



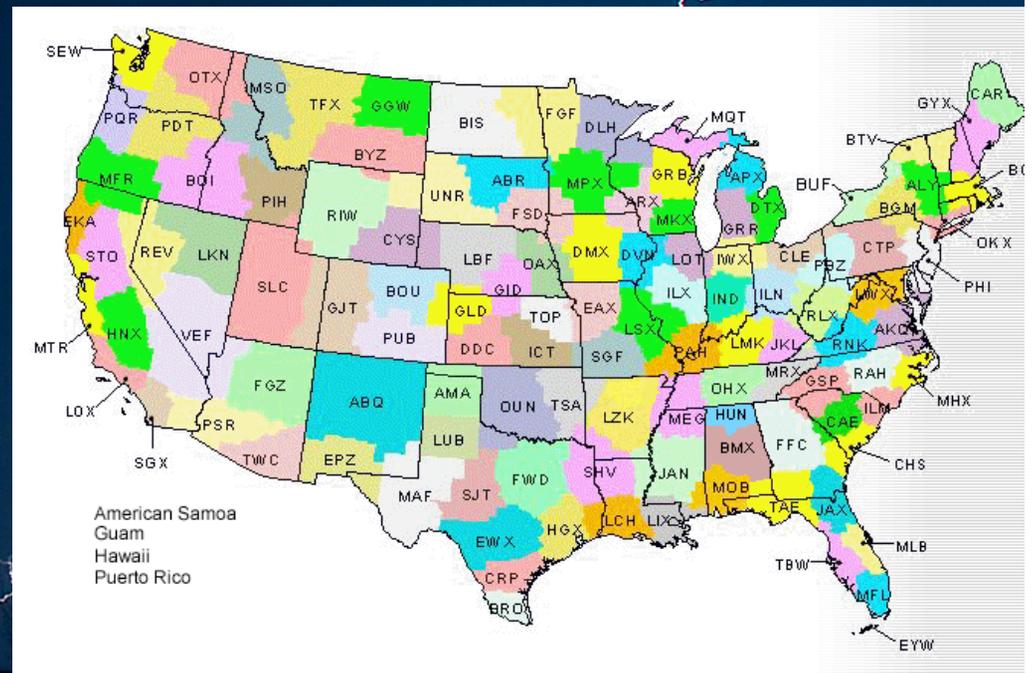
# Skywarn Spotter Training

2013



# National Weather Service

- Federal government
  - Department of Commerce
    - National Oceanic and Atmospheric Administration (NOAA)
- 122 Weather Forecast Offices
- 9 National Centers
  - Storm Prediction Center
  - Climate Prediction Center
  - Tropical Prediction Center



# NWS Detroit/Pontiac

- A team of 24 professionals
  - Meteorologist, Hydrologist,
  - Electronics/IT, Administrative
- Mission: Forecasts and warnings for the protection of life and property
- Forecasts and warnings issued 24/7
- 17 counties in Southeast Michigan
- All or portions of Lakes Huron, St. Clair and Erie



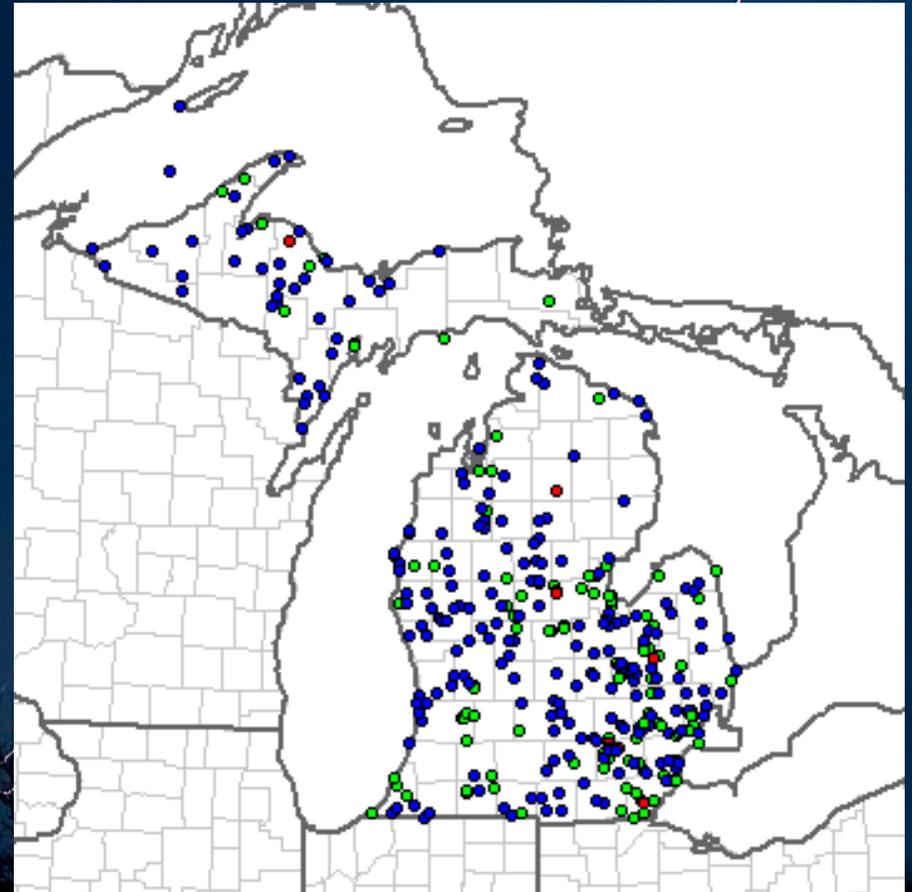
# Review of Last Year

| DTX  | Warnings | Warnings Verified | Events | Fully Warned | Partially Warned | Lead Time | LT 1 <sup>st</sup> Event |
|------|----------|-------------------|--------|--------------|------------------|-----------|--------------------------|
| 2012 | 119      | 77                | 222    | 196          | 0                | 24.5      | 24.6                     |

| Year(s)   | Severe Event Detection | False Alarm | Lead Time |
|-----------|------------------------|-------------|-----------|
| 1995-2007 | 81 %                   | 27 %        | 19.3      |
| 2008-2012 | 88 %                   | 32 %        | 23.3      |
| 2012      | 88 %                   | 35 %        | 24.5      |

# Michigan Severe Weather Summary - 2012

- Total Reports = 375
- Tornadoes = 6
- Hail Reports = 115
- Wind Reports = 254
- **SE MI Tornadoes = 4**
  - March 12, EF1 Coleman
  - March 15, EF3 Dexter
  - March 15, EF2 Columbiaville
  - March 15, EF0 Ida



