

The Detroit/Pontiac National Weather Service Presents

Severe
Weather
Spotting
in
Southeast Michigan



2010 Spotter Training

Part 1

- Introduction
- Thunderstorm Hazards
- Weather References
- Weather Safety
- What to report
- How to report



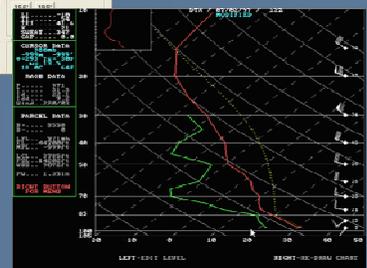
Introduction



- 125 Forecast Offices
- 17 Counties in SE Michigan
- Lake Huron, Lake St. Clair and adjoining rivers.

The highest priority of the National Weather Service is to protect the public by issuing forecasts and warnings!

Why Have Spotters?



Public - Action



Dissemination



TOM SKILLING METEOROLOGIST **WGN NEWS**

Spotter

Radar

Environment

NWS



Review of Last Year

DTX	Warnings	Warnings Verified	NOT Verified	Events	Fully Warned	Partially Warned	NOT Warned	Lead Time	LT 1 st Event
2008	139	102	37	341	297	1	43	23.0	22.9
2009	54	32	22	102	91	0	11	23.1	23.1

Year(s)	Hit Rate	False Alarm	Lead Time
1995-2007	81 %	27 %	19.3
2008	87 %	27 %	23.0
2009	89 %	41 %	23.1

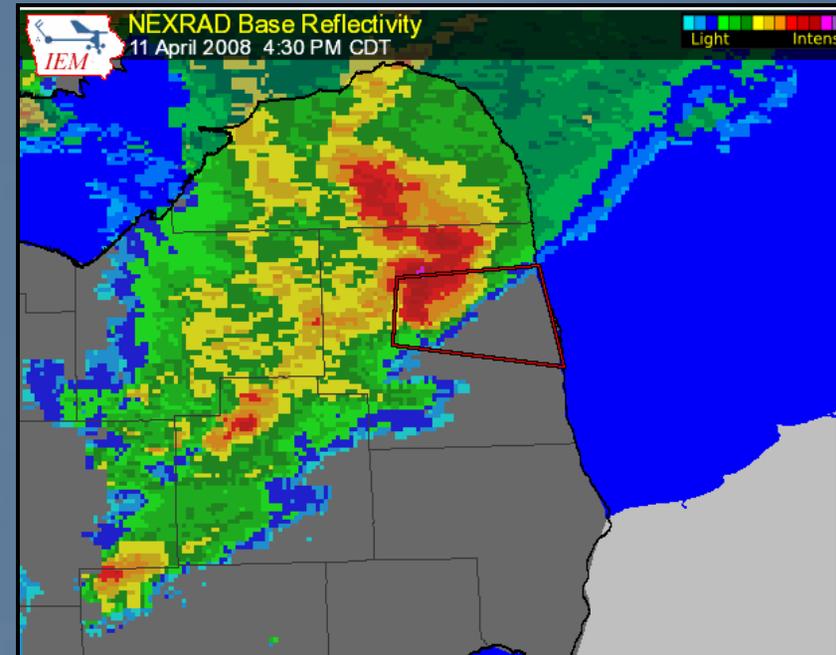
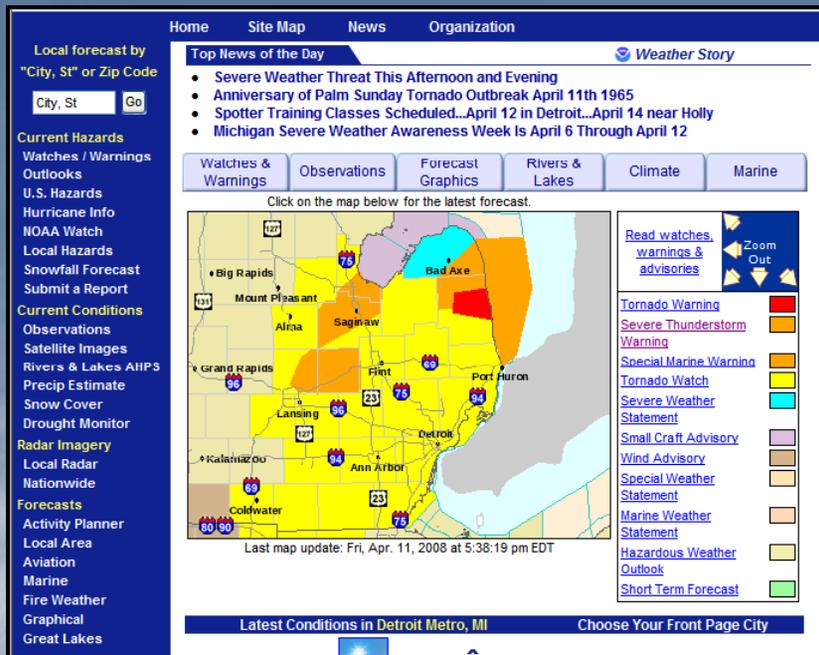
Severe Weather 2009

- Record Low Year
 - 102 Severe Weather Events
 - Previous record 1995 (about 105 event), second was 1997 (115 events)
 - Zero tornadoes in Southeast MI
 - 1981 was the last year this happened
 - Only 3 in all of MI
 - 1970 was the last year with 3 or less for the state
- Significant Events
 - April 25th and June 25th
 - 75 of the 102 events on these two days!!!

What is a *Storm Based Warning*?

Warnings are only issued for the portion of the county that is threatened.

- 2008 and 2009 reduction in warned area (Storm Based vs. County Based)
 - Tornado Warnings - 68%-2008, 48%-2009
 - Severe Thunderstorm Warnings – 36%-2008, 32%-2009



Example from April 11th, 2008

What dangers do thunderstorms present?



Livingston County May 21, 2001

People commonly focus on **tornadoes** when they think of severe weather.

The relative frequency of tornadoes in Michigan is low, so tornadoes only account for a small portion of severe weather **damage, costs, and injuries.**

Non-Tornadic Severe Weather Events



Straight Line Winds

- Severe Thunderstorm Winds \geq 58 mph.
- Can exceed 100 mph on rare cases.
- Damage is more widespread than tornadoes but less extreme.
- **100 million** in damage from squall line on June 8th, 2008.



Bad Axe
June 8, 2008

Straight Line Winds

- Outflow from a thunderstorm that blows in one direction.



Downburst Damage



Minocqua, WI – July 1999

Downburst - A strong downdraft with an outrush of damaging straight-line winds on or near the ground. Also known as a "microburst."

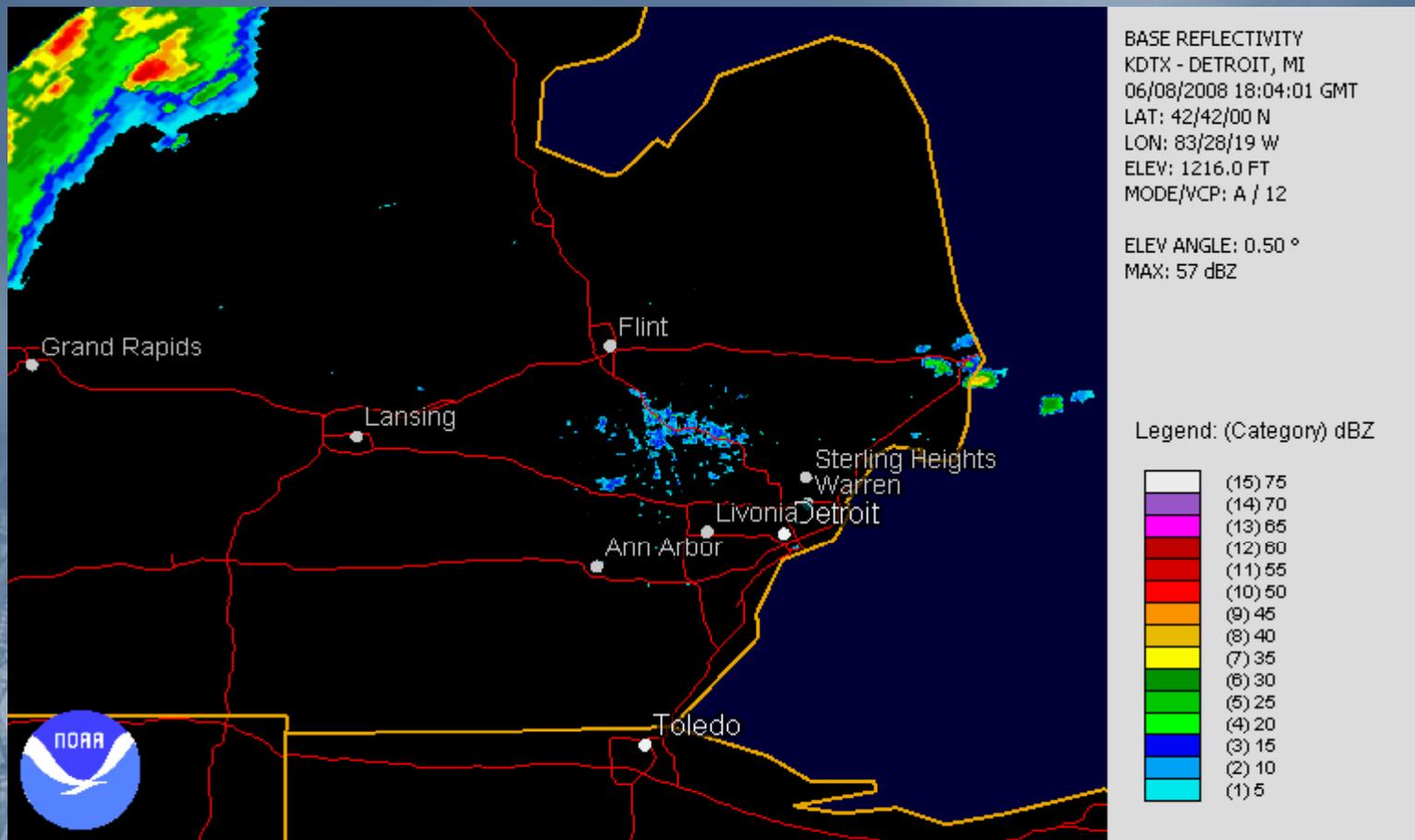


Monroe Co., WI – June 1998

Derecho - are large storm complexes that produce widespread wind damage.

June 8th, 2008 Radar

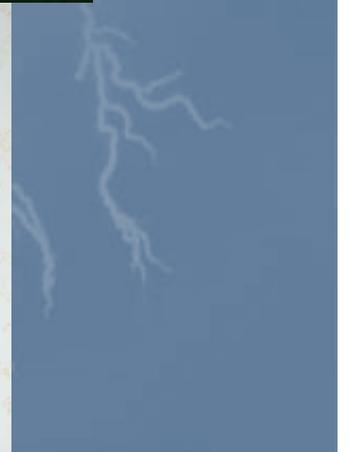
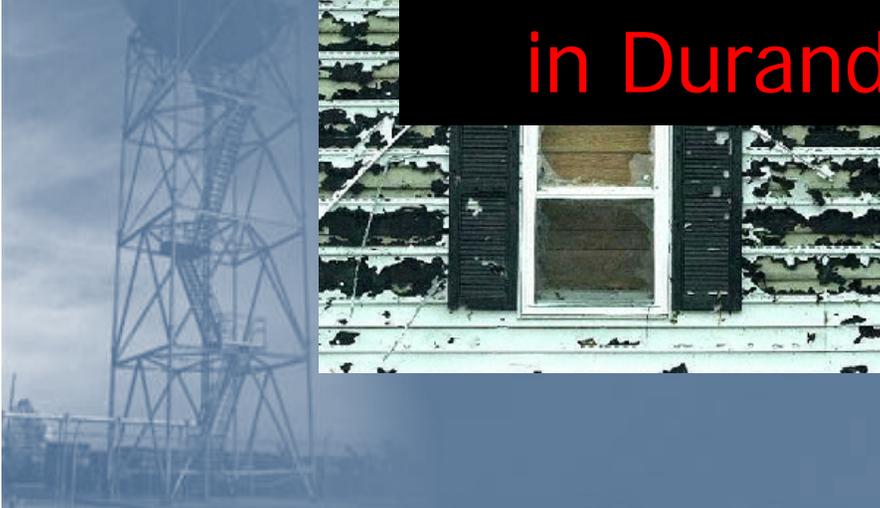
- Winds estimated up to 90 mph!
- 180 total spotter reports!
- 150 of the spotter reports were severe events!



Hail

- Hail is severe when it is 1 inch in diameter or larger.

On July 26th 2007,
hail caused roughly
5 million dollars in
damage
in Durand, Michigan.



