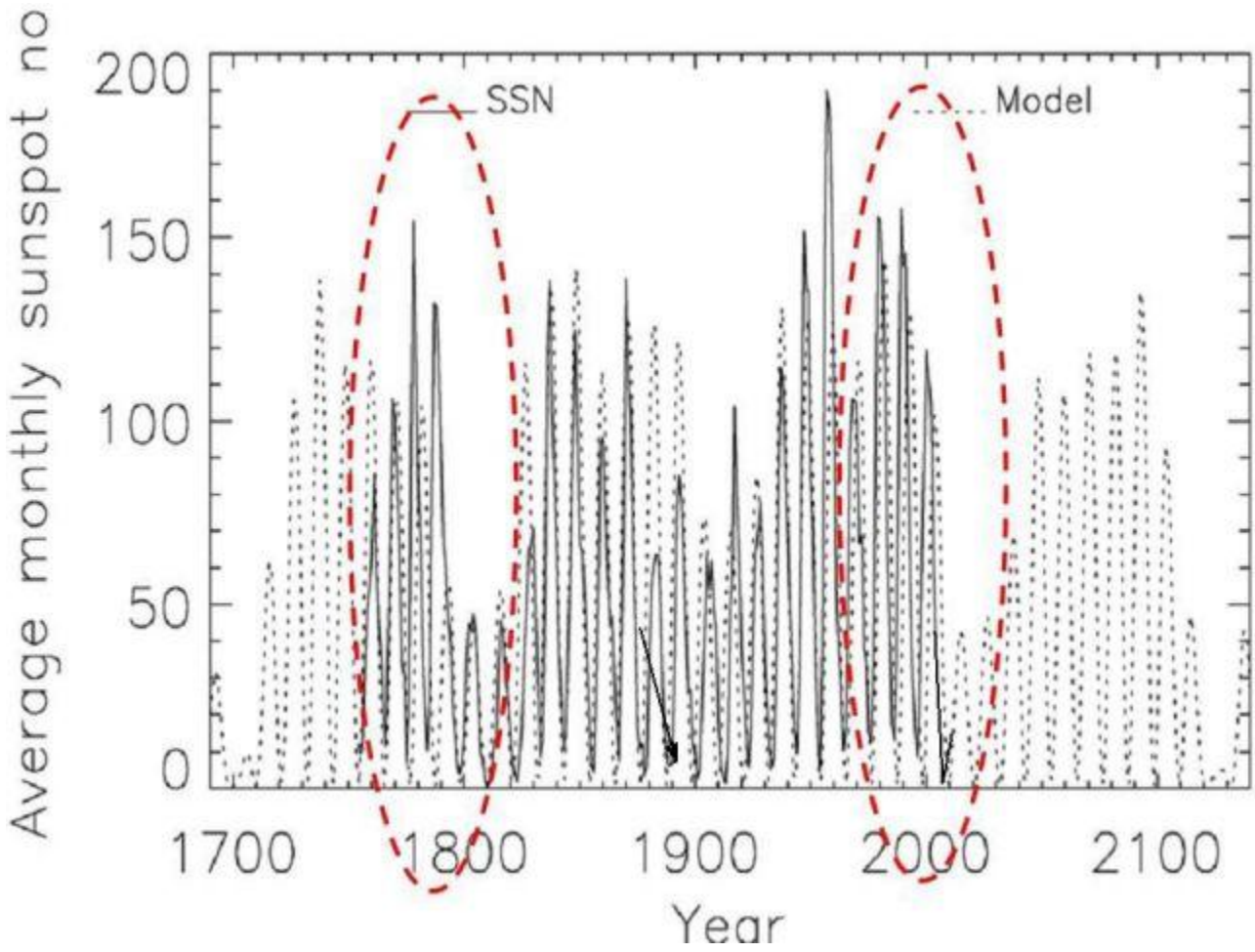
1893 a hurricane season analog?