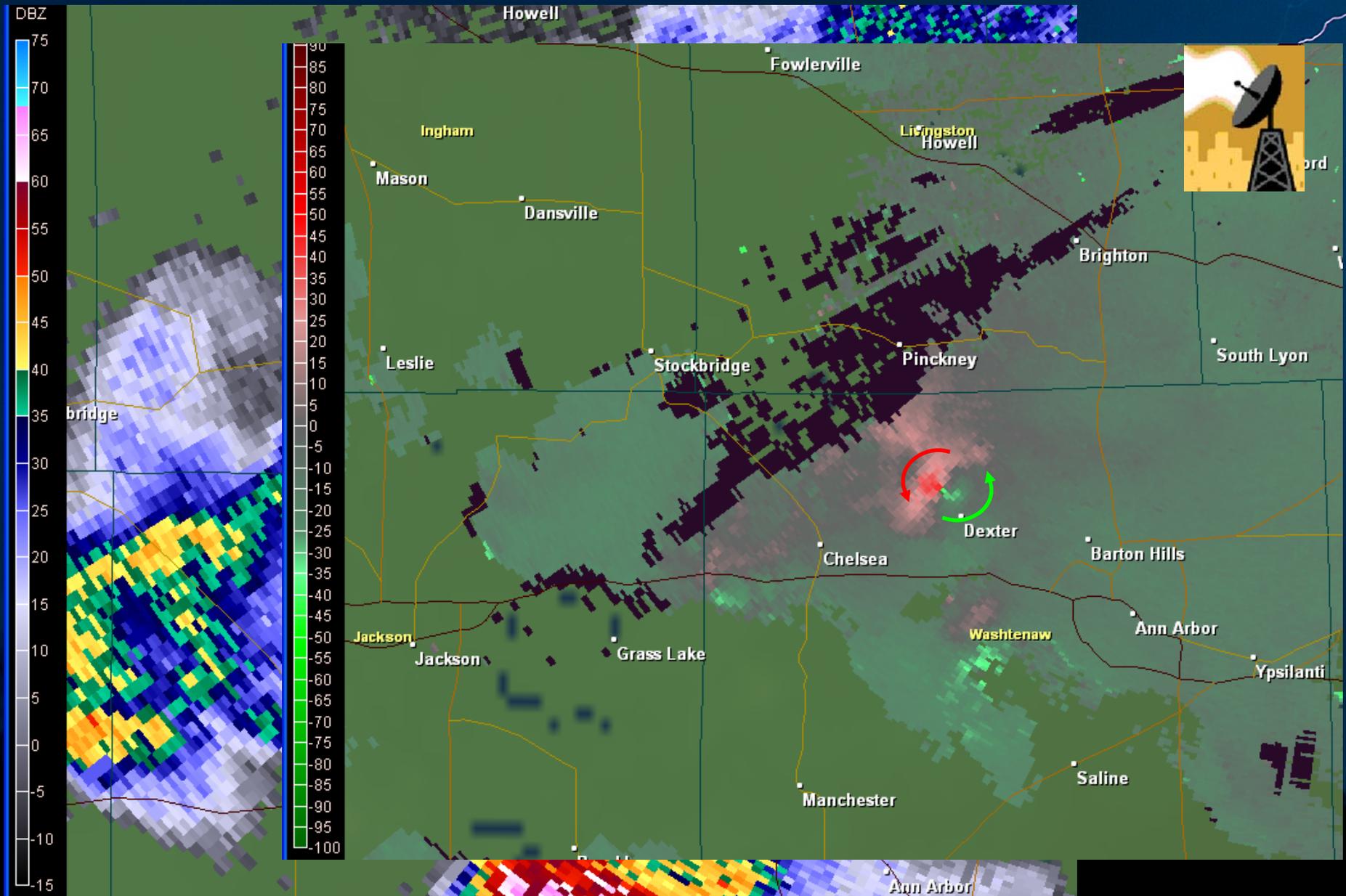
# Dexter Tornado



March 15, 2012 2135Z

Dexter, Michigan

*Nick Nolte*  
©2012 www.nicknolte.com

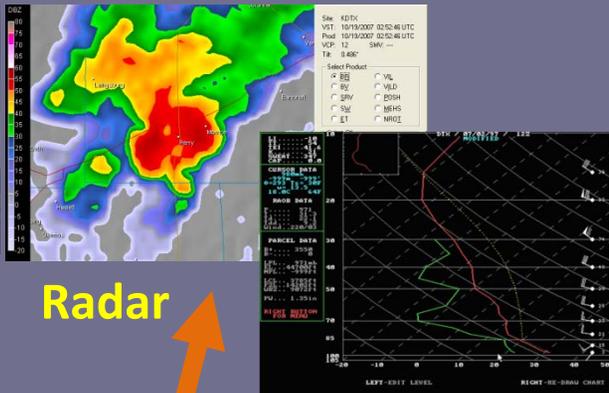




# From Spotters to Warning the Public



Spotter



Radar



Public - Action

Environment

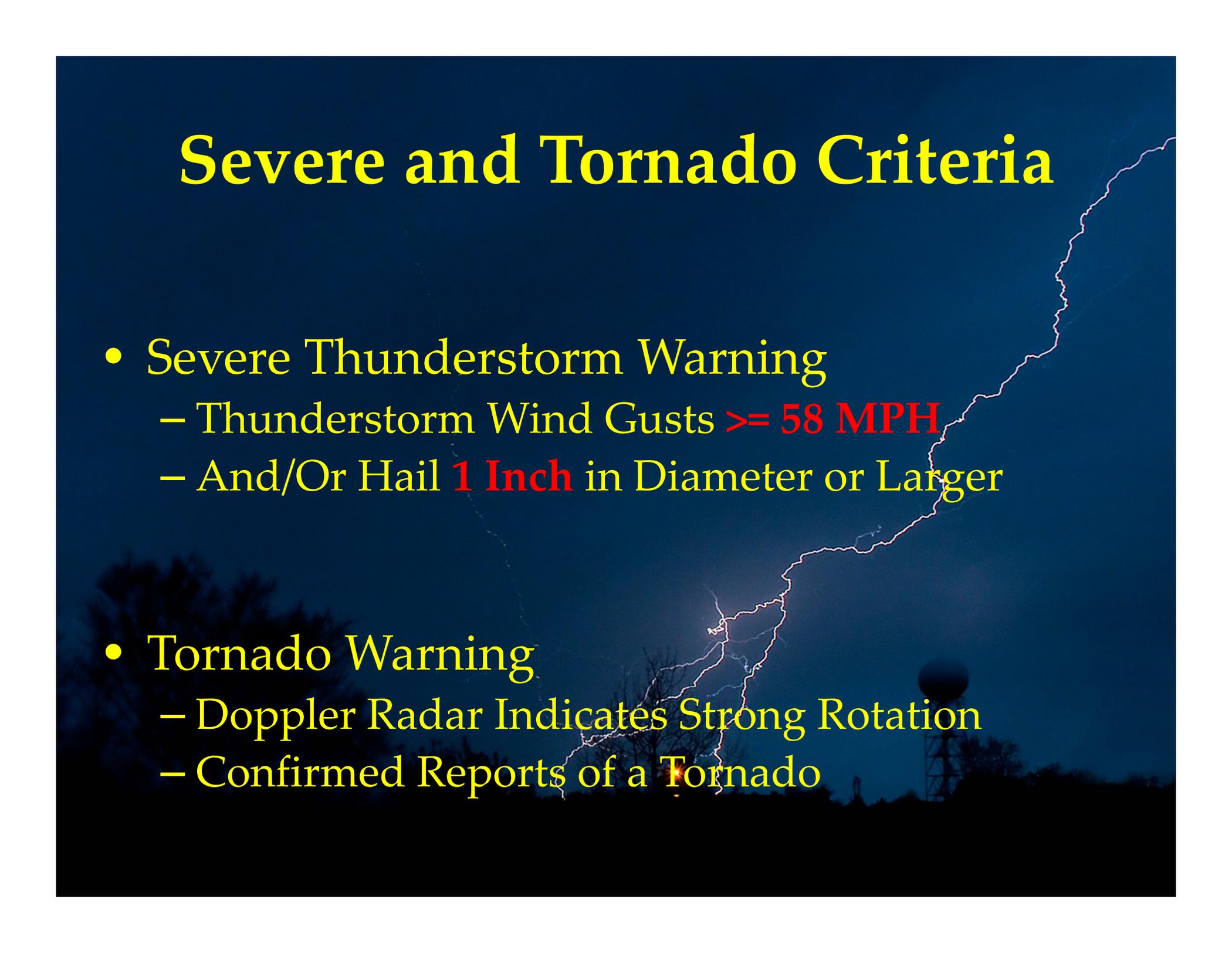


Dissemination

NWS



# Severe and Tornado Criteria



- Severe Thunderstorm Warning
  - Thunderstorm Wind Gusts  **$\geq$  58 MPH**
  - And/Or Hail **1 Inch** in Diameter or Larger
- Tornado Warning
  - Doppler Radar Indicates Strong Rotation
  - Confirmed Reports of a Tornado

# What to Report: Wind

## Wind Gusts of 40 MPH or Greater

- 25-31 Large branches in motion; whistling heard in telephone wires
- 32-38 Whole trees in motion; inconvenience felt in walking against the wind
- 39-54 Twigs break off trees; wind generally impedes progress
- 55-72 Damage to chimneys, TV antennas; pushes over shallow rooted trees
- 73-112 Peels surfaces off roofs; windows broken; light mobile homes overturned; moving cars pushed off road
- 113-157 Roofs torn off houses; cars lifted off ground

# What to Report: Hail

## Hail ½ inch or Greater

|                     |                       |                    |                       |
|---------------------|-----------------------|--------------------|-----------------------|
| Pea                 | 0.25 - .375<br>inch   | Lime               | 2.00 inches           |
| Plain M&M           | 0.50 inch             | Tennis Ball        | 2.50 inches           |
| Penny               | 0.75 inch             | Baseball           | 2.75 inches           |
| Nickel              | 0.88 inch             | Large Apple        | 3.00 inches           |
| Quarter             | 1.00 inch<br>(15/16") | Softball           | 4.00 inches           |
| Half dollar         | 1.25 inch             | Grapefruit         | 4.50 inches           |
| Walnut/Ping<br>Pong | 1.50 inch             | Computer<br>CD/DVD | 4.75 - 5.00<br>inches |
| Golf ball           | 1.75 inch             |                    |                       |

# What to Report: Tornadoes

- Report all tornadoes
- Please tell us your location and direction you are looking
- Seek shelter!



# What to Report: Tornadoes

## When Reporting a Tornado...

- Is it rotating? Do you see debris or electrical flashes?
- Good and accurate reports = Good warnings
- Bad reports lead to false alarms
  - If not sure, wait and keep watching.

**Provide Frequent Updates!**



Livingston County

# What to Report: Flooding

- Rainfall of 1 inch or greater in a “storm”
  - 12-24 hours in winter
  - 1-3 hours for thunderstorms
- Flooding that covers roads or threatens property
- River flooding
- Ice jams



# What to Report: Post-Storm Damage

- Please tell us about any storm damage
  - Large tree limbs
  - Downed trees and power lines
  - Structural damage
- Damage reports, even after the fact, help us verify warnings



West Bloomfield Wind Damage August 2011

# What to Report: Funnel Clouds

**Funnel Cloud:** A rotating column of air that is **NOT** in contact with the ground, tops of buildings, or tree tops



Willow, MI



Sarnia, Ontario

# How to Report

## 1) Toll-Free Spotter Hotline

- Unlisted, 24 hours

**1-800-808-0006**

## 2) Amateur Radio, Local Nets, and MICON

## 3) Internet

- Facebook: [/US.NationalWeatherService.Detroit.gov](https://www.facebook.com/US.NationalWeatherService.Detroit.gov)

- Twitter [@NWSDetroit](https://twitter.com/NWSDetroit)

- eSpotter [espotter.weather.gov](http://espotter.weather.gov)

## 4) Packet Radio **K8DTX-5, 145.76 MHz**

# How to Report



When reporting, tell us:

- ✓ Your location
  - ✓ City
  - ✓ Address or closest major intersection
- ✓ What you are seeing
- ✓ If you are reporting wind or hail, please tell us if its Measured or Estimated
- ✓ Time of the event (if known)
- ✓ Any Damage

**Remember: TEL (TimeEventLocation)**

# Thunderstorm Safety

A dark blue background with a bright lightning bolt striking down from the top right towards the center. The lightning bolt is jagged and bright white/yellow. In the bottom right corner, there is a silhouette of a radio tower with a large spherical antenna. The overall scene is a dramatic representation of a thunderstorm at night.

