

Terminology

Hurricanes are a form of tropical cyclone. Tropical cyclones are called hurricanes in the Atlantic Ocean, typhoons in the Pacific Ocean, and cyclones in the Indian Ocean. In the Northern Hemisphere they rotate counterclockwise, and in the Southern Hemisphere they rotate clockwise. The most common type of tropical cyclone to affect the United States originates between the months of June and November. The areas most commonly affected by hurricanes are shown in Fig. 6-1. The states most often affected are Florida, Texas, Louisiana, and North Carolina.

Starting in 1953 all Atlantic hurricanes were given female names, and since 1979 all hurricanes are given alternating male and female names. The names are used every 6 years unless a hurricane name is associated with severe damage. Then the affected country can request that the name be retired. Retiring a hurricane name means that it will not be used for at least 10 years. Names starting with Q, U, X, Y, and Z are not used because too few names start with these letters. If a season exceeds the number of names given to it, the storms are named using Greek letters. Pacific hurricanes are named using four lists. The names are sequential through one list and on to the next.

Table 6-1 Definitions of tropical cyclonic circulations

Tropical cyclonic disturbance	Definition
Tropical wave	A trough of low pressure in the trade-wind easterlies
Tropical disturbance	A moving area of thunderstorms in the tropics that maintains its identity for 24 hours or more
Tropical depression (development)	The formative stages of a tropical cyclone with maximum sustained surface winds up to 39 mph
Tropical storm	A warm-core tropical cyclone with maximum sustained surface winds ranging from 39 to 73 mph
Hurricane	A warm tropical cyclone with minimum sustained winds of 74 mph
Tropical depression (dissipating)	The decaying stages of a tropical cyclone that has maximum sustained winds of 39 mph
Extratropical cyclone	Tropical cyclones modified by interaction with nontropical environment; no wind speed criteria, and maximum winds may exceed hurricane force.
Subtropical depression	A subtropical cyclone with maximum sustained wind speeds of 39 mph
Subtropical storm	A subtropical cyclone with minimum sustained wind speeds of 39 mph

From Federal Emergency Management Agency: *Multi-hazard identification and risk assessment: a cornerstone of the national mitigation strategy*, Washington, DC, 1997, FEMA.

What is a Hurricane?

Hurricanes have a life cycle consisting of development, intensification, maturity, and decay or modification. They are tropical disturbances, depressions, storms, and then hurricanes

Table 6-2 Names of Atlantic storms

1996	1997	1998	1999	2000	2001
Arthur	Ana	Alex	Arlene	Alberto	Allison
Bertha	Bill	Bonnie	Bret	Beryl	Barry
Cesar	Claudette	Charley	Cindy	Chris	Chantal
Dolly	Danny	Danielle	Dennis	Debby	Dean
Edouard	Erika	Earl	Emily	Ernesto	Erin
Fran	Fabian	Frances	Floyd	Florence	Felix
Gustav	Grace	Georges	Gert	Gordon	Gabrielle
Hortense	Henri	Hermine	Harvey	Helene	Humberto
Isodore	Isabel	Ivan	Irene	Isaac	Iris
Josephine	Juan	Jeanne	Jose	Joyce	Jerry
Kyle	Kate	Karl	Katrina	Keith	Karen
Lili	Larry	Lisa	Lenny	Leslie	Lorenzo
Marco	Mindy	Mitch	Maria	Michael	Michelle
Nana	Nicholas	Nicole	Nate	Nadine	Noel
Omar	Odette	Otto	Ophelia	Oscar	Olga
Paloma	Peter	Paula	Phillippe	Patty	Pablo
Rene	Rose	Richard	Rita	Raphael	Rebekah
Sally	Sam	Shary	Stan	Sandy	Sebastien
Teddy	Teresa	Tomas	Tammy	Tony	Tanya
Vicky	Victor	Virginie	Vince	Valerie	Van
Wilfred	Wanda	Walter	Wilma	William	Wendy

Data from National Oceanic and Atmospheric Administration.

Table 6-3 Names of Central North Pacific tropical cyclones

List 1	List 2	List 3	List 4
Akoni	Aka	Lika	Ana
Ema	Ekeka	Ele	Ela
Hana	Hali	Huko	Halona
Io	Ioalana	Ioke	Iune
Keli	Keoni	Kika	Kimo
Lala	Li	Lana	Loke
Moke	Mele	Maka	Malia
Nele	Nona	Neki	Niala
Oka	Oliwa	Oleka	Oko
Peke	Paka	Peni	Pali
Uleki	Upana	Ulia	Ulika
Wi	Wene	Wali	Walaka

Data from National Oceanic and Atmospheric Administration.

Approximately 80 hurricanes go through this life cycle every year. Upper atmospheric turbulence organizes around a calm center that later becomes the center (eye) of the hurricane. A hurricane can organize itself in as little as 6 to 12 hours but usually develops over several days. Most hurricanes that affect the southeastern United States originate over West Africa. Typical hurricanes derive their energy from oceanic evaporation. Once they make landfall they lose force, but this may not be until they have traveled considerable distances inland. For example, Hurricane Andrew finally expired in the Ohio River Valley over Virginia.

Most hurricanes originate between the latitudes 30° N and 30° S (over tropical waters at temperatures of 80° F [27° C] or more). They travel more than 6000 miles westward in the trade winds at speeds of 5 to 50 mph. The appearance of hurricanes in the southeastern United States correlates with the wet and dry seasons in West Africa. Since 1900 about 140 hurricanes. Only

about 10% of tropical disturbances develop into tropical storms. Only 6% of tropical storms become hurricanes, and only 2% of tropical disturbances develop into hurricanes that hit the United States.