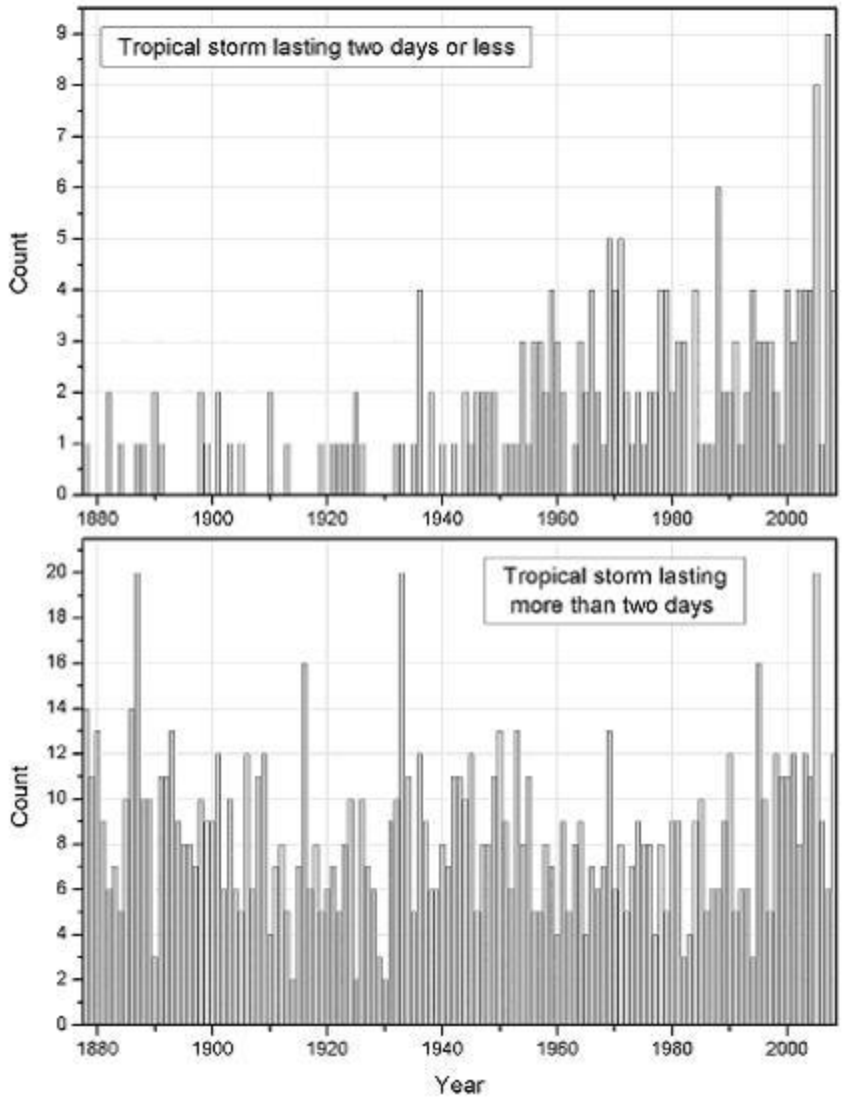
By Joseph D'Aleo CCM

We are coming off the longest and weakest solar minimum in at least a century and perhaps two centuries. We had over 820 sunspotless days in the cycle. We are two and one half years after the solar minimum in December 2008 and today's sunspot number was 16. A statistical analysis of the various identified cycles (11, 22, 44, 106, 212, 426, etc) predicts at least two more quiet cycles 24 and 25, much as we saw during the Dalton Minimum in the early 1800s. Note the 106 year cycle had activity relatively low in the late 1800s and early 1900s.