Hail Terminology

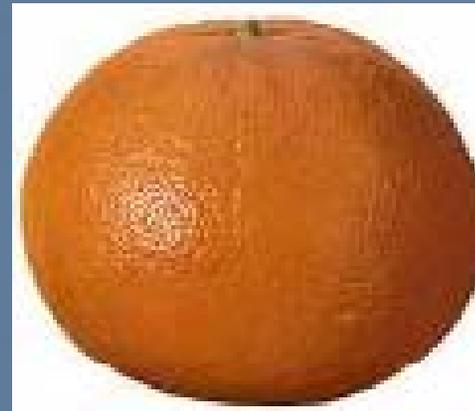
Size	Object
1/4 inch	green peas
1/2 inch	plain m&m's
3/4 inch	penny
1 inch	quarter
1 1/4 inch	half dollar
1 1/2 inch	ping pong ball
1 3/4 inch	golf ball



Hail Terminology

Really Big Hail!

Size	Object
2 inch	lime
2 ½ inch	tennis ball
2 ¾ inch	baseball
4 inch	softball
4.5 inch	grapefruit
5 inch	DVD



***Seek Shelter
Immediately!***

Severe Thunderstorm Warning Recap

Only issued for Wind or Hail

- Winds greater than 58 mph
Damage to: Buildings, Trees, Power lines
- Hail larger than 1 inch in diameter
Damage to: Cars, Crops, Buildings

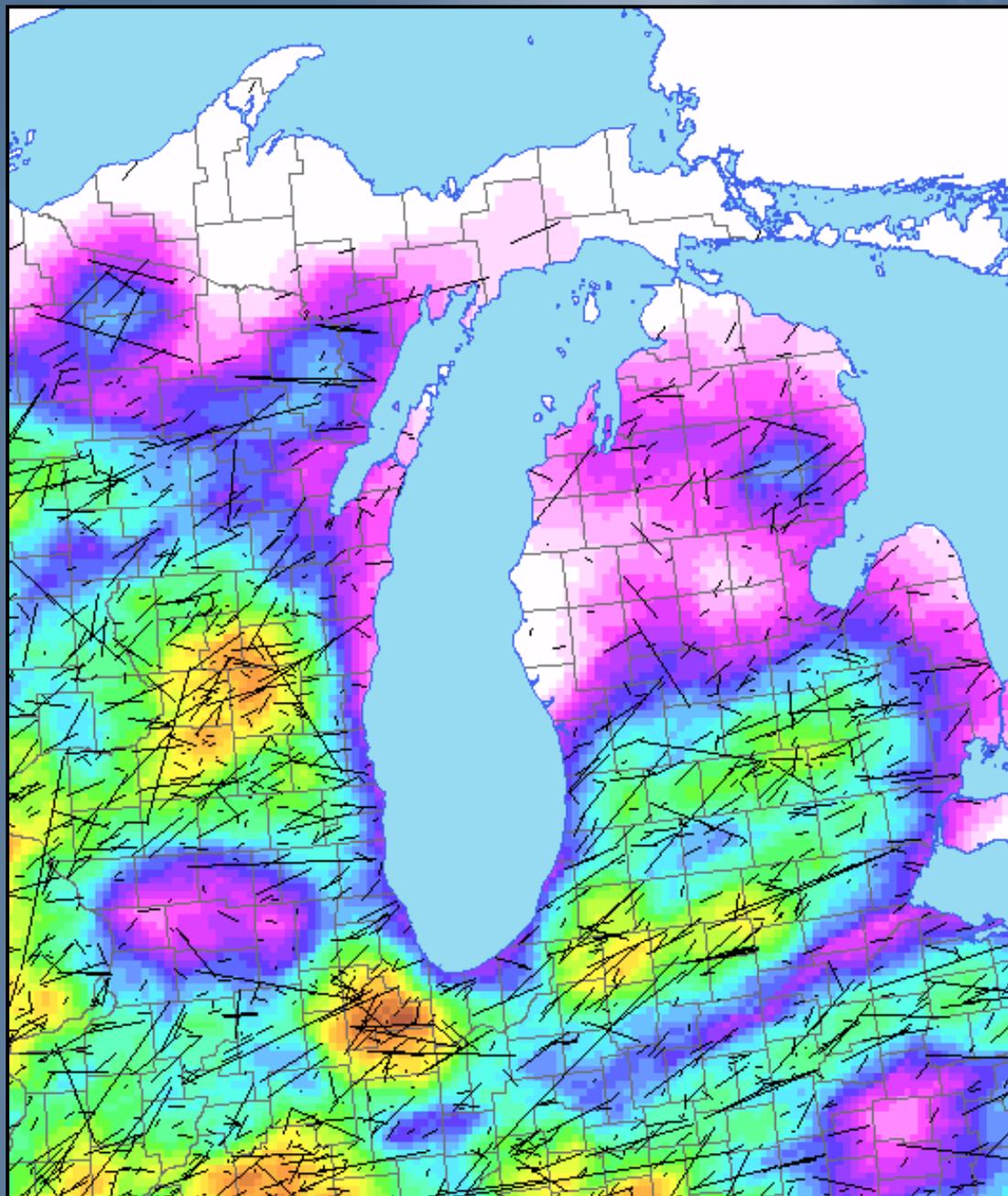
Tornadoes



Newaygo June 29th, 2005

- Michigan averages 15 tornadoes a year
- Southeast Michigan averages 5.5 tornadoes a year
- The United States receives more tornadoes than any other country in the world, more than 1,000 annually!

Tornado Density



Michigan Tornadoes

67% are classified as EF0 or EF1

- Typically on the ground < 10 minutes
- Typically track < 3 miles
- Wind speeds of 65-110 mph
- Can develop quickly and occasionally without warning.



Courtesy S&M Equipment Leighton, AL & WHNT-TV Huntsville, AL

Weak EF2 Tornado in NW Alabama on May 9, 2008

Michigan Tornadoes

The other 33% range from EF2 to EF5

- On the ground for 20 minutes to 1 hour
- Typical duration ranges from 15 to 50 miles
- Wind speeds of 111 to 200+ mph
- Develop from well-organized thunderstorms
 - Easier to detect on radar

Strong Tornado Damage



Are tornadoes and funnel clouds the same thing?

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!



True or False
This is a tornado?



True

Tornado and Funnel Cloud Look-a-Likes

What You See May Not Be What You Think!



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 Look-a-Likes

Low Clouds – “Scud”...

© 1998 Rich Thompson



© 2000 Tim Marshall



© 1999 Christine White



Tornado Look-a-Likes

Rain Shafts/Virga...

© 2007 Roger Edwards



© 1999 Walker Ashley



Tornado Look-a-Likes

Smoke...



Flash Flooding

- Flash Flooding

- Localized heavy rain from thunderstorms
- Typically 3-5" in under 3 hours
- A greater problem in urban areas

- Areal Flooding

- Widespread flooding due to heavy rain on saturated soils over a longer time period.



Flooding

- River Flooding
 - Combination of heavy rain, snow melt, ice jams, frozen ground



Flooding in Monroe (left) and Dundee (top) along the River Raisin
March 10-14, 2009

NWS Products Issued for Severe Weather

Definitions

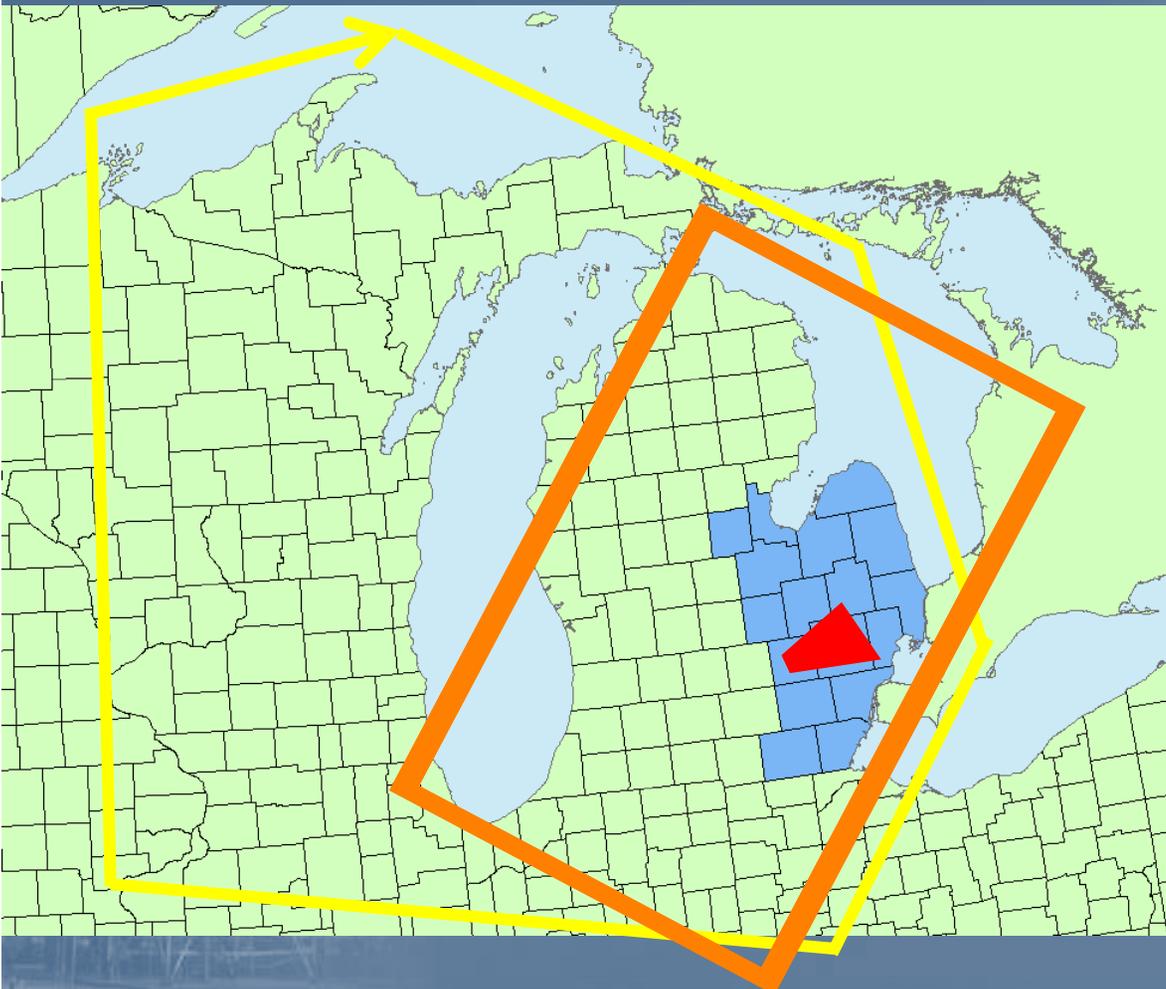
Watch

Conditions are favorable for the weather event in/near the watch area.

Warning

The weather event is imminent or occurring in the warned area.

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

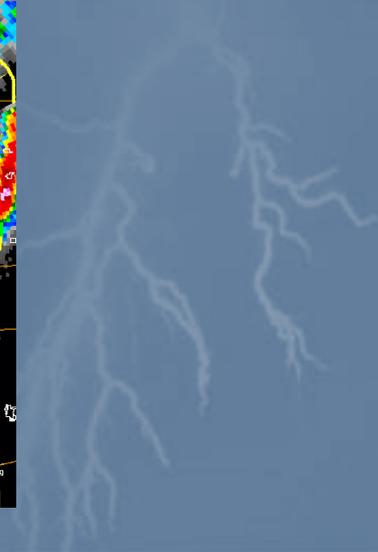
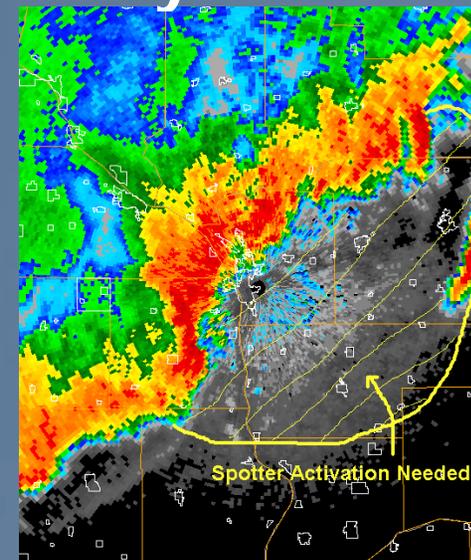
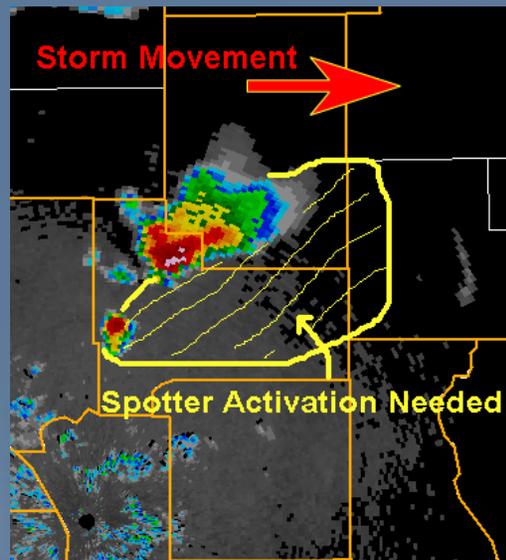
- 10-60 minutes in advance
- Very specific threat, area, and timing

When to Be Ready to Report

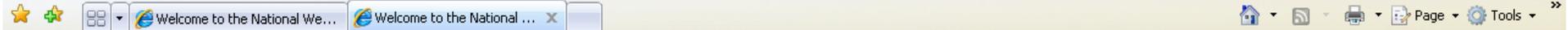
Watch – Sometimes too early

Warning – Sometimes too late

- Anytime storms approach your county or community!



