2011 Spotter Training

Part 2

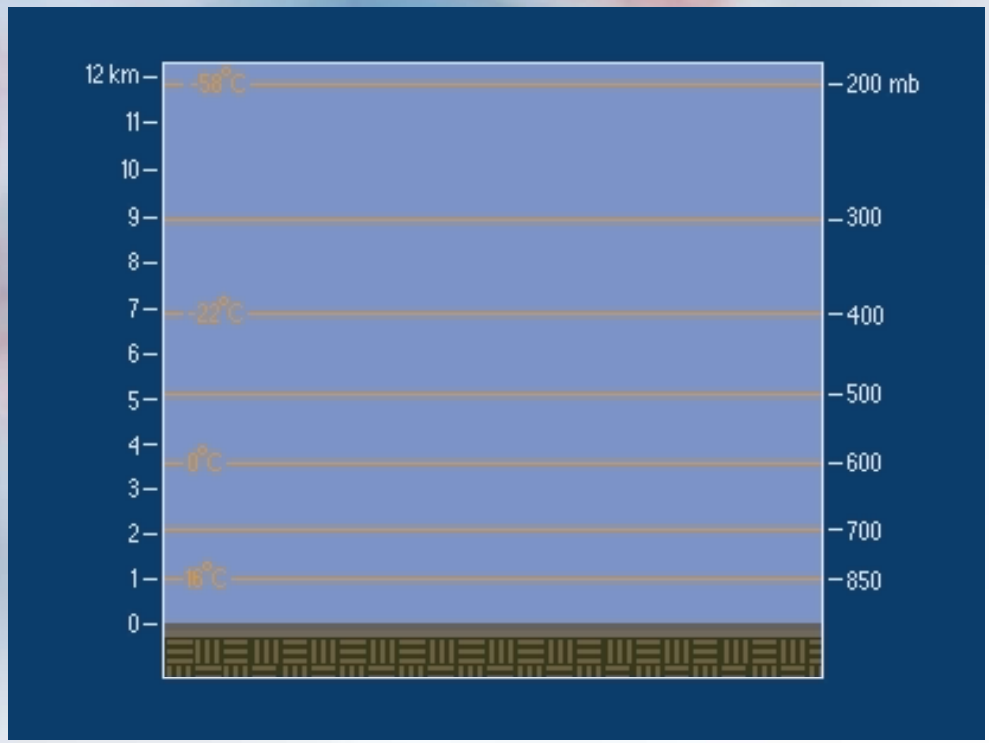
- Thunderstorm Overview
- Thunderstorm Types
  - Single Cell
  - Multicell
  - Squall Line
  - Supercell
- Shelf vs. Wall Cloud
- Tornado vs. Tornado Look-a-likes
- Review of what, when and how to report

Thunderstorm Overview

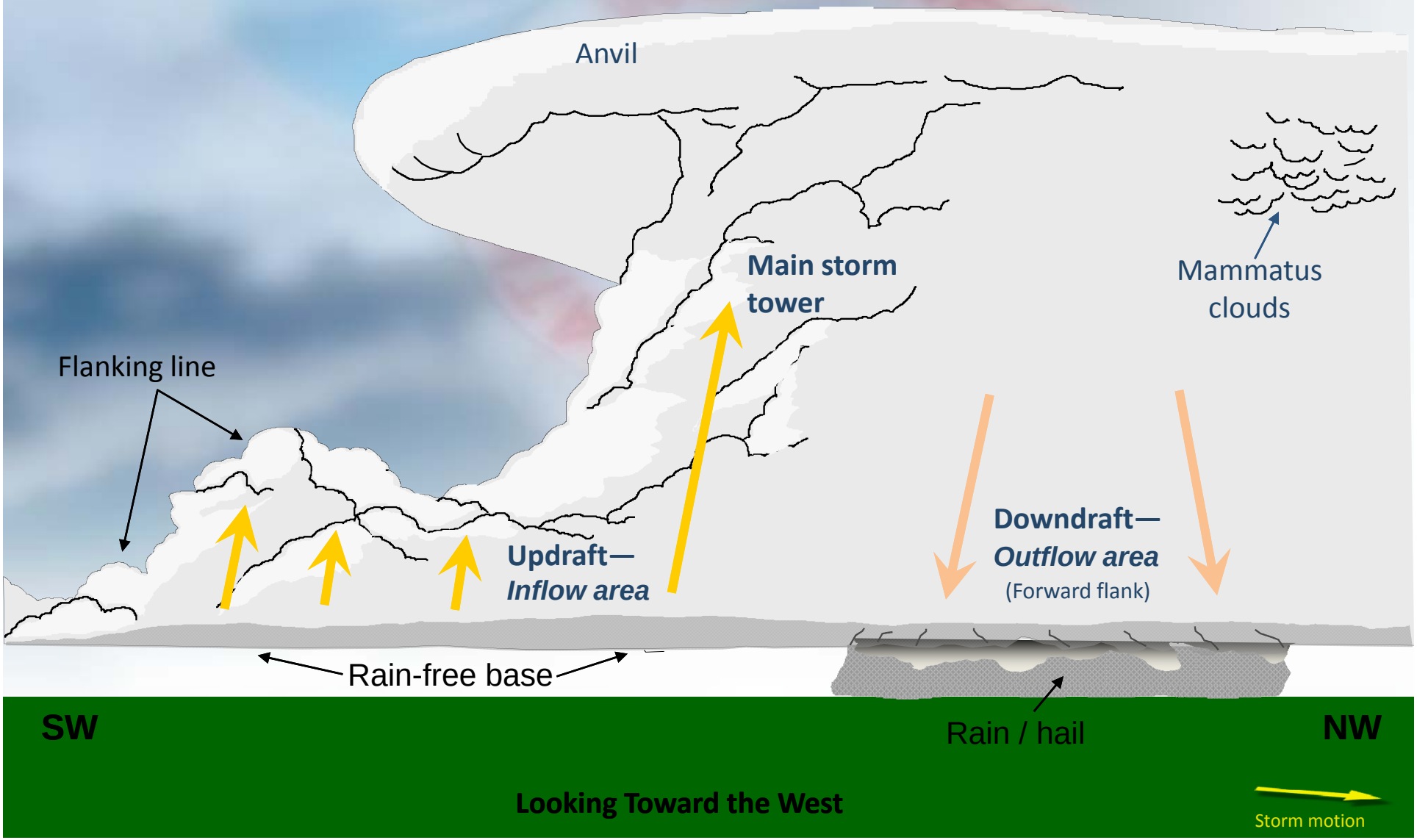
Recipe for a Thunderstorm

Three 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)

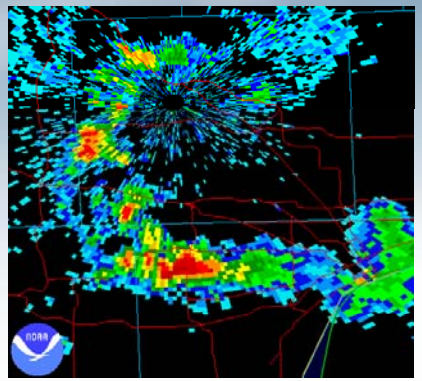
Moderate threat for brief or sustained severe weather events

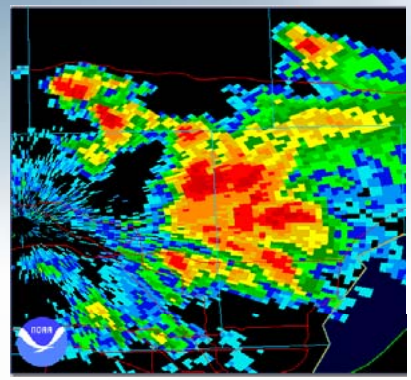
Intense, rotating updraft (always severe)

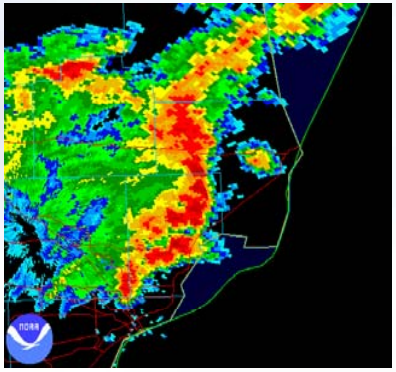
High threat for long-lived severe weather events

