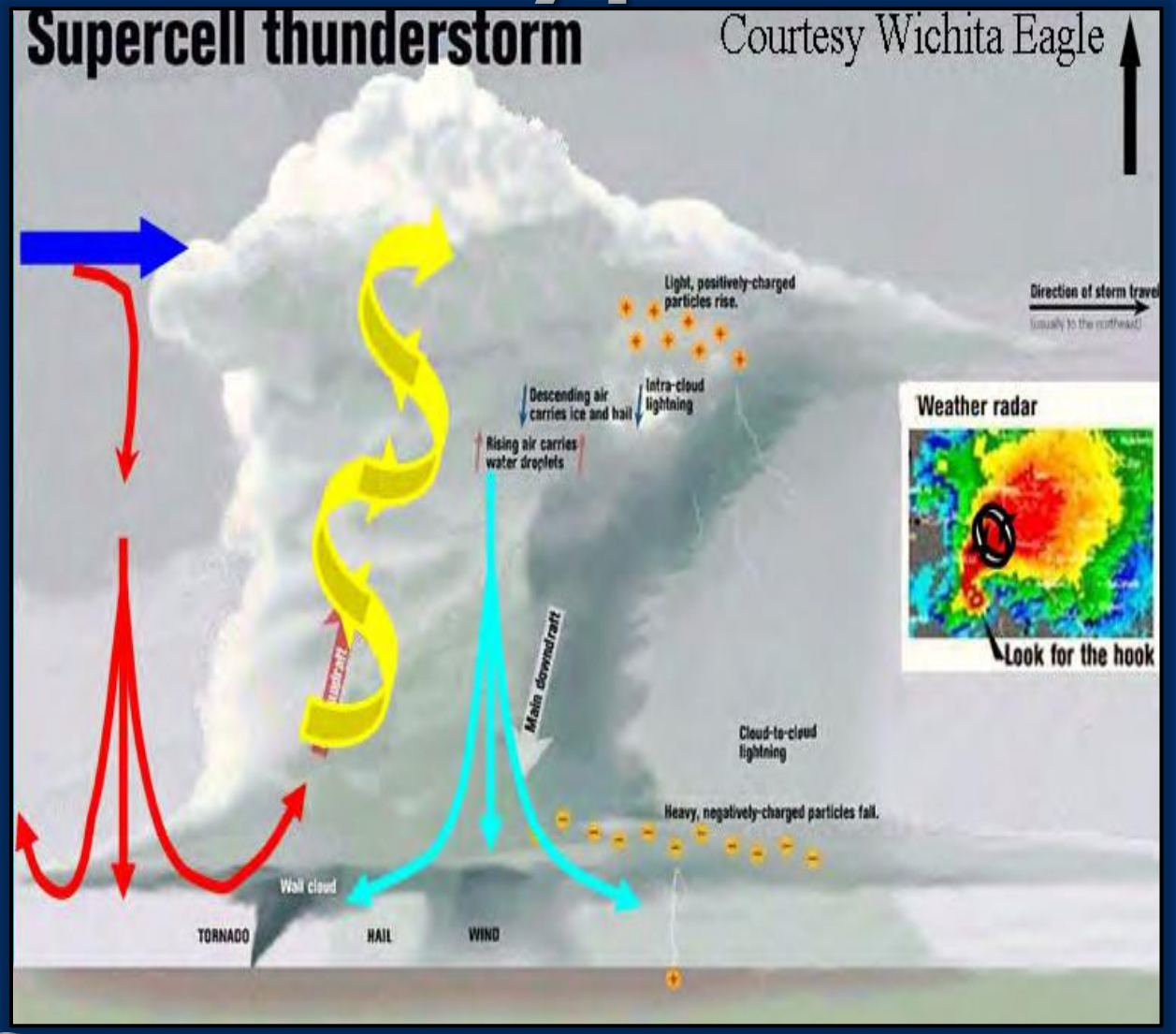
National Weather Service

Theodore, AL Tornado

Tornado Produced in a Squall Line

National Weather Service

Storm Types



Supercells

Stronger, long track “killer” tornadoes

- Based on speed of motion

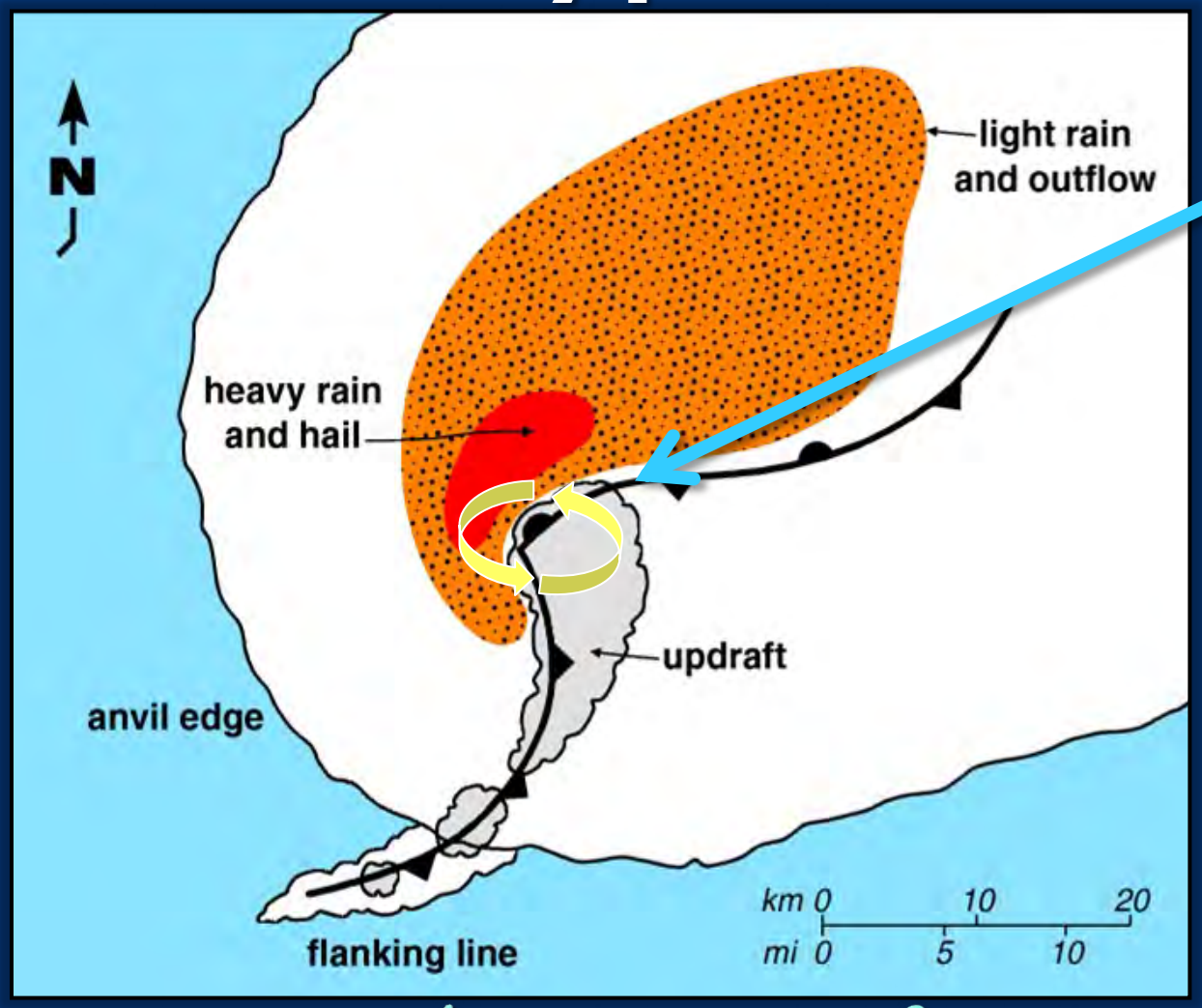
Damaging straight line winds

Giant hail