Weather Resources



NOAA's National Weather Service Weather Forecast Office Detroit Home Page 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

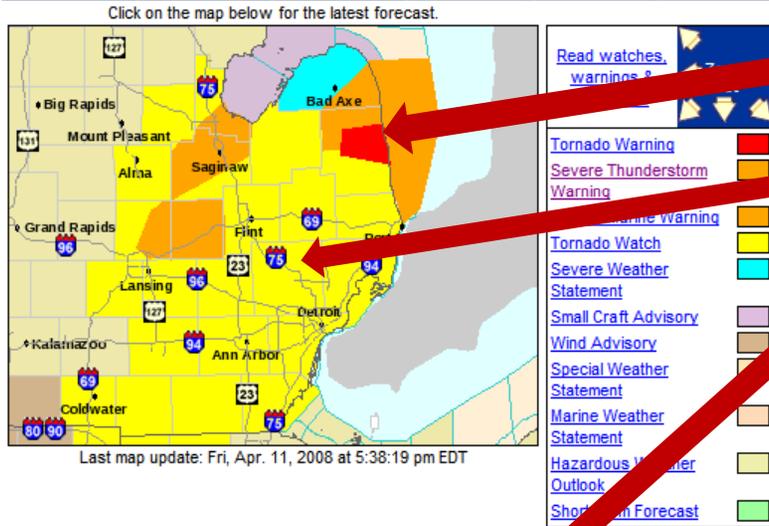
Climate
Local
National

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



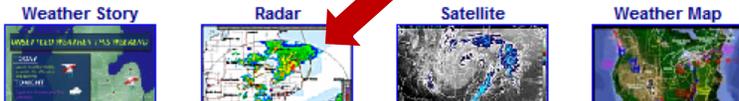
Warnings show up on home page.

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 Resources

Fcst_DTX_Schd.pdf (application/pdf Ob...)

Storm Prediction Center



NOAA's National Weather Service

Storm Prediction Center

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

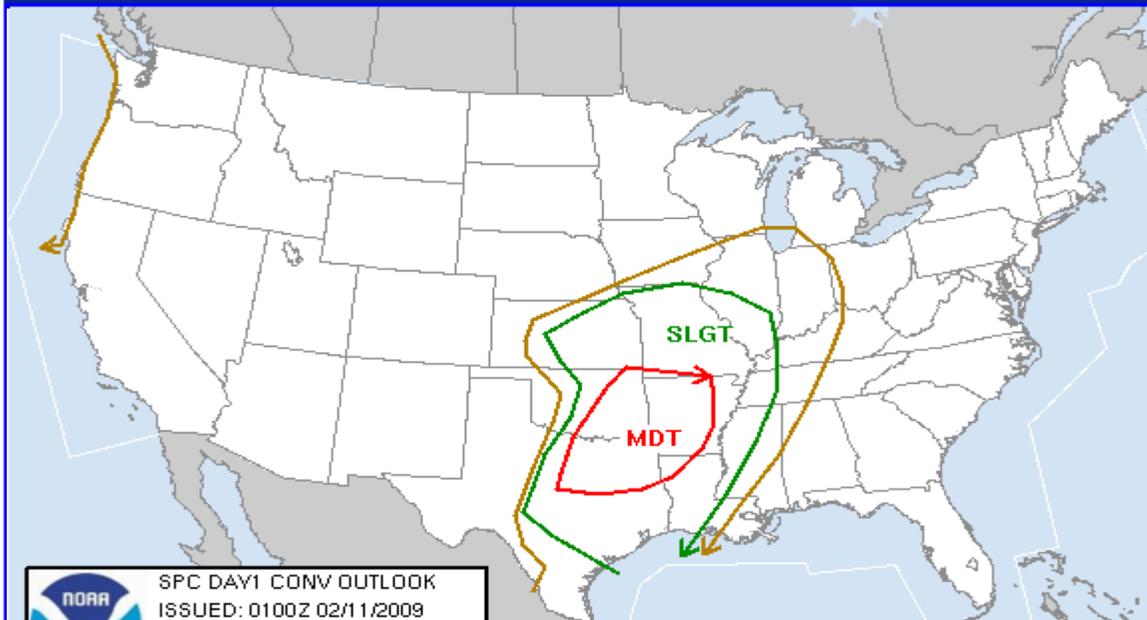
Our History

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

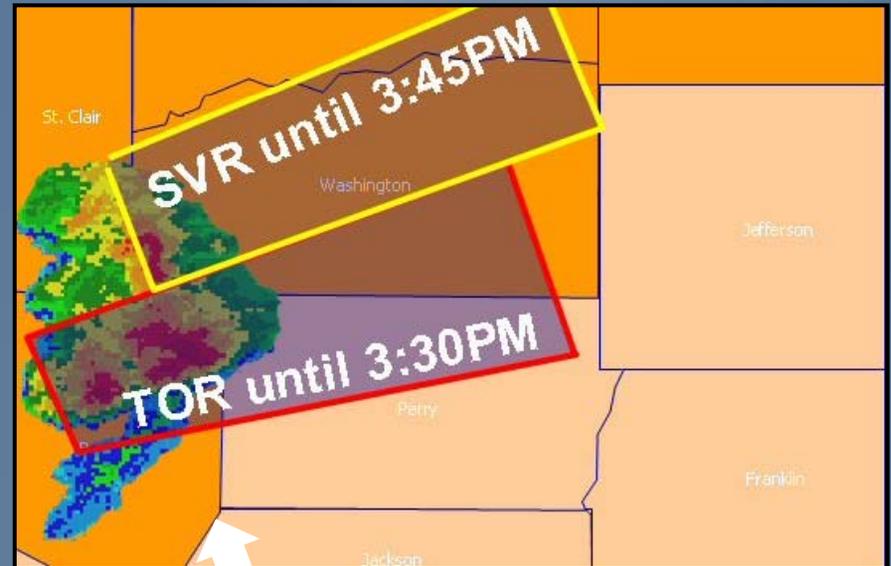
Overview | Conv. Outlooks | Watches | MDs | Reports | Mesoanalysis | Fire | Hazards



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!



Weather Safety



Your safety is
ALWAYS
more important
than a spotter
report!

Weather Safety

It is *never* safe to be outdoors during thunderstorms!

All thunderstorms have lightning and are dangerous!

- Check the weather forecast before going out.
- Postpone outdoor activities
- No Swimming
- Avoid showering, corded phones
- Or use of extra electrical items
- Seek shelter in a car or building





Weather Safety



Lightning

A safe building is one that is fully enclosed with a roof, walls and floor, such as a home, school, or shopping center.



Unsafe Shelters Include:

- Picnic Shelters
- Open pavilions
- Large tents
- Baseball dugouts
- Sheds
- Any building that is not fully enclosed with electricity/plumbing

Weather Safety

When a **WATCH** is in effect...

- Stay tuned to updated weather information
- Alter plans if necessary

When a **SEVERE THUNDERSTORM WARNING** is in effect...

- Seek shelter in a sturdy building immediately
- Stay away from windows
- Monitor for Tornado Warnings

Weather Safety

When a **TORNADO WARNING** is in effect...

- Go to the basement immediately!
- Get under something sturdy
 - Desk, stairwell
- Get in the tornado safety position
- Cover yourself with pillows, blankets, extra clothes to shield debris
- Stay in basement until warning expires

Weather Safety

When a **TORNADO WARNING** is in effect and there is **NO BASEMENT** available...

- Seek shelter in an interior room with no windows
 - Closet, bathroom
 - Stay away from exterior walls
 - Debris can puncture walls
- If driving...pull over and get into a building
- DO NOT try to out-run the tornado





Tornado Myths



DO NOT...

- Open the windows
- Seek shelter under highway overpasses

Myths

- Tornado's never strike big cities
- Your town is protected just because it "has never been hit"
- Tornado's can't occur in valleys or mountainous areas.

www.Ready.gov

1) Get a Kit

Bottled water, non-perishable foods, flashlight with extra batteries, extra medications, money, dry clothes, blankets

2) Make a Plan

Plan for all types of emergencies, not just weather related.

3) Stay Informed

Stay tuned when severe weather or other emergencies occur.

Reporting

- What to report
- What not to report
- How to report
- Call or no call



Spotter Basics

- Monitor radar trends and upstream conditions.
- Use resources like outlooks, radar, Internet, etc.
- Anytime you feel there is a threat – **be pro-active!**
- Best to be in place BEFORE storms hit.
- Communicate – share reports!
- Takes commitment and organization.

Stay safe!



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: Wind

Estimating Wind Speed

- Takes experience (most people over-estimate)
- Avoid “heavy” or “strong” to describe wind
- If possible, measure the wind with an anemometer

When Reporting High Winds...

- Did you measure or estimate the wind gust?
- Did the wind produce damage?
- Describe any damage



What to Report: Hail

Hail ½ inch or Greater

Pea	0.25 - .375 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 (15/16")	Softball	4.00 inches
Half dollar	1.25 inch	Grapefruit	4.50 inches
Walnut/Ping Pong	1.50 inch	Computer CD/DVD	4.75 - 5.00 inches
Golf ball	1.75 inch		

What to Report: Hail

When Reporting Hail...

- Let us know whether it was measured or estimated
- If you cannot measure the hail, use coins or other known objects to describe the size
- Avoid using “marble-sized” to describe hail
- Report size of largest hailstone



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



Monroe, MI



Sarnia, Ontario

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: Tornadoes

Are you sure?



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



What to Report: Marine Weather

- Waterspouts
- Thunderstorm wind gusts of 40 mph or greater



South Haven, MI
August 7, 2008

What to Report: Winter Weather

Snow

- When first inch has fallen
- Each additional 2 inches
- Storm total
- Measure on a snowboard (not pavement or grass)



Ice

- Icing due to Freezing rain or Sleet
- Serious impact on travel
- Damage (power lines, tree limbs)
- Estimate amount of glazing ($\frac{1}{2}$ inch, $\frac{1}{4}$ inch)



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: Fog

- Visibilities less than $\frac{1}{4}$ mile
- Impacts on travel



What NOT to Report

- Conditions NOT meeting reporting criteria
 - Example: Wind gusts to 30 mph
 - Example: Pea-sized hail
- Cloud features other than tornadoes or funnel clouds
- Frequent lightning
- Radar signatures
- Minor ponding on roadways
- The spotter line is only for reports

How to Report

1) Toll-Free Spotter Hotline

- **Unlisted**, 24 hours

1-800-808-0006

2) Amateur Radio, Local Nets, and MICON

3) Packet Radio

K8DTX-5, 145.76 MHz

4) eSpotter

espotter.weather.gov

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)

Call or No Call



Question #1:

You look out the window and notice pea-sized hail starting to cover the ground.

Do you report it?

No. You do not need to report pea-sized hail. Criteria for reporting hail begins at $\frac{1}{2}$ inch, or the size of plain M&Ms.

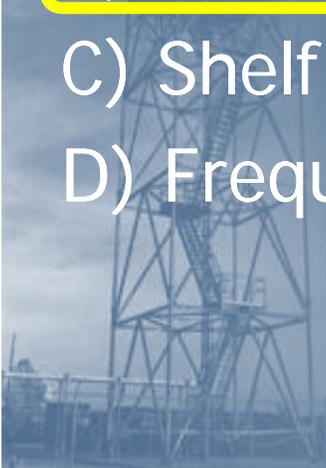


Call or No Call

Question #2:

Which of the following phenomena should you report?

- A) Wall cloud
- B) Funnel cloud
- C) Shelf cloud
- D) Frequent lightning



Call or No Call



Question #3:

You notice cars are no longer able to make it safely through a water-covered intersection near your office.

Do you report it?

Yes. Flood waters that impede traffic should be reported.



Call or No Call



Question #4:

You arrive home after an evening out to discover a tall pine tree in your yard has been snapped in half. You know there was a strong thunderstorm earlier. Do you report it?

Yes, please! Storm damage can help the National Weather Service verify a warning, even many hours later or the next day.

Join the Michigan CoCoRaHS Network!

CoCoRaHS is a grassroots, non-profit, community-based, high-density precipitation network...



made up of volunteers of all backgrounds and ages . . .



who take daily measurements of "just precipitation" right in their own backyards!

