

Natural Disasters: Hurricanes and Tornadoes

What is a *Natural Disaster*?

A disaster caused by nature



Examples

- Earthquakes
- Extreme Heat
- Floods
- Hurricanes
- Landslides & Mudslides
- Tornadoes
- Tsunamis
- Typhoons
- Volcanoes
- Wildfires
- Winter Weather

Effects of Natural Disasters

- Physical destruction
- Emotional effects – loss of belongings and trauma of possible future disasters
- Economic concerns – local areas affected most
- Indirect effect – disruption of utility services
- Hygiene
- Environmental effects – loss of habitats and altered landscape

Possible causes?

- Floods
 - Fires
 - Droughts
 - Weather events

Hurricanes

- Low pressure areas that form over warm ocean waters in the summer and early fall
- Caused by high winds over warm water

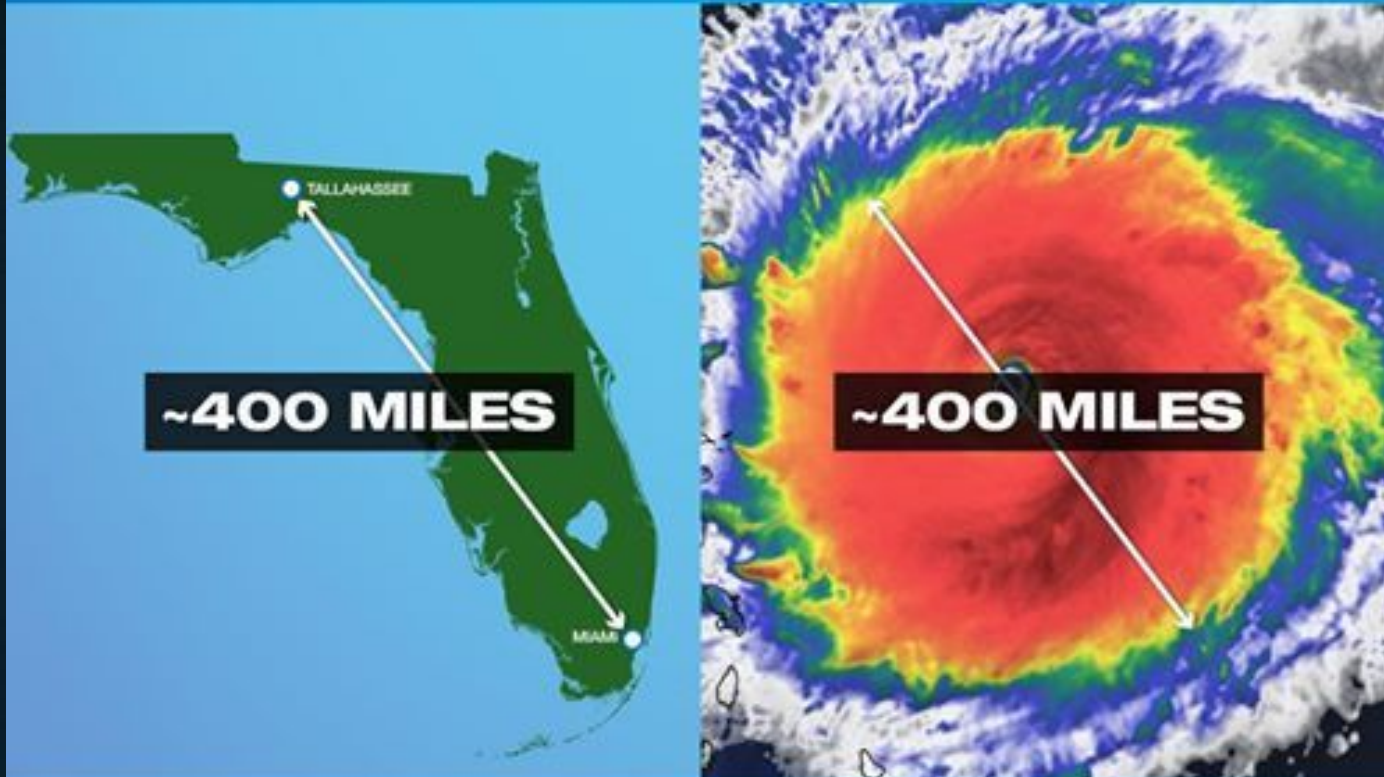


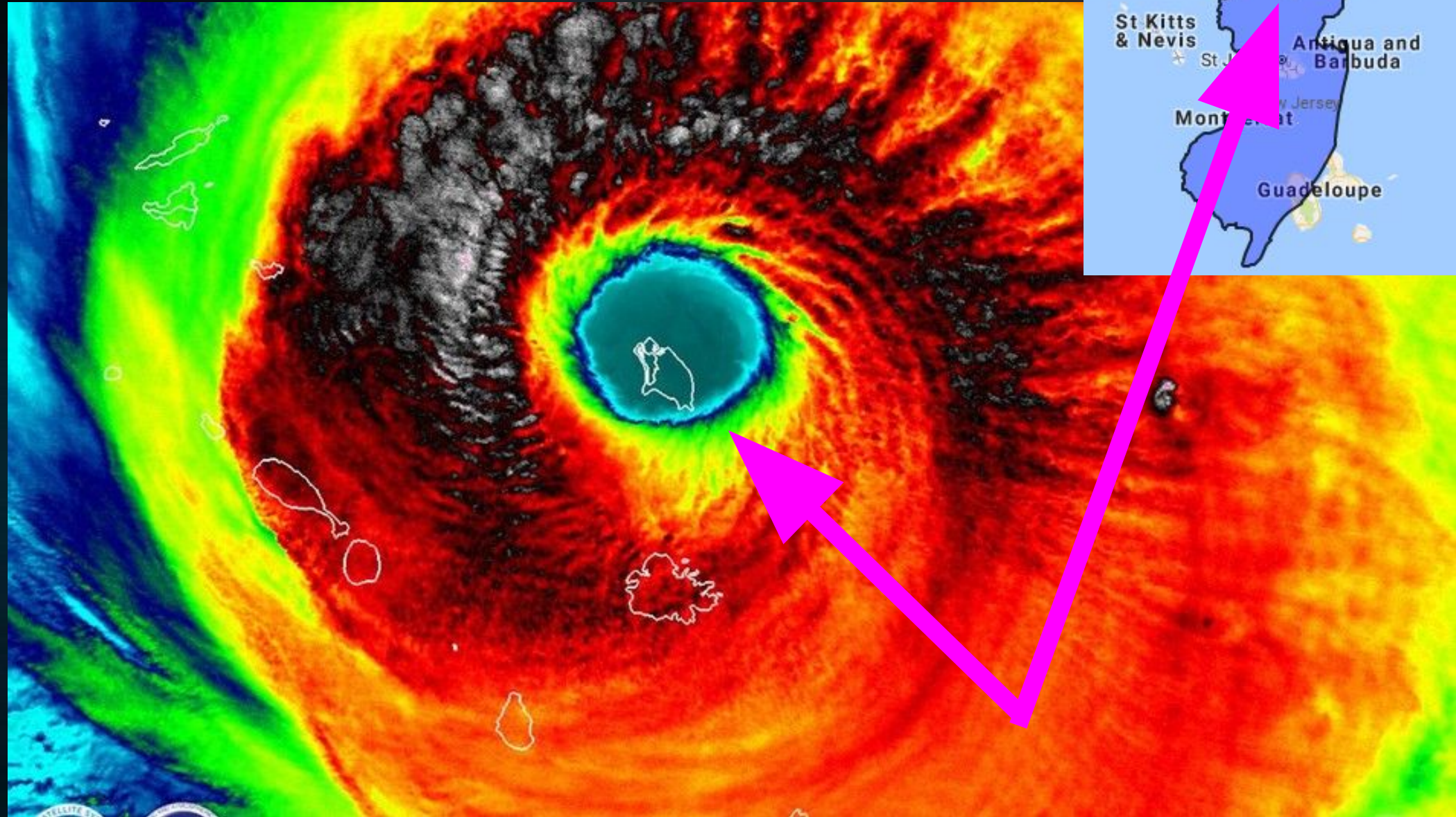
The “Eye”