- Golf ball size or larger

Flash flooding

Storm Types



A supercell is a storm containing a **mesocyclone**

Mesocyclone is a rotating updraft

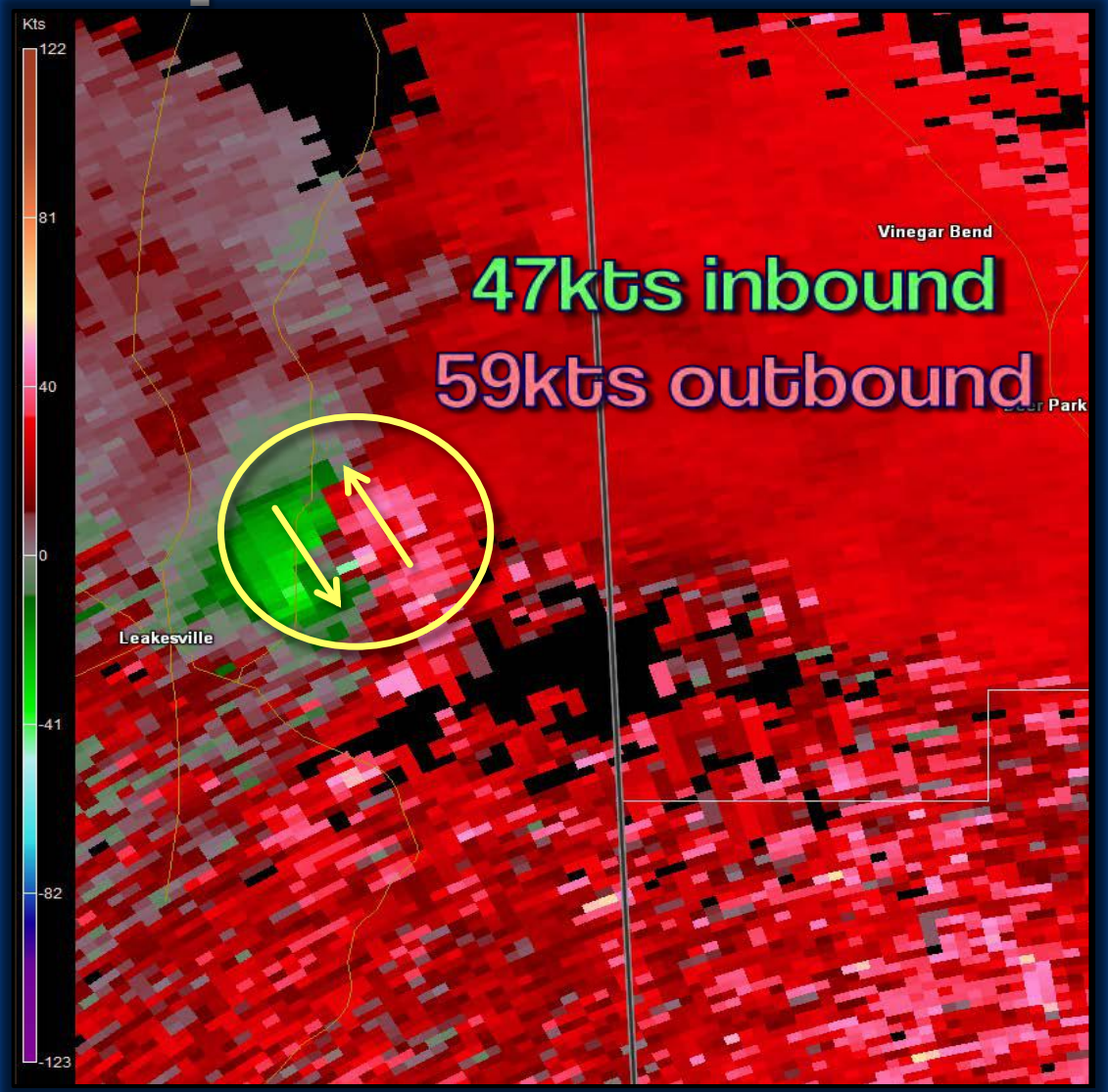
These can be several miles in diameter

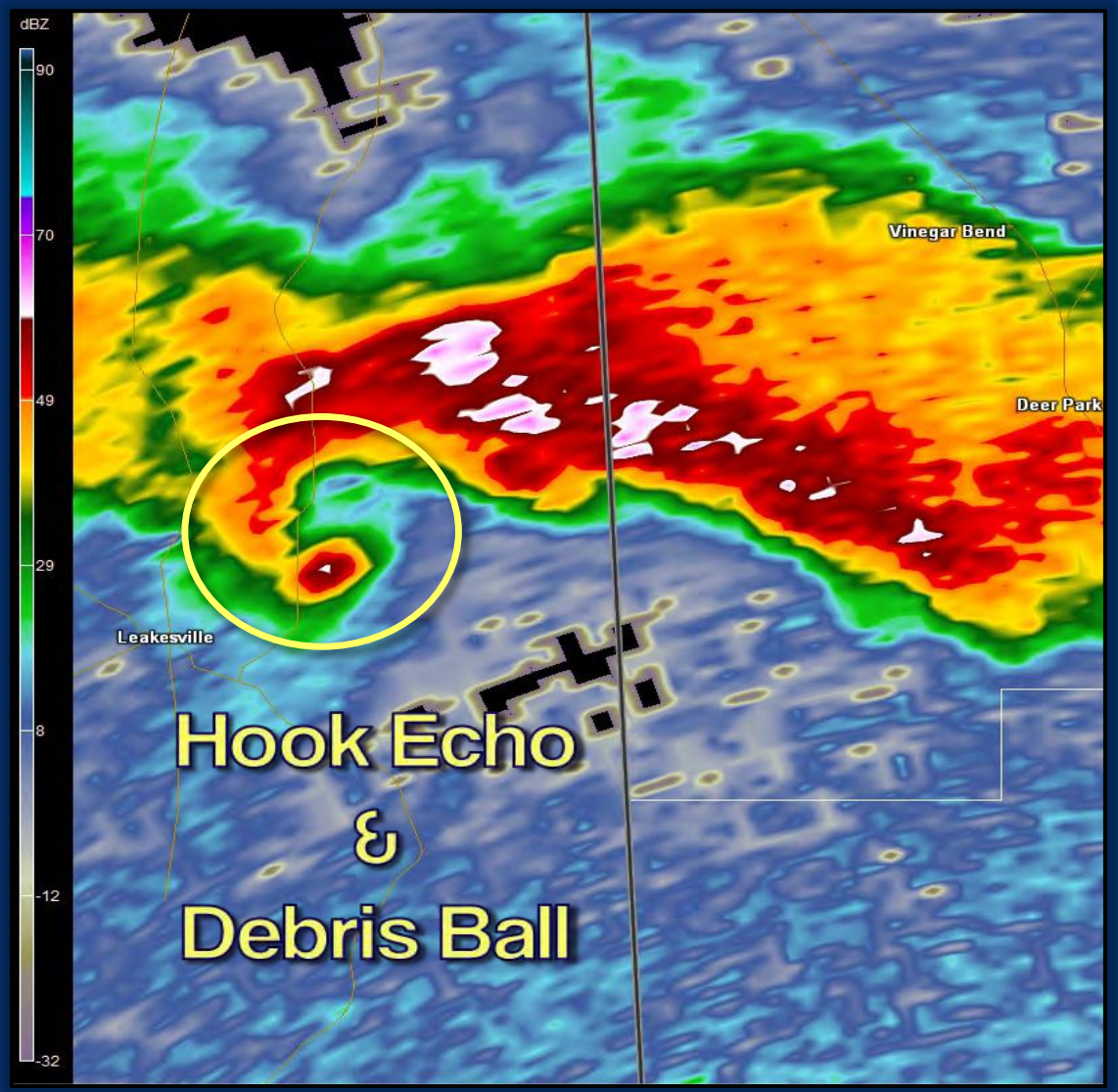
The most strong and violent tornadoes come from supercells

Remember your safety!