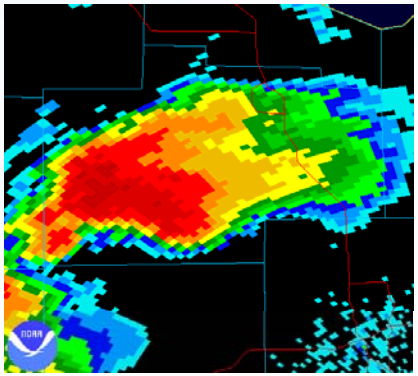
Thunderstorm Types

Single Cell	Multicell Cluster or Line	Supercell





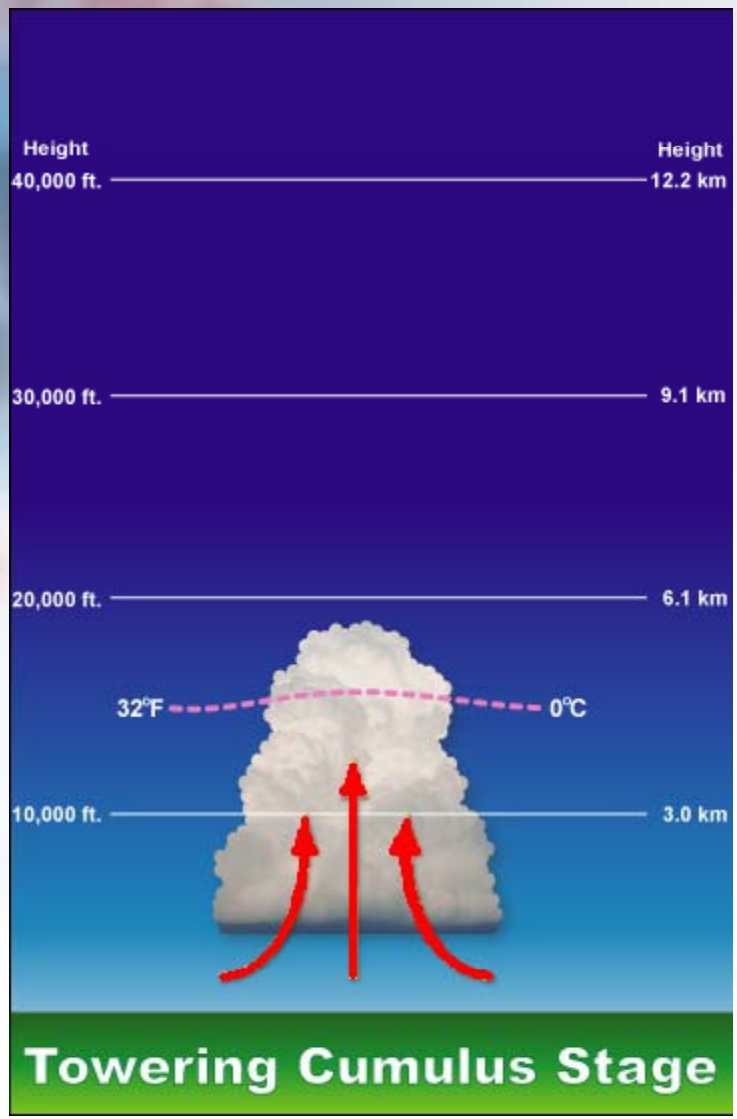




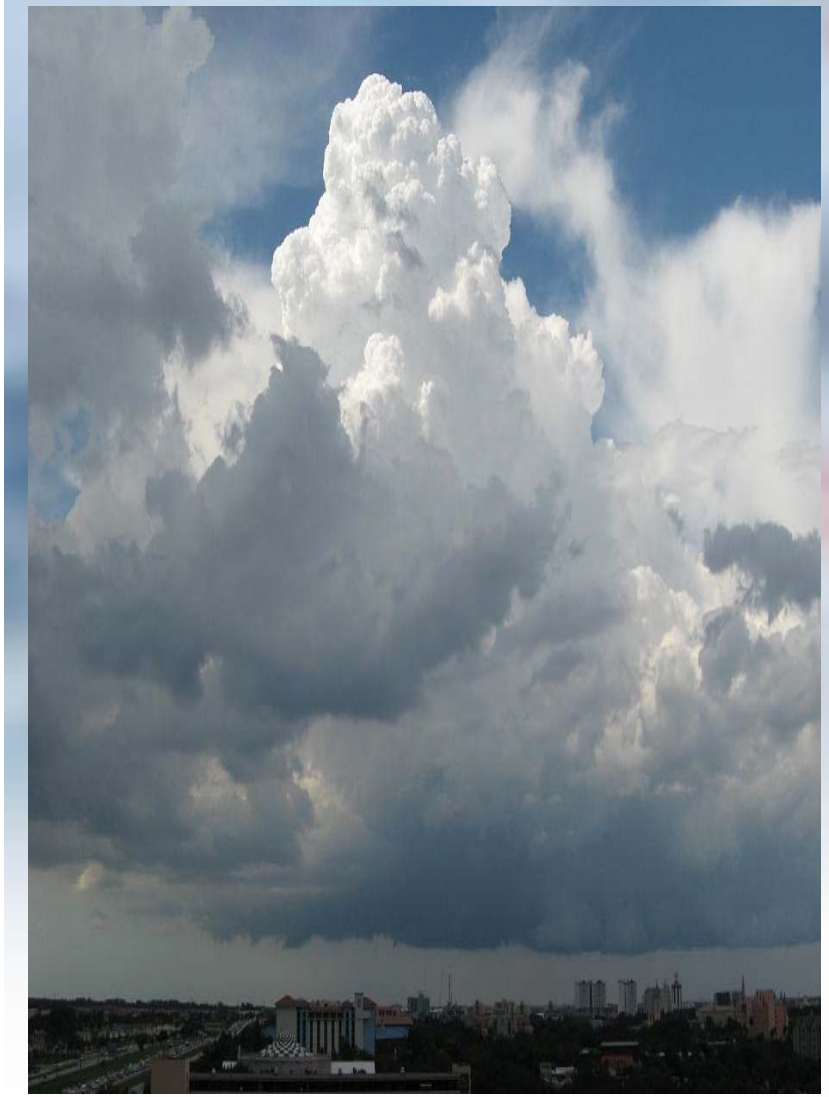
Identify Each Thunderstorm Type

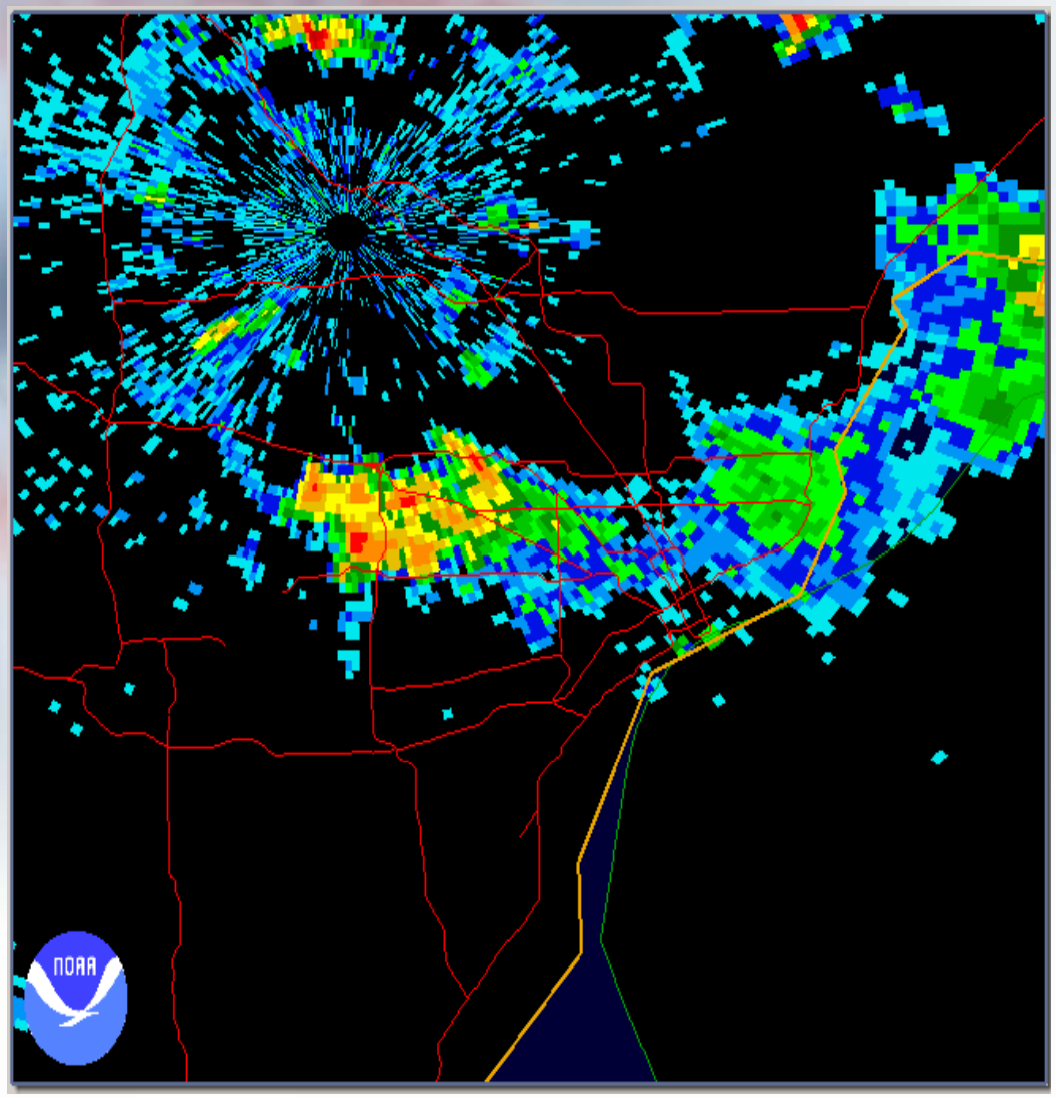
Developing Single Cell

- Towering Cumulus Stage
- All motion is upward
- Tops around 20,000 ft
- Little or no precipitation