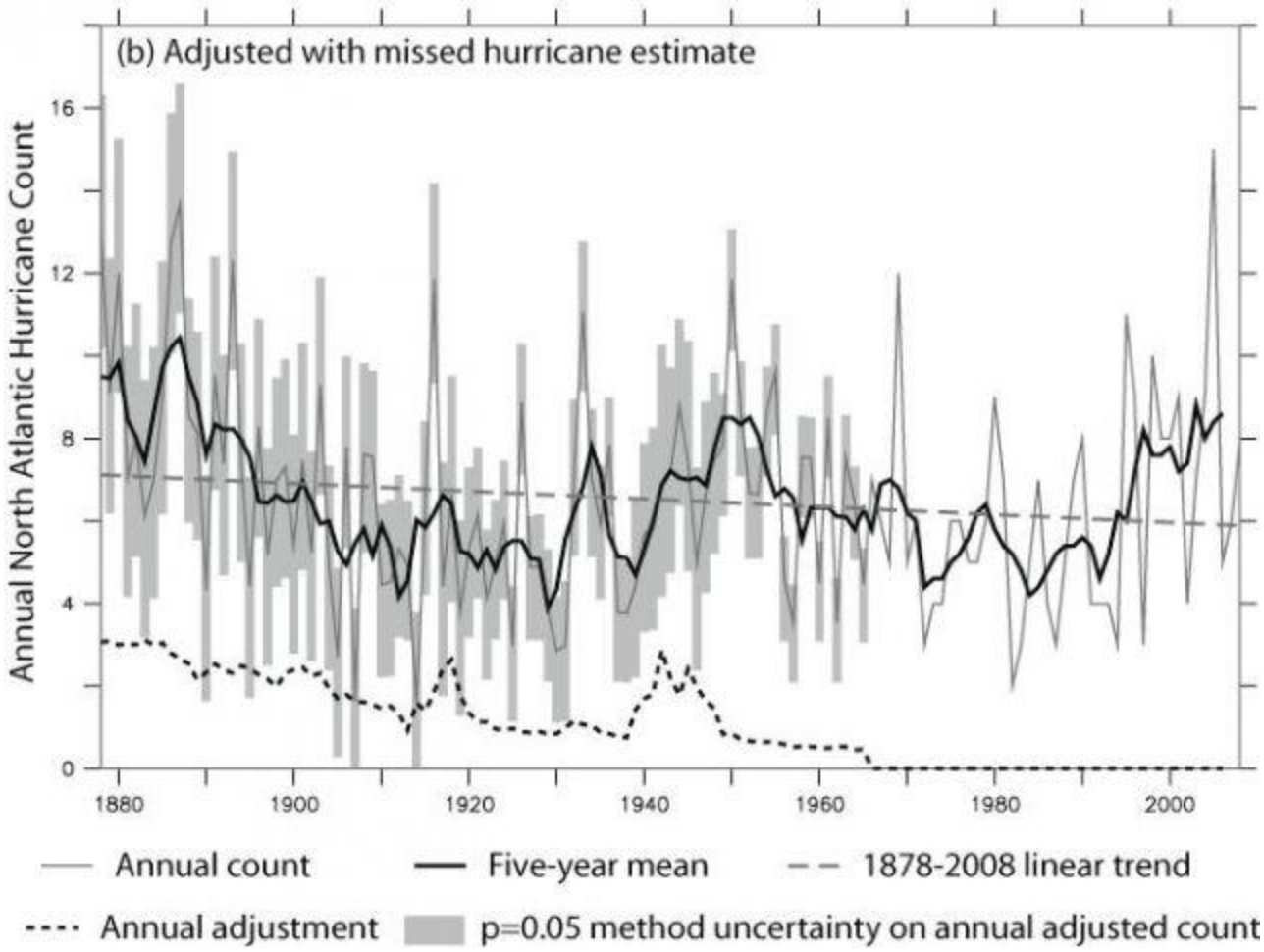


A quiet sun leads to global cooling but does not preclude hurricanes.

Villarini et al (2011) showed any perceived trend is mainly with 'shorties' with duration of two days or less. These storms are more likely to have gone undetected in the pre satellite age, when a storm had to have a ship track close enough to the center and report its existence. Today we have full global satellite coverage and recon with technology to estimate surface winds and a lot of borderline storms get named.



Vecchi and Knutsen estimate the adjusted number for possible missed storm would be 15.