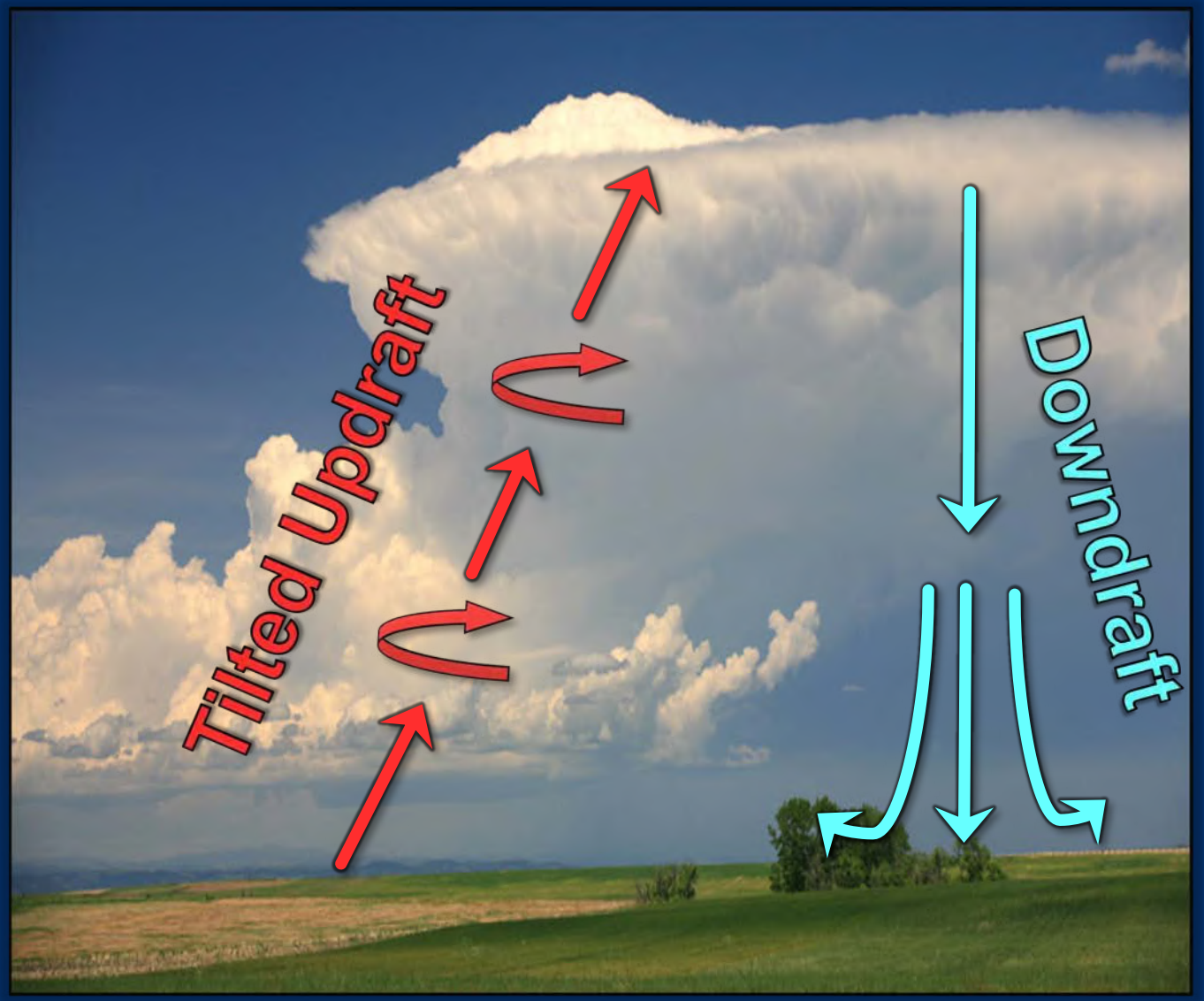
National Weather Service

Supercell Features

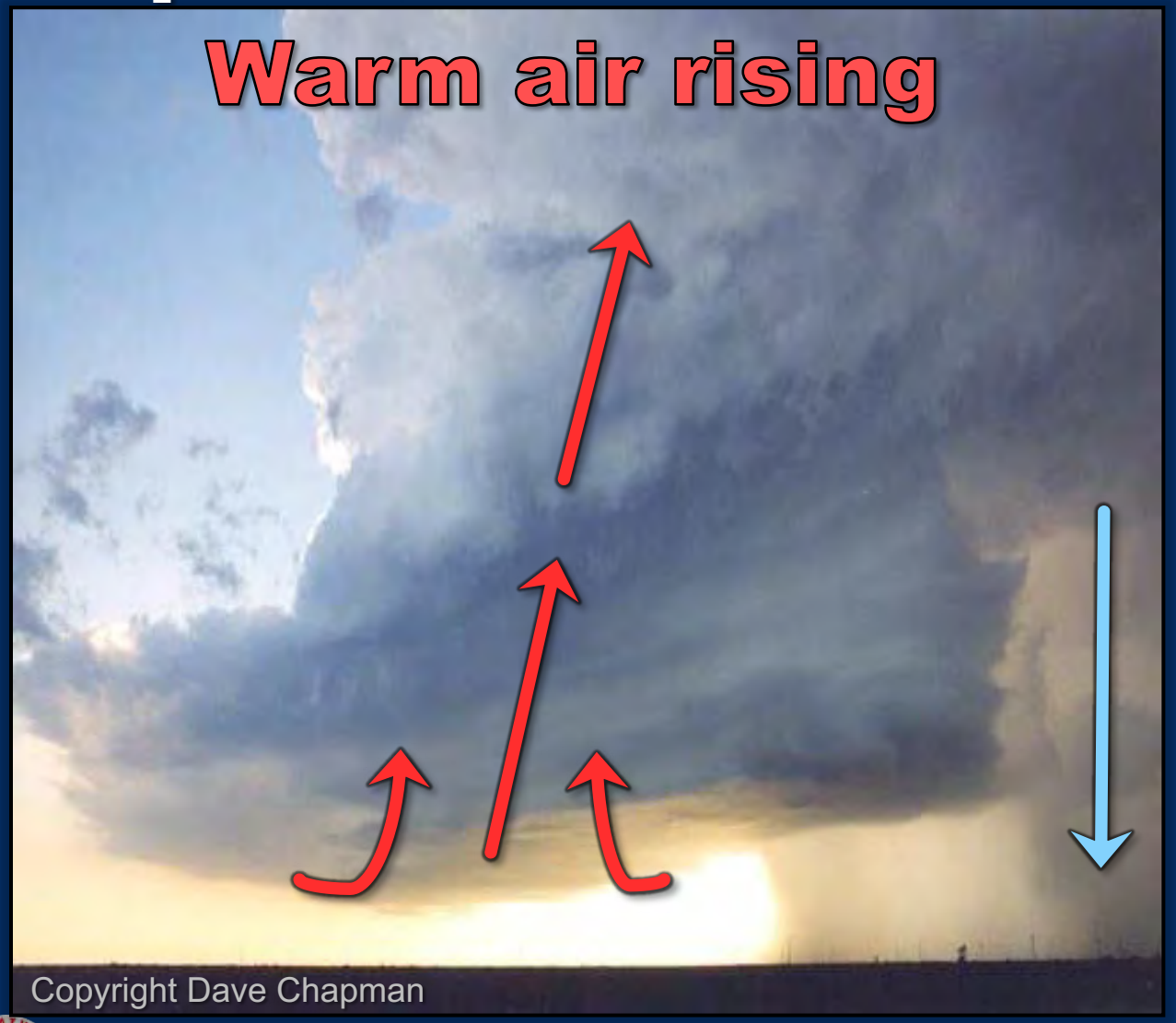




Supercell Features



Updraft



Cumulus tower

Rain-free base

Upward cloud motion

Warm air will be rising into the storm (hence the terminology “up” draft)

Supercell has rotating updraft

Wall Cloud

Updraft base

Rain-free area

Slopes toward the rain

Persistent: 10-20 minutes

Violent **ROTATION**

Potential pre-cursor to the tornado

Funnel Cloud

A **rotating**, funnel-shaped cloud extending downward from a thunderstorm base

Attached to cloud base

Rapid rotation

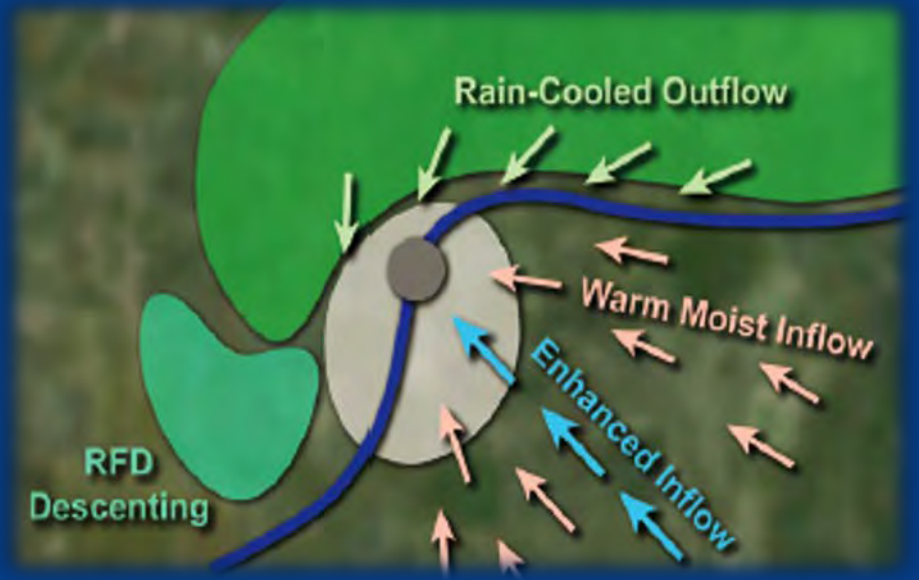
Smooth appearance

DOES NOT REACH THE GROUND

Tornado: Developing Stage

Circulation starts near the cloud base with rapid acceleration of clouds in a tightening rotation