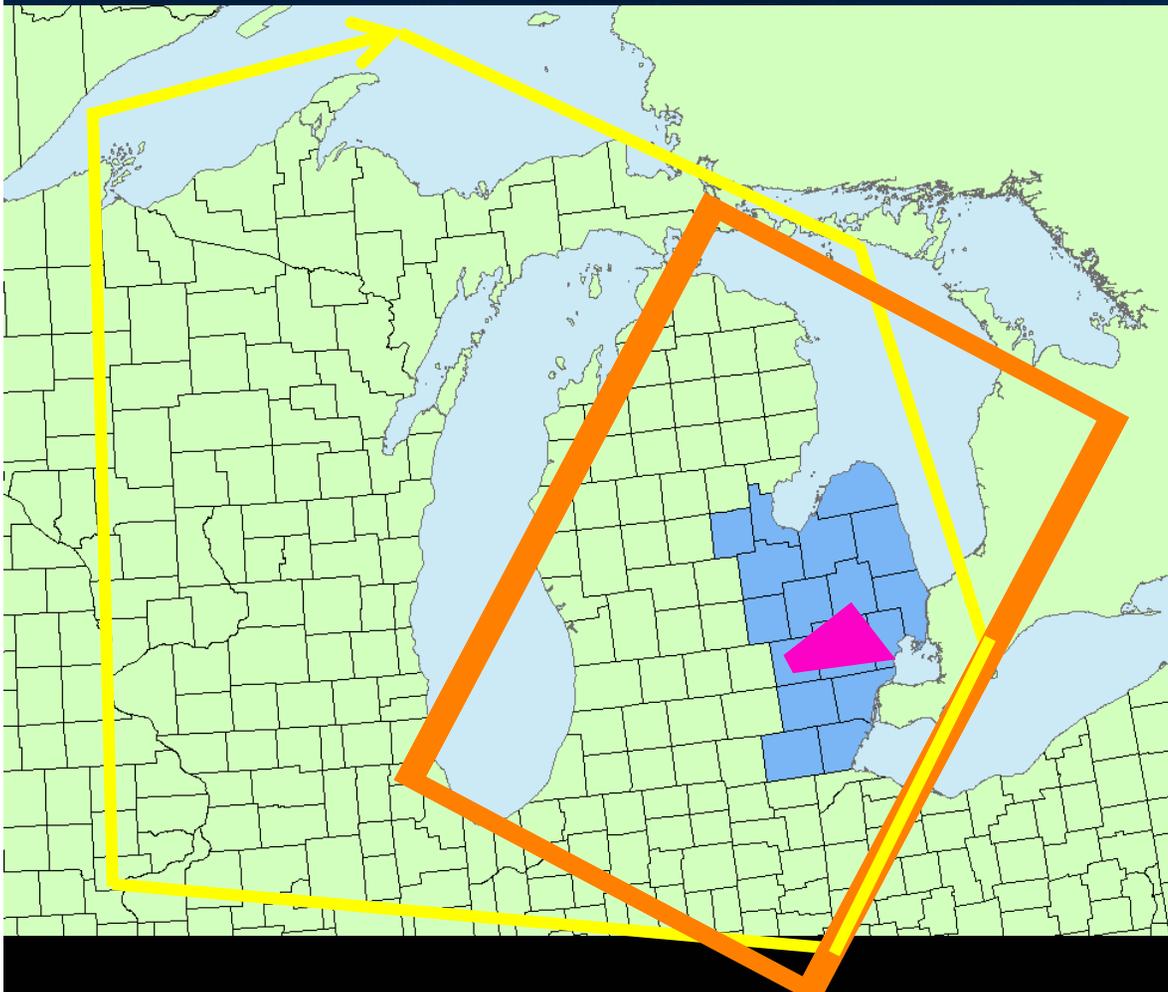
- Lightning
  - Stay indoors or in your car
  - Don't shower or use corded telephones
  - Don't take shelter under tree or pavilions
- Flooding
  - Turn around, don't drown
- Hail
  - Don't run outdoors to measure; wait until storm passes
- High Winds
  - Stay in center/interior part of building
  - Be aware of downed trees and power lines after storm

# Tornado Safety



- Go to basement and get under something sturdy (stairs/desk)
- If no basement, go to interior room with no windows
- If driving, find a sturdy building
- Protect your head by getting low and covering yourself with pillows and blankets
- Stay there until threat is over

# NWS Products Issued for Severe Weather



## Outlook

- Several days in advance
- General idea of area and what is expected

## Watch

- 2-6 hours in advance
- More specific threat, area, and timing

## Warning

- 10-60 minutes in advance
- Very specific threat, area, and timing

# Weather Resources



## NOAA's National Weather Service Weather Forecast Office Detroit Home Page [www.weather.gov/detroit](http://www.weather.gov/detroit)

Home Site Map News Organization

Search for:  NWS All NOAA Go

Local forecast by  
"City, St" or Zip Code

City, St  Go

Current Hazards

Watches / Warnings  
Outlooks  
U.S. Hazards  
Hurricane Info  
NOAA Watch  
Local Hazards  
Snowfall Forecast  
Submit a Report

Current Conditions  
Observations  
Satellite Images  
Rivers & Lakes AHPS  
Precip Estimate  
Snow Cover  
Drought Monitor

Radar Imagery  
Local Radar  
Nationwide

Forecasts  
Activity Planner  
Local Area

Aviation  
Marine  
Fire Weather  
Graphical  
Great Lakes

Rivers / Hydrology  
AHPS / River Info  
Flash Floods

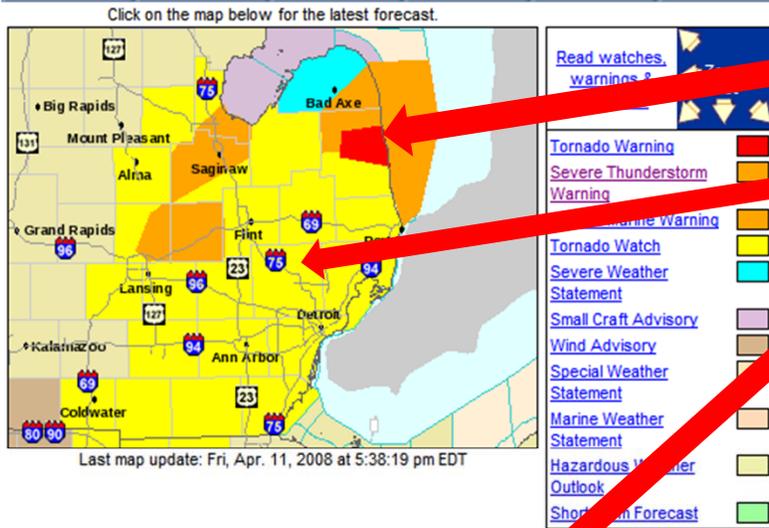
Climate  
Local  
National  
More...

Weather Safety  
StormReady

### Top News of the Day

- Severe Weather Threat This Afternoon and Evening
- Anniversary of Palm Sunday Tornado Outbreak April 11th 1965
- Spotter Training Classes Scheduled...April 12 in Detroit...April 14 near Holly
- Michigan Severe Weather Awareness Week Is April 6 Through April 12

Watches & Warnings Observations Forecast Graphics Rivers & Lakes Climate Marine



Warnings show up on home page.

Click on map for your local forecast.

View radar and satellite imagery.

Latest Conditions in Detroit Metro, MI Choose Your Front Page City

Apr 11  
4:53 pm **70° F**  
Partly Cloudy and Windy (21°C)  
Select A City:

Weather Story Radar Satellite Weather Map

# Weather Resources

Fcst\_DTX\_Schd.pdf (application/pdf Ob... Storm Prediction Center



NOAA's National Weather Service

## Storm Prediction Center

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

Site Map

News

Organization

Search for:

Local forecast by  
"City, St" or "ZIP"

City, St

UTC/GMT/Zulu Time  
**19:19:17**

Overview

SPC Products

All SPC Forecasts

Current Watches

Meso. Discussions

Conv. Outlooks

Fire Wx Forecasts

RSS Feeds

Weather Information

Storm Reports

NWS Hazards Map

Watch/Warning Map

National RADAR

Product Archive

Norman, OK WX

Research

Non-op. Products

Forecast Tools

Svr. Tstm. Events

SPC Publications

Education & Outreach

About the SPC

SPC FAQ

About Tornadoes

About Derechos

WCM Page

Enh. Fujita Page

Cool Images

Our History

Public Affairs

### Top News of the Day

- The following Weather Watches are currently in effect:  
18...
  - The following Mesoscale Discussions are currently in effect:  
145...
  - Note:** Starting **January 5, 2010**, the daily storm report summaries will record **1 inch and greater diameter hail**, as well as severe thunderstorm wind and tornado reports. Please see this [link](#) for more information.
- More news items below the overview graphic. Updated: 2010-02-24 19:12:18 GMT

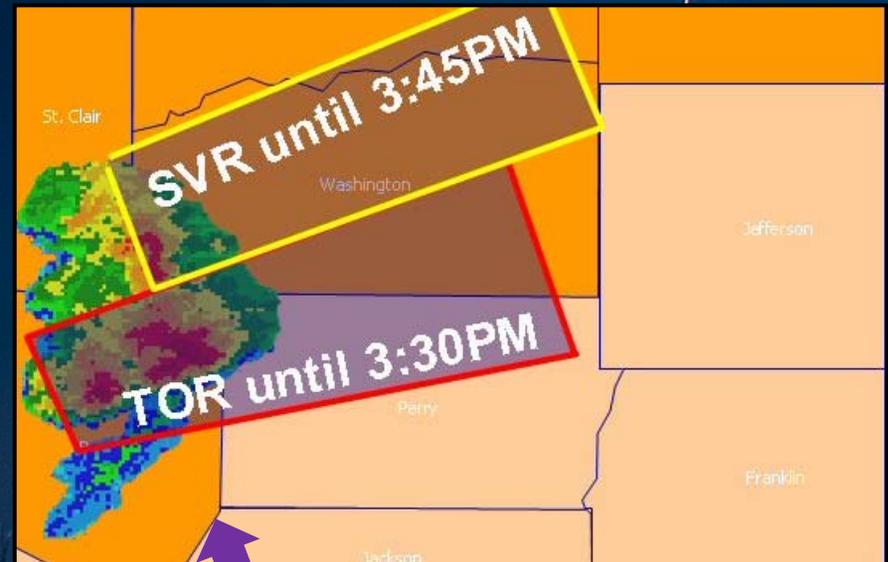
[Overview](#) | [Conv. Outlooks](#) | [Watches](#) | [MDs](#) | [Reports](#) | [Mesoanalysis](#) | [Fire](#) | [Hazards](#)



National Weather Service • Since 1871

# Weather Resources

## Local Television and Radio Broadcasts



**Easily view warning polygons on TV!**

# Weather Radio

## Broadcasts

- weather forecasts
- observations
- warnings

## Programmable

- for your county
- for specific hazards

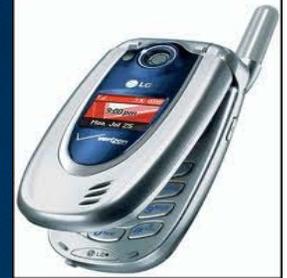
Battery back-up during power outages.

Tone Alerts for **warnings** when not in use!





