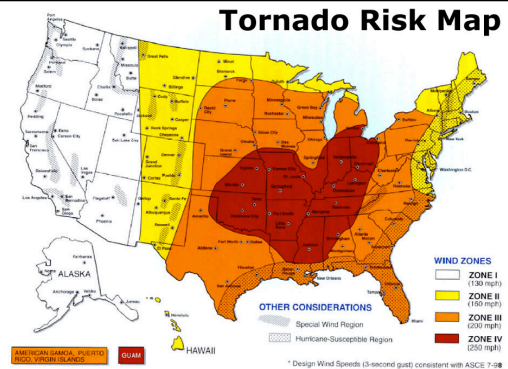




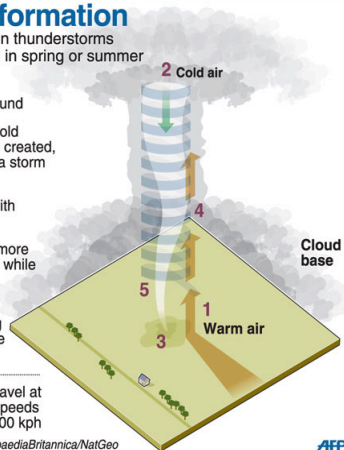
- Most are in the Midwest of the US.
- All form in t-storms
- T-storms w/ tornadoes usually form along cold fronts



Tornado formation

Twisters develop in thunderstorms on hot days, often in spring or summer

- 1 Warm, moist air rises from the ground
- 2 Warm air meets cold dry air, a vortex is created, descending from a storm cloud
- 3 Vortex contacts with the ground
- 4 Updraft draws in more air, rises upwards while rotating
- 5 Tornado spins at speed, creating a destructive force in its path






Most tornadoes travel at 16-32 kph, wind speeds can reach up to 400 kph

Sources: NOAA/Encyclopaedia Britannica/NatGeo

AFF

Fujita Scale

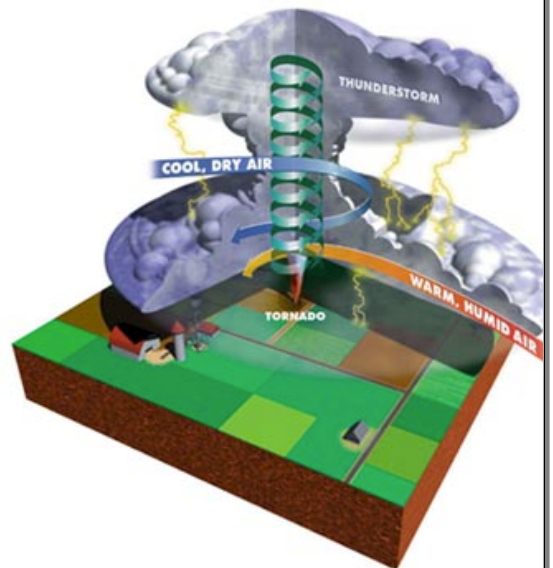
EF Rating	Wind Speeds	Expected Damage
EF-0	65-85 mph	<p>'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.</p> 
EF-1	86-110 mph	<p>'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.</p> 
EF-2	111-135 mph	<p>'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.</p> 
EF-3	136-165 mph	<p>'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.</p> 
EF-4	166-200 mph	<p>'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.</p> 
EF-5	> 200 mph	<p>'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.</p> 

TORNADO FACTS

- Funnel Cloud: a tornado in the air before touchdown ("tornado": must touch ground)
- F3 - F5 most dangerous but only about 20% of all tornadoes
- Water Spouts: tornadoes over water (slow/less dangerous)

25B: Tornadoes & Hurricanes

- MN gets ~20/year
- Dodge Co. gets 1 every 4-5 years (F0 to F2)
- Funnel at ground only ~500m across
- Travels 25 - 45 mph but 79 mph recorded
- Path is ~15 miles long, but not continuous
- Funnel Cloud and Tornado usually last less than an hour