For more information: www.cocorahs.org

2009 Spotter Training

Part 2

- Thunderstorm Evolution
- Thunderstorm Types
- Tornado Formation
- Cold Air and Waterspouts
- Shelf vs. Wall Clouds
- Look-a-likes
- Review of what, when and how to report.

Thunderstorm Evolution



Before we get Severe Weather...

We need a thunderstorm!



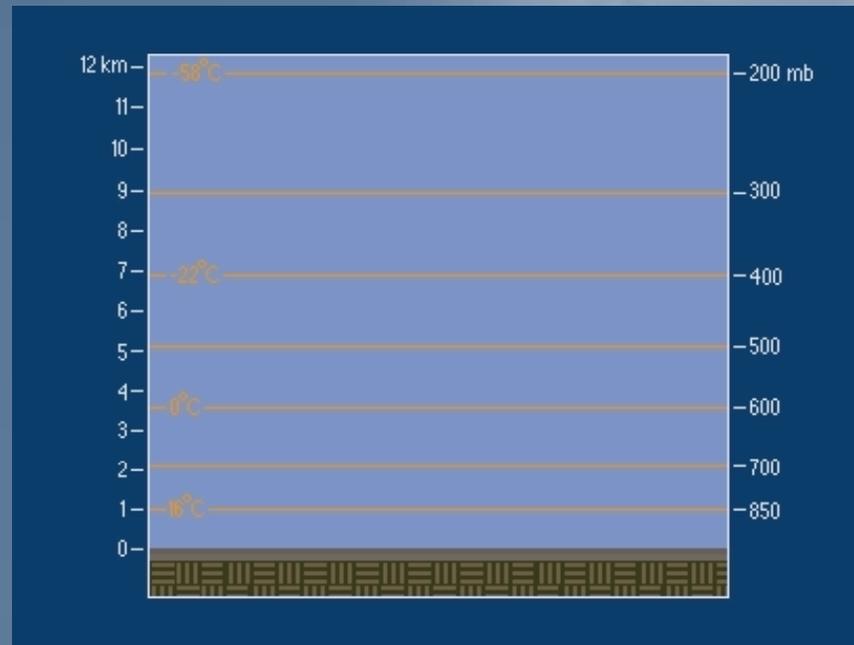
Phil Kurimski

mesovortex.com

Recipe for a Thunderstorm

Three simple ingredients:

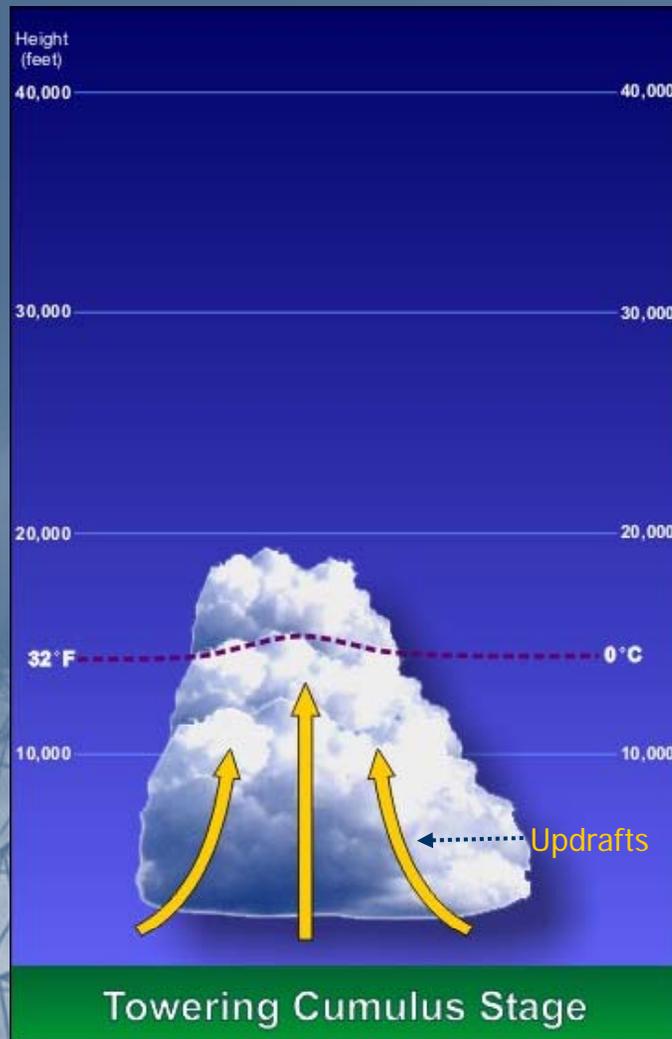
- Moisture
- Unstable Air
- Lift



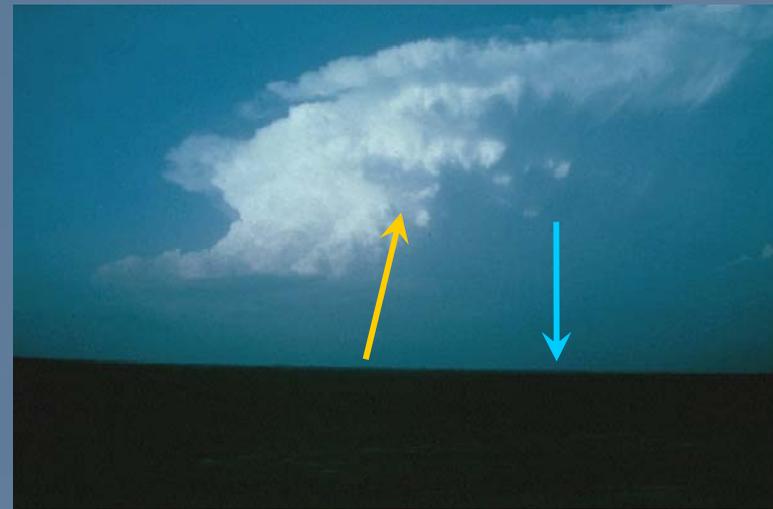
Three Stages of Development



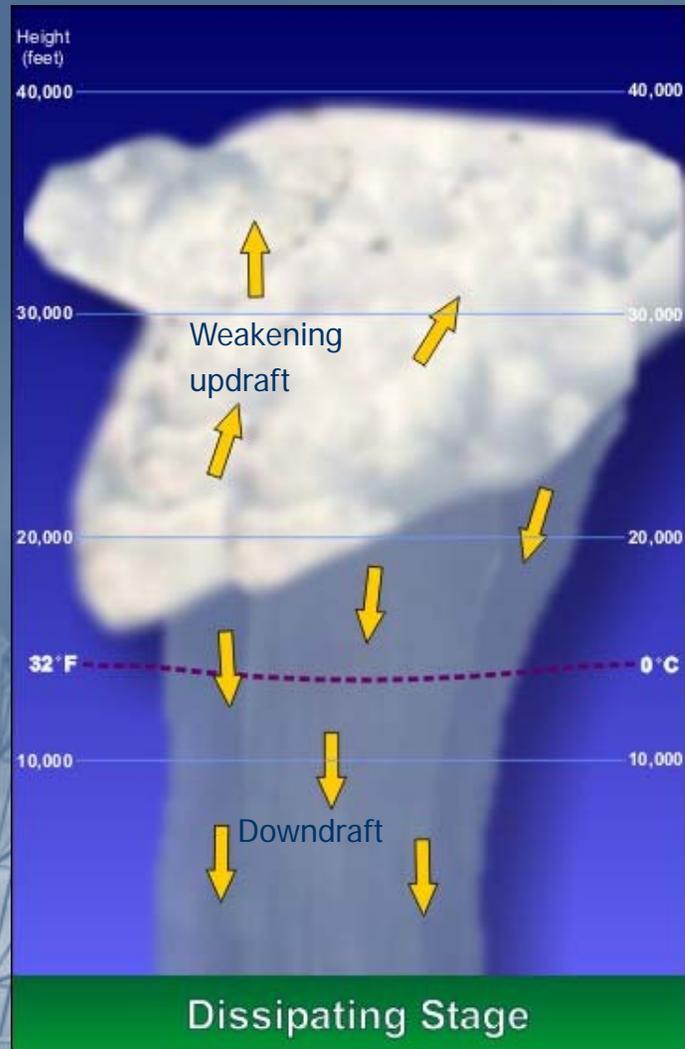
Towering Cumulus Stage



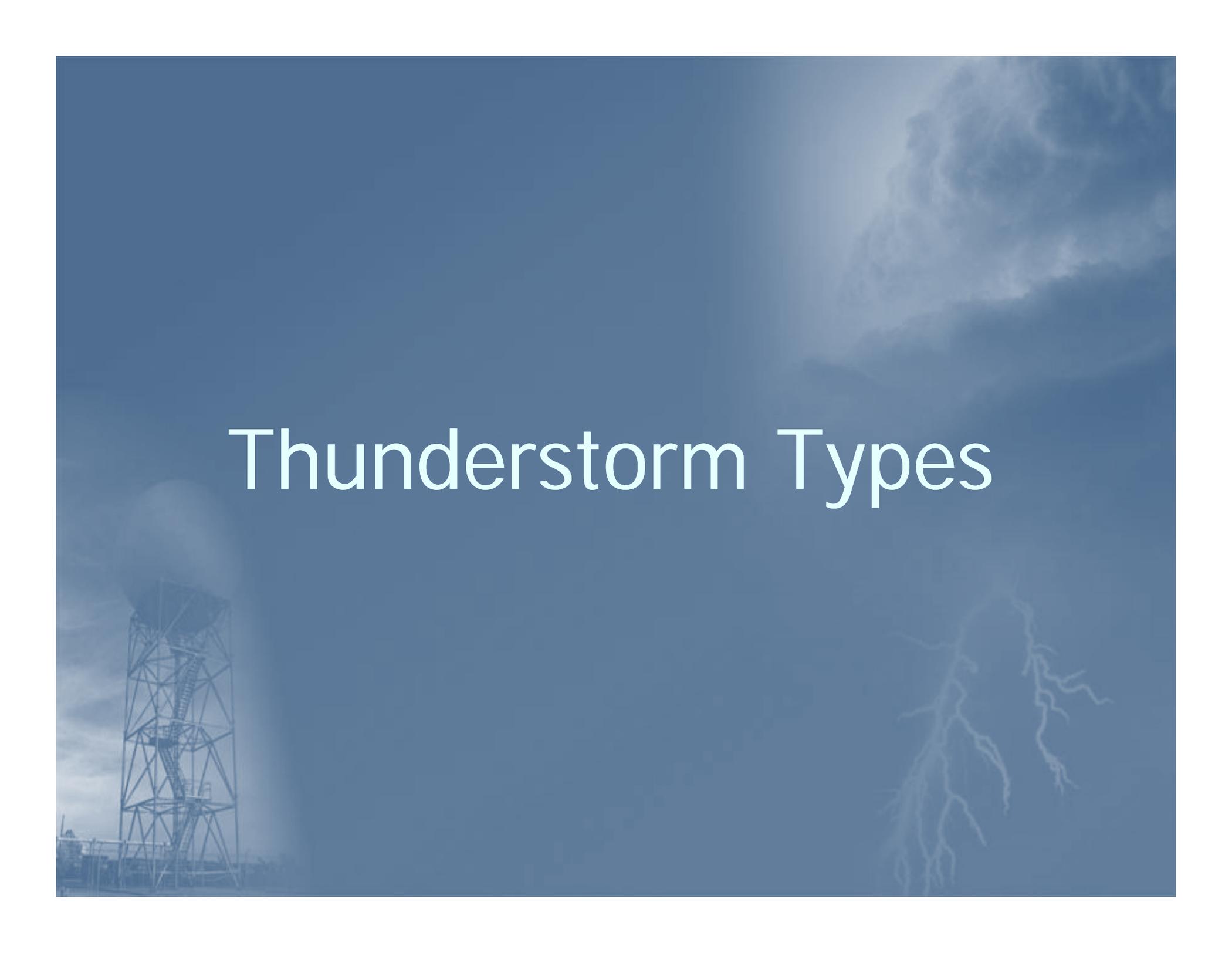
Mature Stage



Dissipating Stage



Thunderstorm Types

The background of the slide is a dark blue, monochromatic image. On the left side, there is a tall, lattice-structured radar tower with a large, circular radar dish at the top. On the right side, there is a bright, jagged lightning bolt striking downwards. The overall scene is a dramatic, stormy sky.

