

## Thunderstorms

A thunderstorm affects a relatively small area when compared to a hurricane or a winter storm. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Despite their small size, **ALL** thunderstorms are dangerous! Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10 percent are classified as severe.

### What Are Thunderstorms? What Causes Them?

#### Every Thunderstorm Needs:

- **Moisture**—to form clouds and rain
- **Unstable air**—warm air that can rise rapidly
- **Lift**—caused by cold or warm fronts, sea breezes, mountains, or the sun's heat

*The National Weather Service considers a thunderstorm **severe** if it produces hail at least one inch in diameter, winds of 58 mph or stronger, or a tornado.*

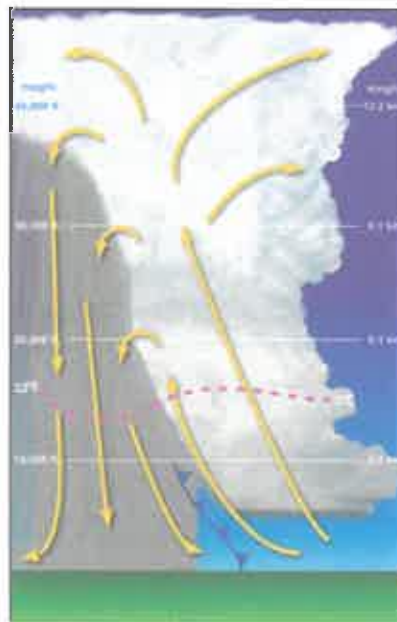
**1,800 thunderstorms occur at any moment around the world. That's 16 million a year!**

## The Thunderstorm Life Cycle



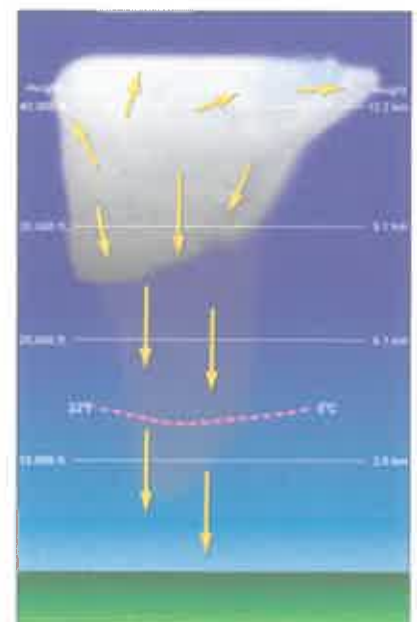
### Developing Stage

- Towering cumulus cloud indicates rising air
- Usually little if any rain during this stage
- Lasts about 10 minutes
- Occasional lightning



### Mature Stage

- Most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes
- Storm occasionally has a black or dark green appearance
- Lasts an average of 10 to 20 minutes but some storms may last much longer



### Dissipating Stage

- Downdrafts, downward flowing air, dominate the storm
- Rainfall decreases in intensity
- Can still produce a burst of strong winds
- Lightning remains a danger



## Tornadoes

Although tornadoes occur in many parts of the world, they are found most frequently in the United States. In an average year, 1,200 tornadoes cause 60-65 fatalities and 1,500 injuries nationwide. You can find more information on tornadoes at [www.spc.noaa.gov](http://www.spc.noaa.gov).

### Tornado Facts

- A tornado is a violently rotating column of air extending from a cumuliform cloud, such as a thunderstorm, to the ground.
- Tornadoes may appear nearly transparent until dust and debris are picked up or a cloud forms within the funnel. The average tornado moves from southwest to northeast, but **tornadoes can move in any direction** and can suddenly change their direction of motion.
- The average forward speed of a tornado is 30 mph but may vary from nearly stationary to 70 mph.
- The strongest tornadoes have rotating winds of more than 200 mph.
- Tornadoes can accompany tropical storms and hurricanes as they move onto land.
- Waterspouts are tornadoes that form over warm water. Water spouts can move onshore and cause damage to coastal areas.

### Be Ready Year Round

- Tornadoes can occur at any time of day, any day of the year.
- Have a plan of action before severe weather threatens. You need to respond quickly when a warning is issued or a tornado is spotted.
- When conditions are warm, humid, and windy, or skies are threatening, monitor for severe weather watches and warnings by listening to NOAA Weather Radio, logging onto [weather.gov](http://weather.gov) or tuning into your favorite television or radio weather information source.

## The Enhanced Fujita Scale

The National Weather Service (NWS) uses the EF-Scale to assign a tornado a 'rating' based on estimated wind speeds and related damage.

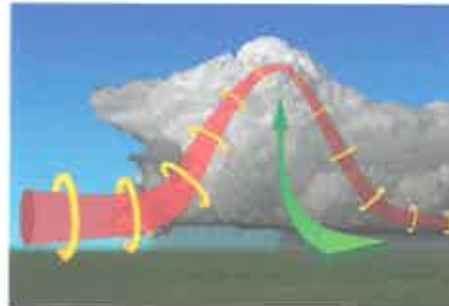
EF- SCALE	
EF RATING	3 Second Wind Gust (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

## How Tornadoes Form

Before thunderstorms develop, winds change direction and increase in speed with altitude. This creates an invisible, horizontal spinning effect in the lower atmosphere.



Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical.



An area of rotation, 2-6 miles wide, now extends through much of the storm. Most tornadoes form within this area of strong rotation.



Chuck Doswell III

### Weak Tornadoes

- 88% of all tornadoes
- Less than 5% of tornado deaths
- Lifetime 1 – 10+ minutes
- Winds less than 110 mph
- Produces EF0 or EF1 damage



Wikimedia/Justin Hobson

### Strong Tornadoes

- 11% of all tornadoes
- Nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 111-165 mph
- Produces EF2 or EF3 damage



Wikimedia/Joshua Jans

### Violent Tornadoes

- Less than 1% of all tornadoes
- 70% of all tornado deaths
- Can exceed 1 hour
- Winds greater than 166 mph
- Produces EF4 or EF5 damage

More detailed information on the EF-Scale can found at:  
[www.spc.noaa.gov/efscale](http://www.spc.noaa.gov/efscale)