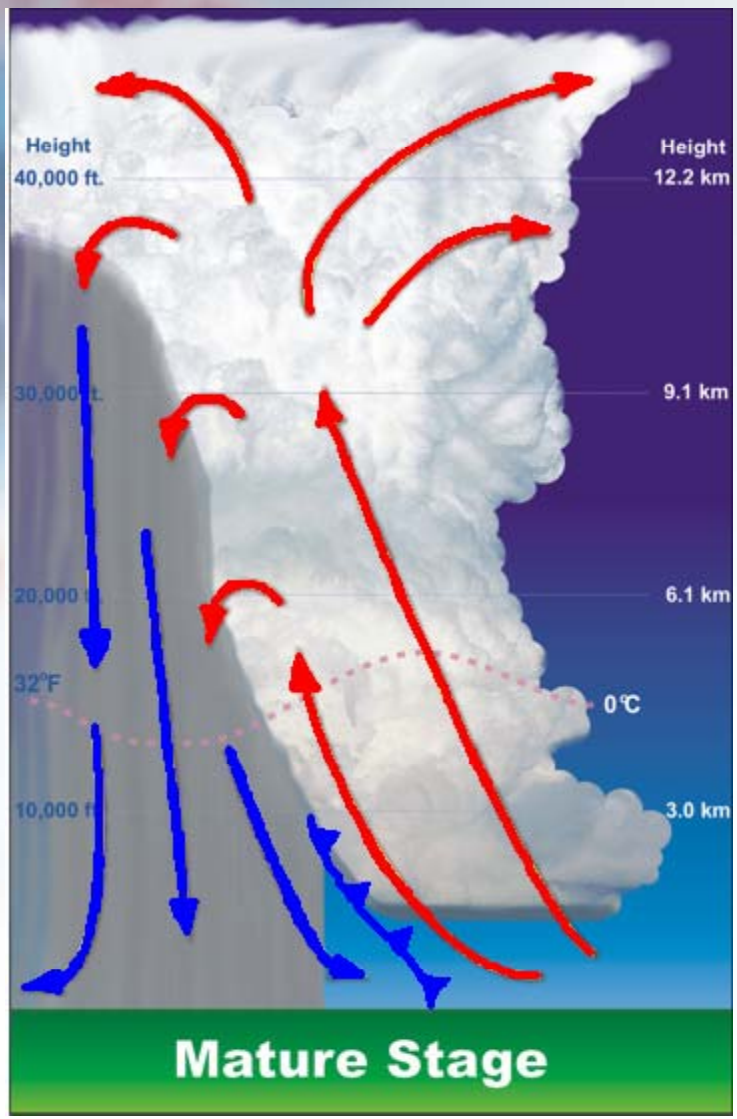
Developing Single Cell



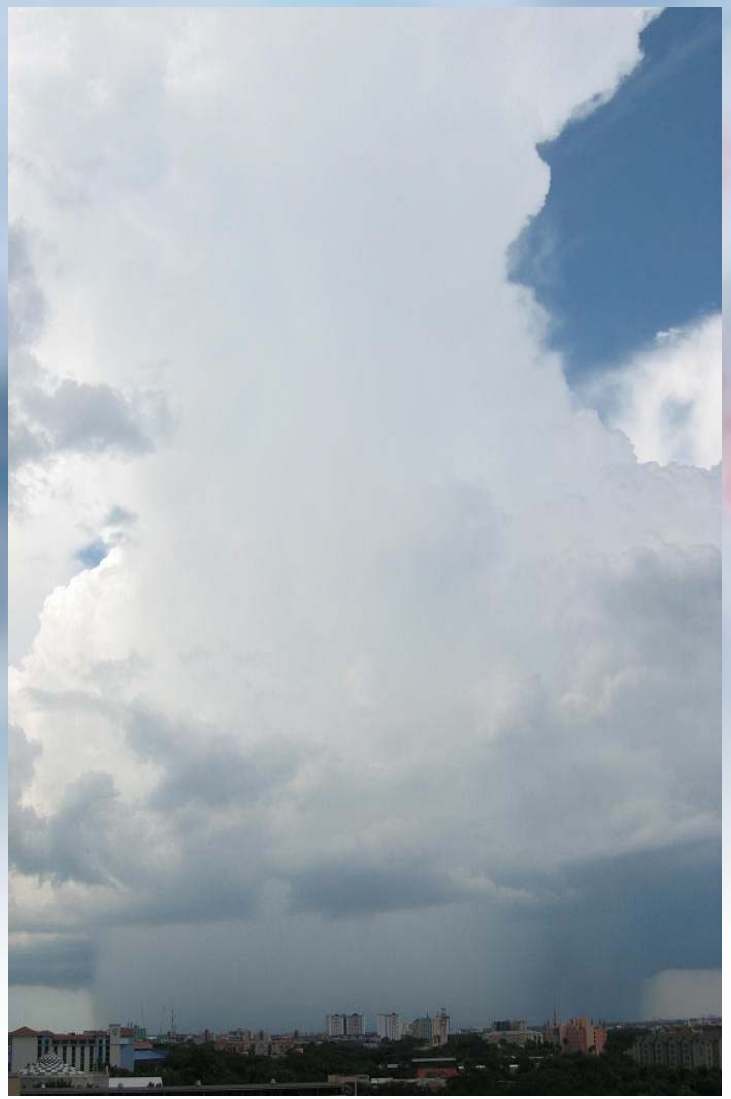


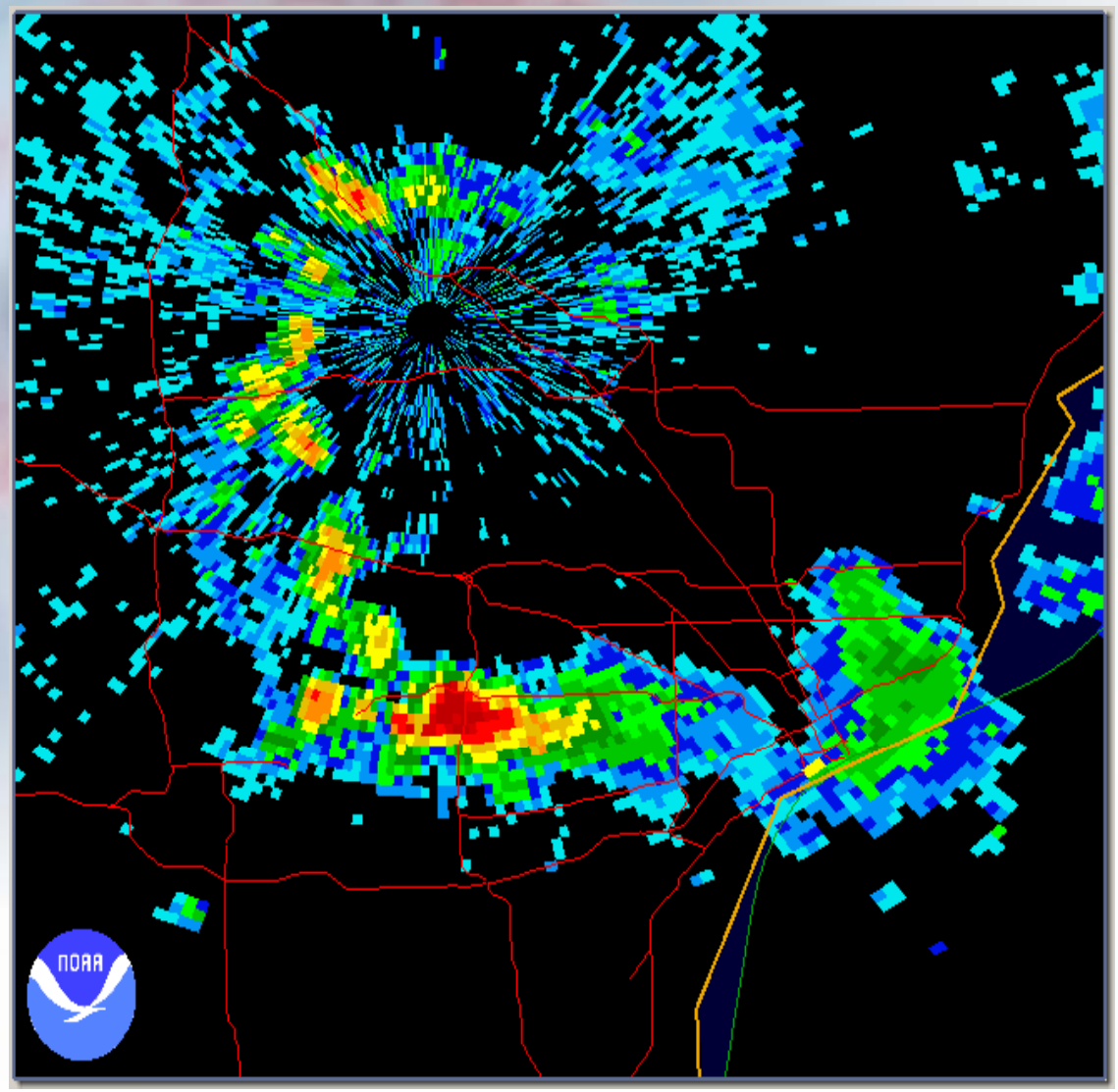
Mature Single Cell

- Strongest and most dangerous stage
- Both upward and downward motion
- Tops around 40,000 ft
- Precipitation in the downdraft
- Gust front forms



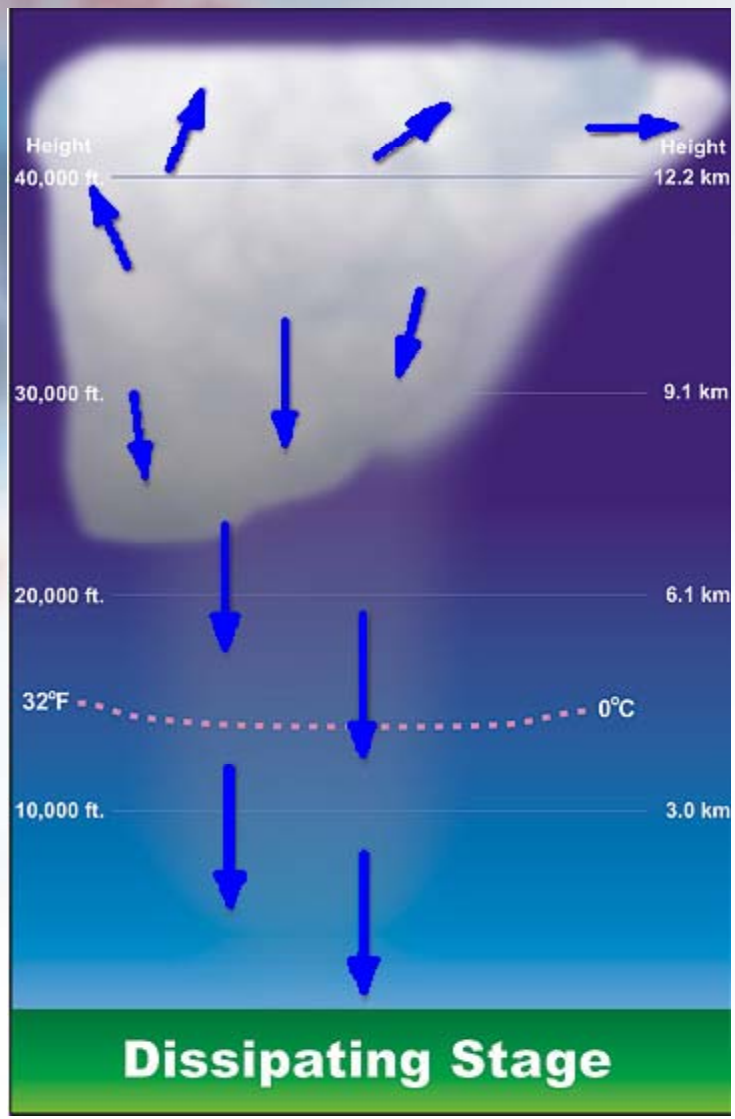
Mature Single Cell



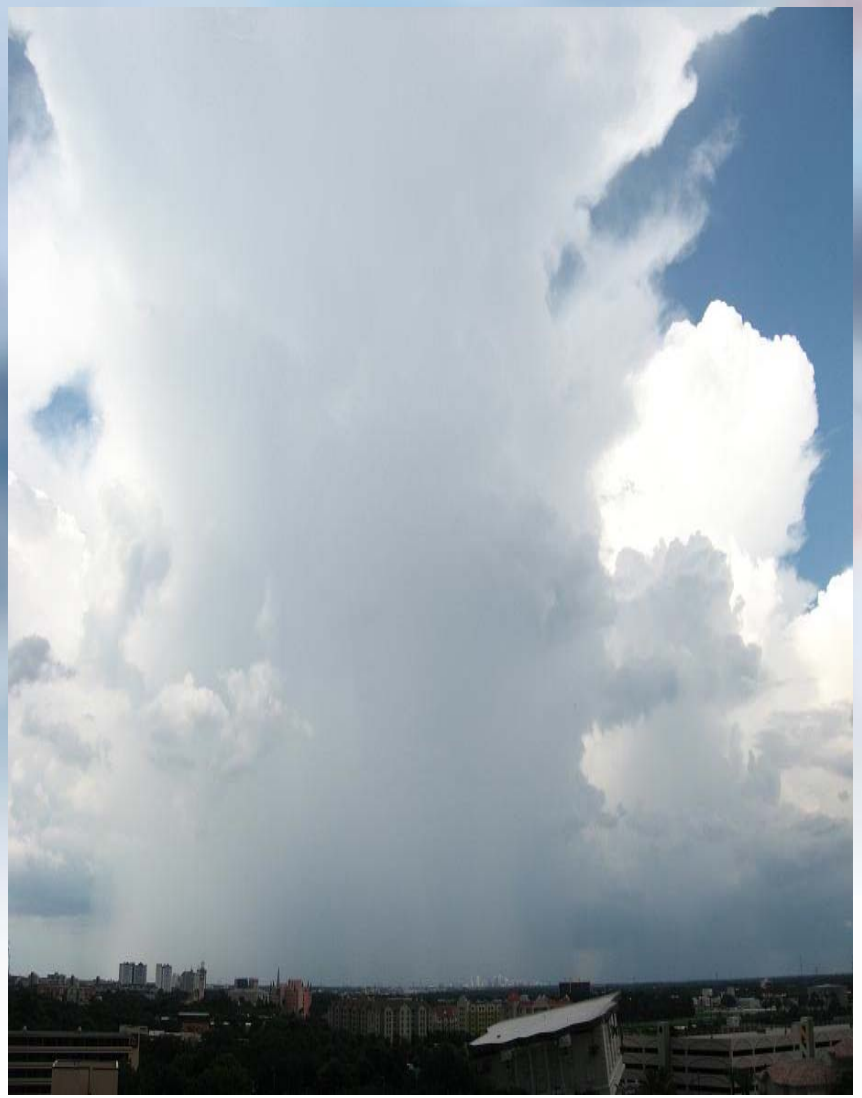


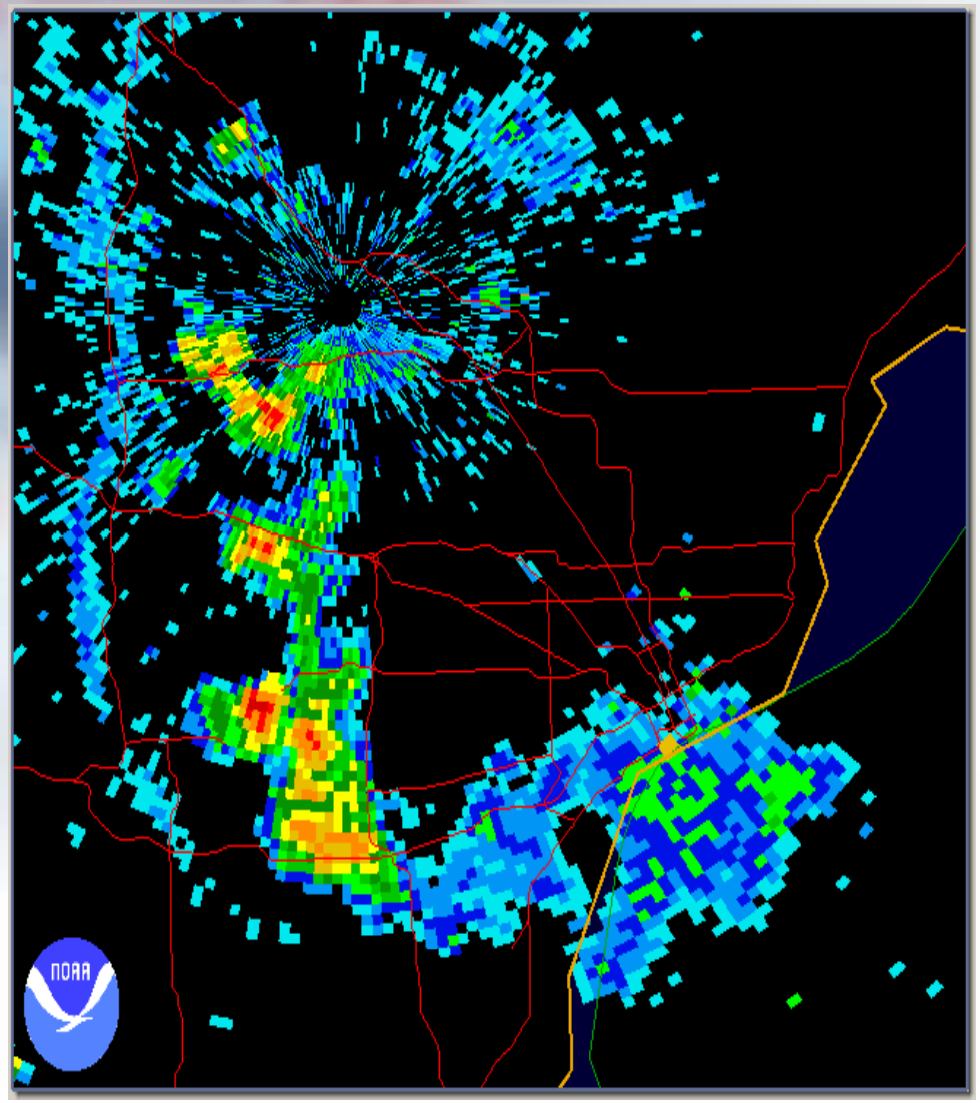
Dissipating Single Cell

- Gust front moves out away from the storm and chokes off updraft
- All motion is downward
- Overshooting top disappears



