Lecture 26  Severe Thunderstorms

- NWS Criteria
- Environment
- Structure
- Climatology

Severe Thunderstorms

- NWS Criteria
- Environment
- Structure
- Climatology
Severe Thunderstorms: NWS Criteria

NWS Criteria: to qualify as a severe thunderstorm at least one of the following must be present:
- Large Hail > 3/4 Inch
- Strong straight line winds >50 kt
- Presence of a Tornado

The Severe Thunderstorm Environment
Air Mass vs Severe Thunderstorms

Environment: Air Mass thunderstorms form in regions of relatively light winds and light wind shear. Thus they form away from fronts and jet streams.

The Severe Thunderstorm Environment
Squall line

A series of thunderstorms that form an extended line.

Supercell Thunderstorms
Severe Thunderstorm Structure

Super Cell Structure
Super Cell Structure

Shelf cloud at leading edge of downdraft region.

Super Cell Structure

Shelf cloud at leading edge of downdraft region.
Super Cell Structure

Shelf cloud at leading edge of downdraft region.

Gust Front – Outflow Boundary
Outflow Boundary Triggers
New Thunderstorms

Severe Thunderstorms

NWS Criteria: to qualify as a severe thunderstorm at least one of the following must be present:
• Large Hail > 3/4 Inch
• Strong straight line winds >50 kt
• Presence of a Tornado
Large Hail

Hail Damage
One Colorado hailstorm caused $625,000,000 damage in July 1990.
Hailstones have high density and fall fast (up to 90 mph)
• Hail damages
• Crops
• Cars, trucks…
• Livestock
Large Hail

Large hail forms in clouds with
• High supercooled water content
• Very strong updrafts

Large hailstones
• make several trips up into the cloud
• layering tells about hailstone history
Strong Straight-line Winds

>50 knots (57 MPH)

Strong straight-line winds in thunderstorm are often the result of precipitation produced downdrafts called downbursts.
Downbursts can reach wind speeds of ~200 mph! Damage to forests and man made structures. Cause of numerous aviation disasters.
Downburst

TORNADOS