# Mobile Alerts

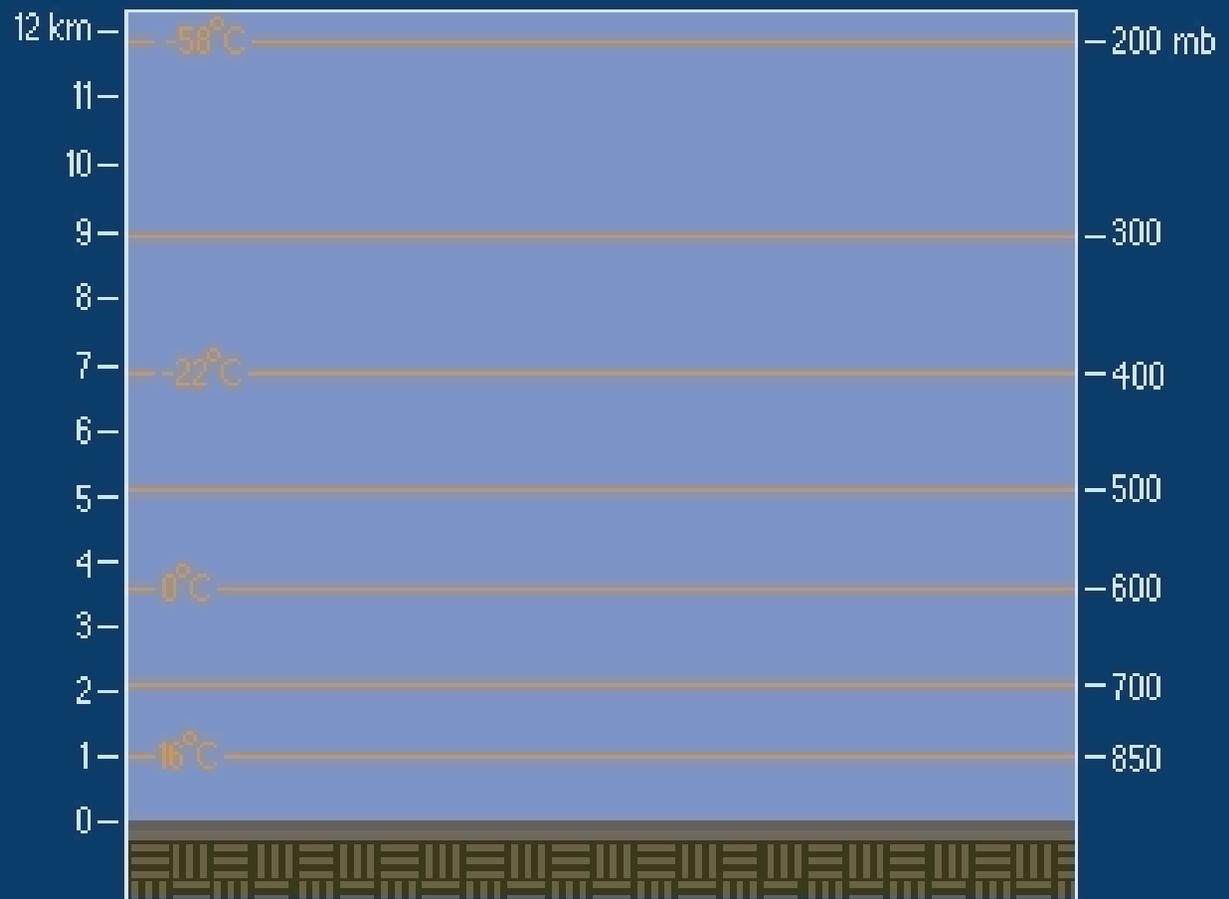


- **Wireless Emergency Alerts**
  - Free Service to the public
  - Uses location of cell tower to alert all persons in affected areas for
    - Tornado, Flash Flood, Blizzard, Hurricane Warnings
    - Presidential Emergency Messages
    - Amber Alerts
    - Automatically enrolled with option to opt out
  - Started in June 2012. Check with your provider about service with your phone.

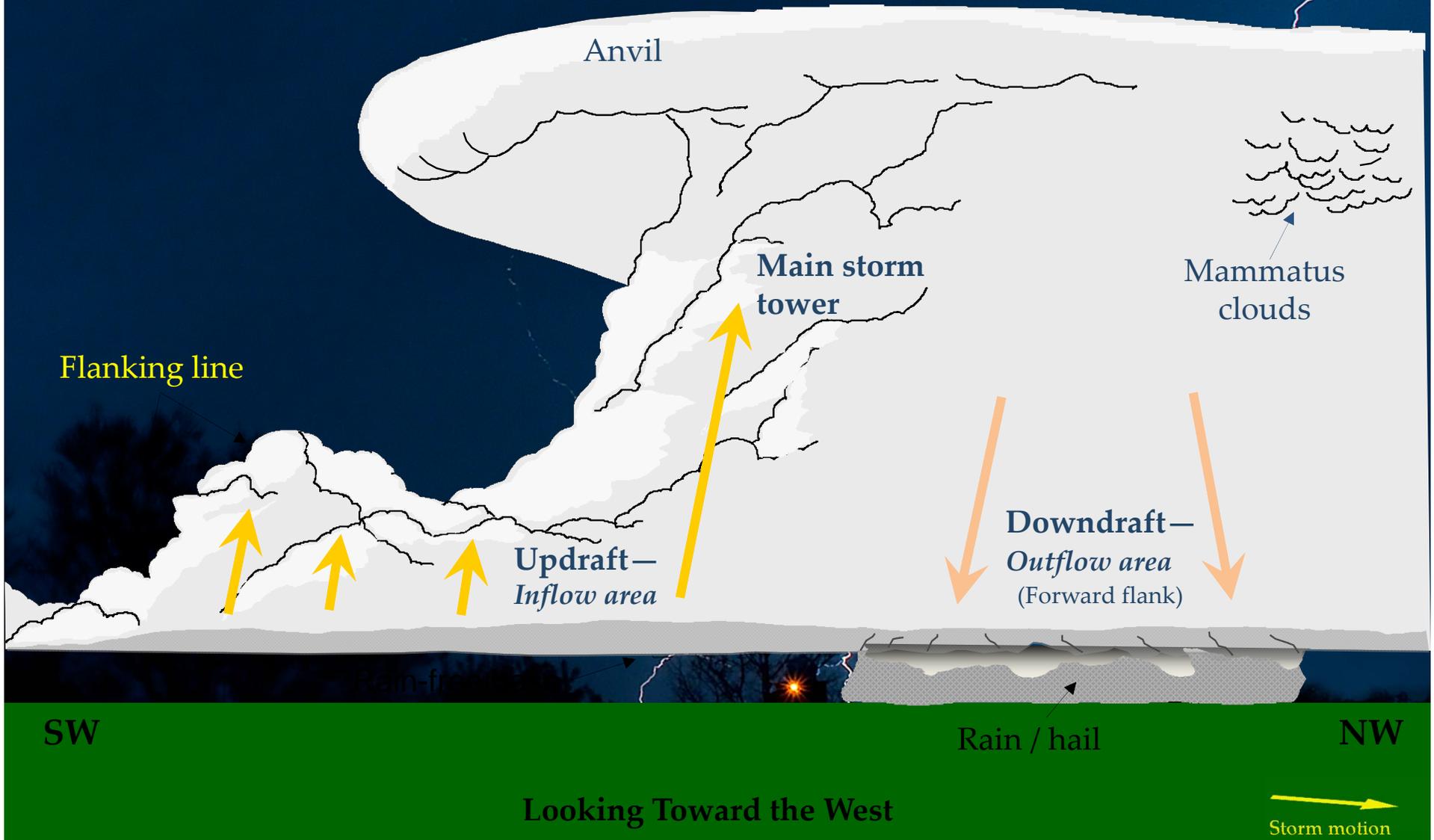
# Recipe for a Thunderstorm

3 simple ingredients:

- Moisture
- Unstable Air
- Lift



# Basic Parts of a Thunderstorm



# Thunderstorm Types

Single  
Cell

Multicell Cluster  
or Line

Supercell



Weak, brief  
updraft (non  
severe or  
severe)

**Slight threat** for  
brief severe  
weather  
events



Moderate updraft (non-severe  
or severe)

**Moderate threat** for brief or  
sustained severe weather  
events



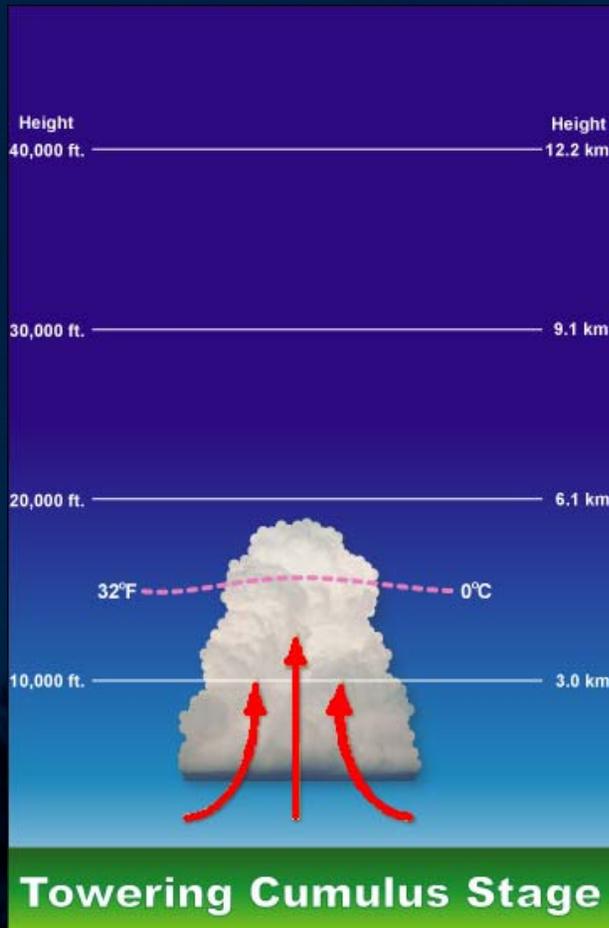
Intense, rotating  
updraft  
(always severe)