Dissipating Single Cell

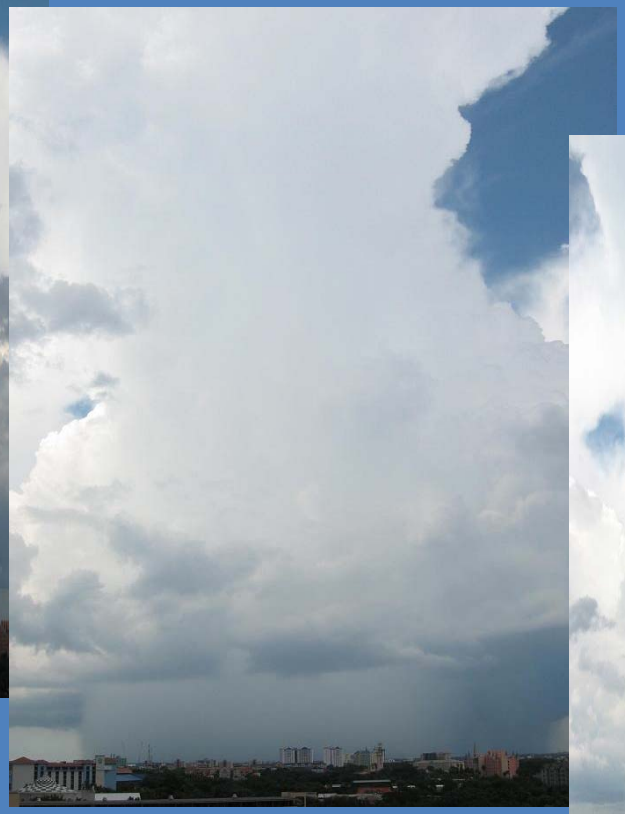




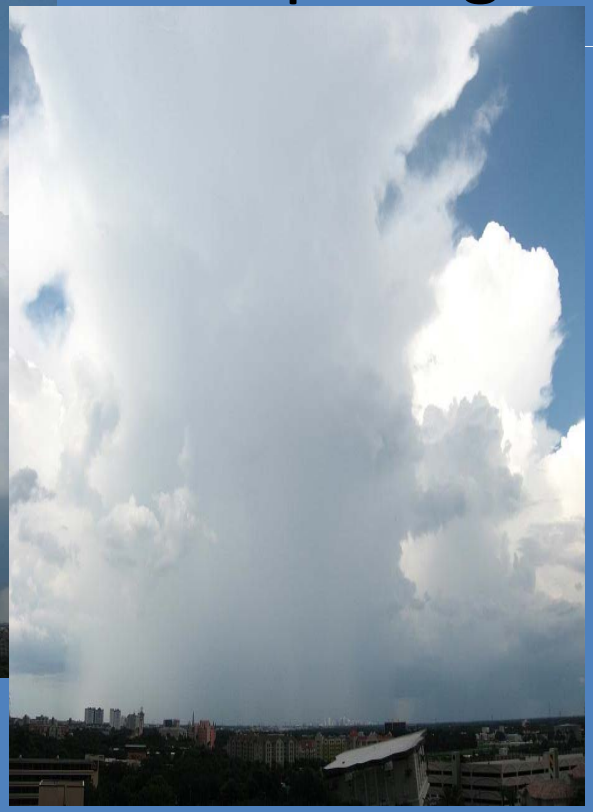
Single Cell Life Cycle

Developing

Mature

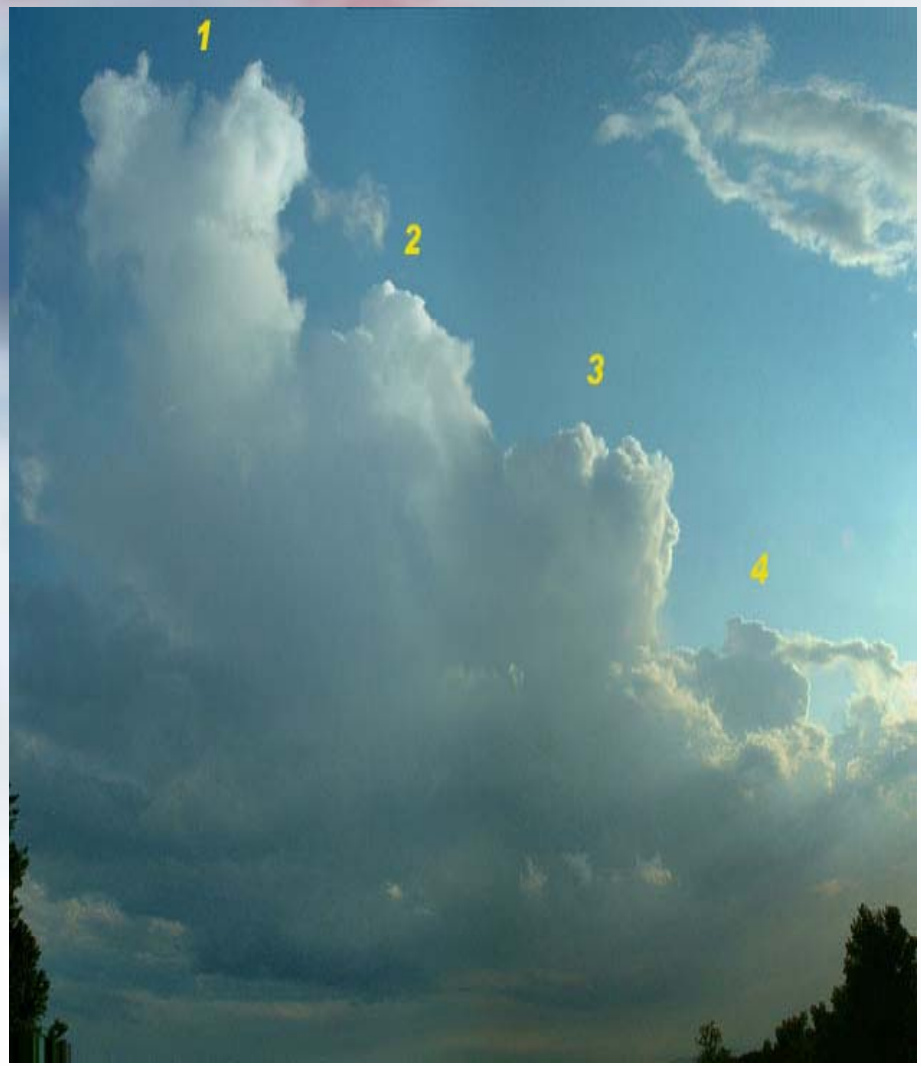


Dissipating

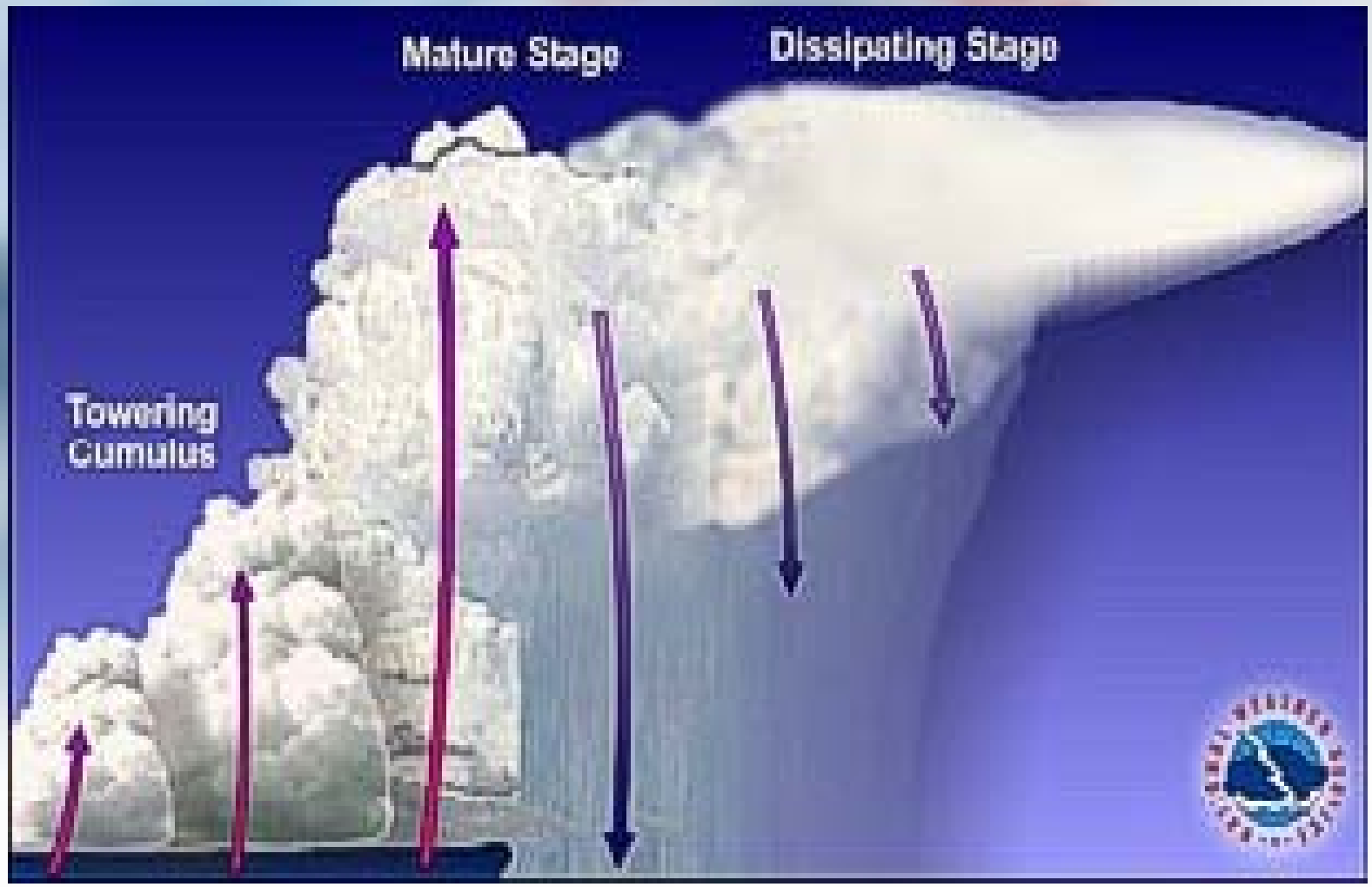


Multicell Cluster

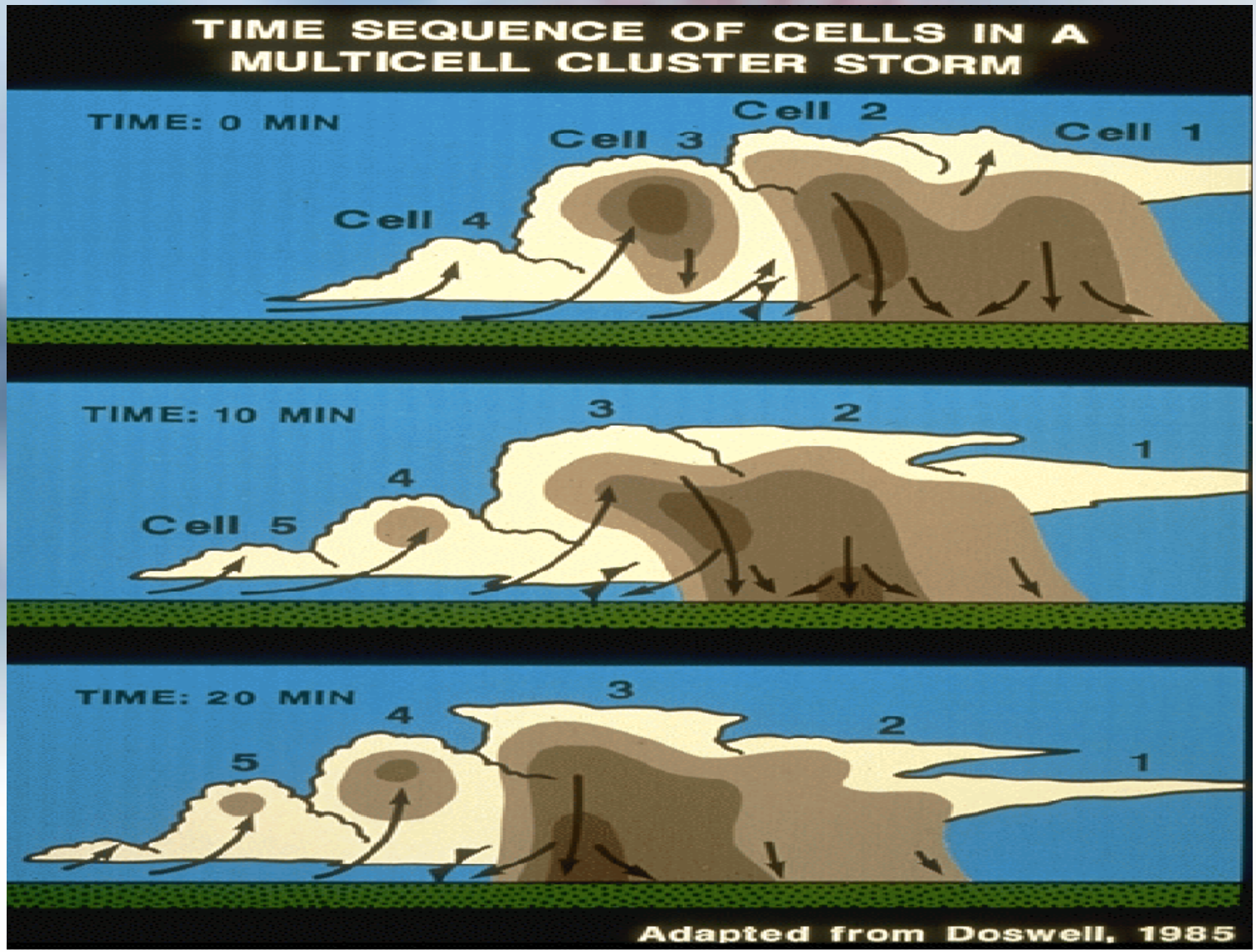
- Multiple single cells can organize into clusters that move as one unit
- Clusters can last for hours
- Most common type of thunderstorm