Types of Thunderstorms

Single
Cell

Multicell Cluster
or Line

Supercell



Weak, brief
updraft
(non-severe or
severe)

Slight threat



Moderate updraft
(non-severe or
severe)

Moderate threat



Intense,
rotating
updraft
(always severe)

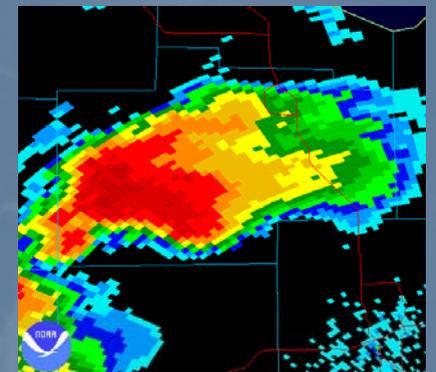
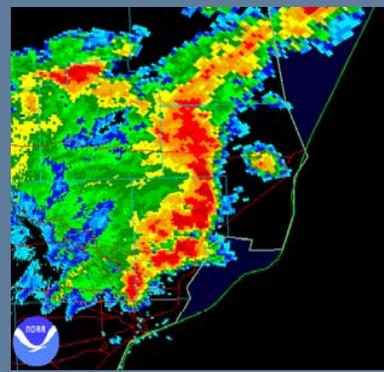
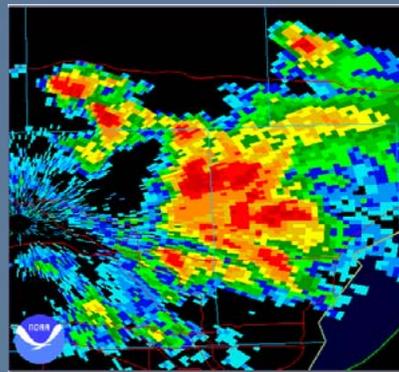
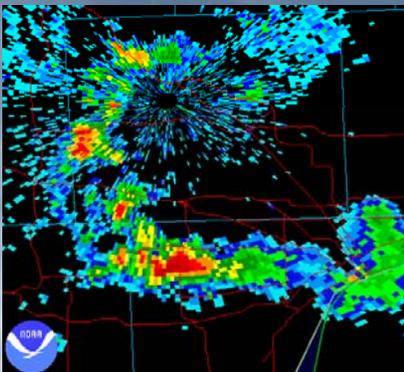
High threat

Types of Thunderstorms

Single
Cell

Multicell Cluster
or Line

Supercell



A Squall Line

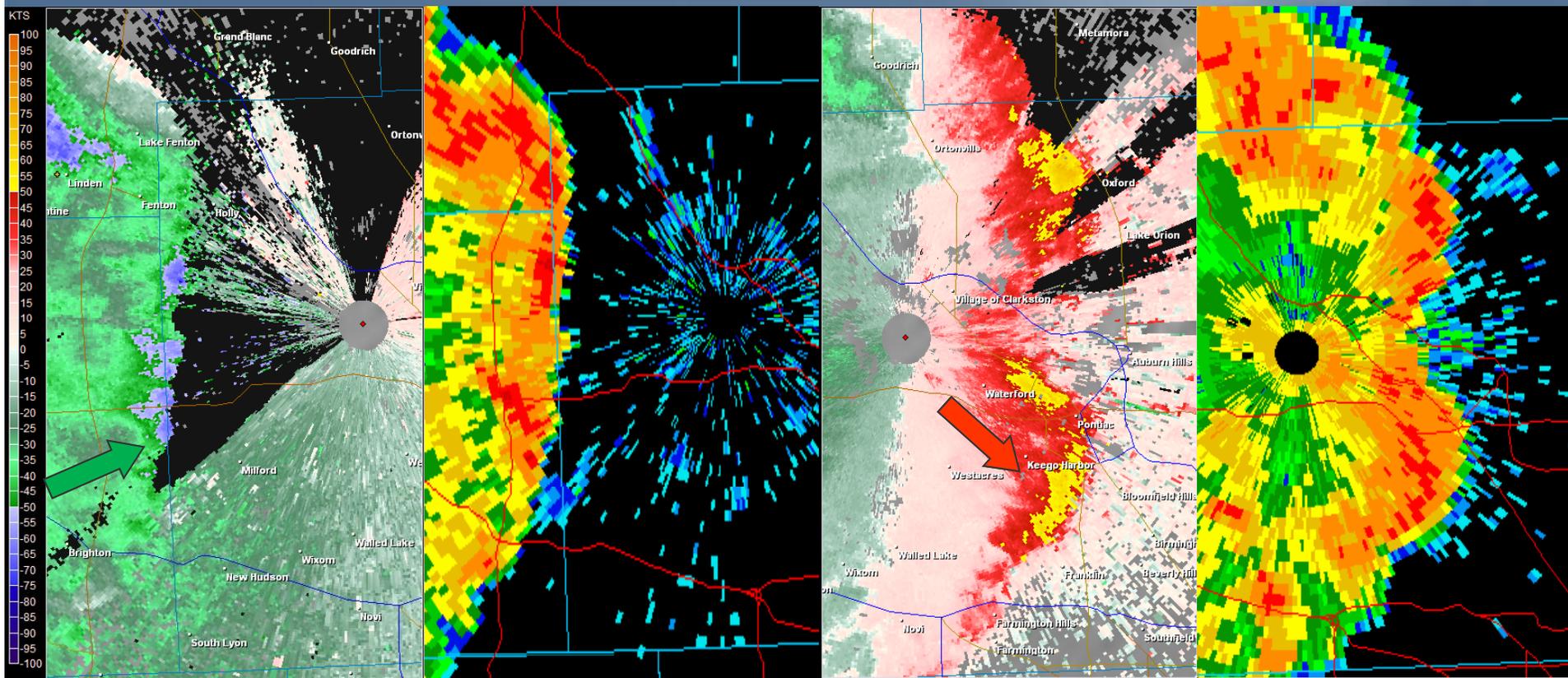
Phil Kurimski



Doppler Radar View

Strong, Straight-Line Thunderstorm Winds

(Large downburst) June 8, 2008



Velocity

Reflectivity

Velocity

Reflectivity

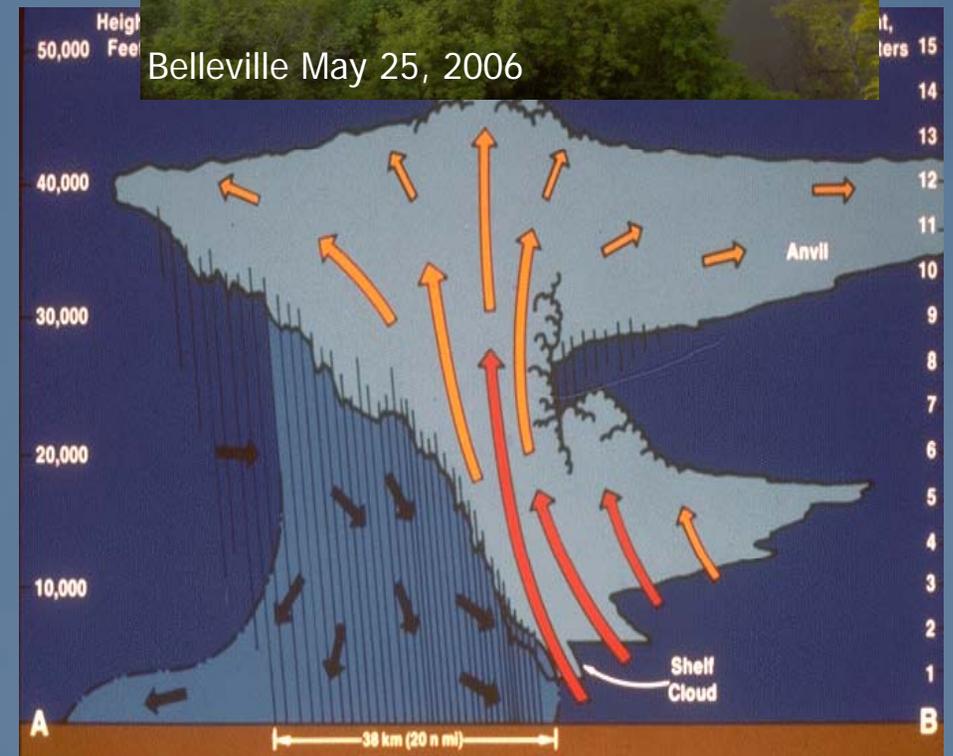
Cloud Features: Arcus Clouds

- An “outflow” cloud that indicates where air is flowing out of the storm at the surface.
- Sometimes a visual indication of a thunderstorm with strong, straight-line winds.



Cloud Features: Shelf Cloud

- Low, horizontal wedge-shaped cloud extending from the base of a thunderstorm (attached)
- Marks the leading edge of a cool outflow winds (not always severe)
- Marks updraft/downdraft interface
- Rising cloud motion sometimes seen in the leading part of the shelf cloud, while the underside often appears turbulent, boiling, and wind-torn.



Cloud Features: Shelf Clouds



Cloud Features: Roll Cloud

- Horizontal tube-shaped cloud that is located below the leading edge of a thunderstorm (not attached)
- Sometimes rotates, or “rolls”, along a horizontal axis (not vertical)
- Forms along gust front as cool outflow lifts warm moist air
- Like shelf clouds, can be a visual indicator of the onset of strong winds



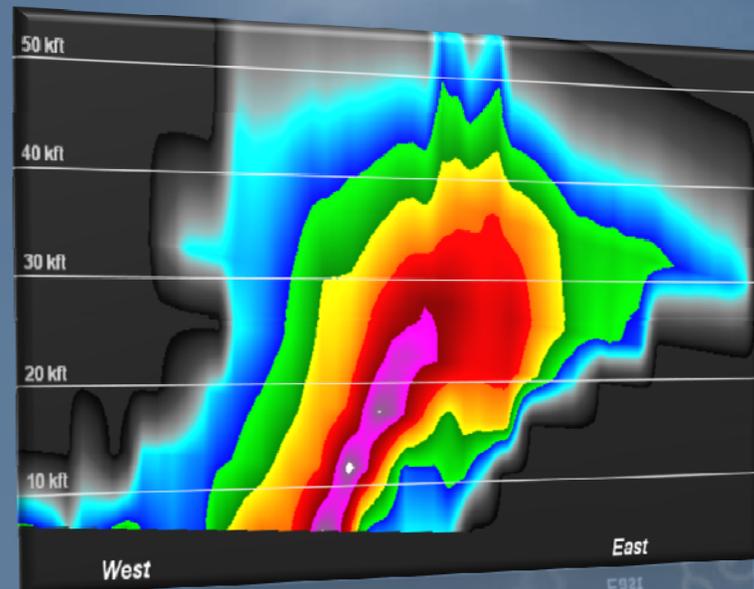
Squall Line Summary

- Strong winds can be preceded by a Shelf Cloud.
- Straight-Line Winds can exceed 100 mph (Hurricane Force).
- Damage can equal or exceed Tornado Damage.
- Winds may push out ahead of main storm and occur before any rain falls.

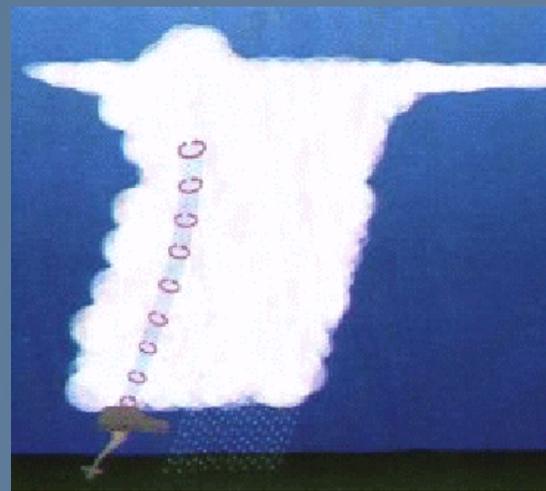
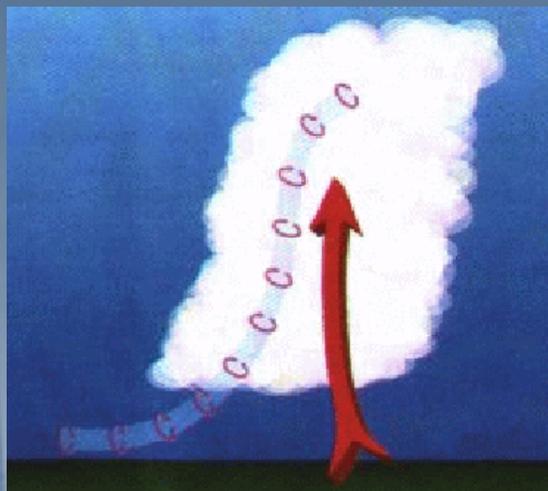
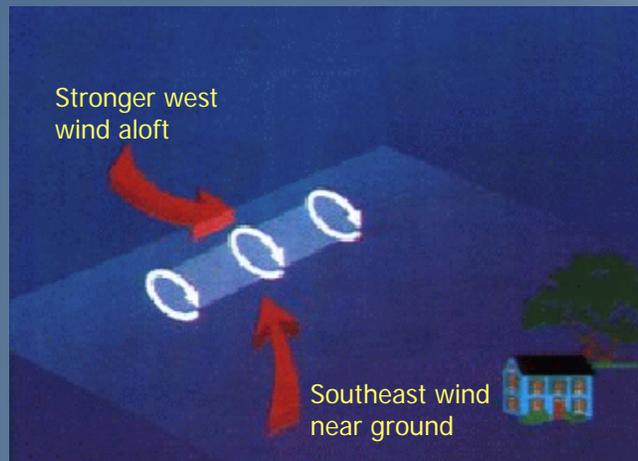