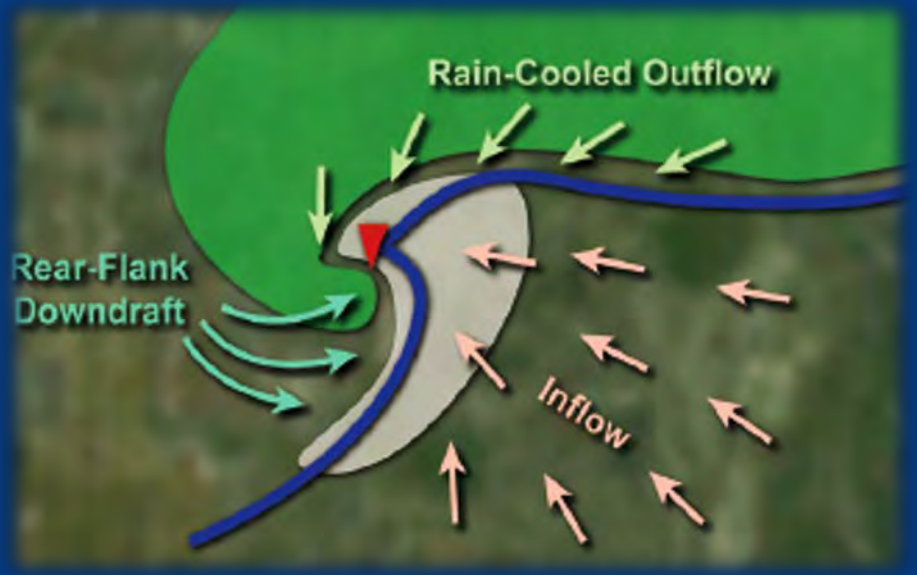
1st development sign might be a dust whirl



Tornado: Mature Stage

Strongest and most dangerous stage

Tornado is in a near-vertical orientation



Tornado: Mature Stage

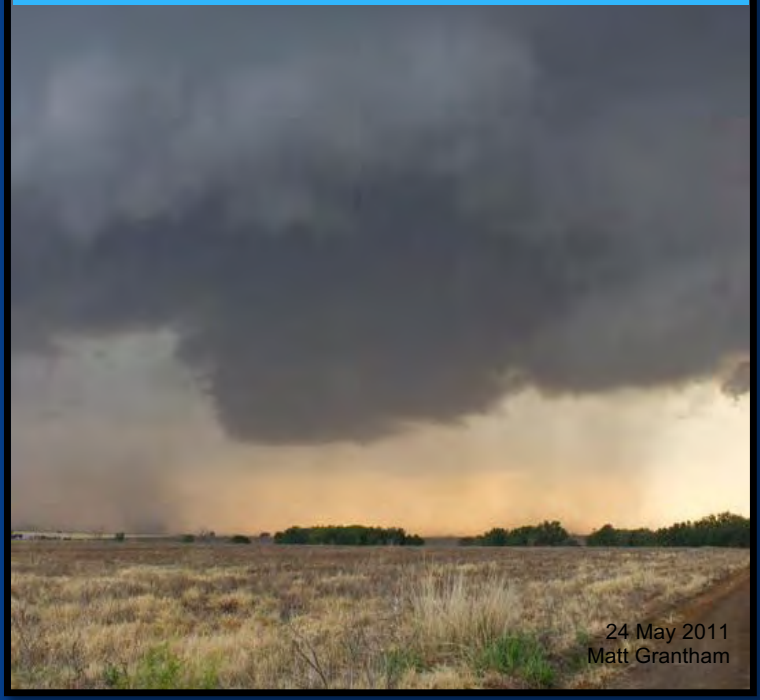
Tornado: Dissipating Stage

Tornado separates from the warm buoyant air that is necessary for survival

The tornado shrinks, tilts, and begins to rope out

Tornado Evolution

Wall Cloud
persistent, blocky lowering



Funnel Cloud
circulation not touching ground

Tornado
circulation touching ground

Downdraft

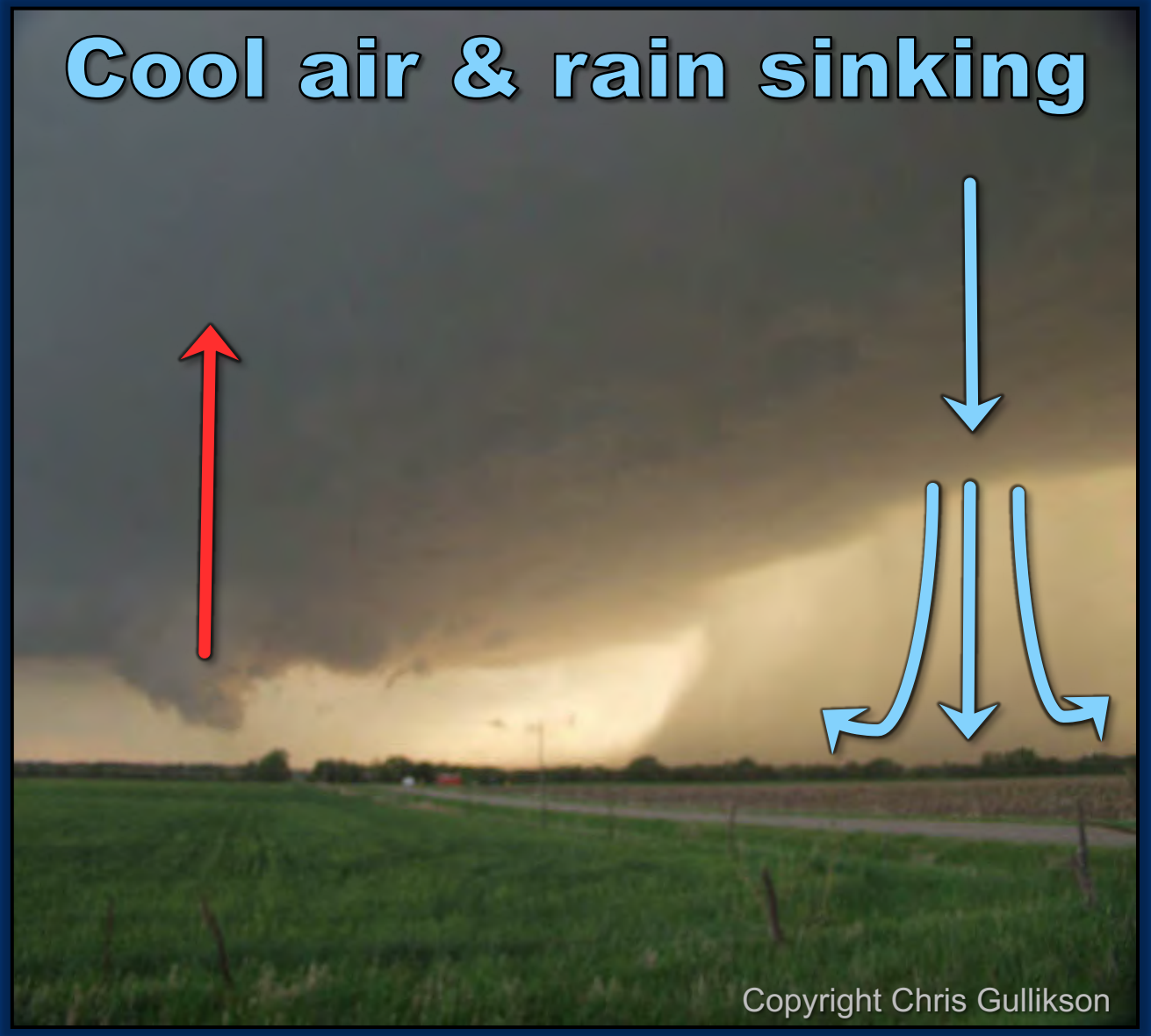
Dark area of the storm

Rainfall region

Downward motion

Cooler air and rain are sinking out of the storm (hence the terminology “down” draft)

Downburst and hail threat



Shelf Cloud

Marks the leading edge of the gust front (ahead of storms)

Produced by rain-cooled air

Cloud slopes down away from the rain

Sometimes associated with straight line wind damage (not tornadoes)