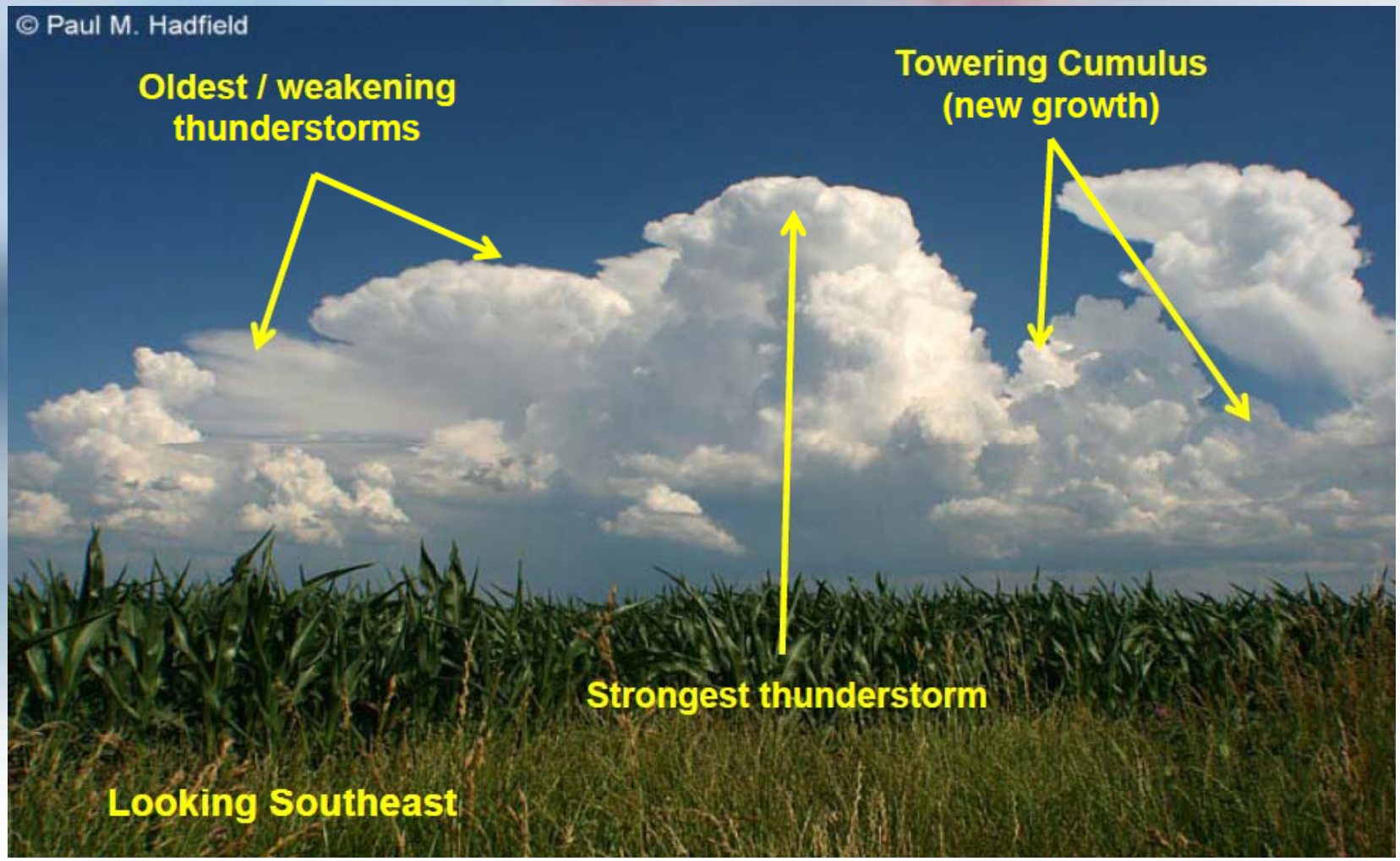
Multicell Cluster



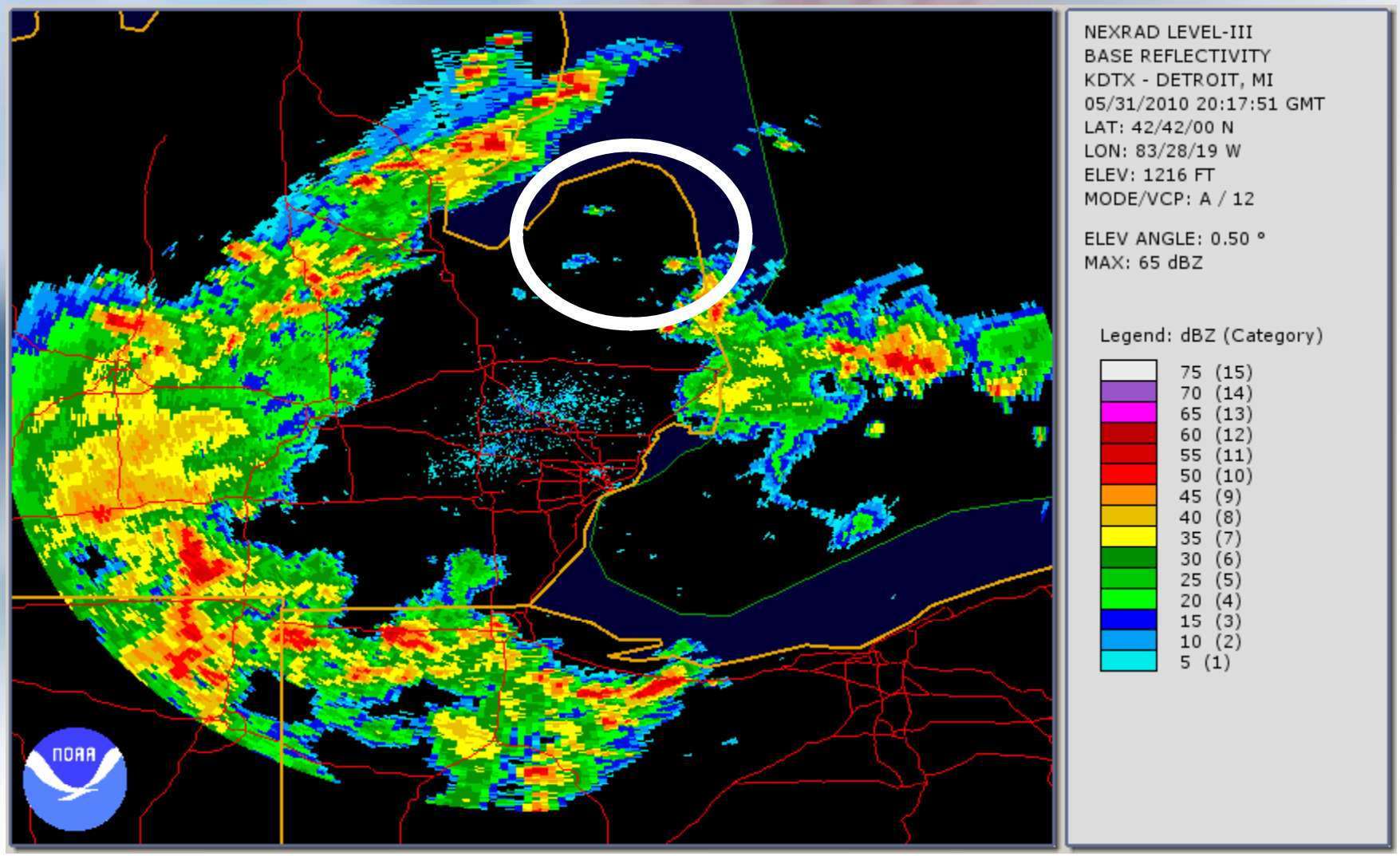
Multicell Cluster



Multicell Cluster



Multicell Cluster



Review

- Place the following in the correct order of development

1

2

3

A. 1, 3, 2
B. 3, 2, 1
C. 2, 3, 1
D. 2, 1, 3
E. 1, 2, 3

Thunderstorm Type: Multicell Line

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

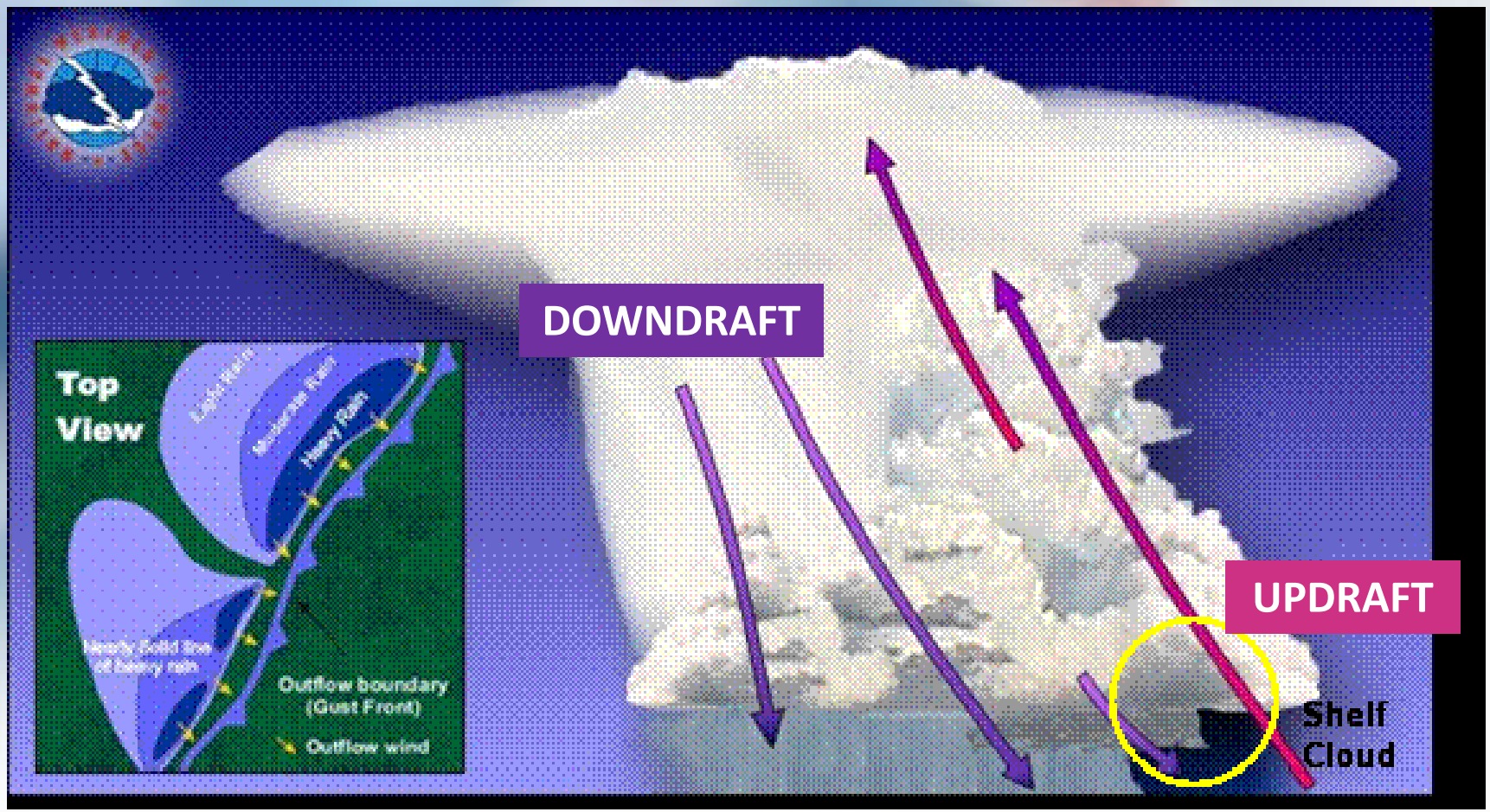
Shelf Clouds

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

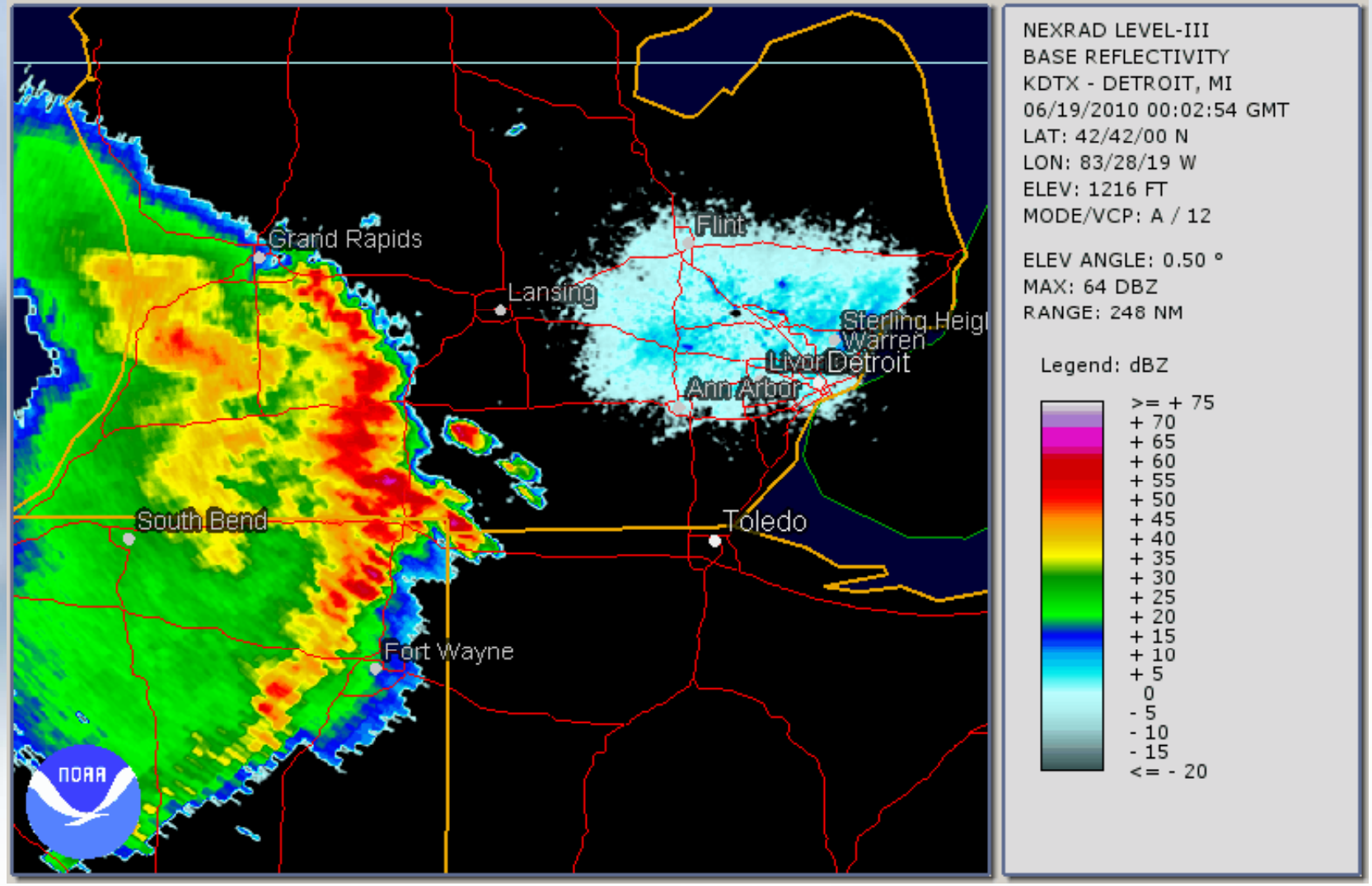