**High threat** for  
long-lived  
severe weather  
events

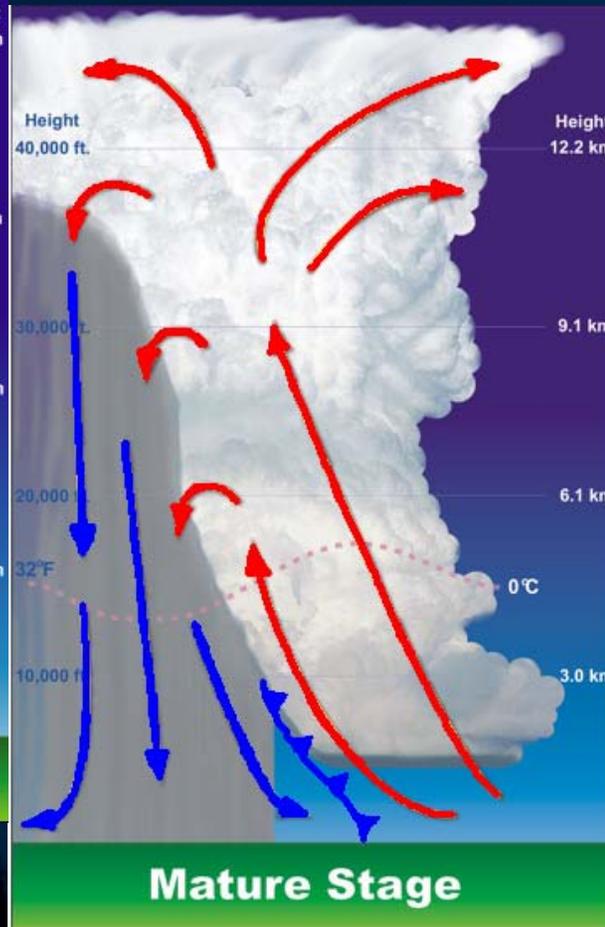
# Identify Each Thunderstorm Type



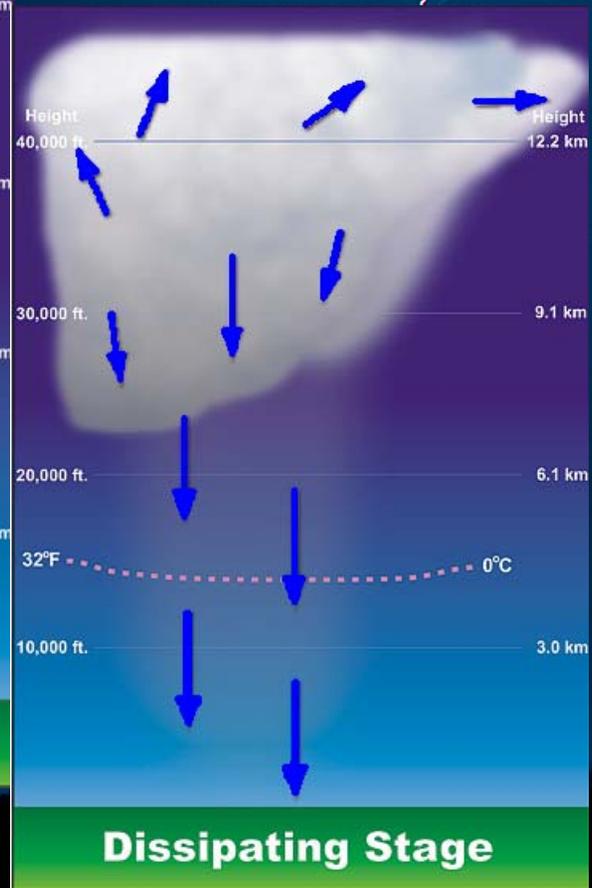
# Single Cell Life Cycle



**Towering Cumulus Stage**



**Mature Stage**



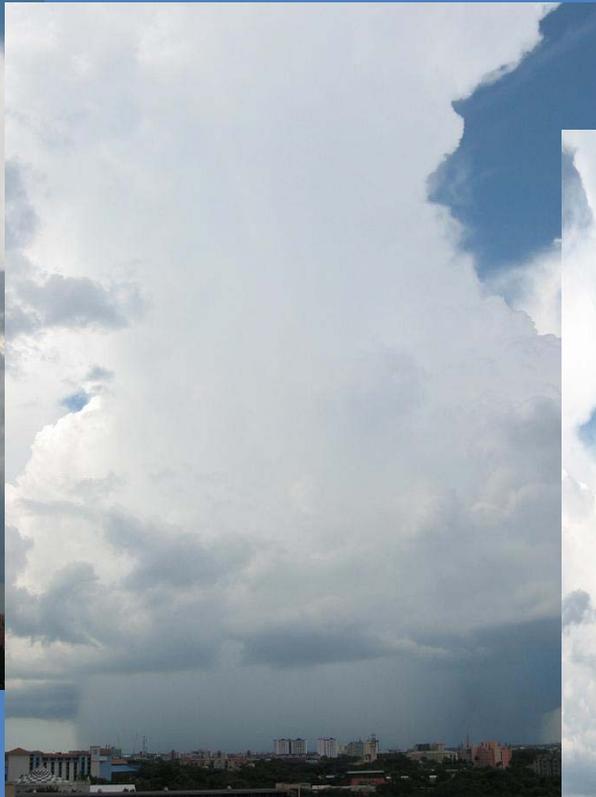