Wall Cloud or Shelf Cloud

Wall Cloud

Abrupt or “blocky” lowering

Associated with storm inflow

Slopes toward the rain

Moves along with storm

Shelf Cloud

Linear feature

Associated with storm outflow

Slopes away from the rain

Moves ahead of rain area

Tornado Look-A-Likes

Scud Clouds

Rain Shafts

Gustnadoes

Smoke

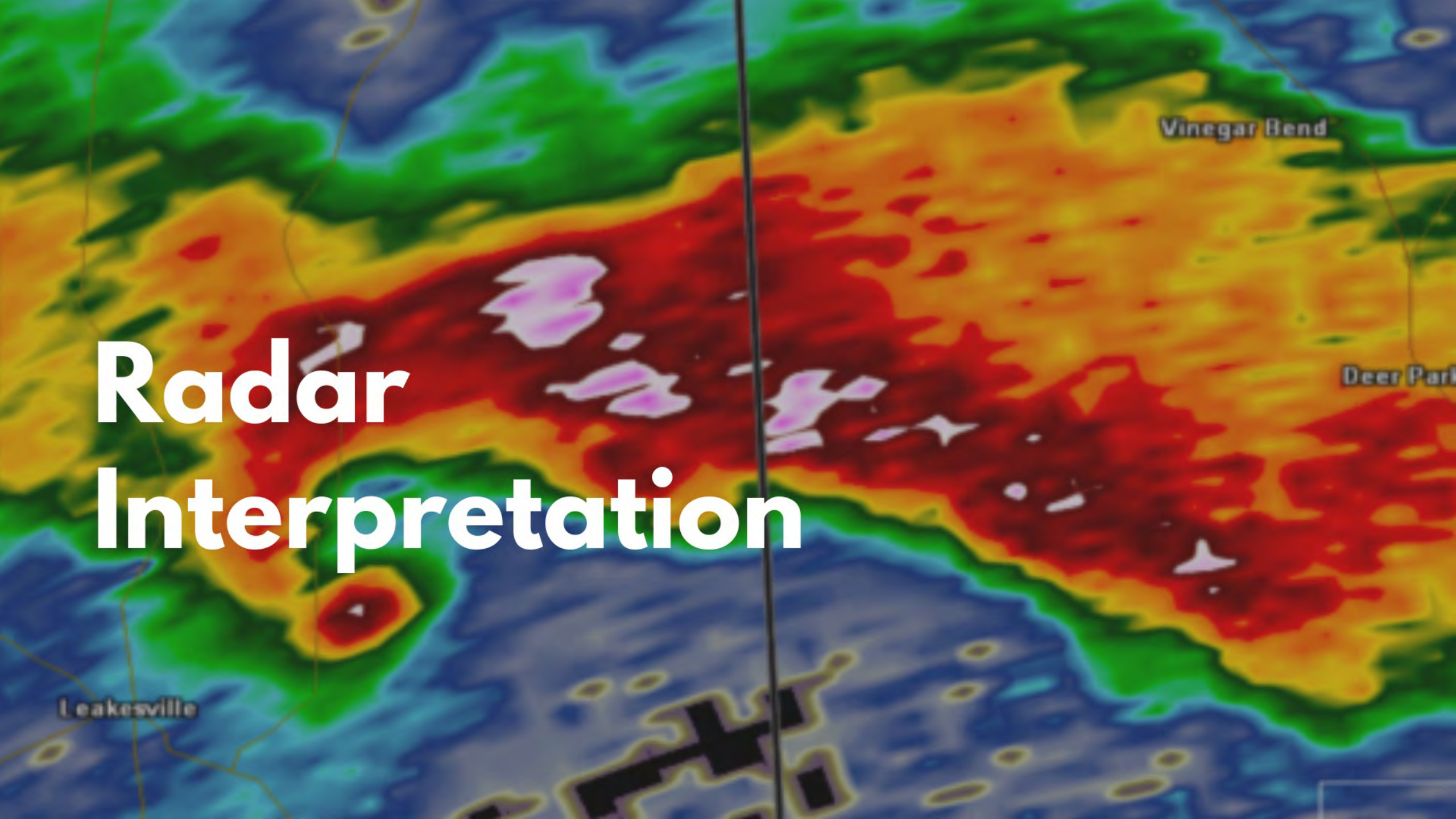
Communication Towers

Grain Elevators

Dust Devils

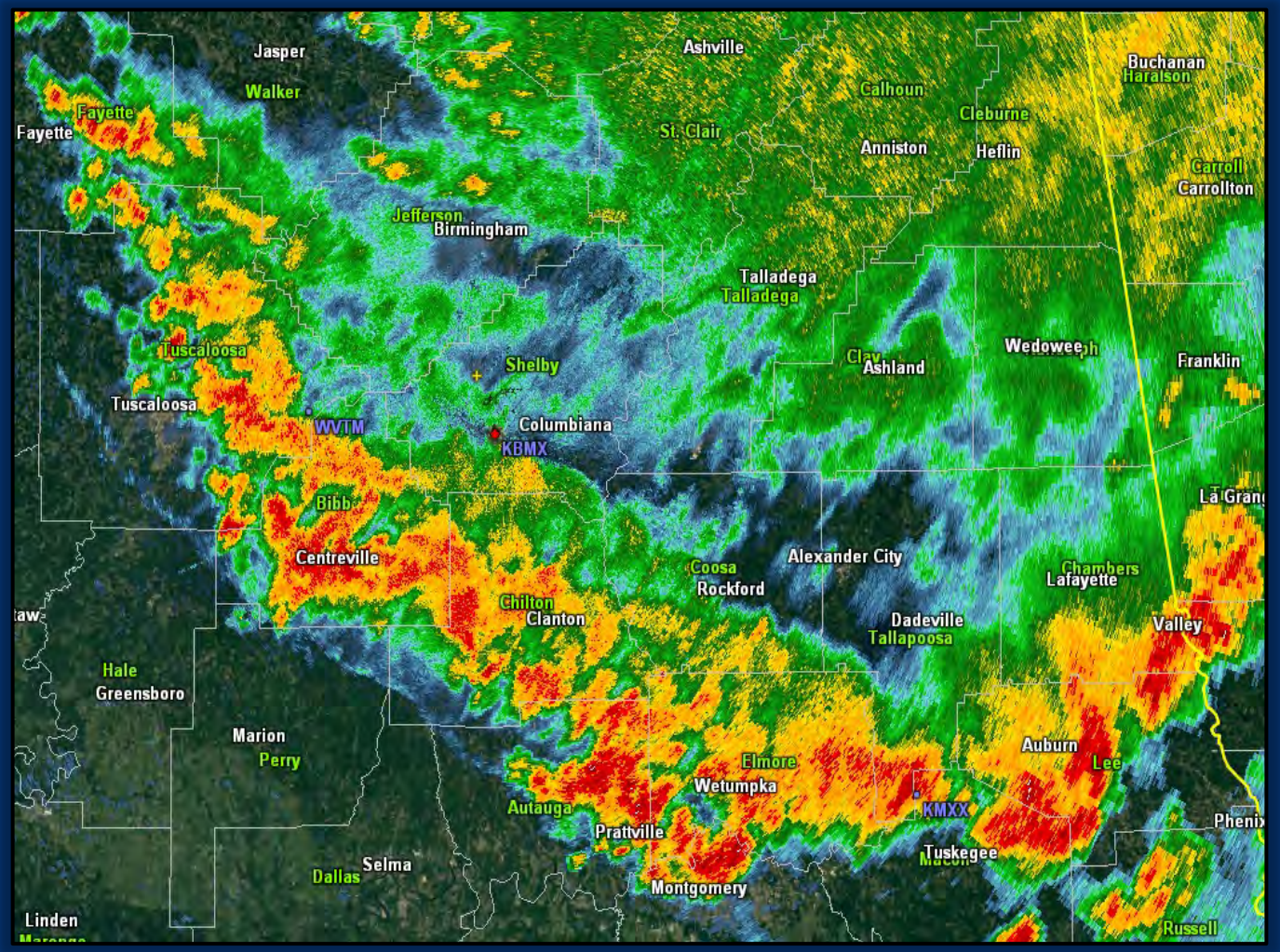
Tornado Look-A-Likes

Tornado Look-A-Likes



Radar Interpretation

Radar – Rain



Very Heavy Rain & Hail

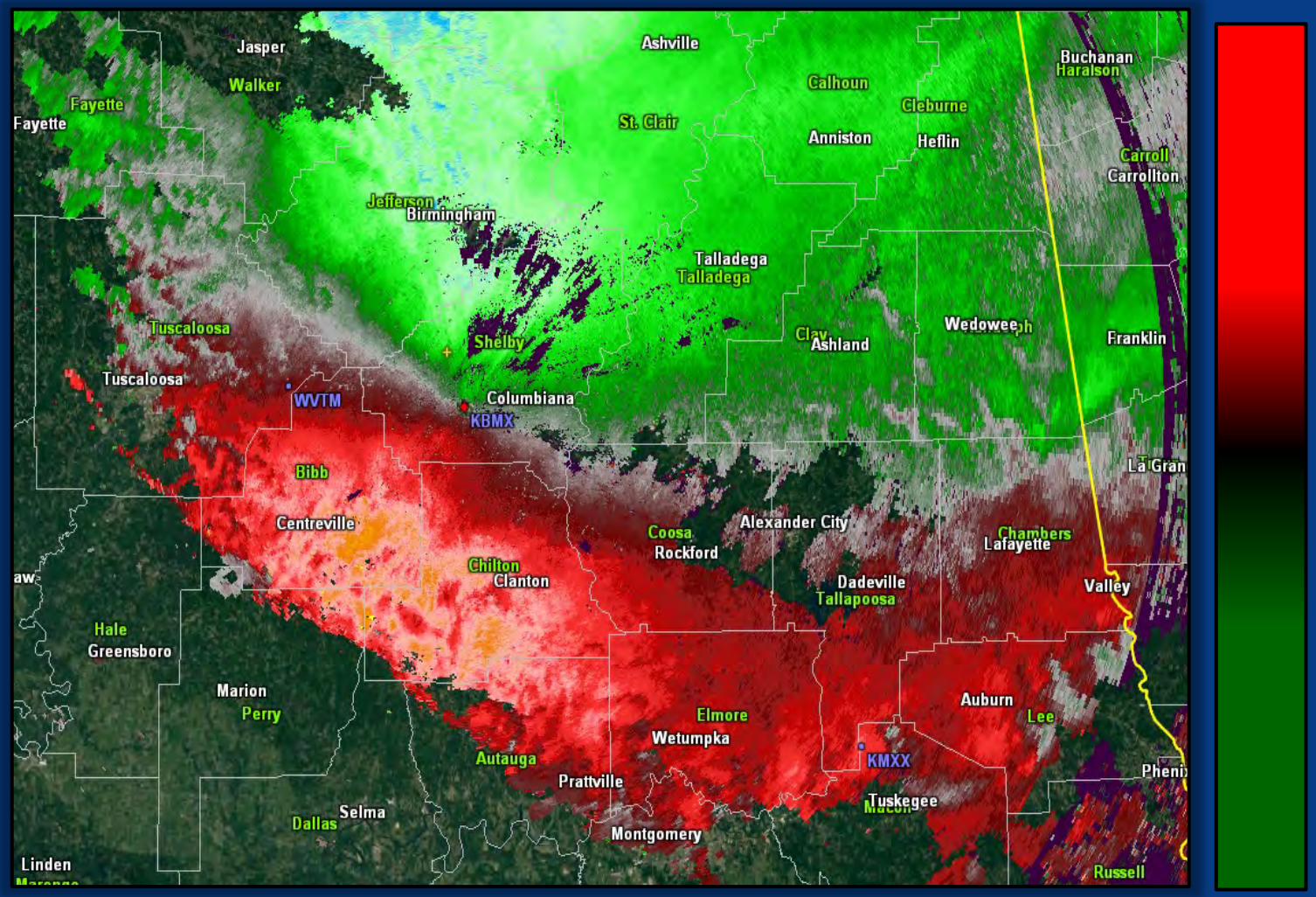