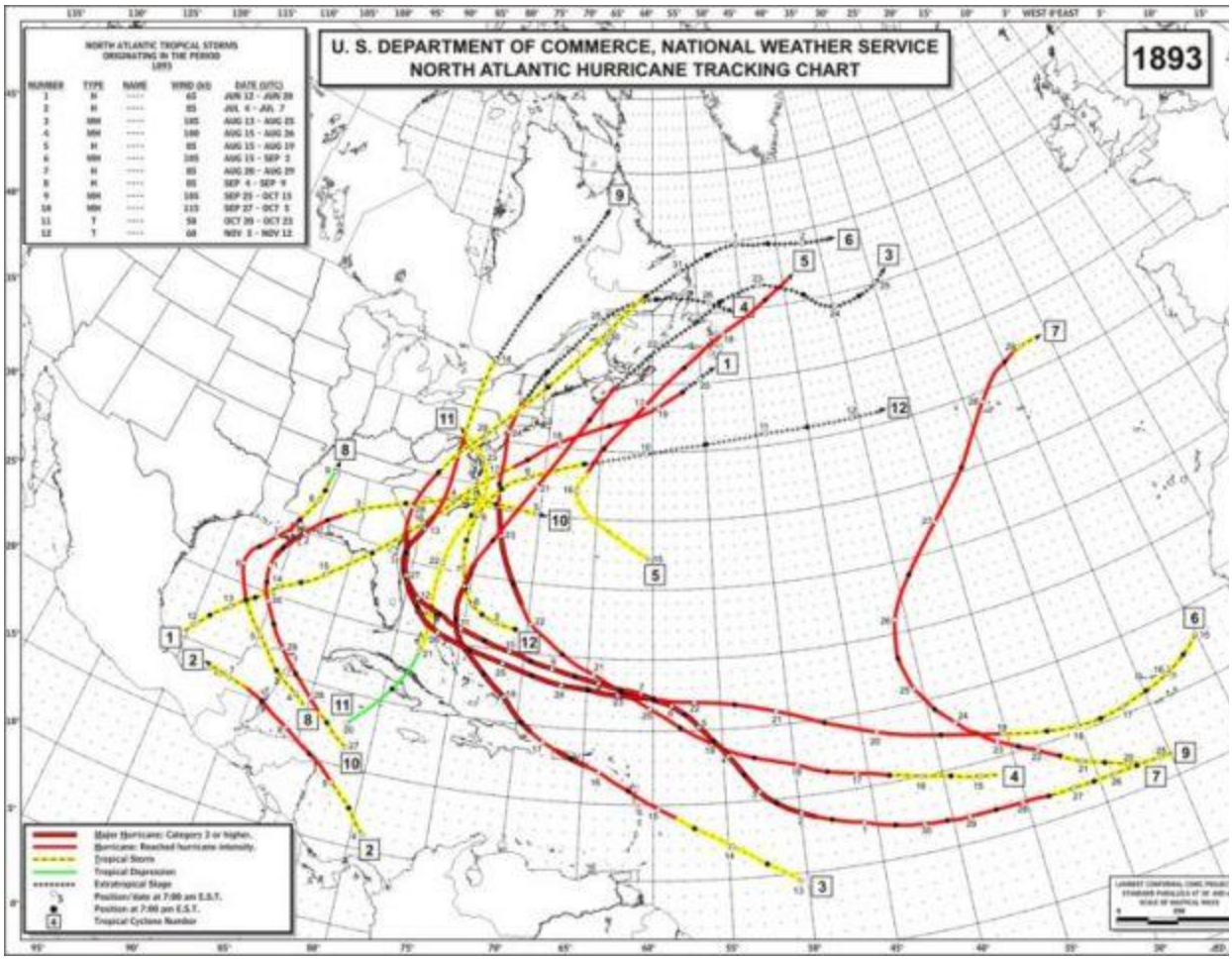
This is similar to tornadoes where the frequency of all tornadoes has risen since 1950 but strong tornadoes F3 or greater have declined. Again population has increased, we have doppler radar, trained spotters and a more aware public which account for us 'seeing' more storms.

