Thunderstorms, Tornadoes, and Hurricanes

Where are Thunderstorms common?

* Common in the summer season
* Usually not part of a larger-scale weather system
* Short-lived, rarely severe
* Occur when a warm front and a cold front meet.

What is a Thunderstorm?

* A thunderstorm is a storm with thunder, lightning, and often heavy rain and strong winds.

Structure and Features of Severe Thunderstorms

* Cumulus clouds build up to form cumulonimbus clouds.
* Heavy rain or hail forms.

Features of Severe Thunderstorms

* Downburst
* A highly localized, very strong downdraft
* Hits ground and spreads out in a circular direction

Microburst

* A downburst with winds only extending less than 4 km in any direction
* Winds can be as high as 150 kt.
* ***Extremely hazardous to Aircraft***

Thunderstorms

* Line of storms that form just ahead of a cold front or some distance ahead (100-300 km)
* Can be over 600 miles long

**Lightning and Thunder**

***Lightning -*** An electrical discharge formed by charge separation within thunderstorms or between thunderstorms and the ground

***Thunder –*** Shock wave produced by lightning

* Lightning heats air to around 30,000 K
* Air expands very rapidly, creates loud noise
* Lightning Characteristics
* Globally, about 100 flashes occur each ***second***
* Most lightning (80%) occurs between clouds. Only about 20% is between cloud and ground
* About 100 deaths/year in U.S. by lightning strikes (second most by a natural phenomena)
* Most in Florida
* Hazardous activities: golf, sailing, walking in open area
* Travels about 1100 ft./sec
* Net negative charge builds up near bottom of cloud
* This attracts net positive charge buildup from ground
* When charge separation is too great, lightning strike will occur

Types of Lightning

* Cloud to cloud
* Cloud to ground
* Ball lightning

Appears as a luminous sphere

* Sheet lightning

Lightning inside of clouds, appears white

Lightning Safety

* Don’t go golfing
* Don’t talk on the telephone (cell OK)
* Don’t go for a walk
* Don’t find an isolated tree to stand under
* If your hair stands on end, lightning is about to strike
* Crouch down (don’t lay down) as low as possible
* Stay away from the bathroom and windows
* Cars are OK

Tornadoes

* Rapidly rotating, small-scale winds that form within severe thunderstorms
* Many different shapes; last anywhere from a few seconds to several hours

Tornado occurrence

* Have occurred in all 50 U.S. states, but rare in Western U.S., Alaska, Hawaii
* Form during every month of the year, but 75% form during months of March – July
* Globally, U.S. has highest occurrence of tornadoes – WHY?

Tornadic Winds and Classification

* Tornadoes are classified on the Fujita Scale

F1 Tornado, F2 Tornado, F3 Tornado, F4 Tornado, F5 Tornado

Tornado Formation

* Updrafts in thunderstorms must rotate
* Called a **mesocyclone**
* As mesocyclone stretches vertically, its diameter shrinks and it spins faster
* Tornado forms within the mesocyclone and descends towards the surface (not understood why)
* If condensation occurs within funnel, a funnel cloud will be seen

Observing Tornadoes

* First sign (visually) of a tornado is the appearance of a ***wall cloud***
  + - Rotating cloud underneath the main cell

Warning For Tornadoes

* Tornado Watch – Conditions are favorable for tornado formation. Monitor local weather conditions and broadcasts
* Tornado Warning – Tornado and/or funnel cloud and/or hook echo has been spotted in the area
  + Take cover immediately

Hurricanes

* A hurricane is a tropical storm with strong winds.

Eye

* The center of the storm is called the eye.
* It is calm and serene.
* No winds.

Parts of a Hurricane-DRAW THE PARTS OF THE HURRICANE