**Dissipating Stage**

# Single Cell Life Cycle

Developing



Mature

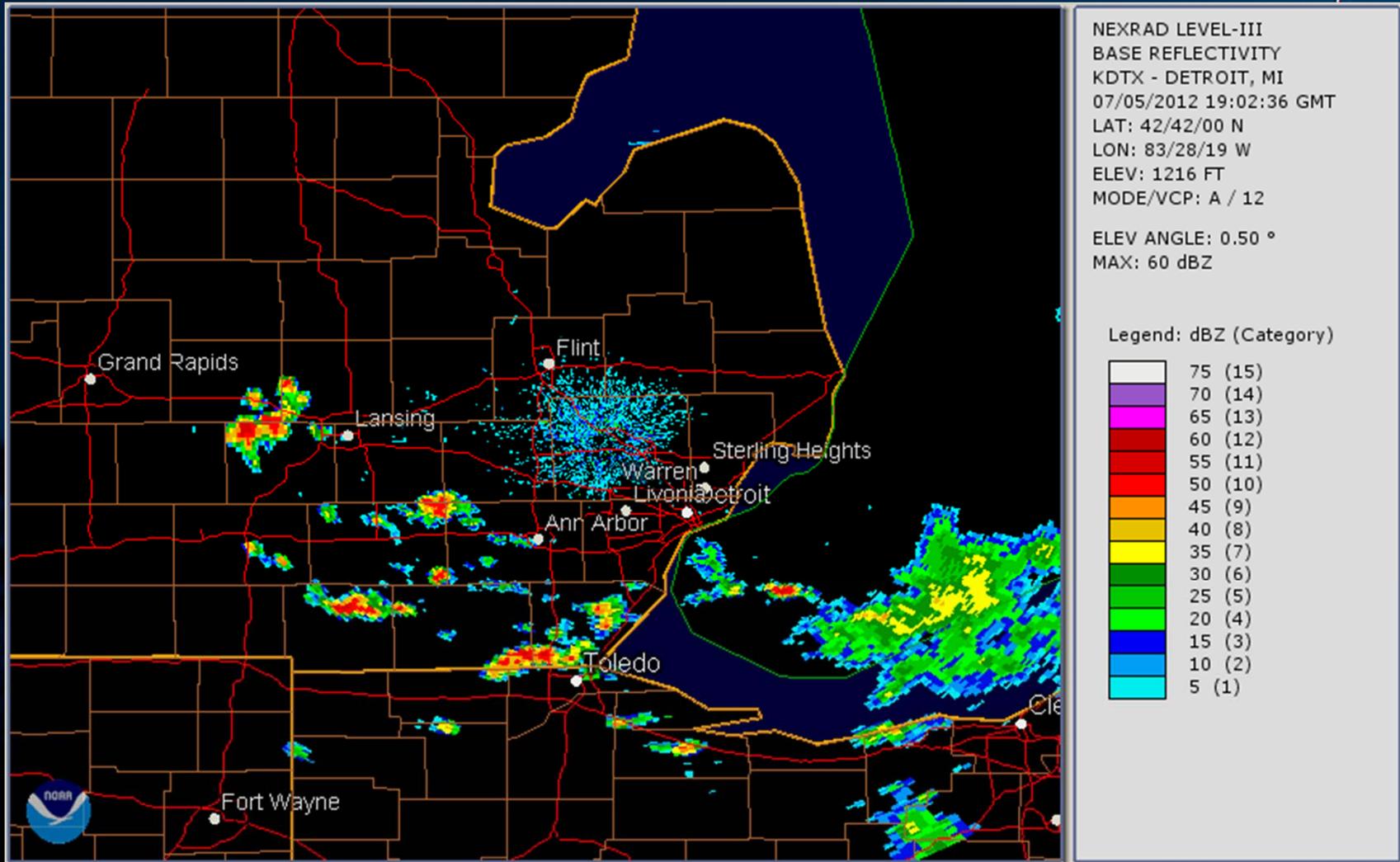


Dissipating

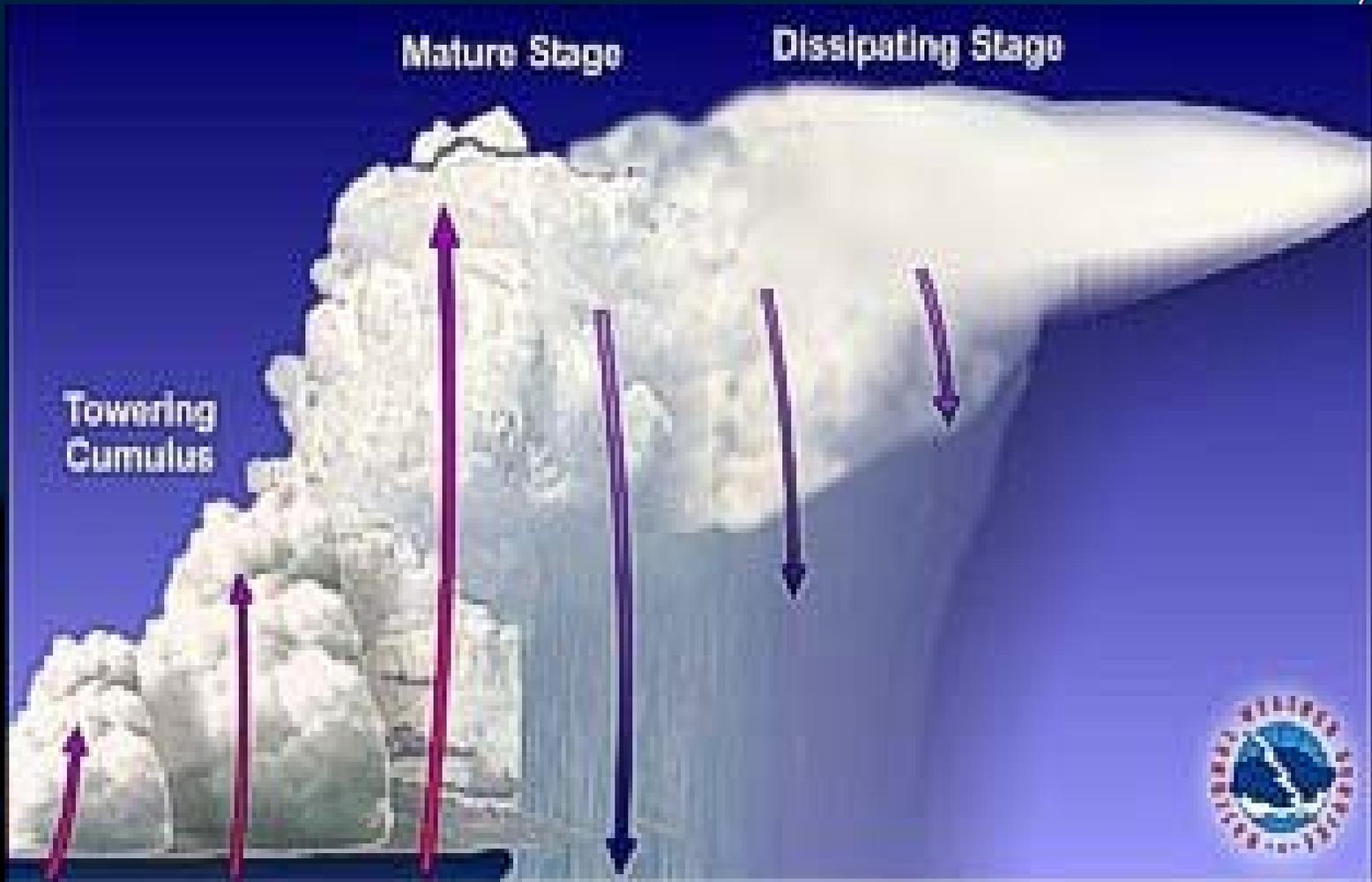


# Single Cell Radar

Afternoon July 5, 2012

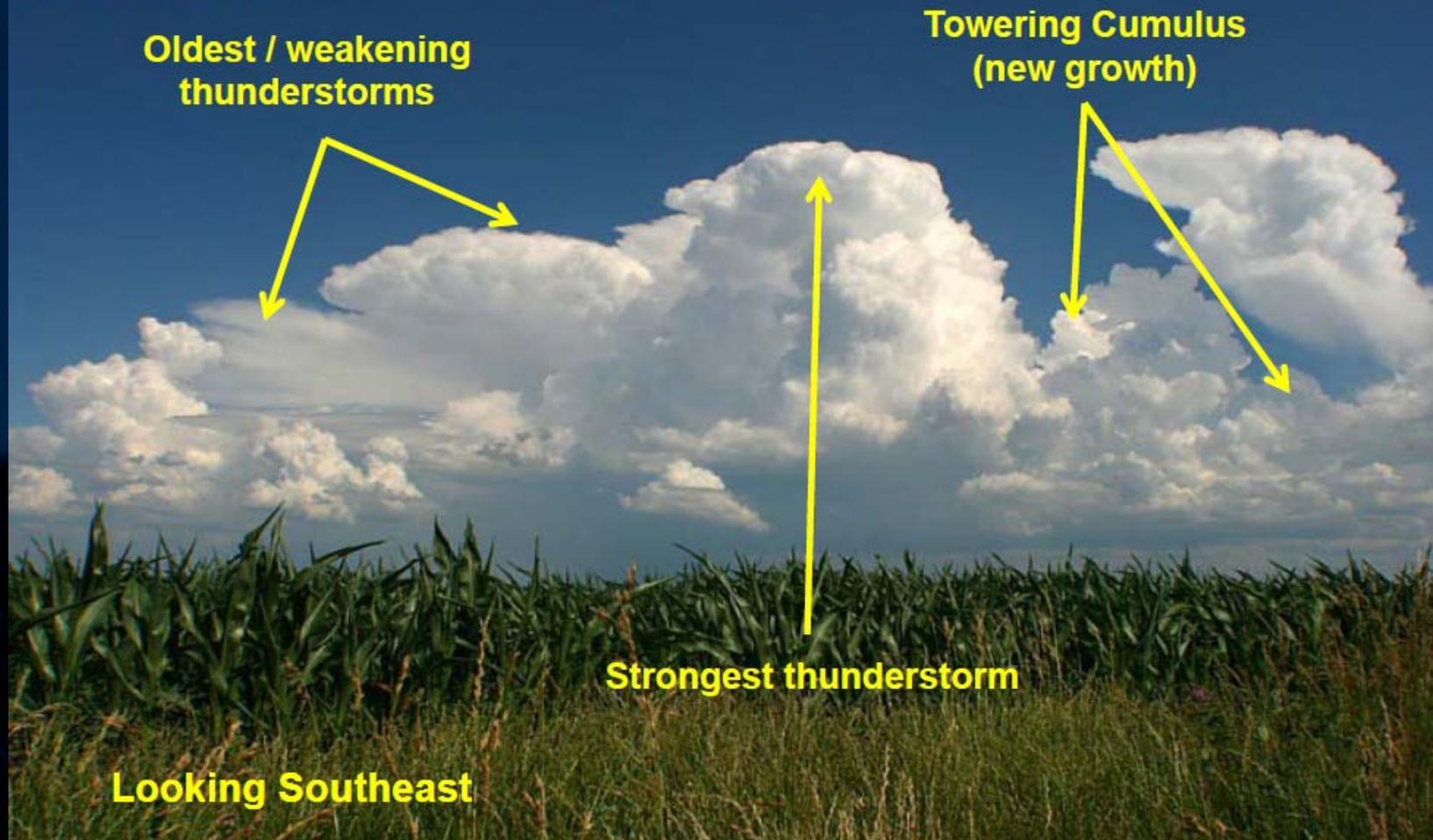


# Multicell Cluster



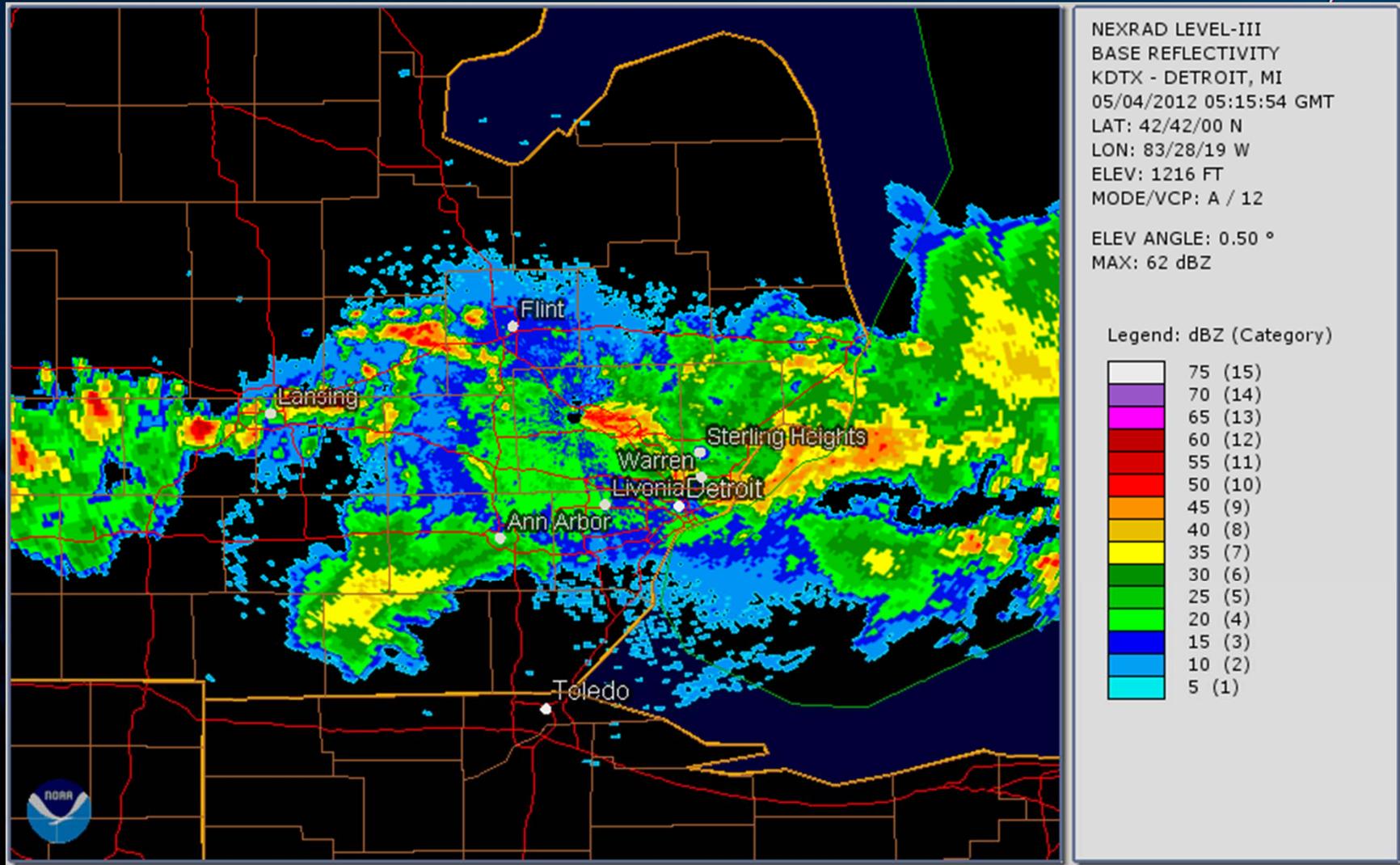
# Multicell Cluster

© Paul M. Hadfield