Richfield Twp. August 19, 2010

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

Squall Line Schematic



June 18, 2010 Squall Line



Review

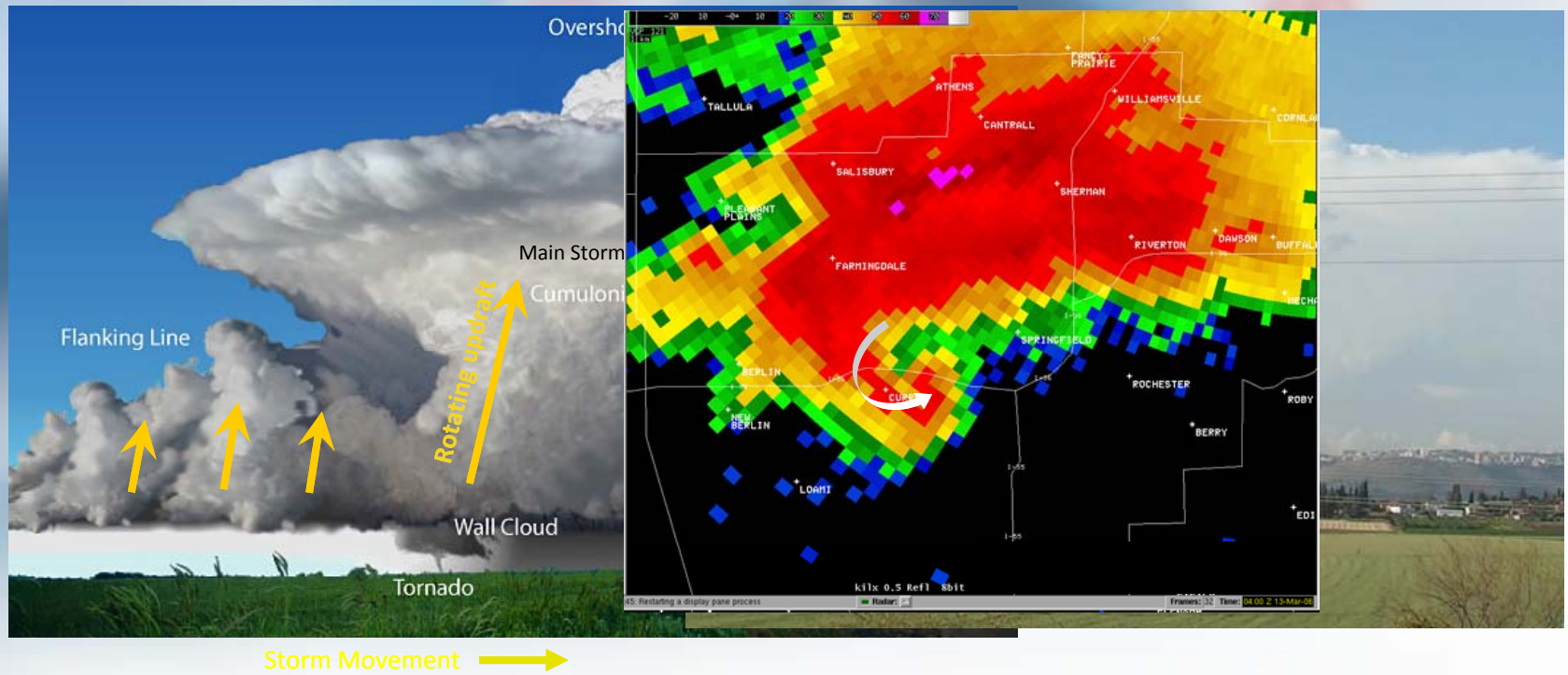
At what point during a squall line do the strongest winds typically occur?

A. Beginning/Leading Edge

B. Middle/During the Rain

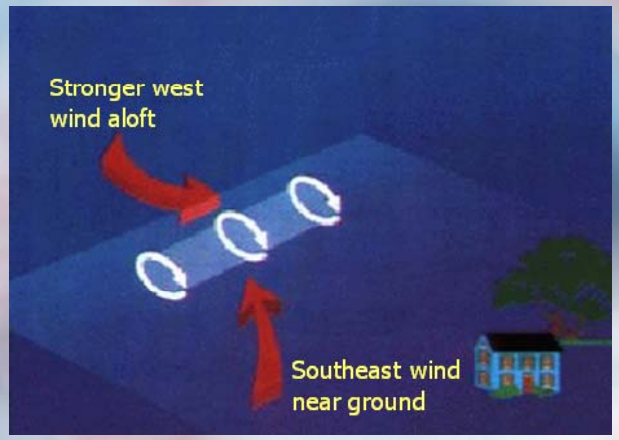
C. End/Back Edge

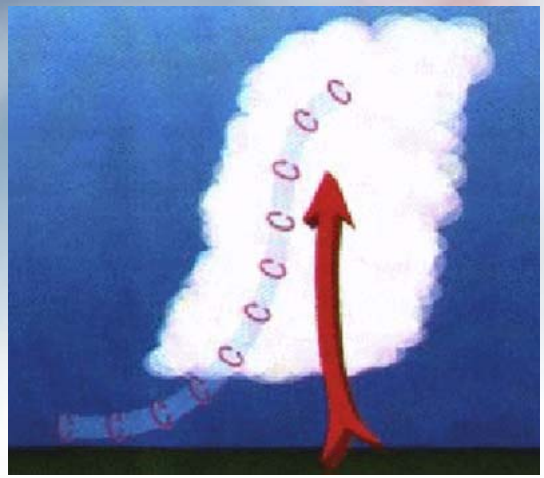
Thunderstorm Type: Supercell

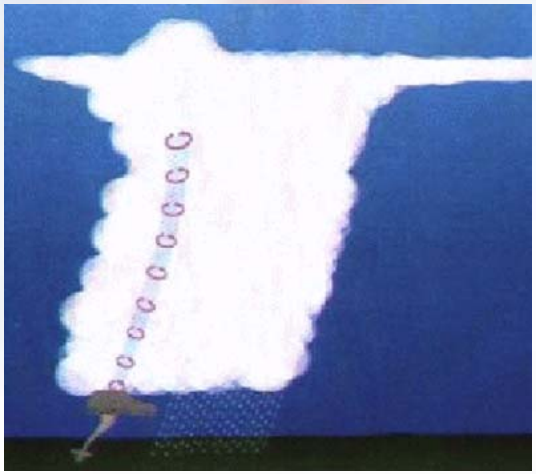


Main threats: Very large hail, high winds, tornadoes.