Heavy Rain

Moderate Rain

Light Rain

National Weather Service

Radar – Wind

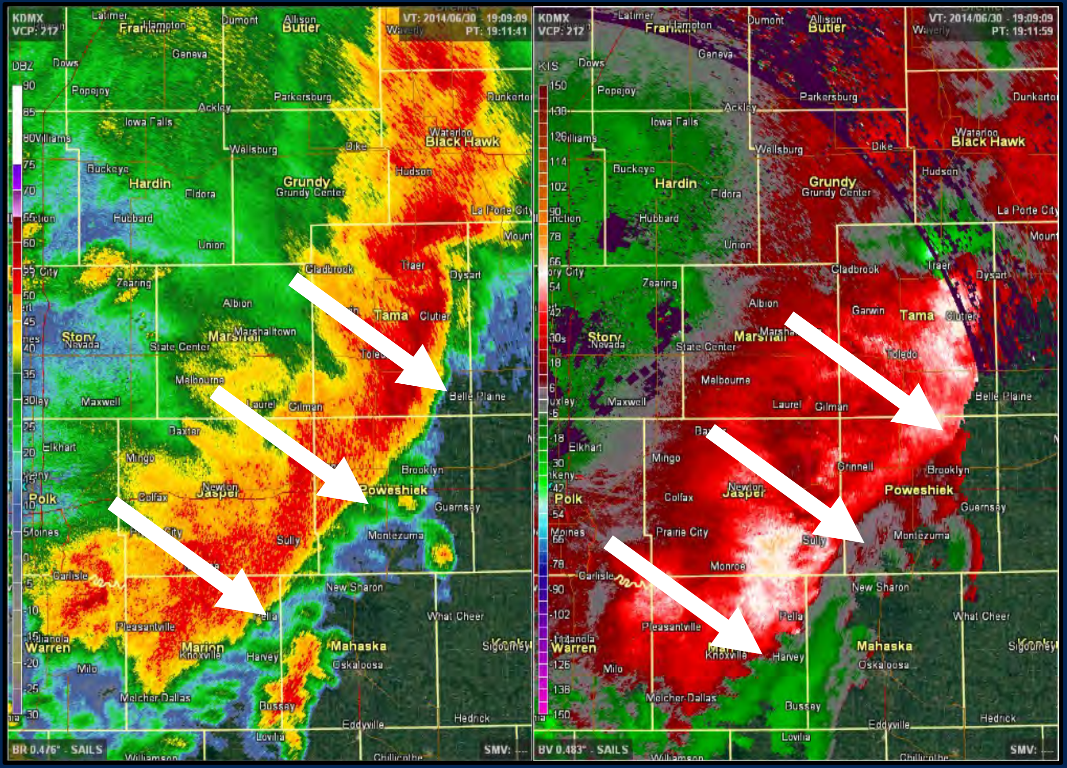


Red =
Wind Away From Radar

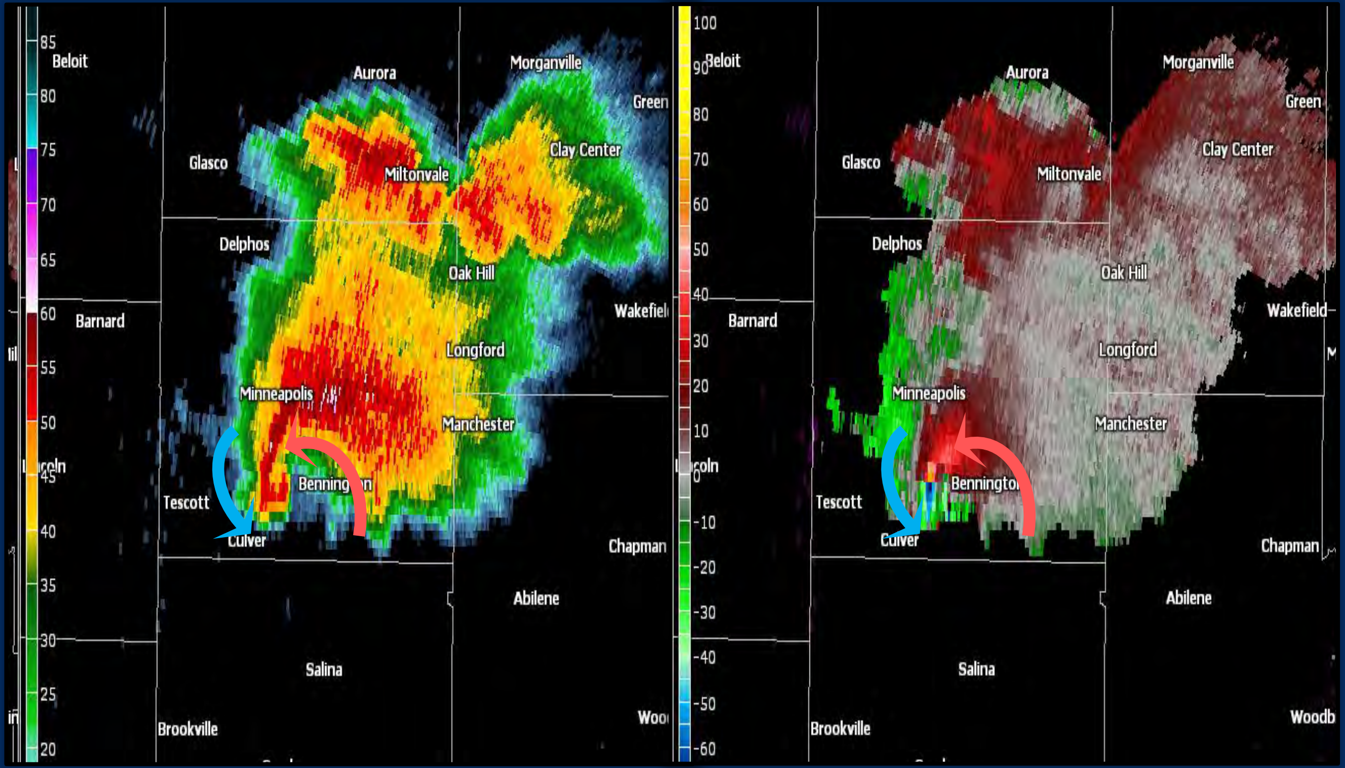
Green =
Wind Toward Radar

National Weather Service

Radar



Straight-Line, Damaging Wind



Rotating Wind, Tornado

What We Observe When Storm Spotting

Storm Chasing

The Plains vs The Southeast

The Plains vs The Southeast

The Plains vs The Southeast

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Categories of
Tornadoes

Categories of Tornadoes


Dover, Ok 10/4/98 (Todd Lindley)