But back to hurricanes and low solar. A hurricane struck New York City during the Dalton minimum in 1821 (more in a post this week).

Another struck during the next quiet period in 1893. 1893 was also a La Nina year as we reported in the last post.

1893 was one of those years like JB predicts for this year with 12 storms reported and perhaps as many as 15 according to Vecchi, but with more impact. The targets were Louisiana (storms #8, #10), the southeast sea islands and coast (#6, #9) and New York City (#4).

At the time, the 1893 Atlantic hurricane season was the most destructive in U.S. history with two storms killing 2,000 people each.

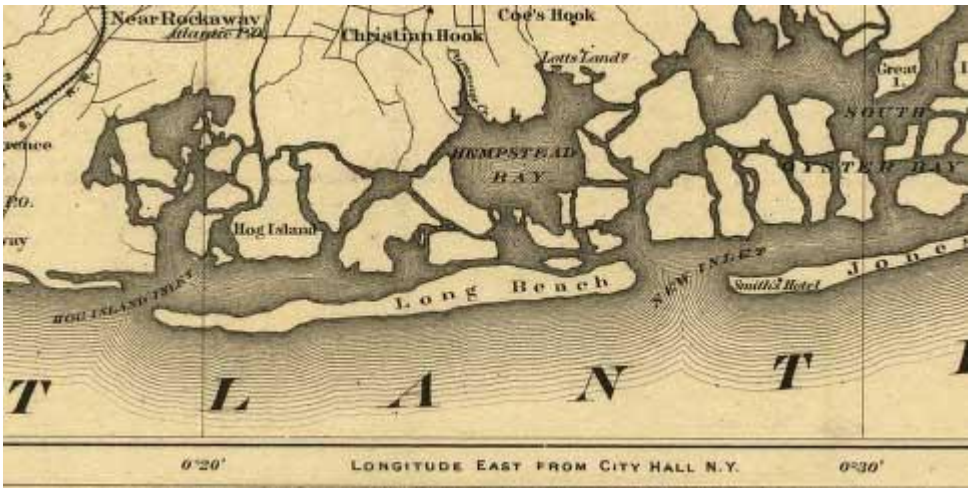


#	Name	Date	Wind	Pres	Cat
1	Hurricane #1	12-20 JUN	65	-	1
2	Hurricane #2	4- 7 JUL	85	-	2
3	Hurricane #3	13-25 AUG	105	-	3
4	**Hurricane #4**	**15-26 AUG**	**100**	**952**	**3**
5	Hurricane #5	15-19 AUG	85	-	2
6	**Hurricane #6**	**15 AUG- 2 SEP**	**105**	**954**	**3**
7	Hurricane #7	20-29 AUG	85	-	2
8	**Hurricane #8**	**4- 9 SEP**	**85**	**-**	**2**
9	**Hurricane #9**	**25 SEP-15 OCT**	**105**	**955**	**3**
10	**Hurricane #10**	**27 SEP- 5 OCT**	**115**	**948**	**4**
11	Tropical Storm #11	20-23 OCT	50	-	-
12	Tropical Storm #12	5-12 NOV	60	-	-

The **1893 New York hurricane** was a powerful and destructive tropical cyclone that struck the New York City area in August 1893. First identified as a tropical storm on August 15, over the central Atlantic Ocean, the hurricane moved northwestward for most of its course, ultimately peaking with maximum sustained winds of 115 mph (185 km/h) and a minimum barometric pressure reading of 952 mbar (hPa; 28.11 inHg). It turned due northward as it approached the U.S. East Coast and struck western Long Island on August 24. It moved inland and quickly

deteriorated, degenerating the next day.

The storm inflicted severe damage with storm tides as high as 30 ft (9.1 m). Trees were brought down, houses were demolished, and Hog Island was largely washed away by the cyclone. Several areas suffered extensive effects from the hurricane, and at least 34 sailors lost their lives. The storm is regarded as one of the most severe hurricanes to strike the city.