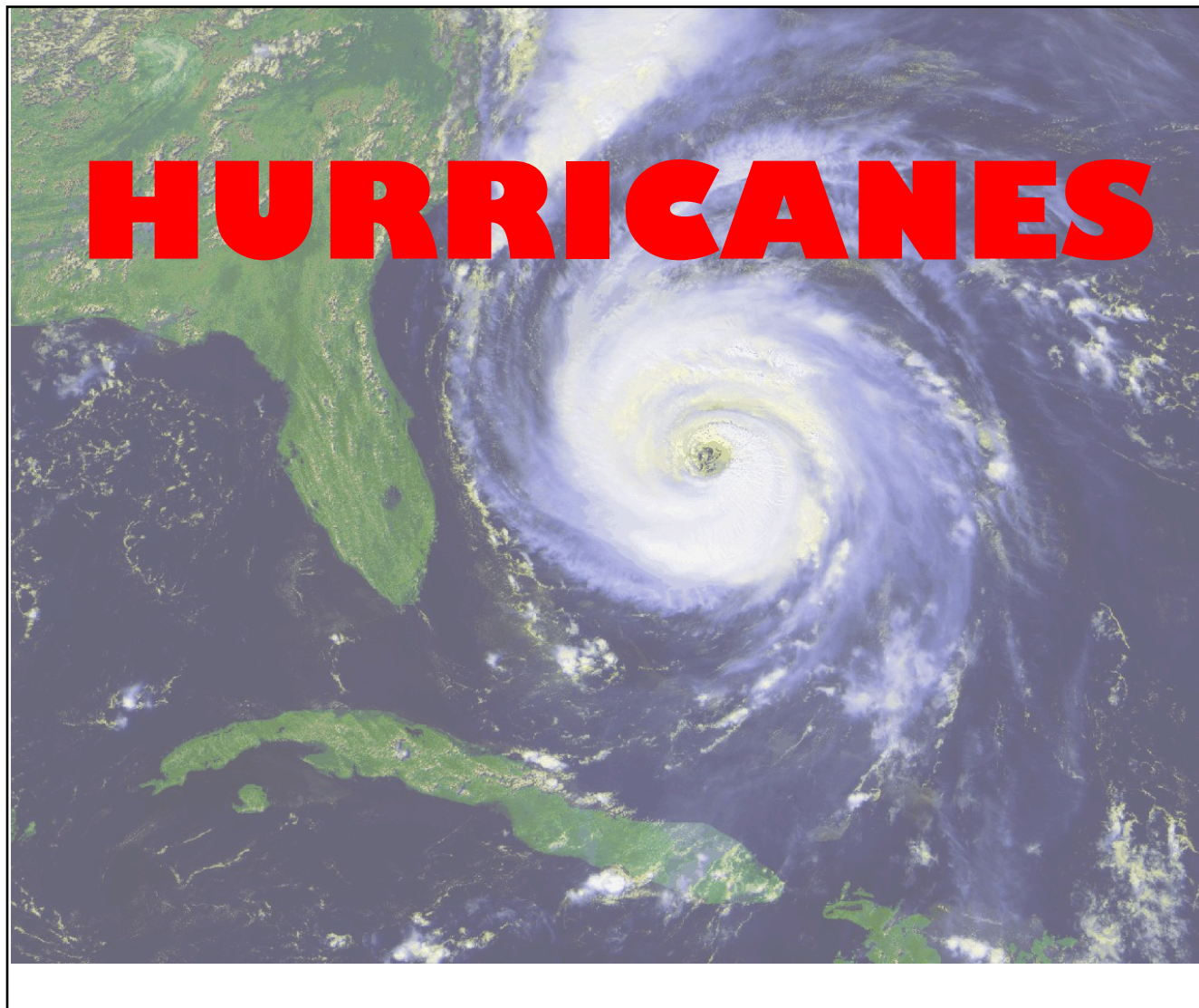
TORNADO SAFETY



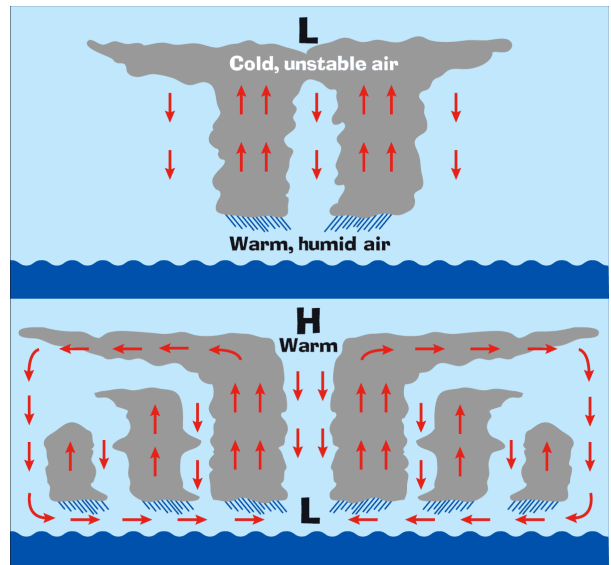
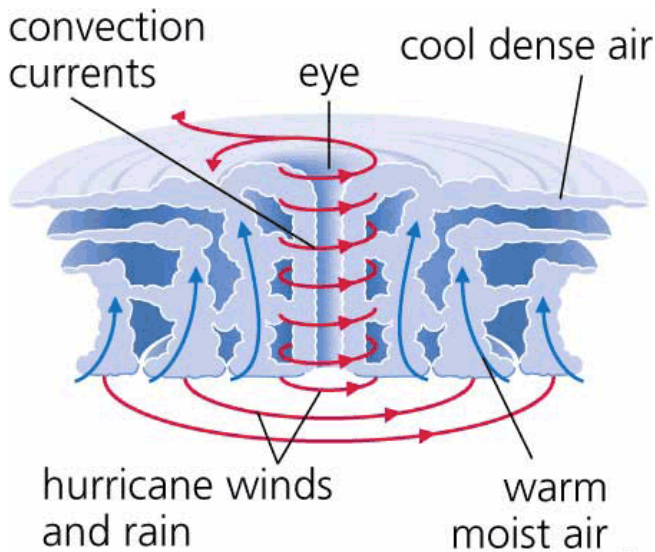
- Designated Shelter:
 - > lowest level, few windows, most walls, under table
- Have a battery radio & flashlight in shelter
- DO NOT LEAVE shelter until tornado is lifted



- If in a car, travel at right angles
