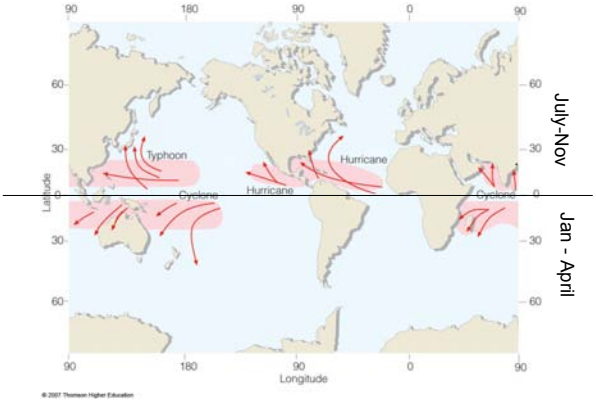
Where *do* you see Hurricanes?



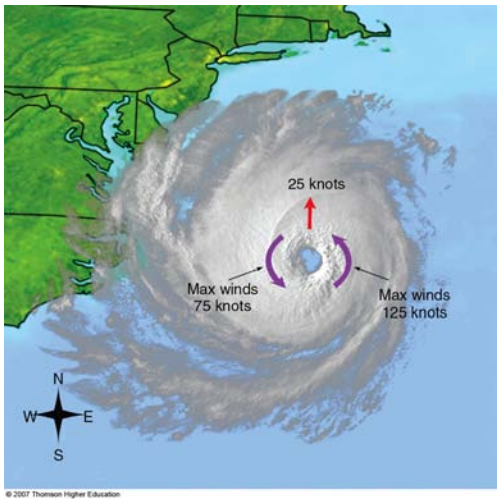


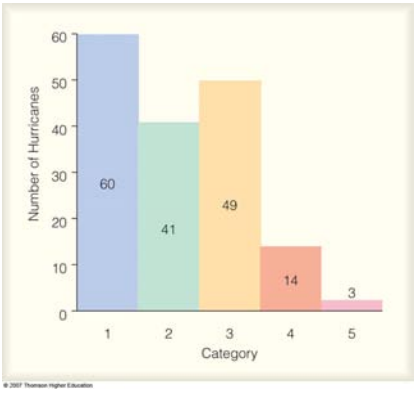
TABLE 15.1

The Thirteen Most Intense Hurricanes (at Landfall) to Strike the United States from 1900 through 2005

RANK	HURRICANE	YEAR	CENTRAL PRESSURE (MILLIBARS/INCHES)	CATEGORY	DEATH TOLL
1	Florida (Keys)	1935	892/26.35	5	408
2	Camille	1969	909/26.85	5	256
3	Andrew	1992	922/27.23	5	53
4	Katrina	2005	920/27.17	3	>1300
5	Florida (Keys)/South Texas	1919	927/27.37	4	>600*
6	Florida (Lake Okeechobee)	1928	929/27.43	4	1836
7	Donna	1960	930/27.46	4	50
8	Texas (Galveston)	1900	931/27.49	4	>6000
9	Louisiana (Grand Isle)	1909	931/27.49	4	350
10	Louisiana (New Orleans)	1915	931/27.49	4	275
11	Carla	1961	931/27.49	4	46
12	Hugo	1989	934/27.58	4	49
13	Florida (Miami)	1926	935/27.61	4	243

*More than 500 of this total were lost at sea on ships. (The > symbol means "greater than.")

The number of hurricanes (by each category) that made landfall along the coastline of the United States from 1900 through 1999



All of the hurricanes struck the Gulf or Atlantic coasts. Categories 3, 4, and 5 are considered major hurricanes.

TABLE 15.2

Saffir-Simpson Hurricane Damage-Potential Scale

SCALE NUMBER (CATEGORY)	CENTRAL PRESSURE mb	CENTRAL PRESSURE in.	WINDS mi/hr	WINDS knots	STORM SURGE ft	STORM SURGE m	DAMAGE
1	≥980*	≥28.94	74–95	64–82	4–5	~1.5	Damage mainly to trees, shrubbery, and unanchored mobile homes
2	965–979	28.50–28.91	96–110	83–95	6–8	~2.0–2.5	Some trees blown down; major damage to exposed mobile homes; some damage to roofs of buildings
3	945–964	27.91–28.47	111–130	96–113	9–12	~2.5–4.0	Foliage removed from trees; large trees blown down; mobile homes destroyed; some structural damage to small buildings
4	920–944	27.17–27.88	131–155	114–135	13–18	~4.0–5.5	All signs blown down; extensive damage to roofs, windows, and doors; complete destruction of mobile homes; flooding inland as far as 10 km (6 mi); major damage to lower floors of structures near shore
5	<920	<27.17	>155	>135	>18	>5.5	Severe damage to windows and doors; extensive damage to roofs of homes and industrial buildings; small buildings overturned and blown away; major damage to lower floors of all structures less than 4.5 m (15 ft) above sea level within 500 m of shore

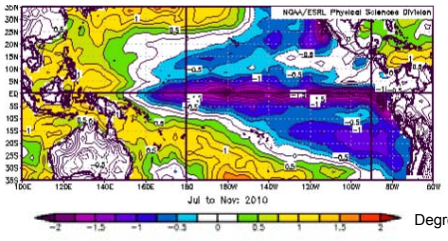
*Symbol > means "greater than"; < means "less than"; ≥ means "equal to or greater than"; ~ means "approximately equal to."

NORTH ATLANTIC HURRICANE SEASON

Probabilistic Seasonal Forecast

- **Hurricanes prefer:**
  - Warm water (fuel); High sea surface temperature (SST)
  - Weak vertical wind shear.
- **Water has great heat capacity (thermal inertia):**
  - If SST is higher than normal now, it is likely to be so for a few more months.
- **El Nino affects the SST and vertical wind shear in the tropical Pacific and Altantic**
  - We can predict El Nino with great skill, 6-9 months in advance. Hence, we can predict hurricane season in advance

There was a strong La Nina throughout Fall 2010



July-Nov Ocean Temp Anomaly

- Reduced SST in the subtropical NE Pacific (bad for hurricanes)
- Reduced vertical wind shear in the subtropical North Atlantic (good for hurricanes)

NORTH ATLANTIC HURRICANE SEASON

Forecast for Summer-Fall of 2010

- **Forecasts were for a very active season:**
  - 85% chance above normal, 10% chance near normal, 5% chance below normal
  - Forecast for 14-23 named storms, 8-14 hurricanes, and 3-7 major hurricanes (Category 3-5). Accumulated Cyclone Energy 155-270% of normal
  - For reference, a normal year 9-14 named storms, 4-7 hurricanes, 1-3 major hurricanes
- **But not as active as the record year, 2005:**
  - 28* named storms, 15* hurricanes, 7 major hurricanes, 5* Cat 5 hurricanes.
- **What happened? Another great forecast!**
  - **19 named storms, 12 hurricanes, 5 major hurricanes. ACE of 190% above normal**
- **Why? ENSO is predictable several seasons in advance, and ENSO has a major impact on hurricanes (in the Atlantic and Pacific)**

* = record for Atlantic; there were 8 major Atlantic hurricanes in 1950

http://www.cpc.ncep.noaa.gov/products/outlooks/hurricane-archive.shtml