# Multicell Radar Animation

May 4, 2012 – Flint Flood

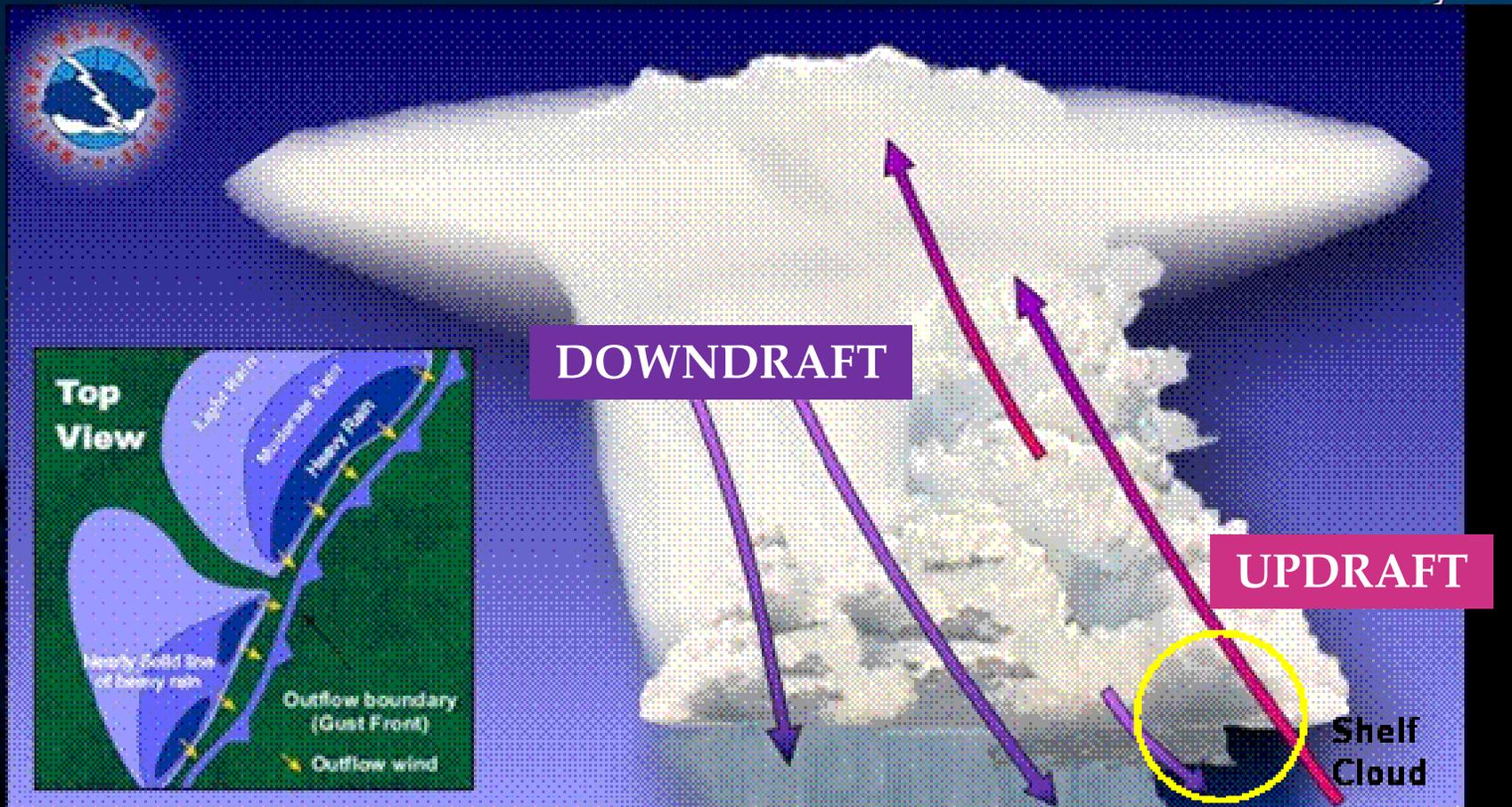


# Multicell Line or Squall Line

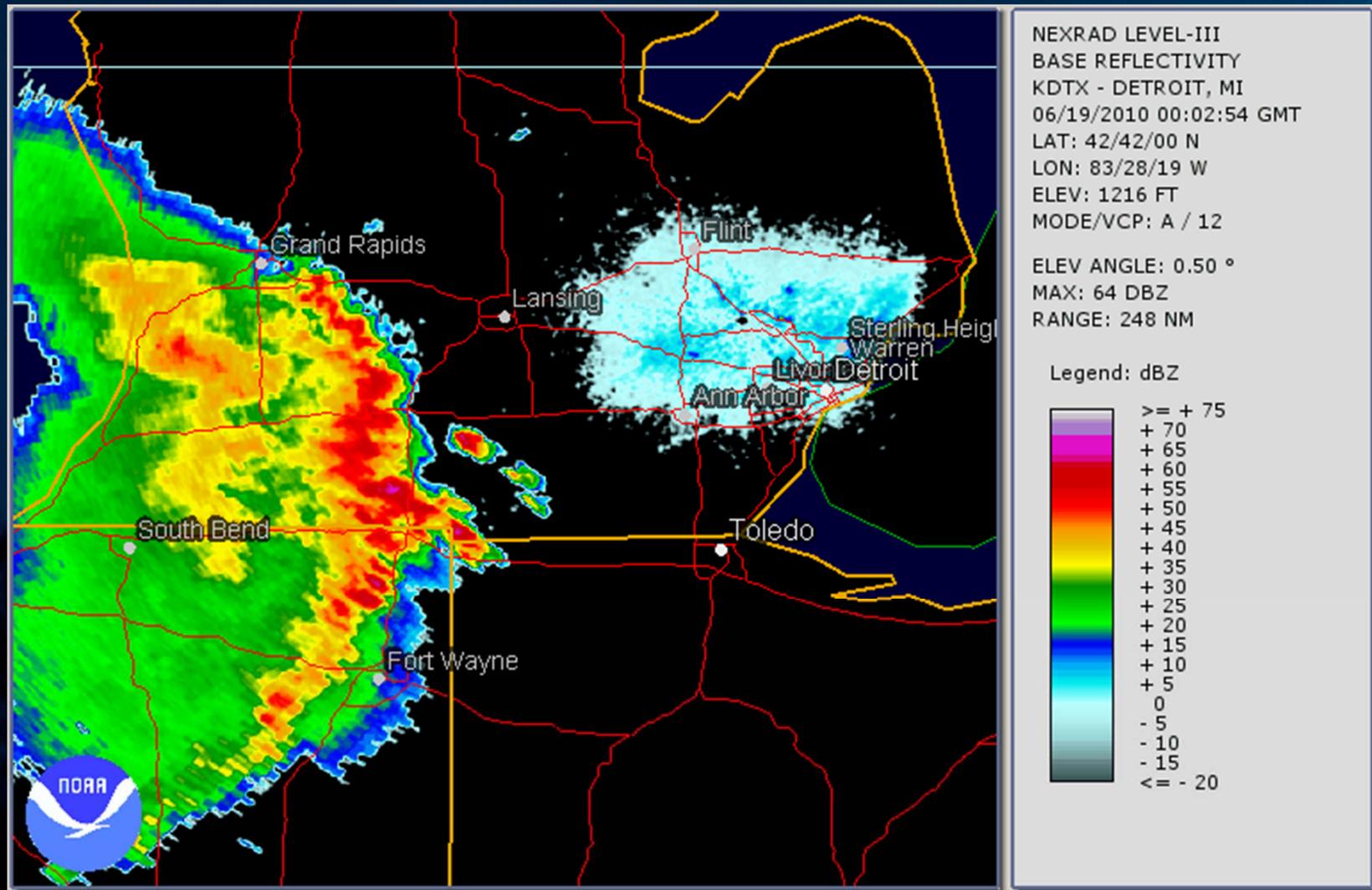


- Severe Straight Line Winds are main threat
- Wind Speeds of 60-100 mph
- Shelf Cloud on leading edge
- Widespread Severe Weather Possible