Supercells: Updraft Rotation

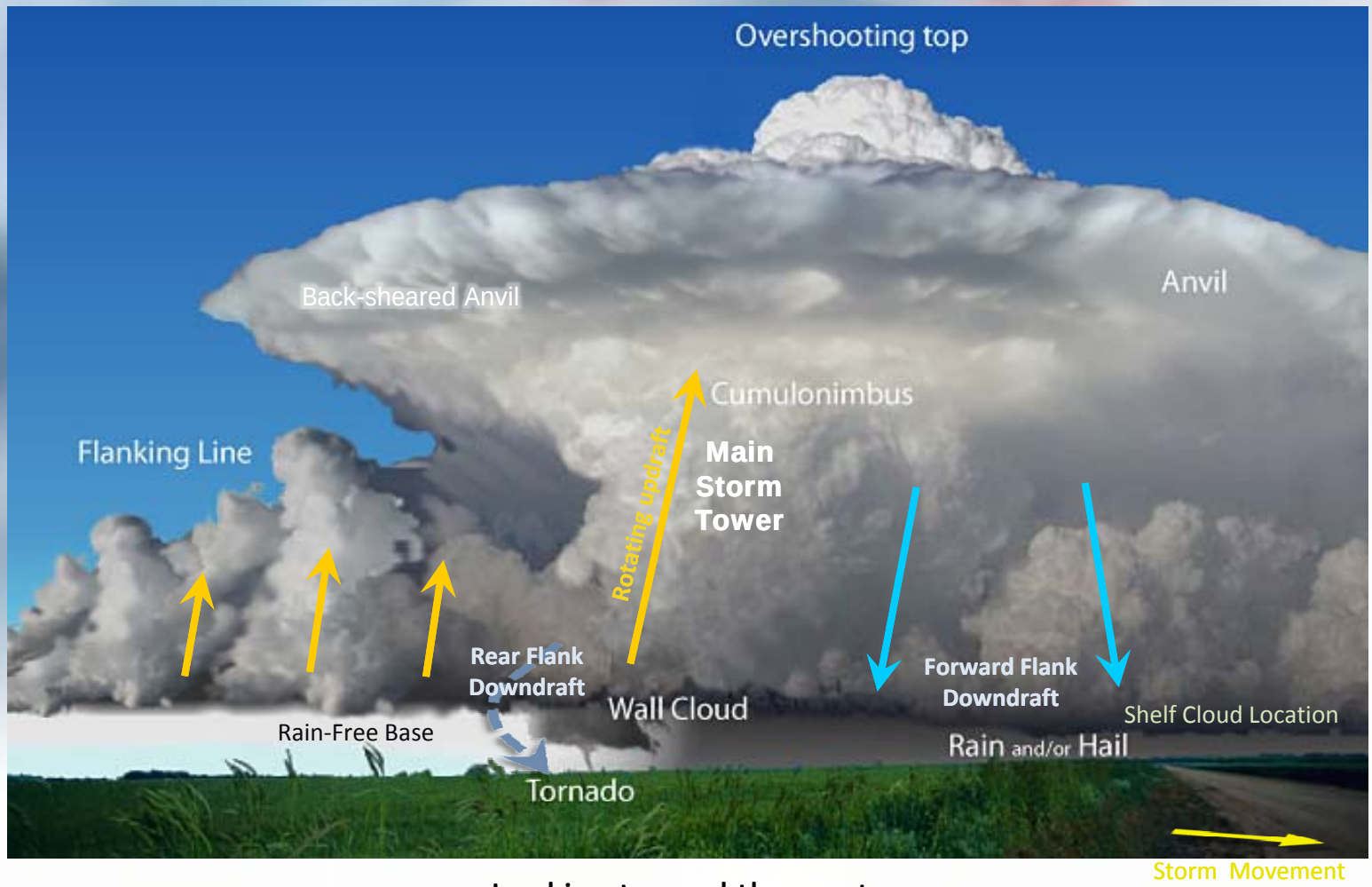






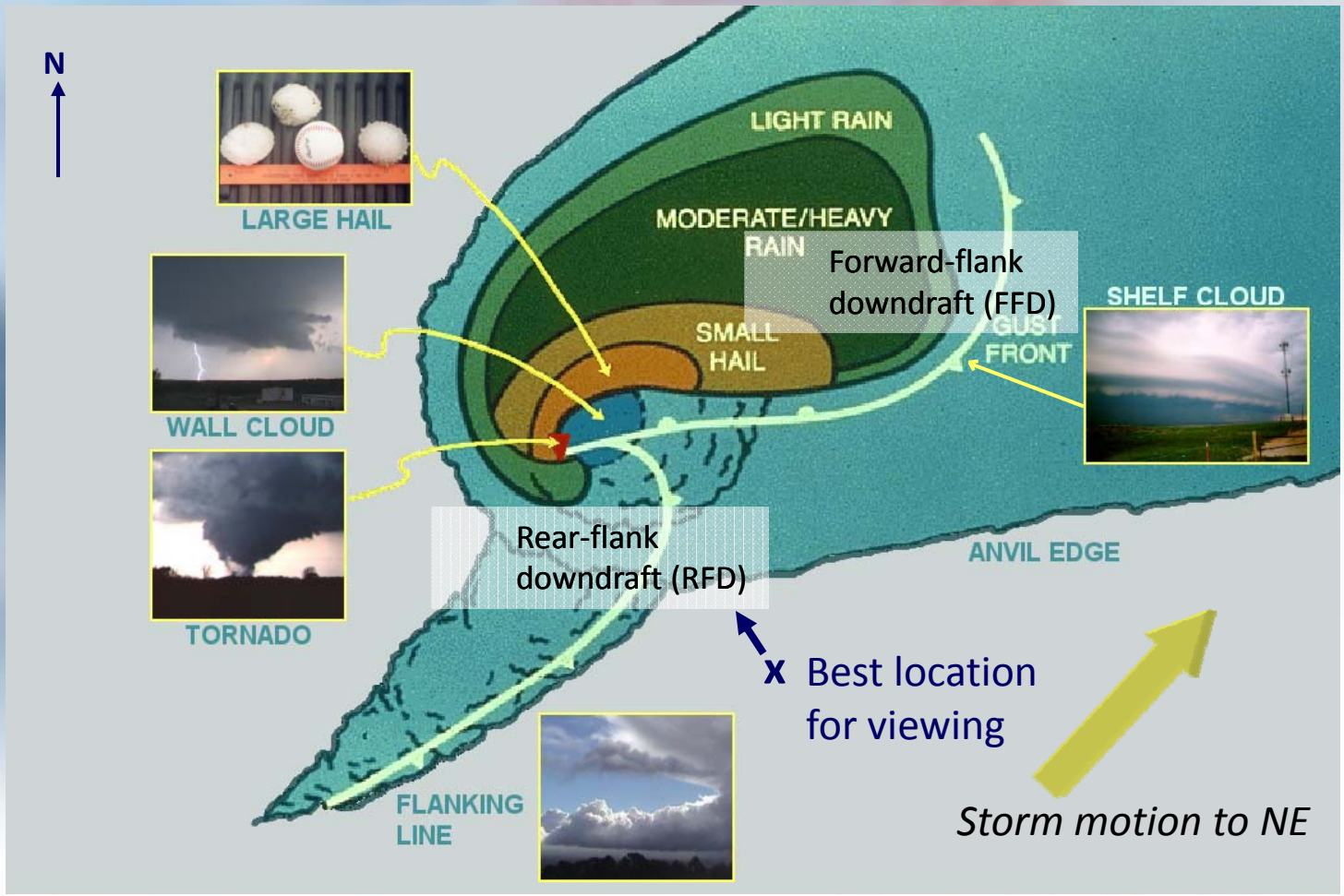
The rotating updrafts in these storms are called **mesocyclones**.