We assign the intensity of tornadoes based on the *actual assessment* of the damage

This is **NOT** a visual guess based on the appearance of the storm

Sometimes large tornadoes are less intense than smaller more compact storms

Tornado Categories

- Weak
- Strong
- Violent

Weak Tornadoes

88% (or more) of ALL tornadoes

Less than 5% of all tornado deaths

Brief touchdowns

Path Length: less than a few miles

Wind Speed: up to 110 MPH

EF0 and **EF1**

Weak Tornadoes

The most common tornado type, yet produces the least amount of damage

Vulnerable Structures: Weak structures with large span roofs and mobile homes, manufactured homes, RVs, and homes on stilts

Strong Tornadoes

Leakesville, MS – April 15, 2011 – EF3


Foley, AL – October 13, 2001 – EF3

Account for only 11% of all tornadoes

Up to 30% of tornado deaths

Path Length: up to 10-15 miles

Wind Speed: 111-165 MPH

EF2 and **EF3**

Strong Tornadoes

Mobile homes and poorly constructed dwellings are **NO match for strong tornadoes**

This is the most likely occurrence of serious tornado damage across our local area


North Choctaw Co, AL
April 27, 2011 – EF3


Foley, AL – October 13, 2001 – F3

Mobile, AL – December 25, 2012 – EF2

Weak and Strong Tornadoes

Photos courtesy Tim Marshall

National Weather Service

VIOLENT TORNADOES

Typically from supercells

Account for 1% or less of all tornadoes

Around 70% of all fatalities

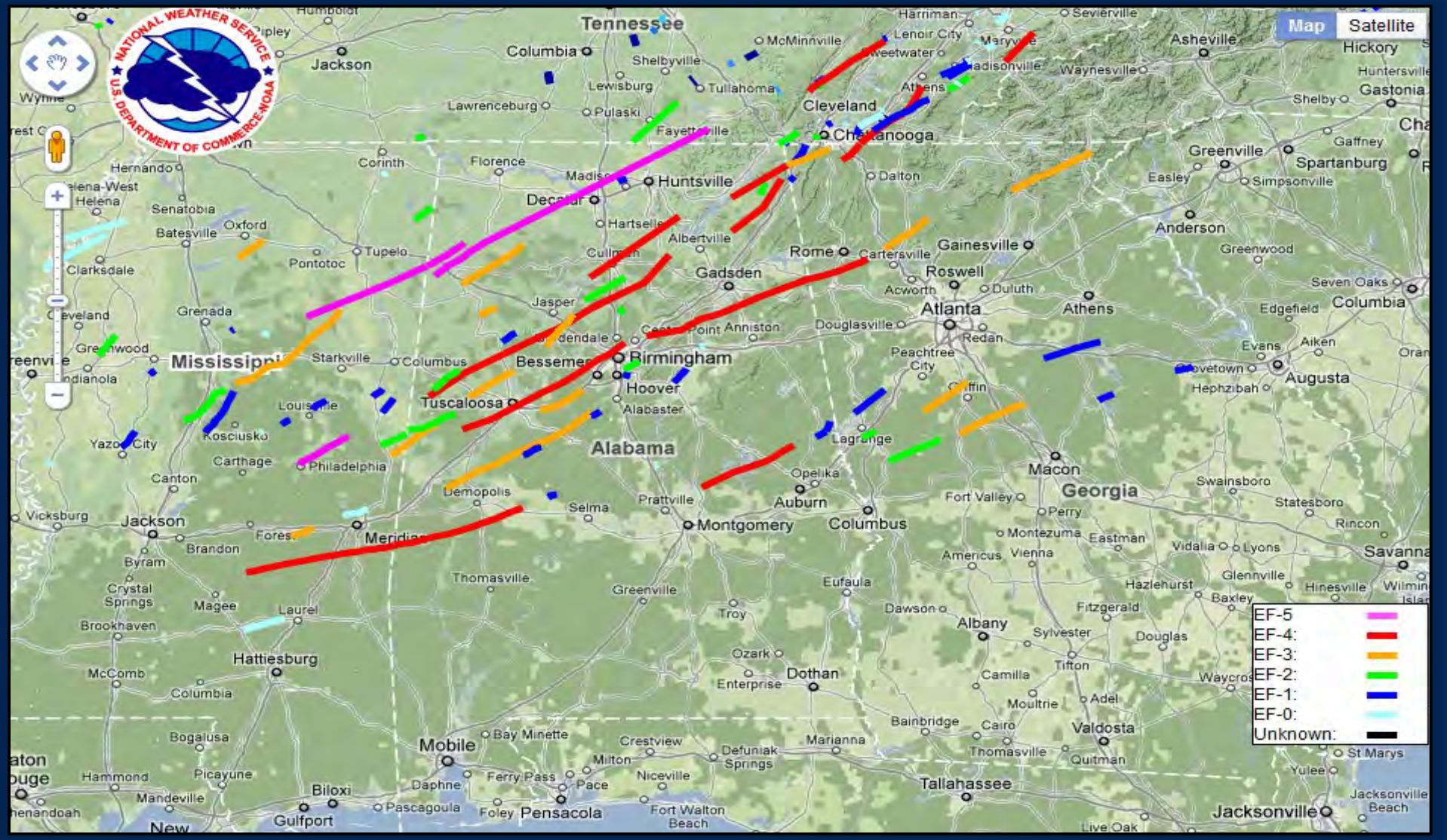
Path Length: up to 70+ miles

Path Width: 1+ miles

Winds: 200+ mph

EF4 and **EF5**

VIOLENT TORNADOES



National Weather Service

VIOLENT TORNADOES

National Weather Service

VIOLENT TORNADOES

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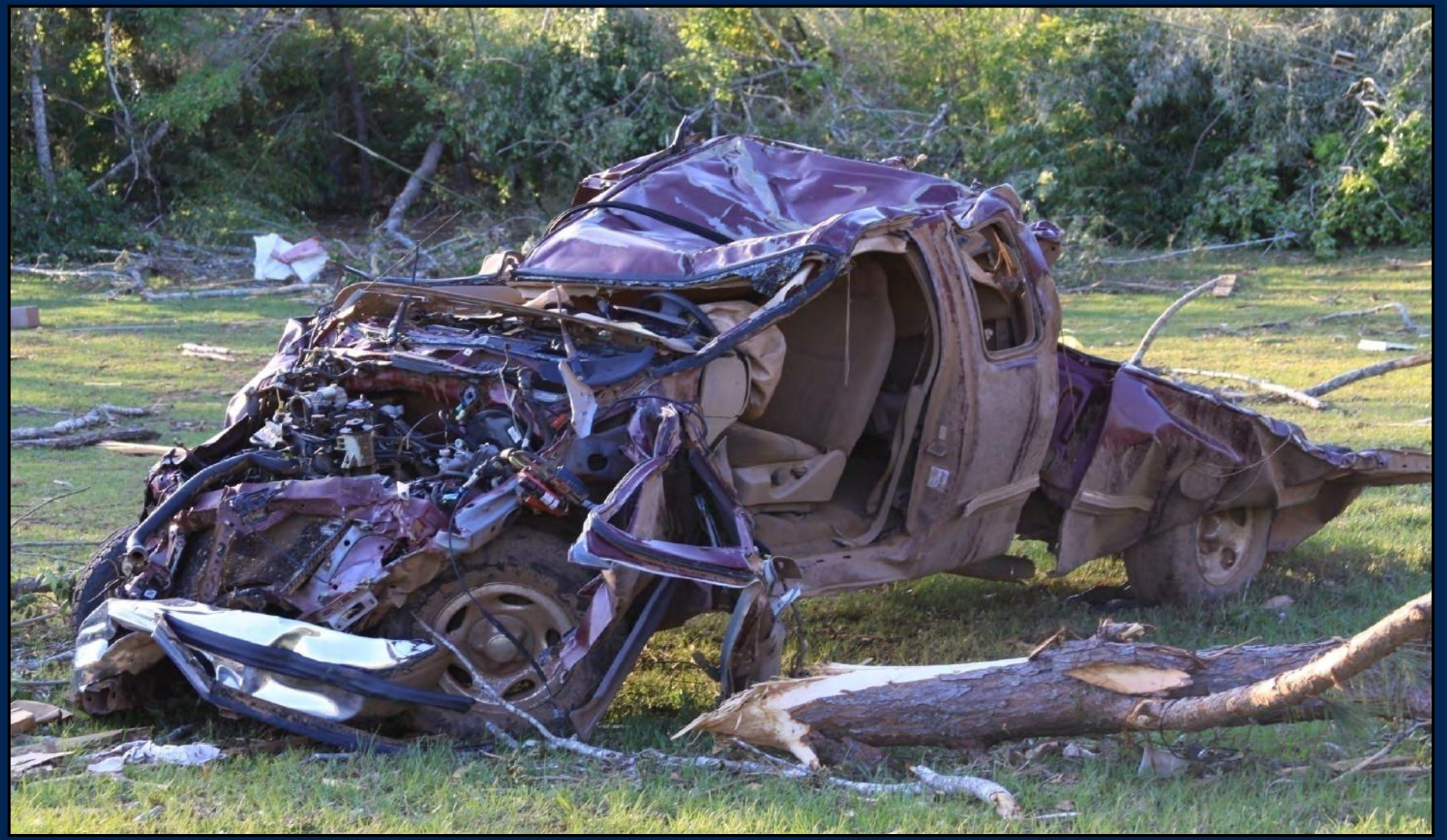
VIOLENT TORNADOES



National Weather Service

Damage Assessment

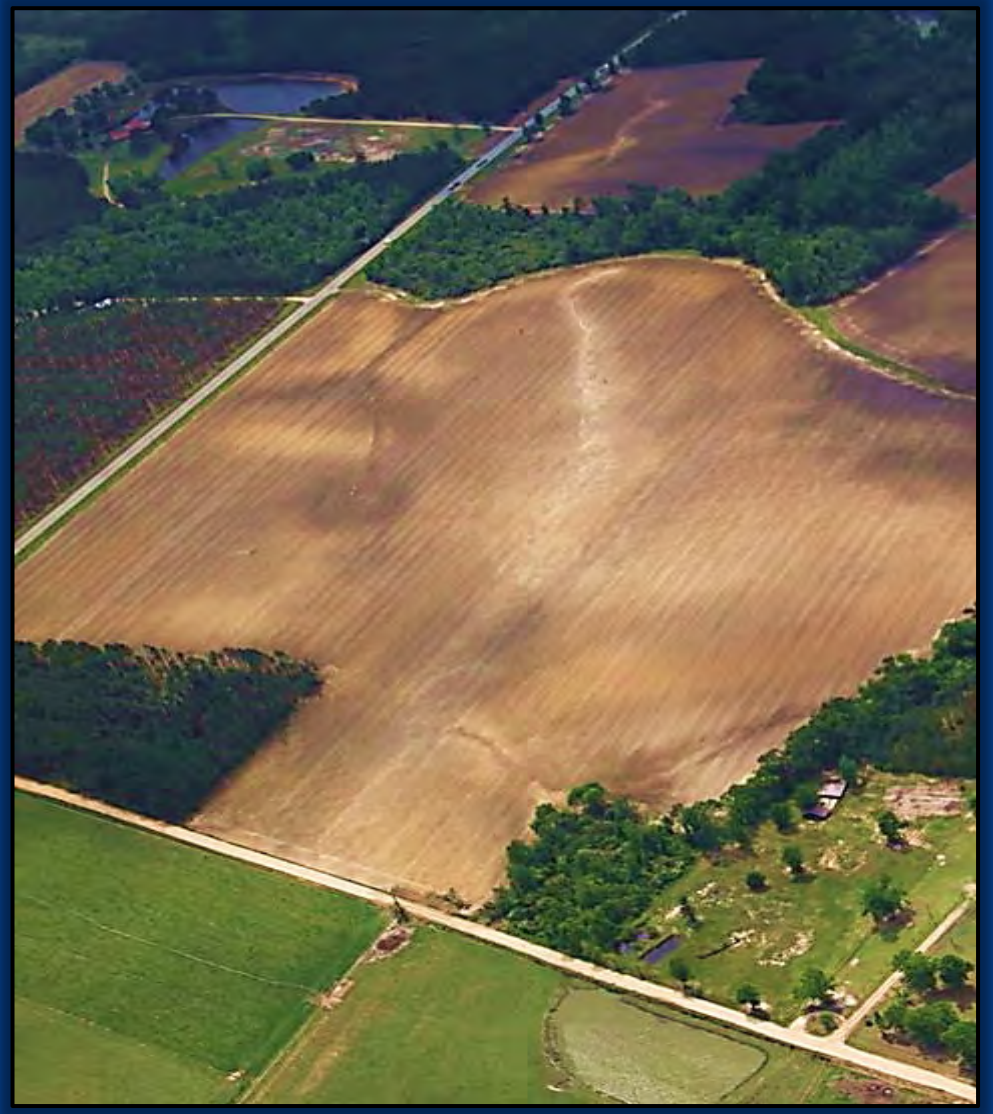
NWS Damage Assessment

Estimate wind strength based on clues seen in the damage produced by a tornado or thunderstorm

NWS staff are trained to use a process of assessing damage based on guidance from:

- National team of wind and structural engineers
- Storm damage experts

Ground and aerial surveys



NWS Damage Assessment

Clues to Wind Strength

National Weather Service

NWS Damage Assessment

Clues to Wind Strength

Greensburg, KS – EF5 – 2007

Photos courtesy of
Mike Theiss & Tim Marshall

NWS Damage Assessment

Clues to Wind Strength

Joplin, MO – EF5 – 2011