- The strongest winds occur in the *eyewall* of the storm
- The *eye* is the warmest and calmest part of a hurricane



TRACKING HURRICANE IRMA

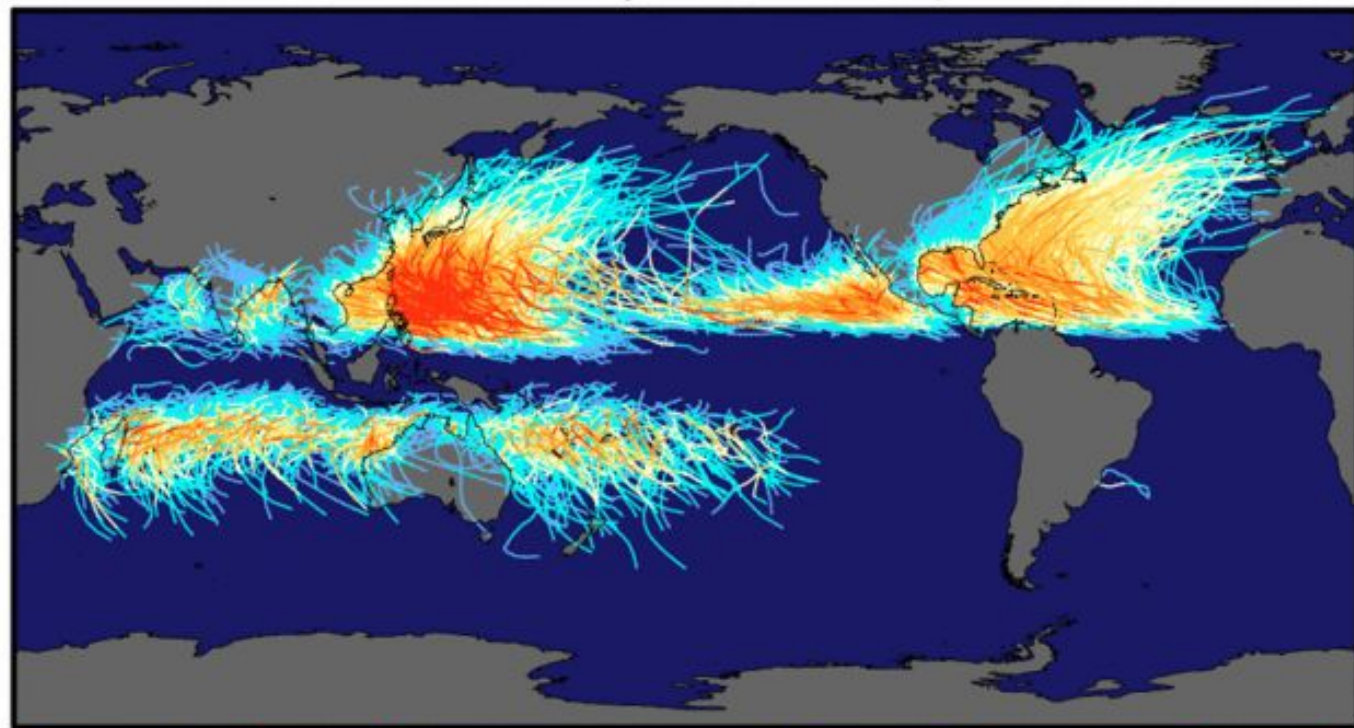




Areas of Activity

- Areas in the world most affected by hurricanes are
 - Central America
 - The Caribbean
 - Mexico
 - Eastern USA seaboard