The Supercell

The Biggest Thunderstorm of All

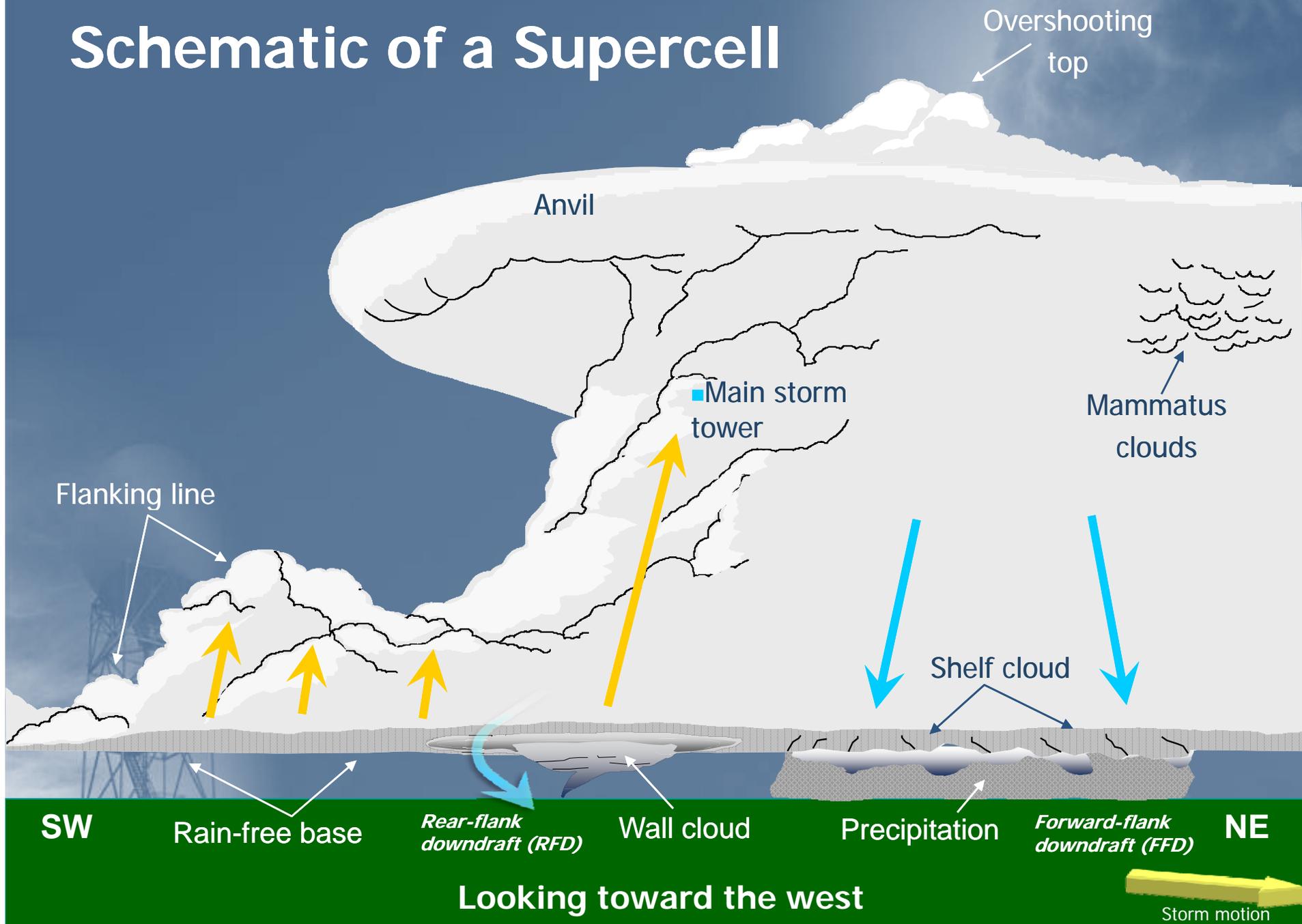


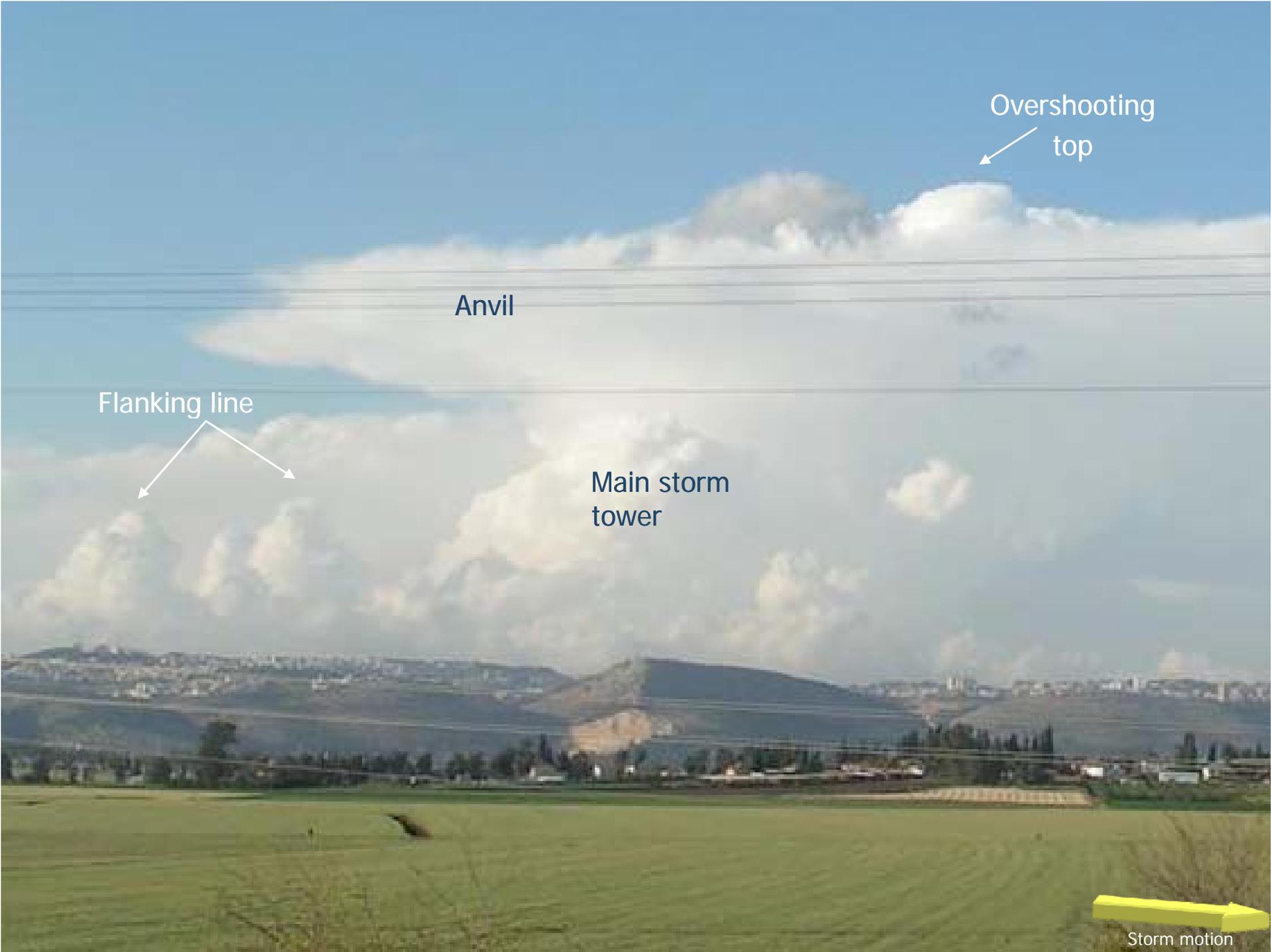
Why a Supercell Updraft Rotates



The rotating updrafts in these storms are called “mesocyclones.”

