Natural Disasters: What Causes Severe Weather?

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What are Natural Disasters?

- Any event which causes significant injuries or deaths or economic impact due to a naturally-occurring phenomenon.
- Often compounded by unintended consequences of human interactions with nature.
- Can be counteracted to some extent by engineering or behavioral changes.
- Includes weather and climate, geological and astronomical events (earthquakes, asteroid hits, solar flares).
What is Severe Weather?

The **National Weather Service** definition of severe weather includes:

- Tornadoes
- Hail of greater than 1 inch in diameter (used to be ¾”)
- Winds of greater than 55 mph

More broadly, it is any type of weather that causes injury or death or significant economic losses.
Types of Severe Weather

Wind phenomena

☑️ Tornadoes
☑️ Hurricanes
☑️ Derechos
☑️ Severe wind

Water phenomena

☑️ Flash floods
☑️ Storm surge
☑️ Ice storms
☑️ Droughts

Other

☑️ Lightning
☑️ Fog
☑️ Forest fires
☑️ Blizzards
☑️ Heat waves
☑️ Frost
Ingredients for Severe Weather from Thunderstorms

- Source of moisture/humidity for energy source
- Changes in wind speed and/or direction with height
- Dynamic forcing such as a cold front
Tornadoes vs. Hail

Tornadoes tend to form where the winds high in the atmosphere are blowing in a different direction than the surface wind.

Hail tends to form where the winds aloft are in the same direction as the surface wind and the dynamics are less strong.
Strong and damaging winds occur most often in the Eastern US, although they can also occur along mountain ridges out west or along the coast. **Derechos** are a form of severe wind storm with winds that blow straight out rather than twisting like tornadoes.
Risks of Damaging Hail in the US

Significant hail forms mainly east of the Rockies in the Great Plains. Hail can cause injuries and death but can also destroy crops and damage buildings and vehicles.
Risks of Hurricanes in the US

Hurricanes provide impacts from both wind in the form of high wind gust and tornadoes and water in the form of storm surges and local flooding.
Risks of Tornadoes in the US

Tornadoes occur mainly east of the Rocky Mountains, but are especially likely in the Great Plains. The highest likelihood of death due to tornadoes is farther east in more populated areas.
Seasonality of Tornadoes: January

Seasonality of Tornadoes: February

Probability (%) of Tornado in February (1980–1994)
Seasonality of Tornadoes: March
Seasonality of Tornadoes: April

Probability (%) of Tornado in April (1980–1994)
Seasonality of Tornadoes: May

Probability (%) of Tornado in May (1980–1994)
Seasonality of Tornadoes: June

Seasonality of Tornadoes: July

Seasonality of Tornadoes: August

Probability (%) of Tornado in August (1980–1994)
Seasonality of Tornadoes: September
Seasonality of Tornadoes: October

Probability (%) of Tornado in October (1980–1994)
Seasonality of Tornadoes: November
Seasonality of Tornadoes: December

Probability (%) of Tornado in December (1980–1994)
Tornadoes can occur any time of the day, although in the Midwest they are most frequent in late afternoon. Tornado damage is highly variable depending on the strength and path of the storm.
Ingredients for Localized Flooding

Flooding can be caused by slow-moving tropical systems like TS Alberto in 1994 or by stationary thunderstorm systems that redevelop thunderstorm cells over the same area (“training”). Flooding is worse when the soils are already saturated.
Thanks for listening! You can contact Pam Knox at pknox@uga.edu, 706-542-6067
Number of tornado watches per year

Tornado Watches per Year (1999-2008 Average)

NOAA/NWS Storm Prediction Center
Norman, Okla.