Tracks and Intensity of All Tropical Storms



Saffir-Simpson Hurricane Intensity Scale

Measuring Hurricane Intensity

- Saffir-Simpson Scale estimates how much damage and flooding is expected using the wind speed
- Rated as Category 1-5

Category	Wind speed mph (km/h)	Storm surge ft (m)
5	≥156 (≥250)	>18 (>5.5)
4	131–155 (210–249)	13–18 (4.0–5.5)
3	111–130 (178–209)	9–12 (2.7–3.7)
2	96–110 (154–177)	6–8 (1.8–2.4)
1	74–95 (119–153)	4–5 (1.2–1.5)
Additional classifications		
Tropical storm	39–73 (63–117)	0–3 (0–0.9)
Tropical depression	0–38 (0–62)	0 (0)

Why name Hurricanes?

- Easier to refer to them
- Usually short and easy names to pronounce
- Used to be all female
- Used to change names
- Intense storms have their names retired

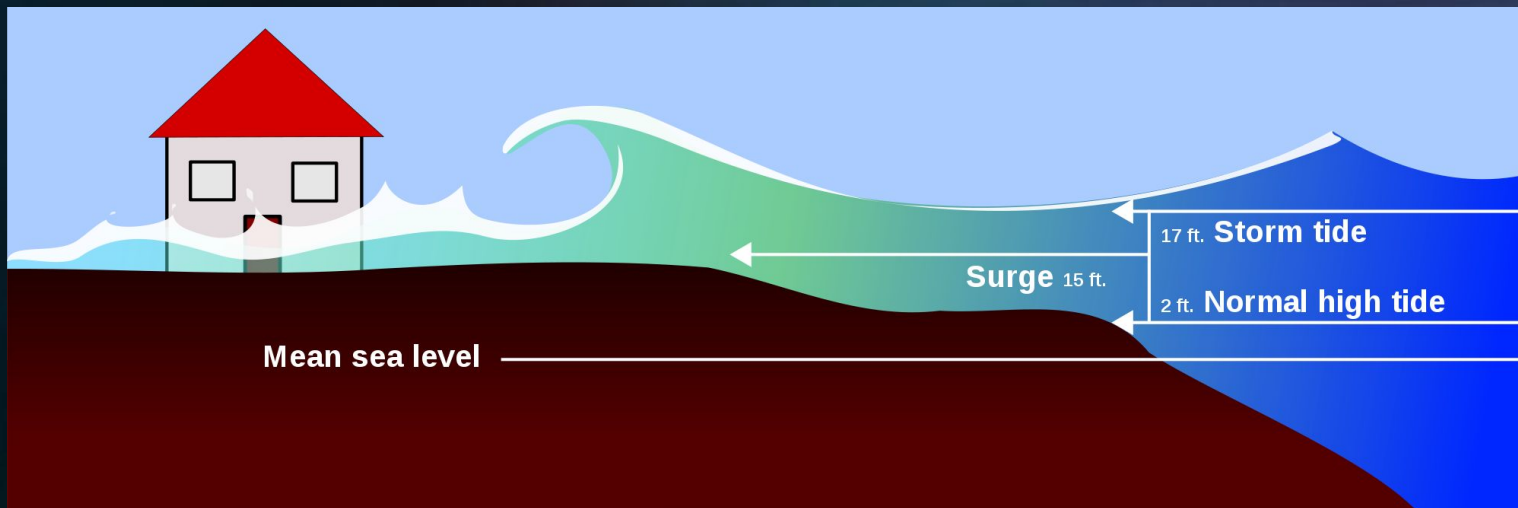
Caribbean Sea, Gulf of Mexico and the North Atlantic Names