- If not possible, leave the car and lie down in a ditch and cover head



- **Hurricane:** An intense tropical low pressure system w/ wind speeds over 74 mph



Hurricane

vs.

Mid-Latitude Low

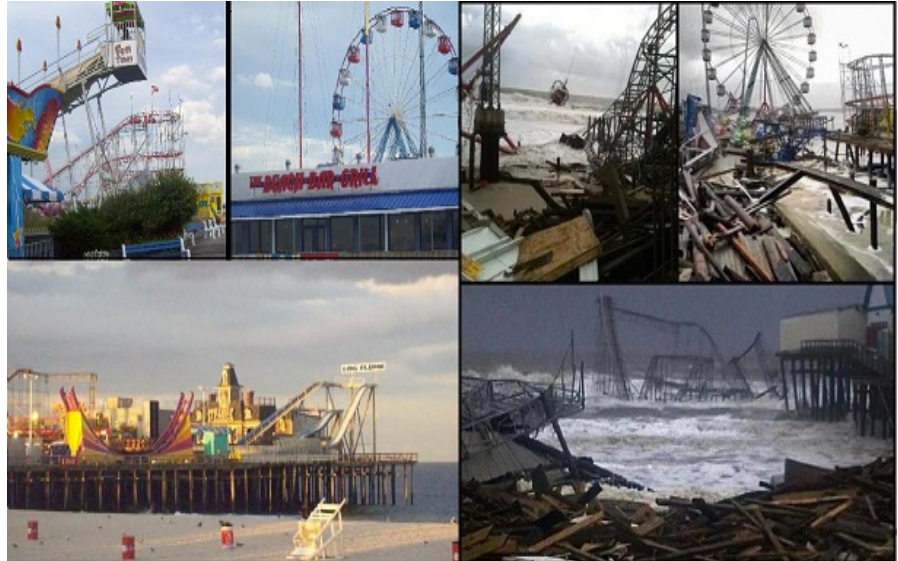
- no fronts
- eye (center) is calm
- smaller (300-600 km)
- higher winds
- Moves East to West

