MAR 110 LECTURE #23
Hurricane Facts

Figure 23.1 Tropical Storms
A computer simulated image of a hurricane. Note the distinct eye around which there is an array of spiral bands. (NG??)

Figure 23.2 Historical Hurricanes
Hurricanes ravaged the early colonists.
The Great September 1815
“Gale”
Caribbean Sea and Northeastern United States
September 21-23, 1815.

The most celebrated TROPICAL CYCLONE to have affected NEW YORK and NEW ENGLAND since the GREAT COLONIAL HURRICANE of 1635, the Great September Gale pummeled Long Island, Connecticut, central Massachusetts, and New Hampshire with what one awestruck survivor described as winds of the "utmost fury."

Of possible Cape Verde origin, the Great September Gale whirled with destructive consequence through the islands of the eastern and northern CARIBBEAN SEA before tracking northward, across Long Island, and into south central Connecticut on the morning of September 23. A truly notable hurricane in terms of its size and severity, the Great September Gale skipped ashore at Sag Harbor, Long Island, with a 6-foot storm surge in tow. Nearly every house in the settlement was flooded, with several being carried from their foundations and wrecked. The lantern atop the stone lighthouse at Montauk Point was smashed, allowing its fragile lenses to become pitted from windblown sea salt. New York City was "buffeted by very heavy rain and gales from the northeast," causing the restless waters of the harbor to submerge dozens of Manhattan's wooden piers as well as toss a heavily laden merchant ship ashore at Staten Island. As the vessel's crew labored to salvage its cargo, bursting flood waters in the nearby town of Flushing swept away a wooden drawbridge, isolating hundreds of residents.

Tearing across Long Island Sound, the Great September Gale raised
an enormous storm surge in Rhode Island's Narragansett Bay that flooded much of Providence with 12 feet of water. At least 25 ships, many of them lumber schooners and fishing sloops, were carried across the crowded anchorage by the surge and then sent careening into the long wooden bridge that spanned the head of the bay. A number of offshore islands were stripped of their trees, houses, and piers, and extensive dune and washout damage almost permanently altered the geography of Buzzard's Bay, Massachusetts. Nearly 7 inches of rain fell across central Connecticut, precipitating raging flash floods and dangerously swollen rivers. Transiting the region at forward speeds of 50 mph (81kph), the September Gale's winds—judged by Noah Webster to have blown "a perfect hurricane" in Amherst, Massachusetts—decimated dozens of apple orchards and cider mills, uprooted entire groves of oak, maple, and poplar trees, razed barns, gutted carriage houses, and sprayed the resulting wreckage with tons of bitter sea salt. Surprisingly, only two deaths were reported in the Great September Gale, a miraculously low number considering the obvious severity of the hurricane's passage.
Figure 23.4 Hurricane Katrina - August 2005
The landfall of hurricane Katrina in Florida in 2005. At this point the storm was a category 1 hurricane. (web??)
Figure 23.5 - RI Landfall of the Hurricane of September 1938
The “unnamed” hurricane of September 22, 1938 destroyed a large portions of the coast from New York to Massachusetts. (??)

Figure 23.6 Hurricane Carol in Narragansett Bay – Aug 1954 (??)
Figure 23.8 Hurricane and Typhoon Distribution
The map locates historical hurricanes/typhoons. Not surprisingly, the greatest frequencies of
Figure 23.9 Hurricane Trajectories
Hurricane tracks for the “warmer” years of 1985-1994, showing a wide distribution. The width of the segments (thicker-stronger) indicates the relative strengths of the storms. (NG??)

Figure 23.10 Seeds of a Hurricane
Hurricanes begin as tropical disturbances off the west coast of Africa. (ITO)
Figure 23.11 Hurricane Development in the tropical Atlantic August 1995 (LEiO)

Figure 23.12 Hurricane Trajectories
Hurricane tracks for the “cooler” years of 1985-1994, showing a wide distribution. The width of the segments (thicker-stronger) indicates the relative strengths of the storms. (NG??)
Figure 23.13 Extreme Air-Sea Interaction - Hurricanes
Extreme imbalances can result in storms such as hurricanes. (??)

Figure 23.14 Hurricane Structure
The progression of hurricane Andrew showing the 22-23 August 1992 development of the storm before landfall in Florida; and its re-intensification after crossing the Florida peninsula. (NH)
Figure 23.15 - **Weather aircraft of the "Hurricane Hunters" flying through the eye of a hurricane.** [Photograph courtesy of the 53rd Weather Reconnaissance Squadron, 403rd Wing, U.S Air Force.]

Figure 23.16 **Storm Surge.** (top) A sea level record on Mustang Island, Texas is partitioned into the (middle) contribution of storm surge (atmospheric wind and pressure) and (bottom) astronomical (sun and moon). Note the extreme, storm surge-related high water around February 1.
The Saffir-Simpson hurricane scale

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Figure 23.11 Saffir-Simpson Scale
Occasionally a extratropical coastal storm will interact with a tropical storm and morph into a powerful hybrid –such as the so-called “Perfect Storm” that stayed relatively stationary off the northeast coast for several days in and around Halloween October 1991. (NH)
The Halloween Storm or “Perfect Storm”

October 1991

Figure 23.12 Hybrid Storm
Ocassionally an extratropical coastal storm will interact with a tropical storm and morph into a powerful hybrid—such as the so-called “Perfect Storm” that stayed relatively stationary off the northeast coast for several days in and around Halloween October 1991. (NH)

Figure 23.13 Hurricane Frequency and El Nino
ENSO events appear to be linked to increases in hurricane activity. (NH)