The sixth tropical cyclone of the 1893 Atlantic hurricane season called the Sea Islands Hurricane formed to the east of Cape Verde on 15 August. By 19 August, the system had intensified into a hurricane, reaching Category 3 strength on 22 August while located northeast of the Lesser Antilles.

The hurricane then turned north-northwest as it approached the Bahamas on 25 August. That night, the first effects of the storm's approach could be felt on the Sea Islands off the coast of Georgia and the barrier islands of South Carolina. Conditions rapidly deteriorated as the hurricane tracked parallel to the southeast U.S. coast for 161 km (100 mi) before making landfall as a Category 3 hurricane near Savannah, Georgia on 27 August.

Pressure in Savannah was measured at 960 mbar at the storm's landfall; modern estimates put the pressure around 954 mbar at landfall, and possibly as low as 931 mbar at sea. This suggests that the hurricane was most likely stronger than a Category 3 storm at landfall. Researchers believe the hurricane was of equal intensity to the 1900 Galveston Hurricane, which is now estimated to have been the 2nd most deadly storm in the Atlantic Basin in the last 500 years, killing 8,000 to 12,000 people

The hurricane carried an estimated 193 km/h (120 mph) winds and a tremendous storm surge (5 m/16 ft), which completely submerged many of the Sea Islands. The storm moved through South Carolina and up the East Coast before becoming extratropical over the Canadian Maritime Provinces on 1 September.

The hurricane's storm surge caused a great amount of destruction to the Sea Islands and the peninsulas that line the Georgia and South Carolina coastlines. Some 2,000 people are said to have drowned during the event. Nearly every building on the Sea Islands was damaged beyond repair leaving 30,000 people homeless. It took over a month for the American Red Cross to arrive to the disaster areas, possibly due to ongoing efforts in response to another hurricane that had hit South Carolina in June. Relief efforts were further hampered by another Category 3 hurricane, which struck just north, near Charleston, South Carolina, on 13 October. After a significant 10-month relief campaign, housing and food resources had been restored to the Sea Islands. Damages from the hurricane totaled at least $1 million (1893 USD [$22.8 million 2007 USD]).

The hurricane reduced Beaufort, South Carolina to rubble. The phosphate industry that had thrived in the city since the 1870s was practically wiped out. Rice cultivation also ceased, as the fields became filled with saltwater. Economic turmoil plagued Beaufort for nearly half a century after the hurricane.