- low pressure
- counterclockwise direction
- precipitation

- warm, cold, occluded, and/or stationary fronts
- Moves West to East

HURRICANE DAMAGE

- Storm Surge: bulge of water created by low pressure
- High winds <120 km
- Heavy Rains
- Waves
- Tornadoes
- Lightning

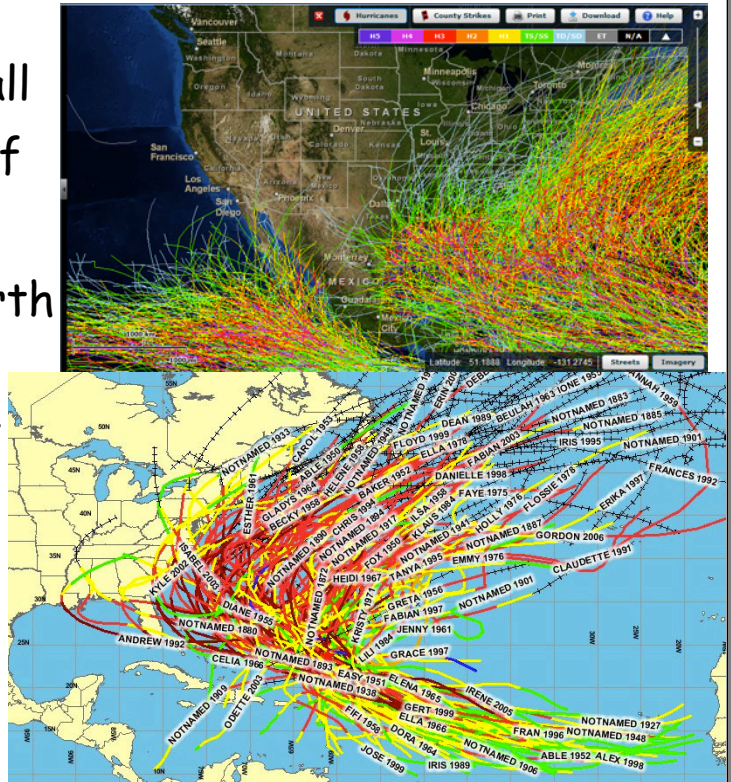


Before Hurricane Sandy

After Hurricane Sandy

Source & Track of Hurricanes

- Late summer and early fall
- Form in tropical waters of the Doldrums
- Moves west and then North w/ trade winds
- Hooks and moves East w/ westerlies
- Low strength over cold water and land



How do they measure hurricanes?

Saffir-Simpson Hurricane Scale

Category	Wind speed (mph)	Storm surge (feet)
5	156	More than 18
4	131–155	13–18
3	111–130	9–12
2	96–110	6–8
1	74–95	4–5
Additional classifications		
Tropical storm	39–73	0–3
Tropical depression	0–38	0

- Hurricanes are named alphabetically w/ male and female names
- They are tracked mainly by satellite photos but also by planes and ships
- Cause immense property damage but relatively low loss of life

- Hurricane warnings are posted up to 24 hours in advance of land fall

WATCHES

- cover large areas for several hours
- Conditions are right for severe weather

WARNINGS

- The actual condition exists
- Small area for short time
- Take action immediately!

HOMework



- **25B Questions 21-34**