2011	2012	2013	2014	2015	2016
Arlene	Alberto	Andrea	Arthur	Ana	Alex
Bret	Beryl	Barry	Bertha	Bill	Bonnie
Cindy	Chris	Chantal	Cristobal	Claudette	Colin
Don	Debby	Dorian	Dolly	Danny	Danielle
Emily	Ernesto	Erin	Edouard	Erika	Earl
Franklin	Florence	Fernand	Fay	Fred	Fiona
Gert	Gordon	Gabrielle	Gonzalo	Grace	Gaston
Harvey	Helene	Humberto	Hanna	Henri	Hermine
Irene	Isaac	Ingrid	Isaias	Ida	Ian
Jose	Joyce	Jerry	Josephine	Joaquin	Julia
Katia	Kirk	Karen	Kyle	Kate	Karl
Lee	Leslie	Lorenzo	Laura	Larry	Lisa
Maria	Michael	Melissa	Marco	Mindy	Matthew
Nate	Nadine	Nestor	Nana	Nicholas	Nicole
Ophelia	Oscar	Olga	Omar	Odette	Otto
Philippe	Patty	Pablo	Paulette	Peter	Paula
Rina	Rafael	Rebekah	Rene	Rose	Richard
Sean	Sandy	Sebastien	Sally	Sam	Shary
Tammy	Tony	Tanya	Teddy	Teresa	Tobias
Vince	Valerie	Van	Vicky	Victor	Virginie
Whitney	William	Wendy	Wilfred	Wanda	Walter

The six lists are used in rotation. Thus, the 2011 list will be used again in 2017.

Storm Surges

- Water blown onshore by high winds making them rise rapidly
 - Destroys lower floors of buildings
 - Destroy foundations to wash houses away
 - Trap residents from leaving low-lying areas



Hurricanes by Other Names

- **Hurricane**

- North Atlantic Ocean, Caribbean Sea, Gulf of Mexico, Northeast Pacific Ocean

- **Typhoons**

- Northwest Pacific Ocean and west of International Date Line

- **Tropical Cyclones**

- Australia and Indian Ocean

- **Willy-Willies**

- Australia

Tornadoes

- Violent, rotating columns of air extending from a thunderstorm to the ground
- Can happen anytime with little to no warning
- Peak season
 - South: March – May
 - North: late spring – early summer



- Form when moist air from the Gulf of Mexico & dry air from Canada meet and winds cause it to change