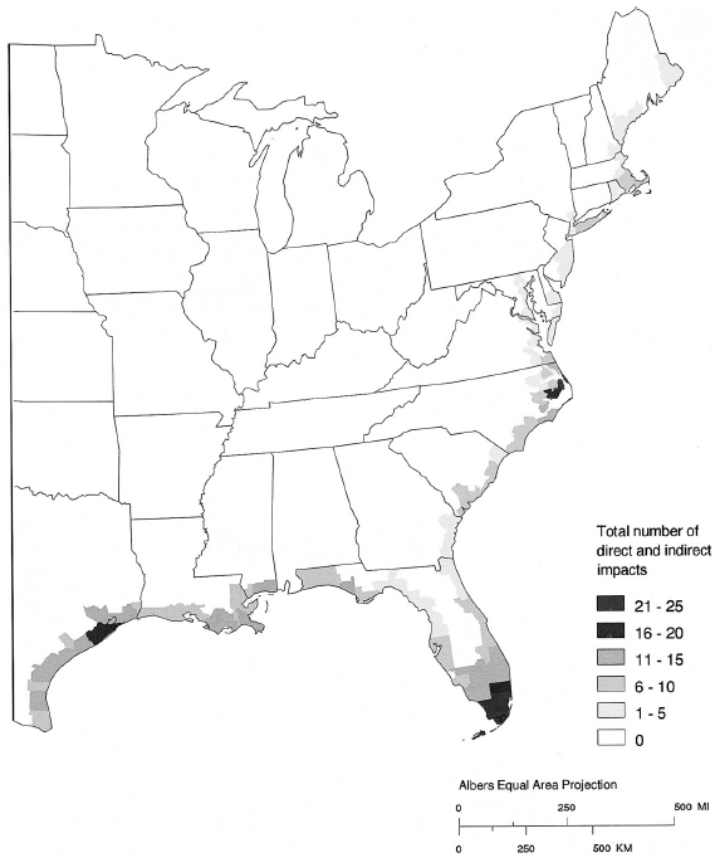


FIG. 6-1 Distribution of direct and indirect impacts from hurricanes that made landfall, 1900 to 1994. (From Federal Emergency Management Agency: *Multi-hazard identification and risk assessment: a cornerstone of the national mitigation strategy*, Washington, DC, 1997, FEMA; data from National Oceanic and Atmospheric Administration.)

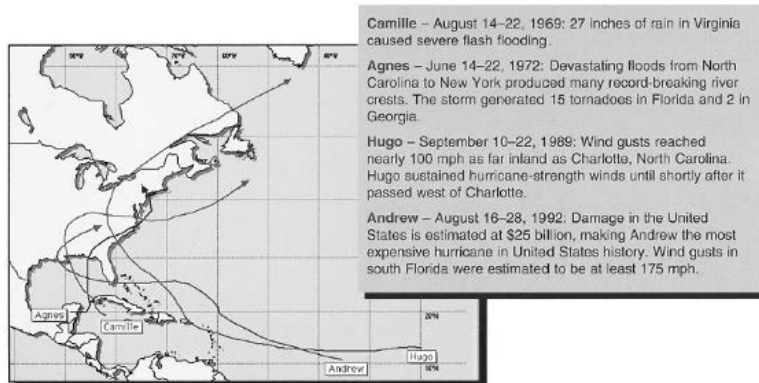


FIG. 6-2 Tracks of hurricanes Camille—August 14-22, 1969; Agnes—June 14-22, 1972; Hugo—September 10-22, 1989; and Andrew—August 16-28, 1992. (From National Oceanic and Atmospheric Administration.)

The larger the eye of a hurricane, the more severe the system. The eye of a hurricane usually is 20 to 30 miles in diameter. The eye of Hurricane Andrew was 40 miles across. The eye wall can be up to 10 miles thick. It is here that rapid upward movement of evaporated water occurs that then condenses and precipitates as rain. A typical hurricane produces 200 billion tons of water as rain. Hurricanes typically deposit 3 to 6 inches of rain. However, it is often difficult to record the exact amount of precipitation because the strong winds do not allow conventional rain gauges to be used. Record amounts of rainfall have been recorded in hurricanes: in 1921 in Texas 23 inches fell in 24 hours; in 1928 in Puerto Rico 30 inches fell in 24 hours; in 1967 Hurricane Beulah dropped 20 to 30 inches of rain over 40,000 square miles of Texas and Mexico; and in 1969 Hurricane Camille dropped 27 inches in 8 hours.

Another type of hurricane originates as a low-pressure cell over the south central United States and moves east and north. These become “Nor’easters,” which rotate counterclockwise with intense onshore winds moving from northeast to southeast on the north and east front of the storm. As the storm moves toward the coast, it picks up moisture, which precipitates as rain and results in severe flooding. Storm surges resulting from Nor’easters are commonly over 4 feet.

Table 6-4 Dolan/David Nor’easter scale

Storm class	Beach erosion	Dune erosion	Overwash	Property damage
1 (weak)	Minor changes	None	None	None
2 (moderate)	Modest, mostly to lower beaches	Minor	None	Modest
3 (significant)	Erosion extends across beach	Can be significant	None	Loss of many structures at local scale
4 (severe)	Severe erosion and recession	Severe erosion or destruction	On low beaches	Loss of structures at community scale
5 (extreme)	Extreme beach erosion	Dunes destroyed over extensive area	Massive in sheets and channels	Extensive at regional scale

From Federal Emergency Management Agency: *Multi-hazard identification and risk assessment: a cornerstone of the national mitigation strategy*. Washington, DC, 1997, FEMA.