Photos courtesy of Tim Marshall

National Weather Service

NWS Damage Assessment

Looks Bad…Right? Look Closer

NWS Damage Assessment

Looks Bad…Right? Look Closer

Damage Indicators

So, how do we get the **final tornado rating**?

We have an app on our gov't devices that shows us the **degree of damage** possible for each of the **damage indicators** (on the right)

Residences

Commercial & Retail Structures

Schools

Prof. Buildings

Metal Buildings

Towers & Poles

Vegetation

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)

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

Enhanced Fujita (EF) Scale

Based on Damage

EF0 (Gale)	65-85 mph | 3-second gusts
EF1 (Weak)	86-110 mph | 3-second gusts
EF2 (Strong)	111-135 mph | 3-second gusts
EF3 (Severe)	136-165 mph | 3-second gusts
EF4 (Devastating)	166-200 mph | 3-second gusts
EF5 (Incredible)	over 200 mph | 3-second gusts


Tornado MYTHS

Tornado MYTHS

MYTH

Lakes, rivers & hills will protect me from getting hit by a tornado…

TRUTH

This is simply folklore. These features provide no protection and have no bearing on the development or movement of a tornado.

Tornado MYTHS

MYTH

Tornadoes will not strike me if I live in a downtown area or large metropolitan city…

TRUTH

Tornadoes have touched down in most big cities east of the Mississippi River such as Birmingham, Chicago, Louisville, Atlanta, Miami, Nashville, and even right here in MOBILE over the past few years.

Tornado MYTHS

MYTH

Mobile homes attract tornadoes…

TRUTH

Mobile homes are not more likely to get hit by a tornado. However, they are more likely to sustain damage (compared to a well-built house) from a tornado.

Tornado MYTHS

MYTH

I should shelter from a tornado under an overpass…

TRUTH

Overpasses are not safe. They can funnel wind and increase the strength of wind. They do not provide protection from flying debris. It also creates a traffic jam.

Tornado MYTHS

MYTH

I should open windows as the tornado approaches…

TRUTH

Stay away from windows. Your house will not explode from a decrease in pressure within the tornado.

If the tornado is close enough, chances are the wind & debris will destroy your house before the minimum drop in pressure occurs.

Contact NWS Mobile

Phone:
1-800-284-9059

Web:
weather.gov/mob

Facebook:
facebook.com/NWSMobile

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twitter.com/NWSMobile

YouTube:
youtube.com/NWSMobile