Supercells: A Closer Look

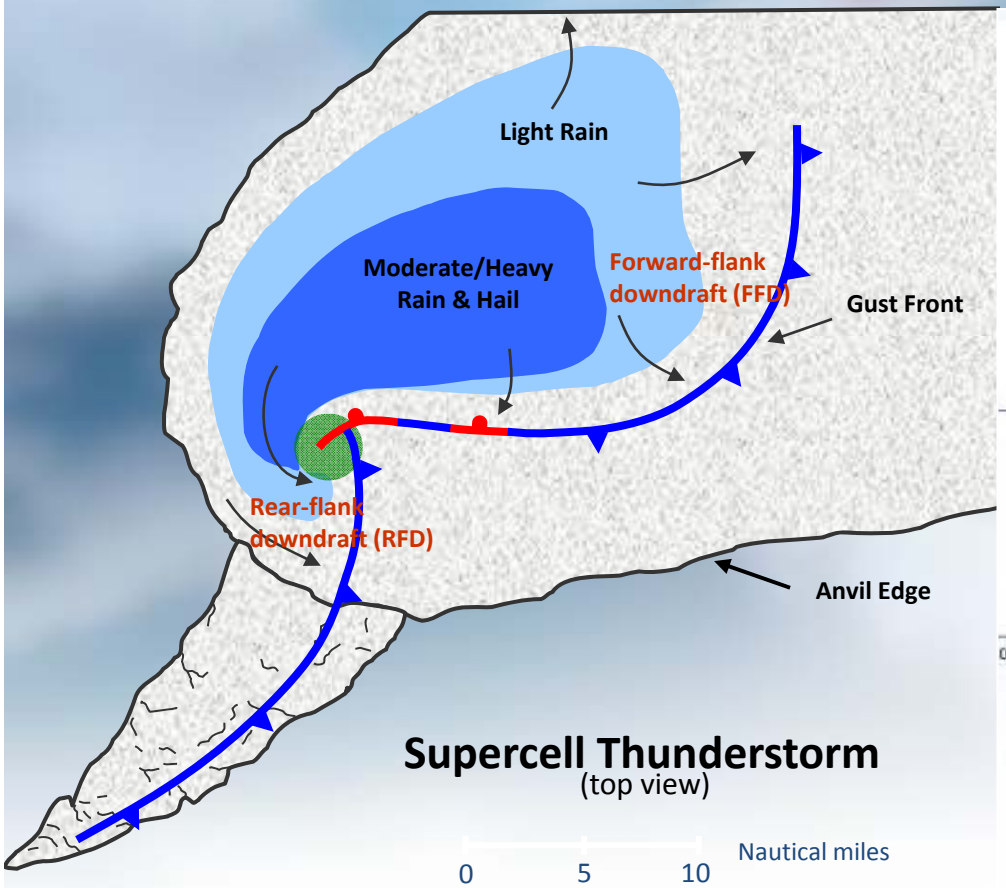


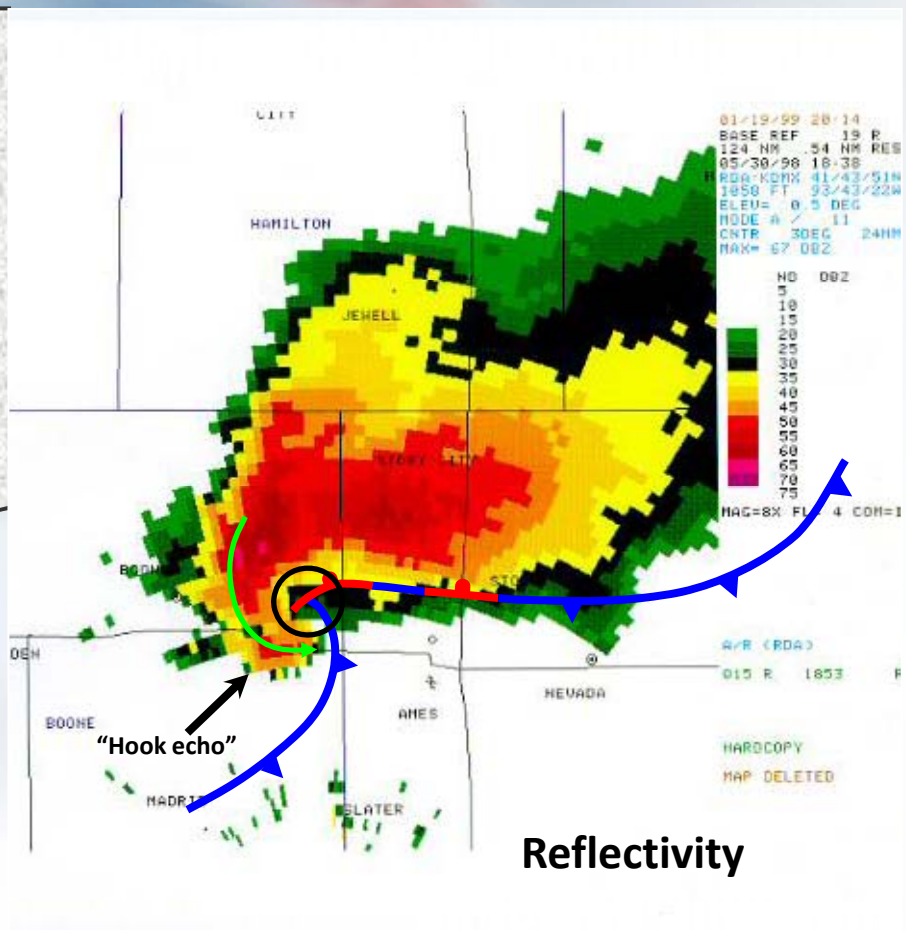
Looking toward the west

Same Storm, Looking Down

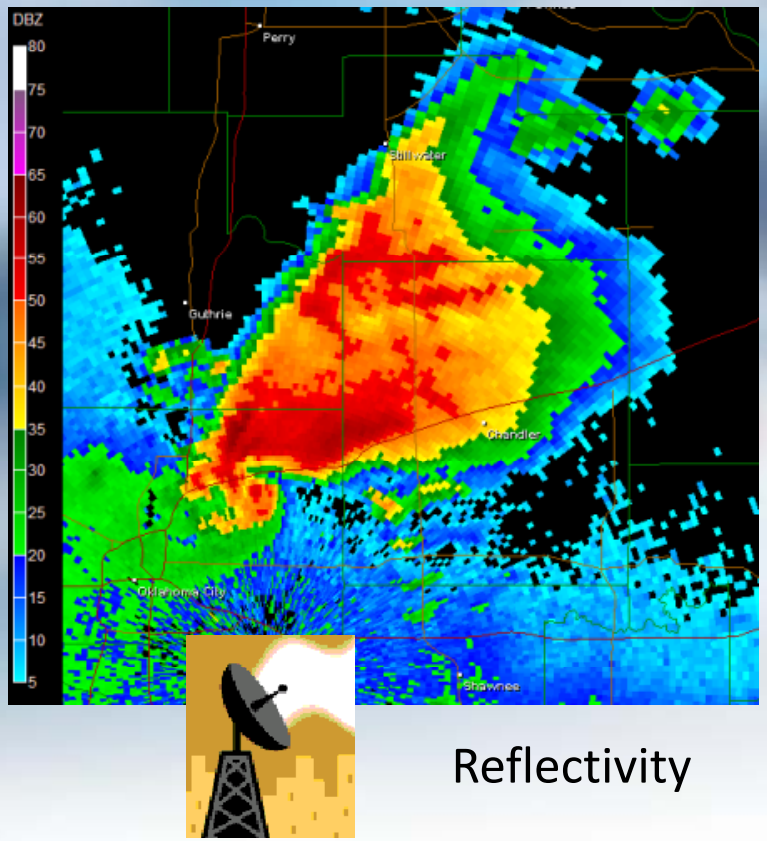


Doppler Radar View of a Supercell

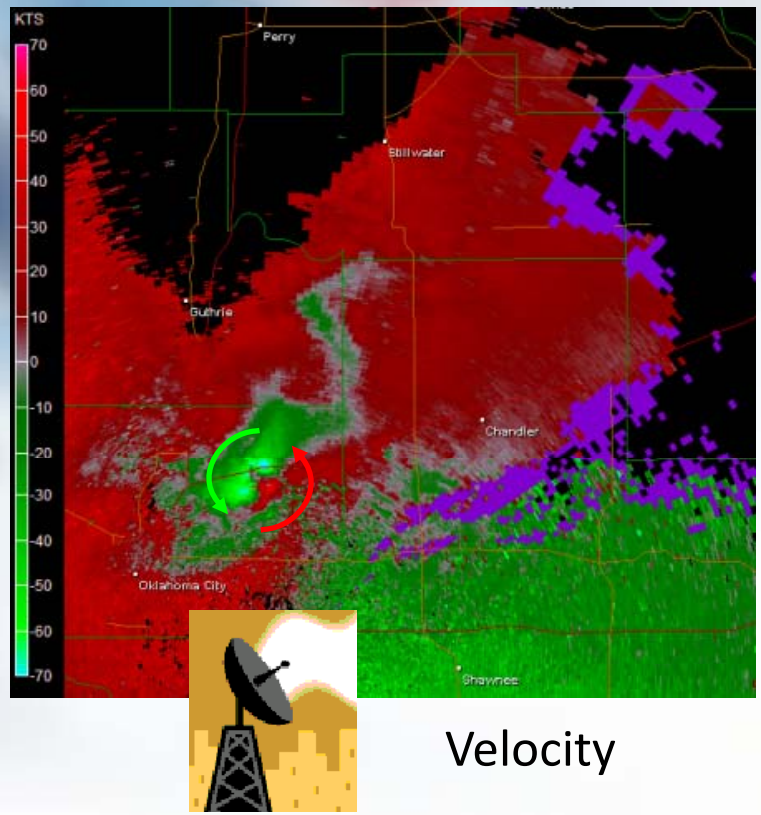




Doppler Radar View of a Supercell



Reflectivity



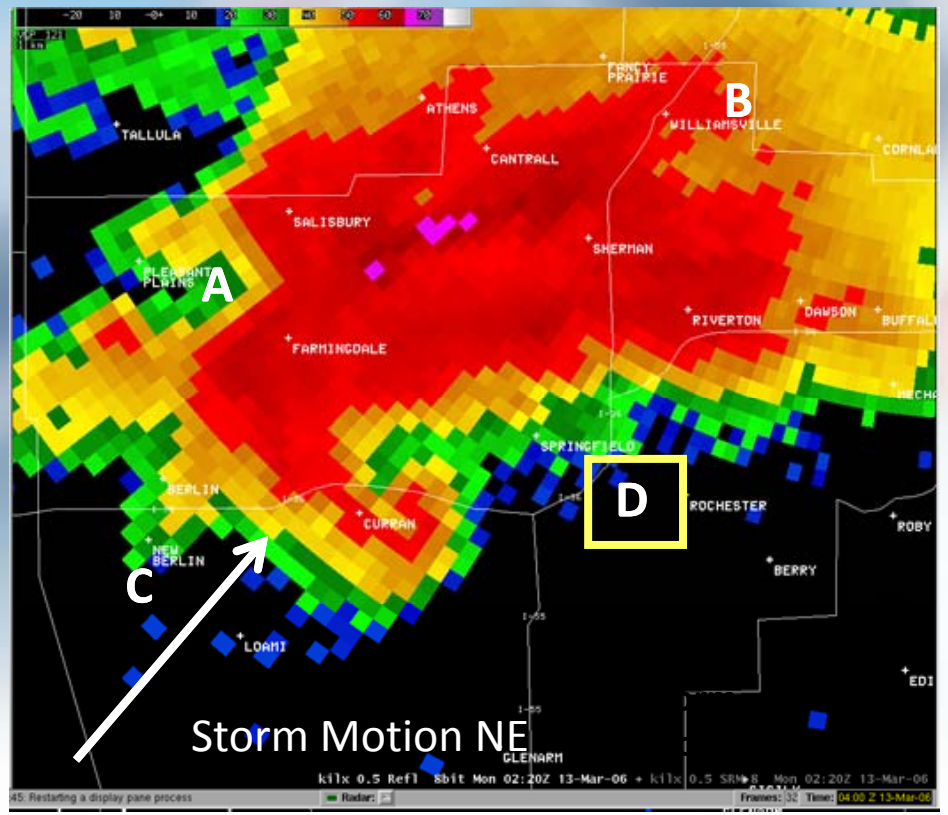
Velocity

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.

You're watching this storm on radar. You have friends at the 4 locations denoted below. Who has the best view of a potential tornado?



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”…

Tornado Look-a-Likes

Rain Shafts/Virga…

Tornado Look-a-Likes

Smoke…

Tornado or Not?

Remember when spotting tornadoes, look for:

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

It's Time To Play…

WHAT IS IT?

Shelf Cloud

Funnel Cloud

SCUD

Rain Shaft

Tornado

Wall Cloud

What is it?

Small debris cloud

Smooth condensation funnel

Rotating

What is it?

No rotation

No debris cloud

No funnel

What is it?

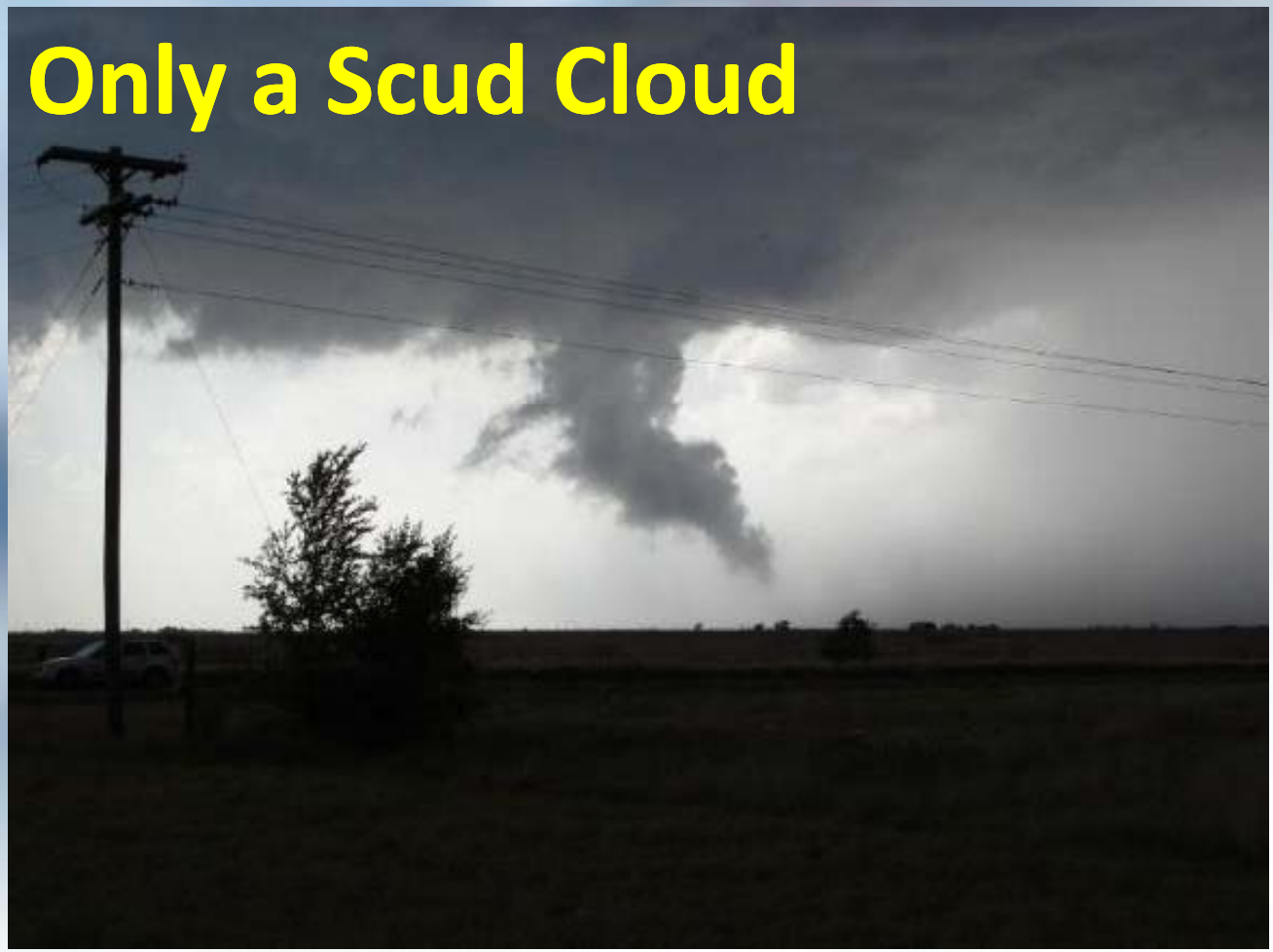
Not rotating

"Debris" cloud is smoke from a grass fire rising into the updraft

What is it?

Not rotating
Slopes down and away from precipitation
Shelf Cloud
mesovortex.com

What is it?



Not making contact with the ground
Not Rotating
Jagged edges

What is it?

There is a wall cloud

Debris cloud is not rotating

What is it?

What is it?

What is it?

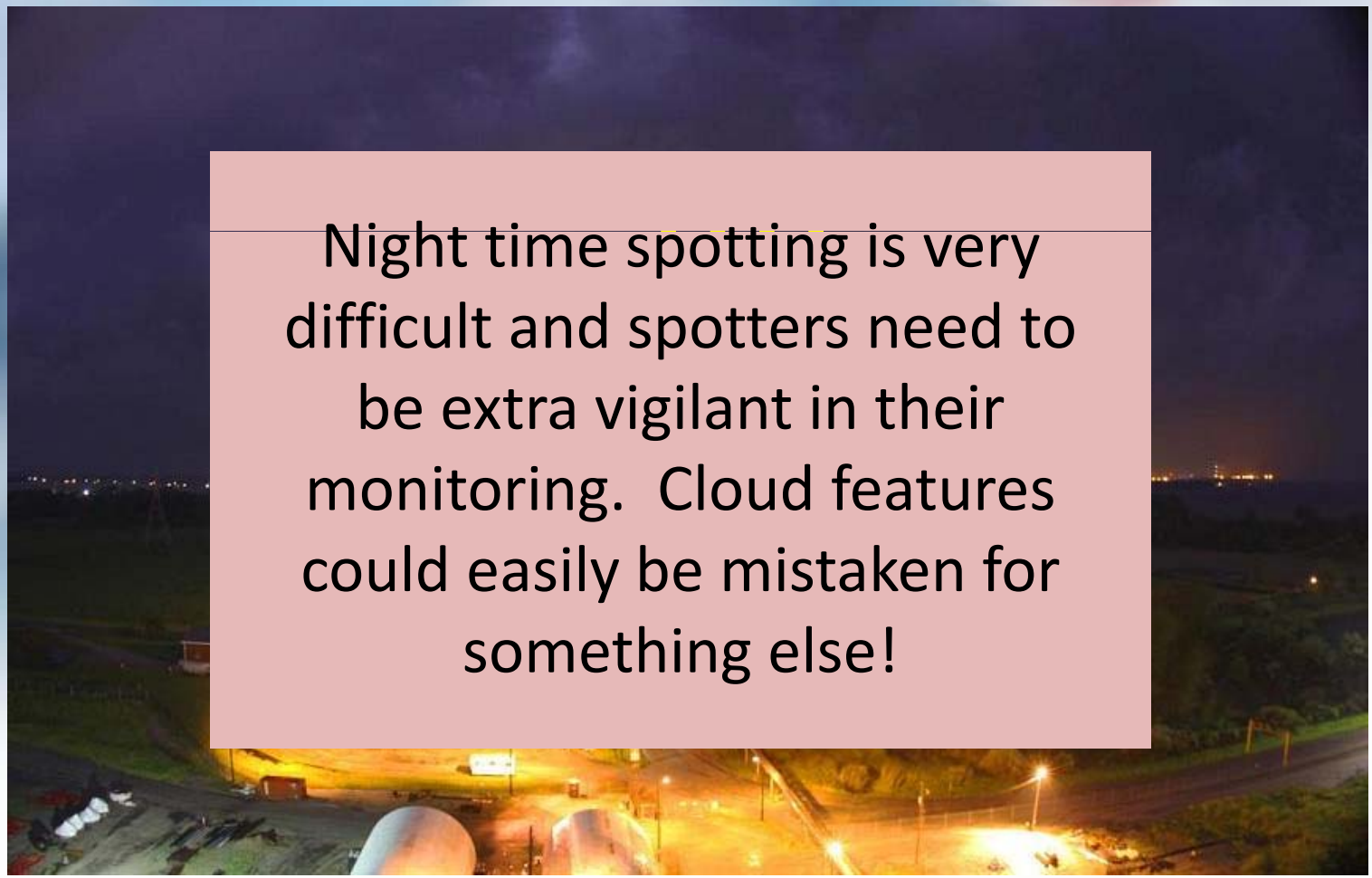
Wall Cloud

Funnel Cloud

What is it?

Night Time Spotting

What is it?



Night time spotting is very difficult and spotters need to be extra vigilant in their monitoring. Cloud features could easily be mistaken for something else!

What to Report: A Review

See Complete list on Spotter Essentials Handout

Top 5 Most Important

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) Flooding that threatens property or covers roads

THANK YOU!!!

THANK YOU!!!