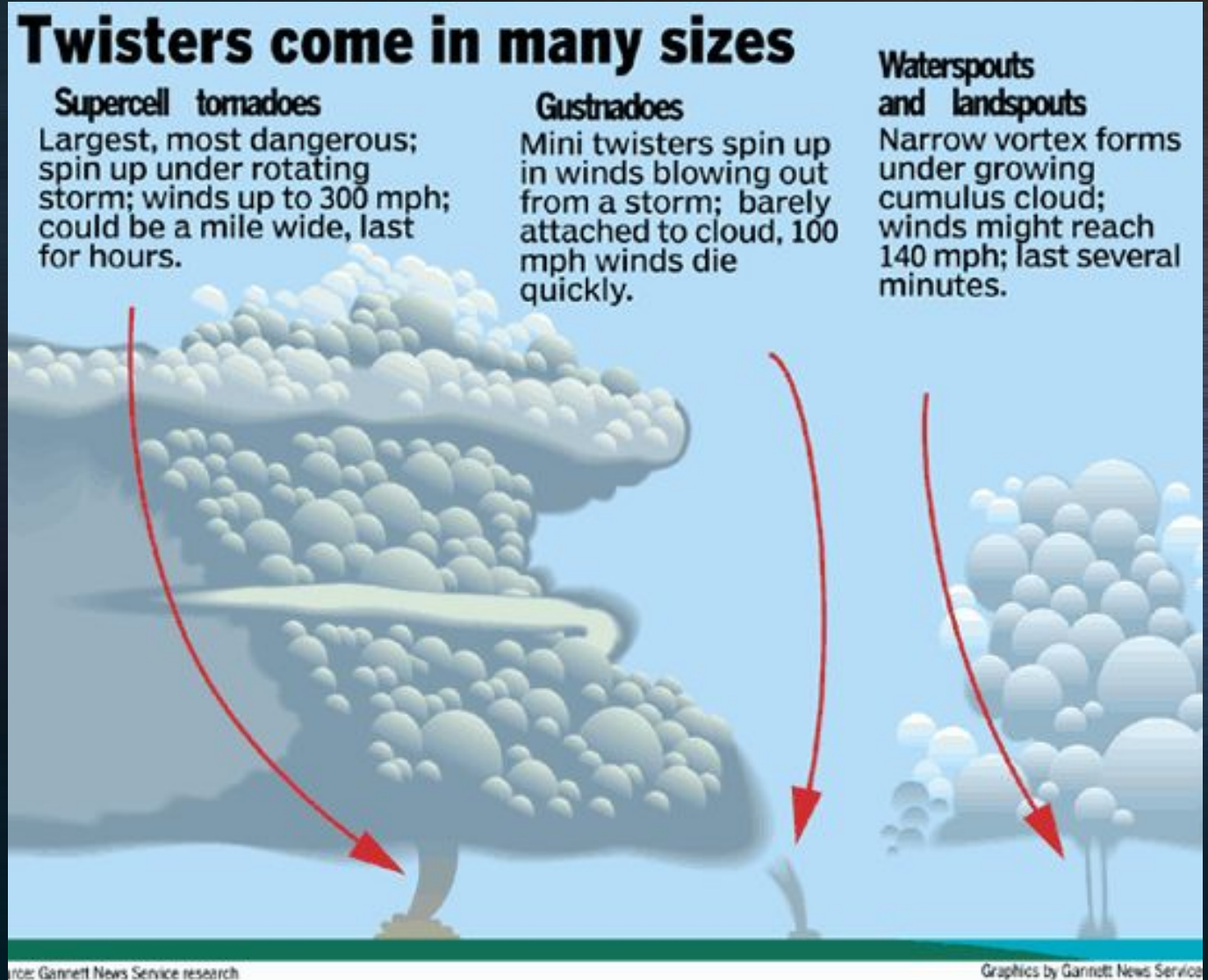
Danger Signs

- Dark greenish sky
- Large hail
- Large, dark, low-lying cloud
 - Especially if it is rotating!
- Loud roar similar to freight train