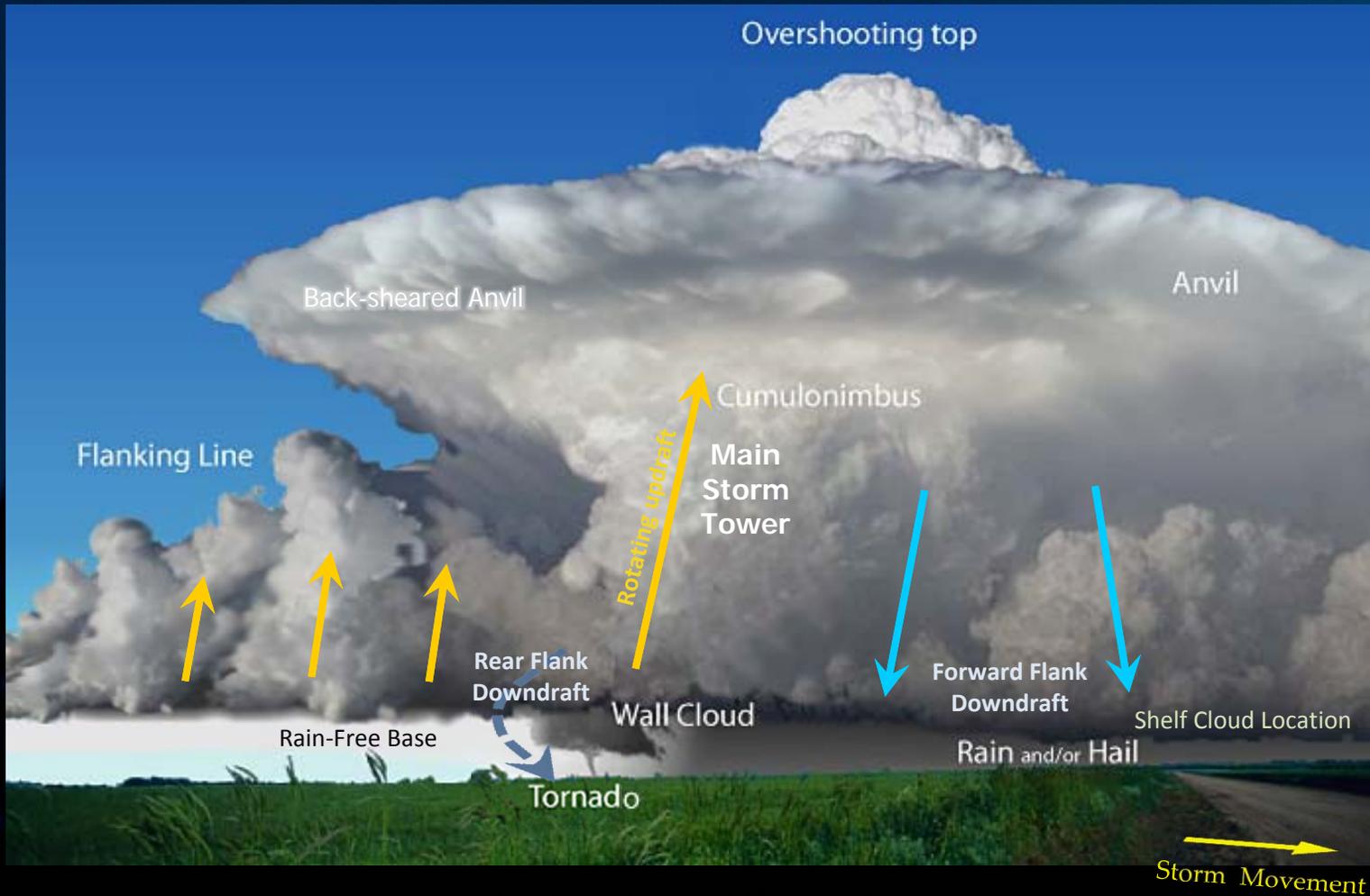
# Squall Line Schematic



# June 18, 2010 Squall Line



# Supercells

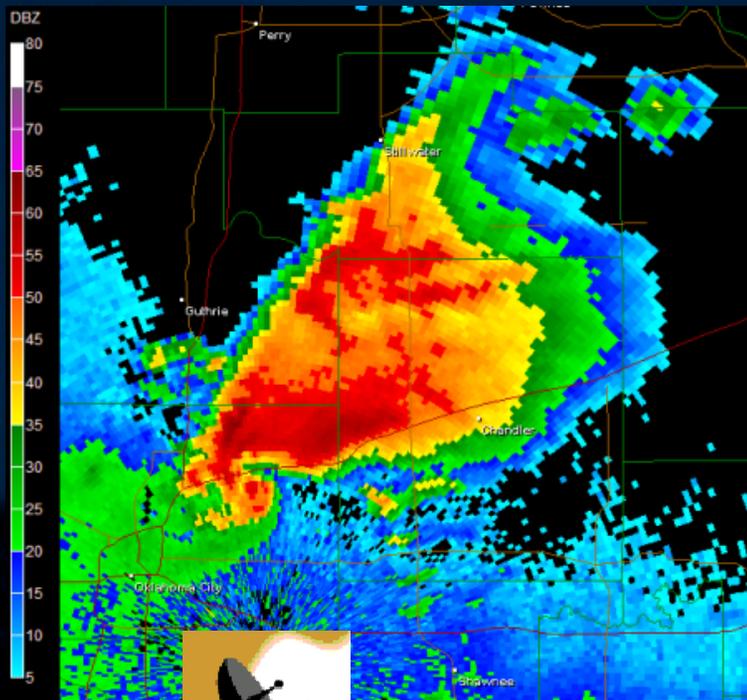




# Examples of Supercells



# Doppler Radar View of a Supercell



Reflectivity



Velocity



# Shelf Clouds



- Leading edge of Squall Line
- Slopes down and away from precipitation

- Strong winds occur along and behind shelf cloud
- **Visible Warning!**



# Wall Clouds

- Isolated lowering of the rain-free cloud base in a supercell
- Slopes down and toward the precipitation



- Indicates the possible location where a tornado could form
- Often exhibits signs of slow, churning rotation (mesocyclone)

# Tornadoes and Funnel Clouds

## Tornado

A violently rotating column of air extending from a thunderstorm and in contact with the ground.



## Funnel Cloud

A rotating, funnel-shaped cloud extending from a thunderstorm base, but not in contact with the ground.



Note: Funnel does not touch ground and no debris is seen at the surface!

# Tornado Look-a-Likes

- One of the biggest challenges in tornado spotting is determining whether you are seeing the “real thing” or a tornado look-a-like.
- Two key features present with a tornado:
  - debris cloud near the ground
  - organized rotation about a vertical axis
- The rotating, tornadic condensation cloud edges will be fairly “smooth.” Many look-a-likes have a more ragged-looking appearance.



Tornado

# Tornado Look-a-Likes

## Low Clouds – “Scud”



© 2000 Tim Marshall



## Smoke



NSSL photo

© 2007 Roger Edwards

## Virga/rain shaft



# Tornado Damage vs. Straight line wind damage



Trees falling in different directions with some convergence



Trees falling in divergent pattern



# What do you report?

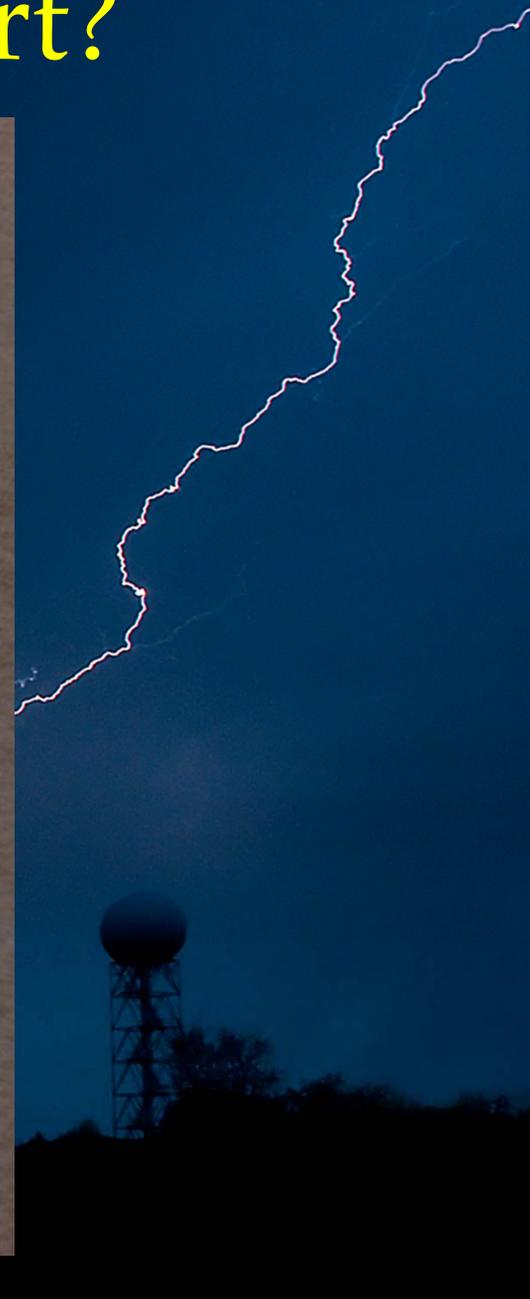
After a thunderstorm you walk outside and see:



1 foot diameter tree limb downed

# What do you report?

Quarter-sized hail  
(remember to report  
the largest sized hail  
stone)

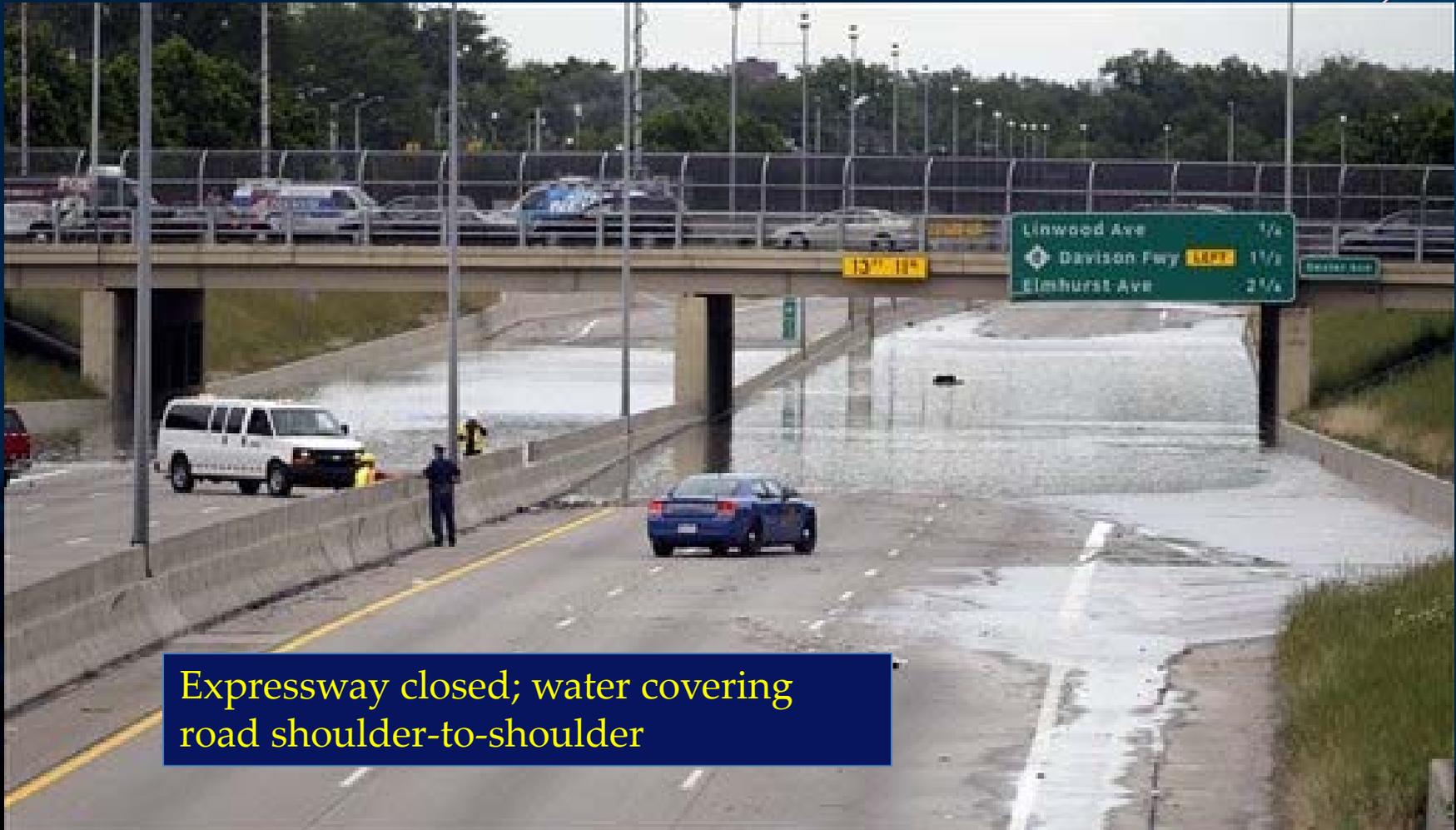


# What do you report?

Nothing.  
Lightning, while dangerous, is not criteria for severe weather



# What do you report?



Expressway closed; water covering road shoulder-to-shoulder

# What do you report?

Funnel Cloud



# Review

## Top 6 Most Important Events to Report

- 1) Tornadoes, waterspouts and funnel clouds
- 2) All weather-related damage
- 3) Wind gusts over 40 mph
- 4) Hail: plain M&M size (1/2") or larger
- 5) Winter Weather
- 6) Flooding that threatens property or covers roads

**THANK YOU**