Schematic of a Supercell





Overshooting top

Anvil

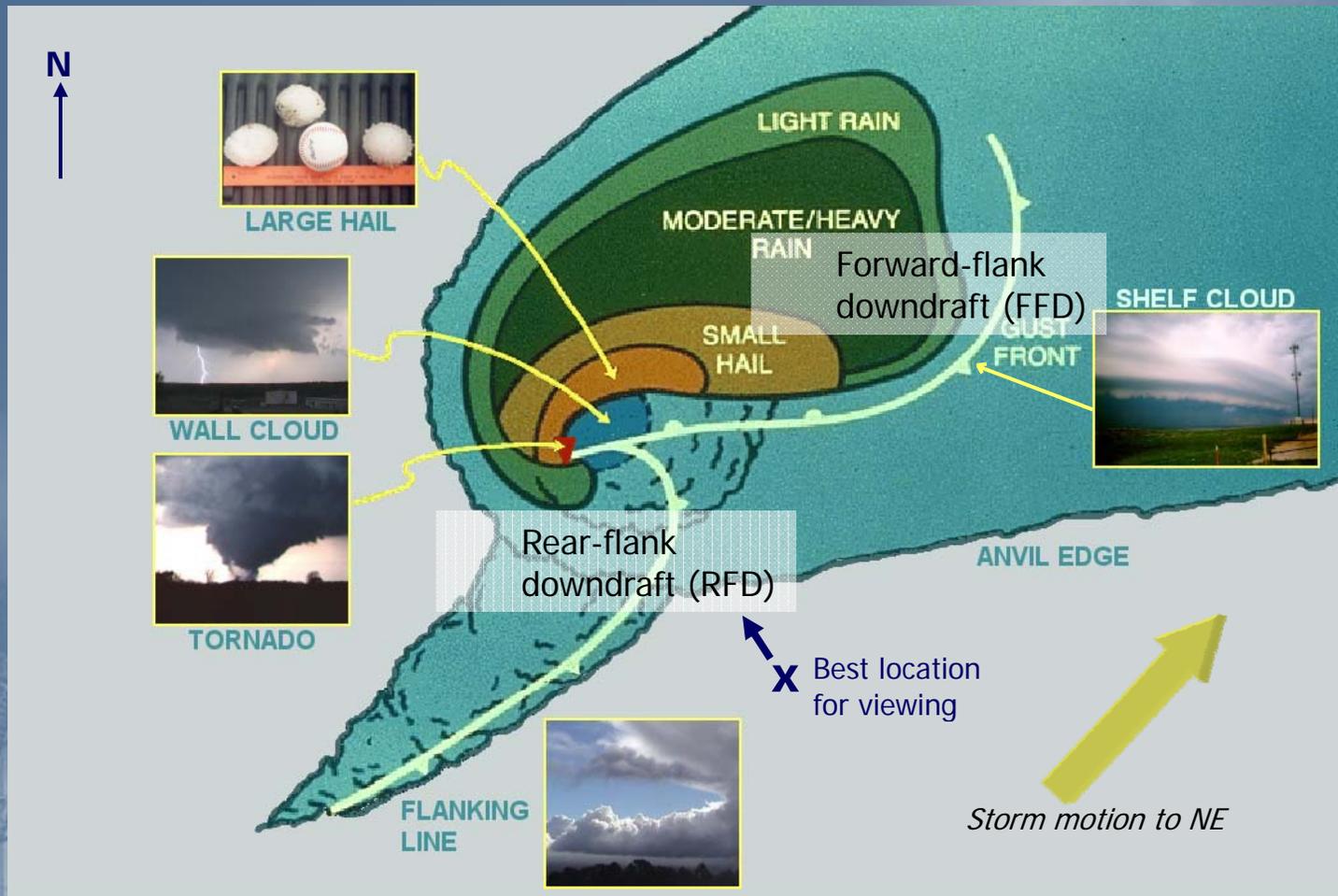
Flanking line

Main storm tower

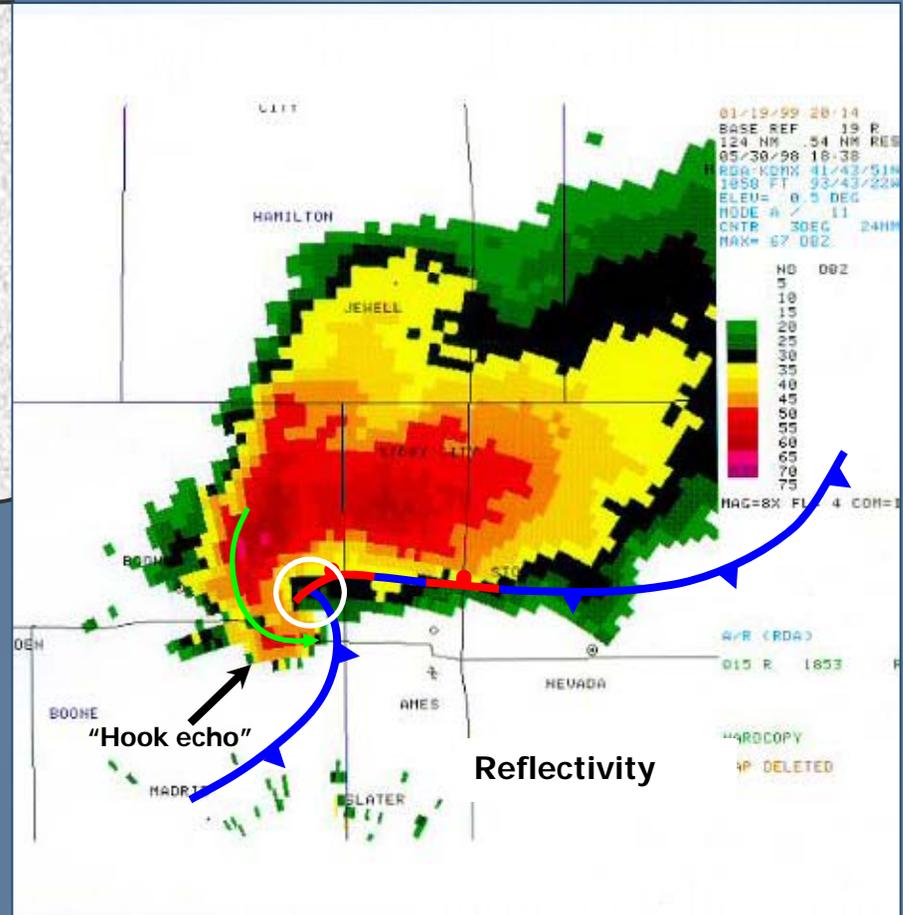
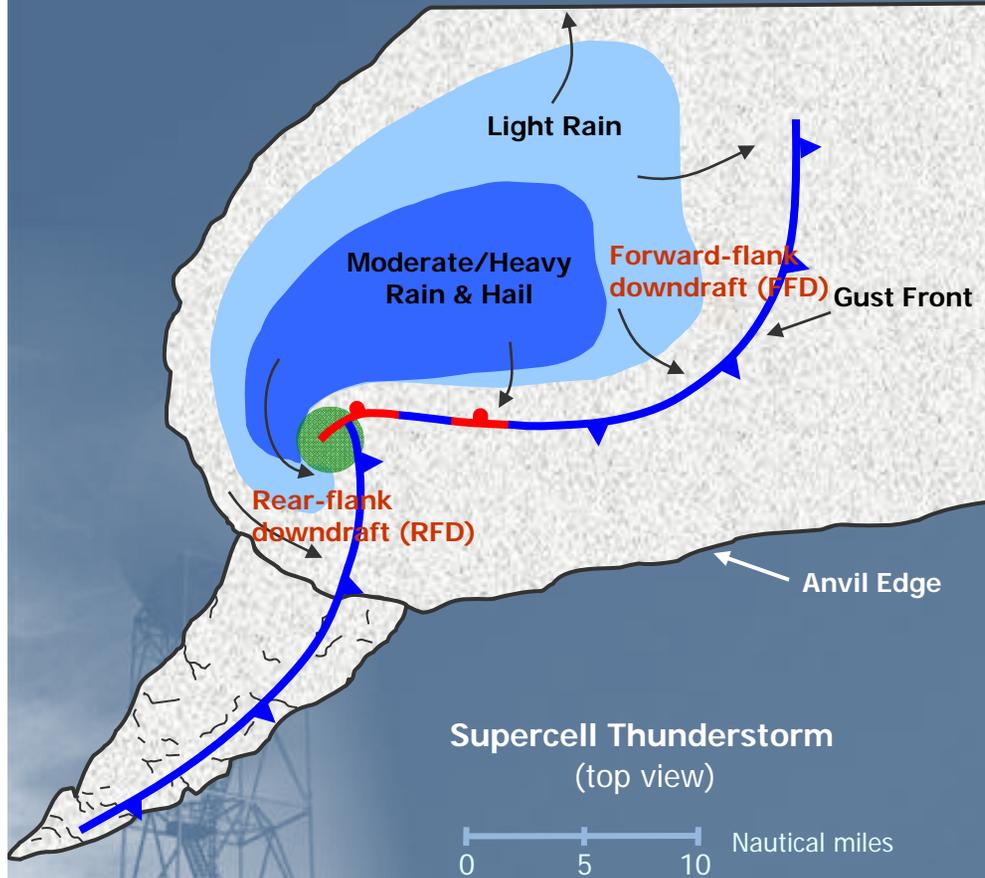


Storm motion

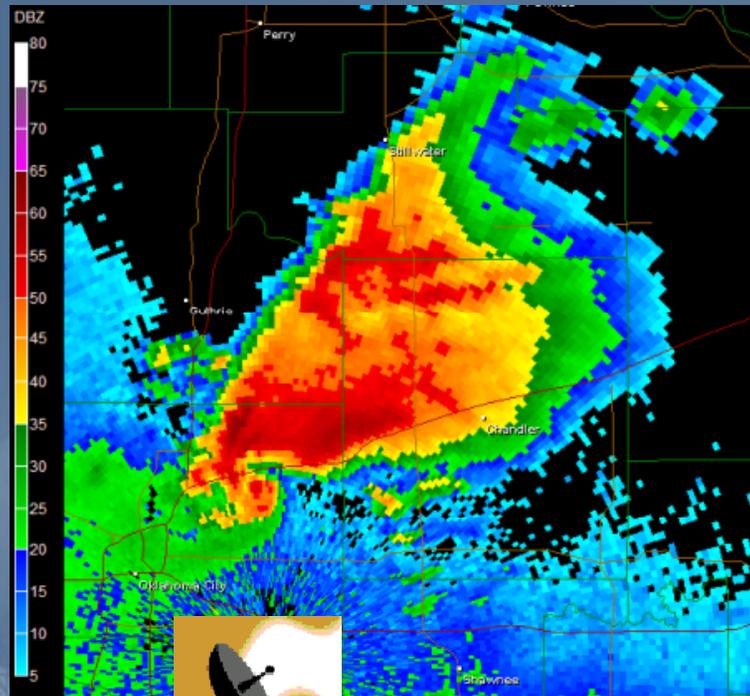
Same Storm, Looking Down



Doppler Radar View of a Supercell



Doppler Radar View of a Supercell



Reflectivity



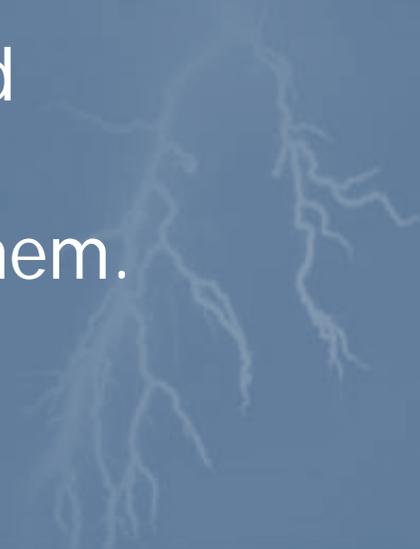
Velocity

Examples of Supercells



More About Supercells

- True supercells are rare.
- Supercells produce the most severe type of weather associated with thunderstorms.
- While severe storm spotting, try to identify as many thunderstorm cloud features as possible - supercells will have many or all of them.



Cloud Features: Wall Clouds

- Wall Cloud – a **localized**, persistent, lowering from a rain-free base, which typically rotates.
- Attached to the cloud base
- Slopes downward and towards precipitation (tail cloud)



Cloud Features: Wall Clouds

May exhibit rapid upward motion and cyclonic rotation. However, not all wall clouds rotate

- Tail cloud extending out of wall cloud slopes down and towards precipitation



Cloud Features: Wall Clouds

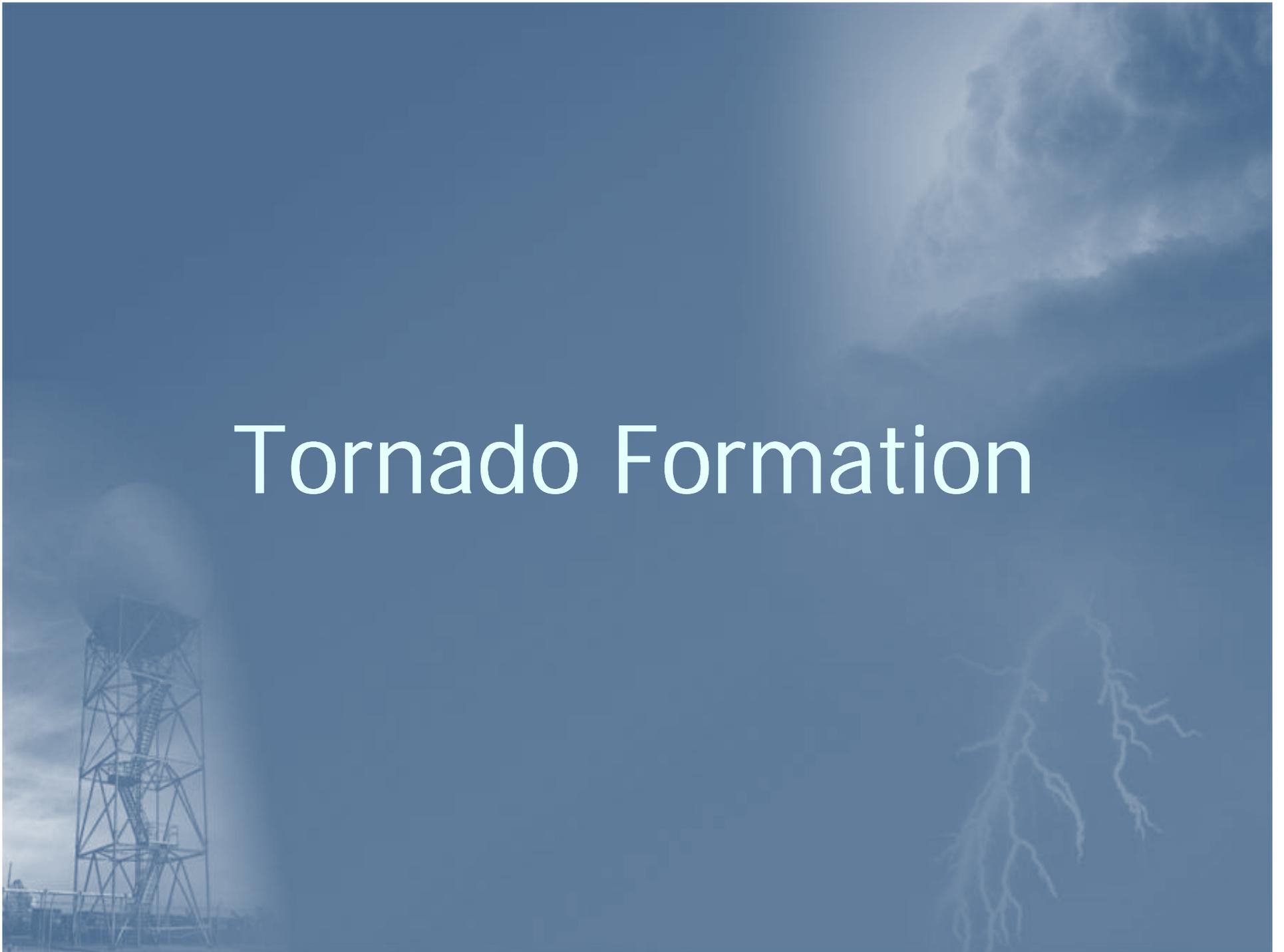
Tornadic Wall Cloud Characteristics

- Persistence: 10 to 20 min.
- Rotation: Visible, Churning
- Strong Surface Inflow: 15+ mph winds blowing toward rain-free base and wall cloud (from south/east).
- Vertical Motion: Air rapidly rising into the wall cloud.