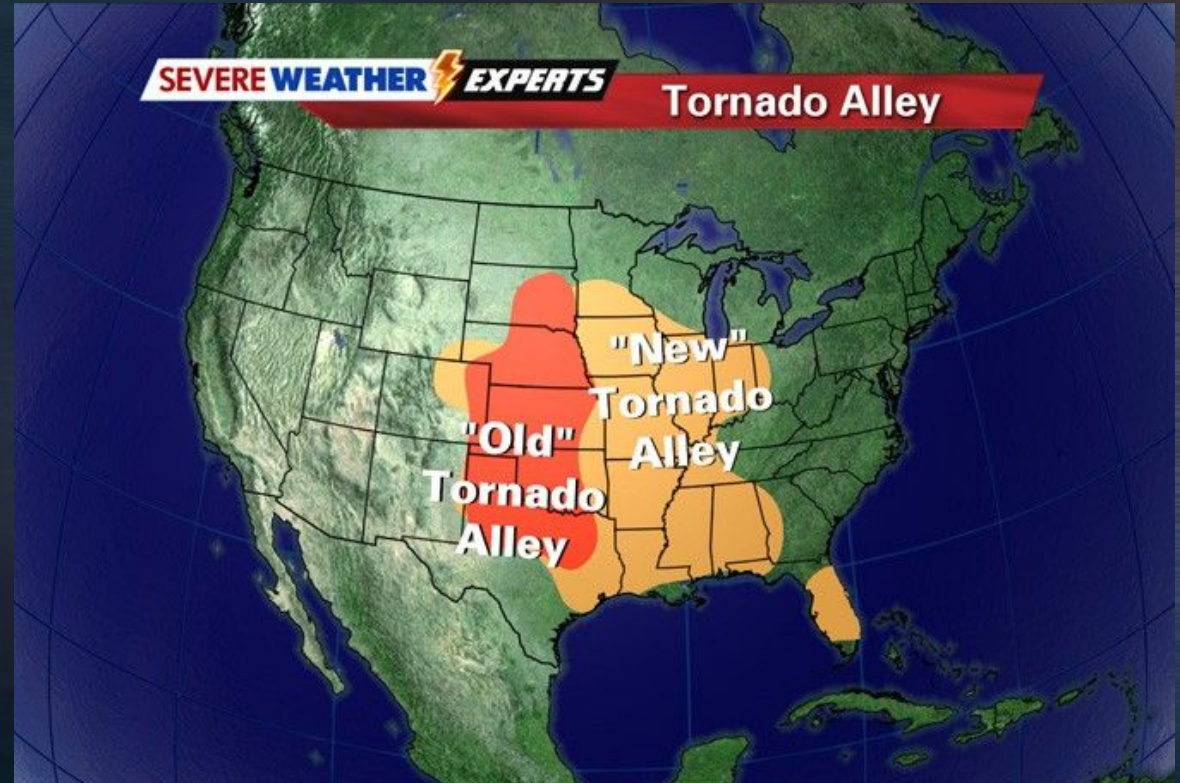
Tornado Size and Shape

- Depend on:
 - Their environment
 - Wind speed
 - Dirt and dust in the environment



Tornado Alley

- The area where tornadoes are more frequent is called *Tornado Alley*
- It has been updated to include newer areas



Tornado Intensity

- Dr. T. Theodore Fujita created a scale in 1971 and it has been used since to measure intensity of tornadoes
- It is based on how much damage is caused

Fujita (F) Scale

Level	Wind Speed	Possible Damage
F0	40 - 72 mph	Light damage: Tears branches from trees; rips shallow-rooted trees from the ground; can damage sign-posts, traffic signals and chimneys
F1	73 - 112 mph	Moderate damage: Roofing materials and vinyl siding can be displaced; mobile homes are highly vulnerable and can easily be knocked from the foundation or toppled; motorists can be sent careening off road and possibly flipped over
F2	113 - 157 mph	Considerable damage: Well established trees are easily uprooted; mobile homes are destroyed; entire roofs can be ripped off houses; train cars and trucking hauls are knocked over; small objects become dangerous missiles
F3	158 - 206 mph	Severe damage: Forests are destroyed as a majority of trees are ripped from the ground; entire trains are derailed and knocked over; walls and roofs are torn from houses
F4	207 - 260 mph	Devastating damage: Houses and other small structures can be razed entirely; automobiles are propelled through the air.
F5	261 - 318 mph	Incredible damage: Cars become projectiles as they are hurled through the air; entire houses are completely destroyed after being ripped from the foundation and sent tumbling into the distance; steel-reinforced concrete structures can be seriously damaged.

Source: NOAA

Storm Chasers

- Follow storms to observe them and sometimes understand the science of them



Different Types of Tornadoes



- Multiple Vortex Tornadoes: 2+ spinning columns around a common center



- Waterspout Tornado-formed over water, not destructive

Different Types of Tornadoes



- Landspout Tornado- similar to waterspout but winds can cause damage



- Dust-Devil Tornado- twisting columns of air when sun heats dry land

Different Types of Tornadoes



- Gustnado- updraft of air not connected to a cloud, lasts a few seconds