Video by Roger Hill

Tornado Formation



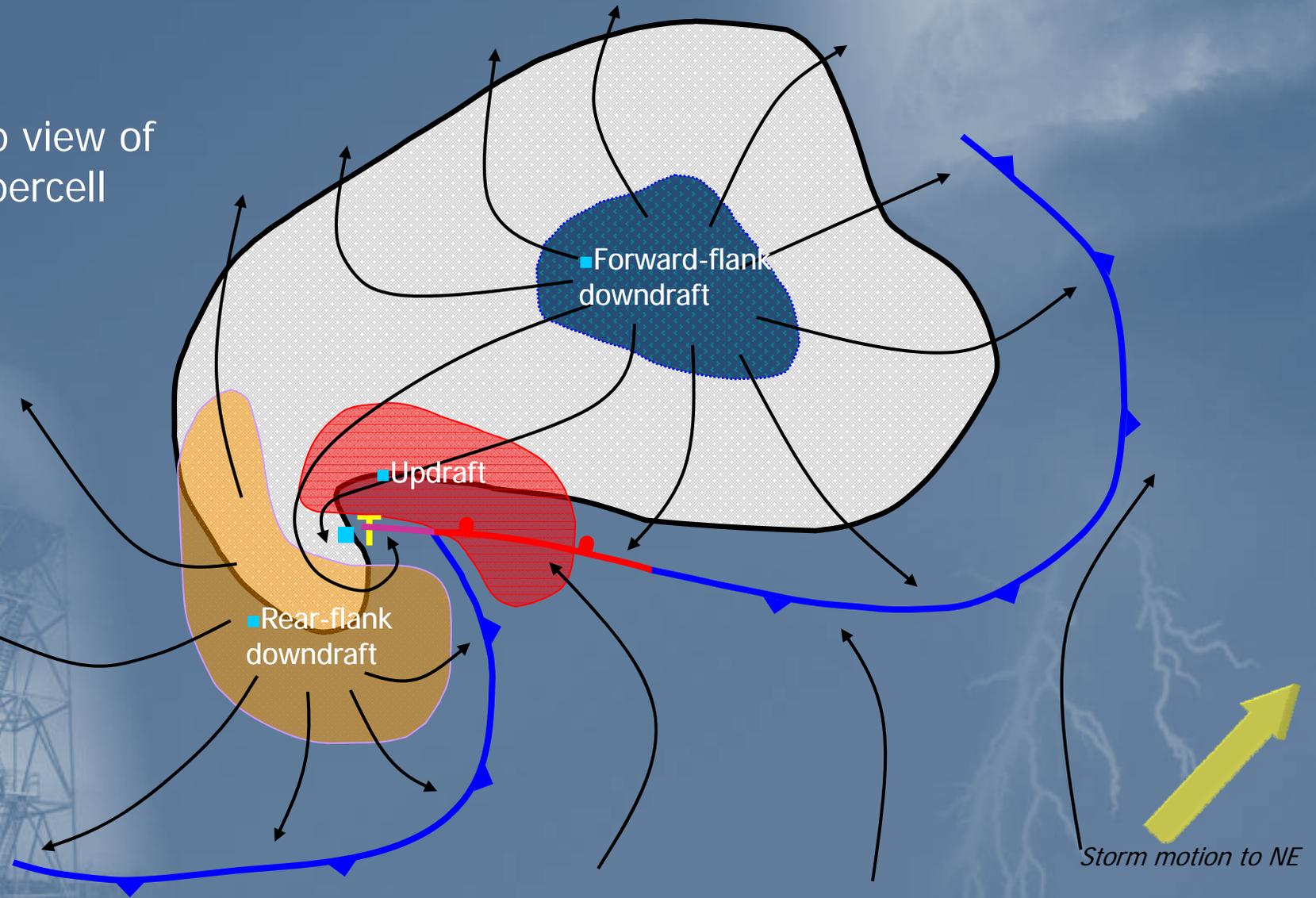
The Tornado

A Rare and Dangerous Storm

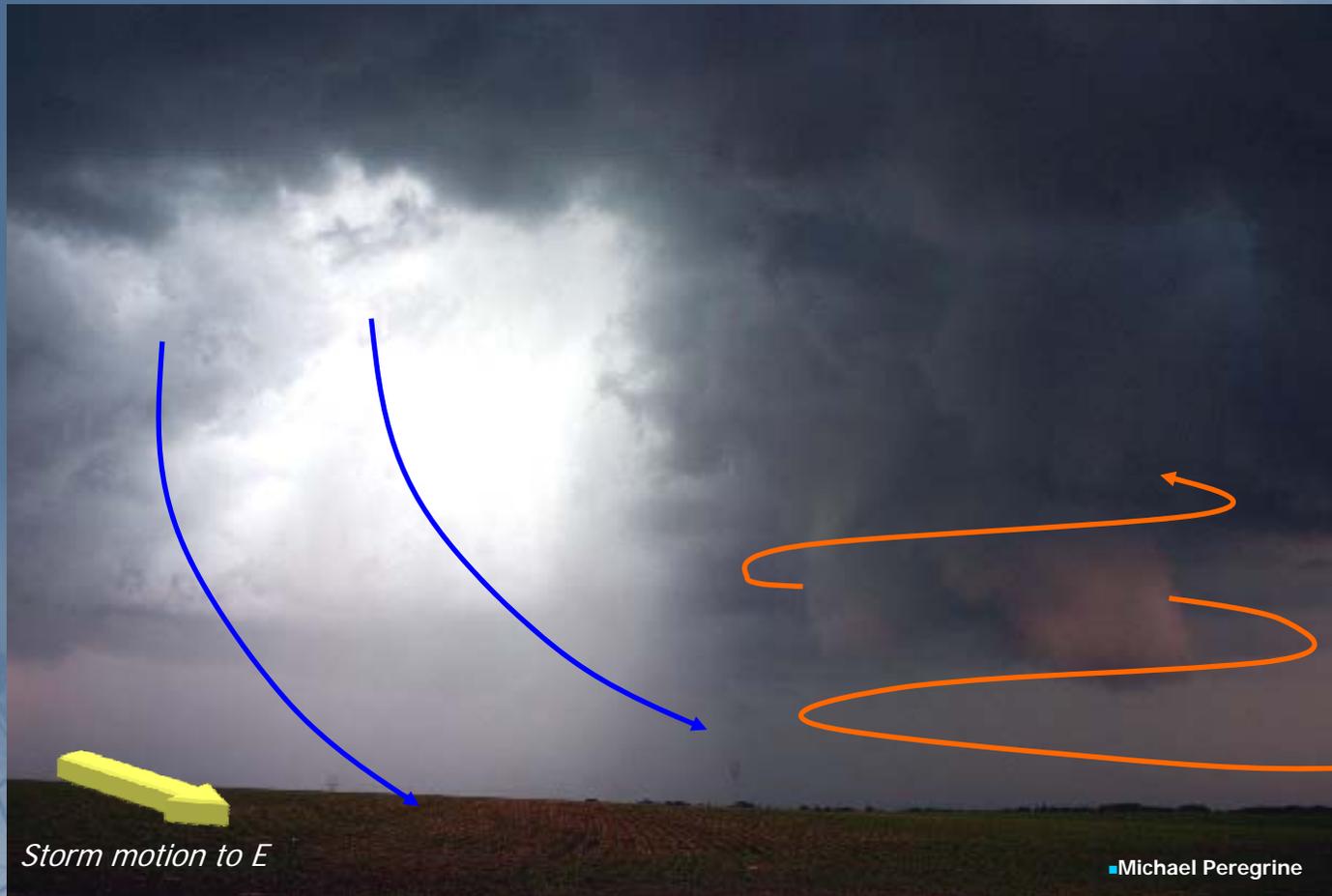


Tornadogenesis

Top view of supercell



The Role of the Rear Flank Downdraft



The Role of the Rear Flank Downdraft



Tornadogenesis

Photos by Gene Rhoden



Not all tornadoes will exhibit a “classic” life cycle appearance.

Many of Michigan’s tornadoes are weak and short-lived, and therefore may not have discernable stages.



Non Supercell Tornadoes

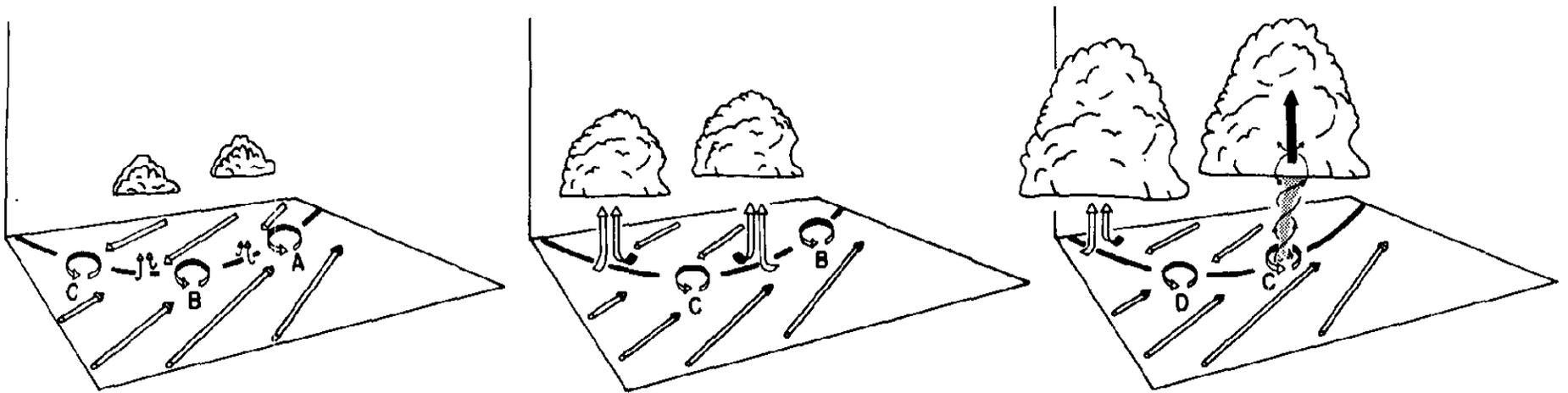


FIG. 20. Schematic model of the life cycle of the non-supercell tornado. The black line is the radar detectable convergence boundary. Low-level vortices are labeled with letters.



What Are They?

- A tornado that occurs with a parent cloud in its (rapid) growth stage.
- The parent cloud does not contain a preexisting midlevel mesocyclone.
- As a result, these are very difficult to detect on RADAR.
- These events are most typical with high instability below the cloud base.

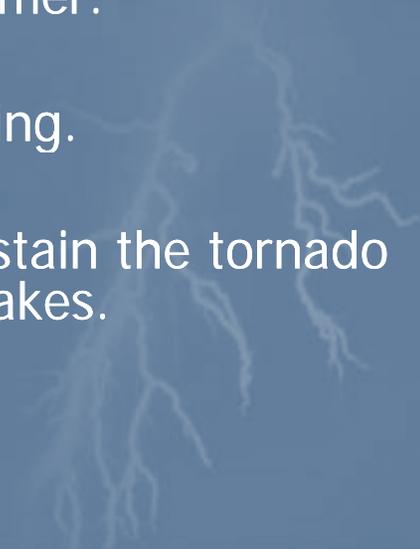
Marine Meteorology - Waterspouts

- Cool season waterspouts
 - Develop from light showers, or even non-precipitating clouds.
 - Waterspout wind speeds in the range of 30 to 80 knots.
 - Occur when winds are light with surface high pressure over the Great Lakes, and when the air is much cooler than the water.
 - Most common in the late summer and autumn.
 - Most common in the morning.
 - Can occur in groups.



Marine Meteorology - Waterspouts

- Warm season waterspouts
 - Form from severe thunderstorms that move over the water.
 - Wind speeds can exceed 60 knots.
 - Most common in the late spring and summer.
 - Most common in the afternoon and evening.
 - It usually takes a very strong storm to sustain the tornado a significant distance out into the Great Lakes.
 - This type of waterspout is very rare.



Review

Shelf Clouds Vs Wall Clouds

Shelf Cloud



- Slopes down and away from precipitation
- Moves away from the precipitation

Wall Cloud



- Tail cloud slopes down and towards precipitation
- Tail cloud not always present
- Maintains position with respect to precipitation

Shelf cloud or wall cloud?



Wall Cloud

Tornado, Funnel Cloud and Wall Cloud Look-a-Likes



Tornado Look-a-Likes

Remember when spotting tornadoes, look for:

- Debris Cloud
- Rotation about a vertical axis
- Fairly smooth look to condensation funnel



Is this a tornado?

No rotation



NSSL photo

Distant rain shaft



Is this a tornado?

Small debris cloud

Smooth condensation funnel

Rotating



YES!



Is this a tornado?



Not rotating

“Debris” cloud is actually rain and blowing dust from thunderstorm outflow

NO!

What is this?

Scud clouds
moving with outflow

© 1999 Christine White



Not making contact with the ground
No rotation

Is this a tornado?

**Dust from rear flank
downdraft**



There is a wall cloud
Debris cloud is not
rotating



What is this?

Funnel cloud
Please call us



Not making contact with the ground
Rotating

As this cloud feature approaches my location, I can expect:



- A. Wind at my back because I am looking at a wall cloud.
- B. Wind at my back because I am looking at a microburst.
- C. Wind at my face because I am looking at a shelf cloud.**
- D. Wind at my face because I am running away from it.

What to Report: A Review

- 1) Tornadoes, waterspouts and funnel clouds
- 2) Wind gusts over 40 mph
- 3) Hail: plain M&M size (1/2") or larger
- 4) Flooding that threatens property or covers roads
- 5) Rainfall of greater than one inch in 24 hours
- 6) Snow accumulations greater than one inch and storm totals
- 7) Ice: freezing rain or sleet accumulations
- 8) Fog (not forecast) with visibility less than ¼ mile
- 9) All weather-related damage

How to Report: A Review

- 1) Toll-Free Spotter Hotline: **1-800-808-0006**
(**Unlisted**, 24 hours)
- 2) Amateur Radio, Local Nets, and MICON
- 3) Packet Radio: **K8DTX-5, 145.76 MHz**
- 4) eSpotter: **espotter.weather.gov**

Report: What you saw, when you saw it, and your location (including address or closest major intersection)

The End

- Questions?