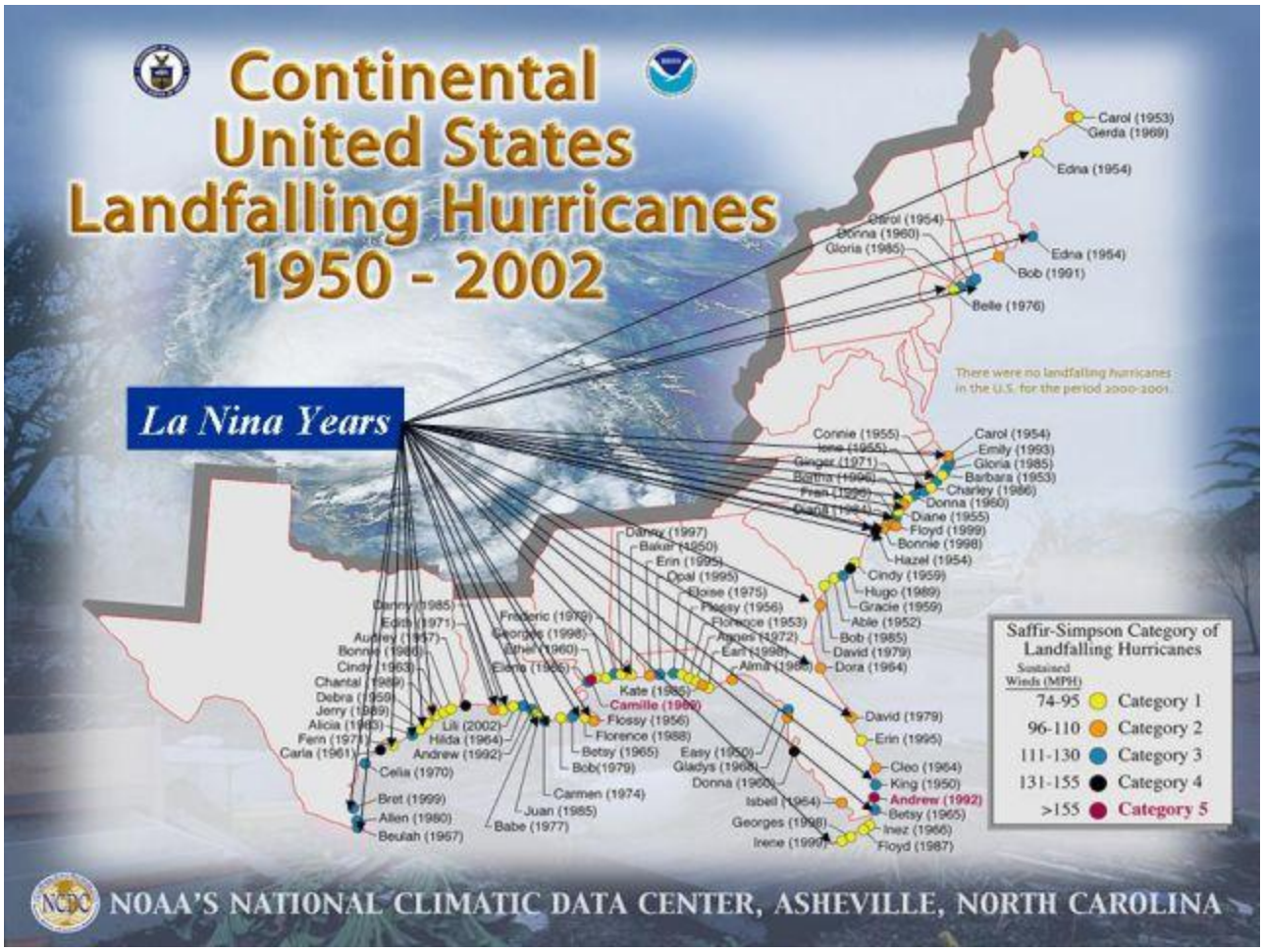
The destructive Hurricane Hugo would follow a similar course as the Sea Islands Hurricane nearly a century later. Damage reports from the 1893 hurricane are also very similar to the damage sustained from Hurricane Floyd in 1999.

The **8th storm** of the season formed in the western Caribbean Sea on September 4. After hitting the Yucatán Peninsula, it strengthened in the Gulf of Mexico to a 95 mph (153 km/h) hurricane. It hit the southern coast of Louisiana on September 7.

The **10th storm** of the season, known as the Cheniere Caminada Hurricane began on September 27 in the western Caribbean Sea. After hitting the northeastern coast of the Yucatán Peninsula as a Category 2 hurricane, it moved through the Gulf of Mexico. As it approached the southeast coast of Louisiana, it rapidly strengthened to a Category 4 hurricane, and hit land on October 2. It moved through Alabama, Georgia, and the Carolinas before dissipating at sea. This storm was one of the first hurricanes to officially receive a Category 4 designation on the modern Saffir-Simpson scale. It killed 2000 people and caused around $5 million (1893 dollars) in damage.

One final note:

La Ninas since 1950 have a 'spray' of landfalls with clusters in the Gulf, the southeast coast and the northeast.


Continental United States Landfalling Hurricanes 1950 - 2002
La Nina Years
There were no landfalling hurricanes in the U.S. for the period 2000-2001.
Carol (1953)
Gerda (1969)
Edna (1954)
Edna (1954)
Bob (1991)
Belle (1976)
Connie (1955)
Carol (1954)
Emily (1993)
Gloria (1985)
Barbara (1953)
Charley (1986)
Donna (1960)
Diane (1955)
Floyd (1999)
Bonnie (1998)
Hazel (1954)
Cindy (1959)
Hugo (1989)
Gracie (1959)
Able (1952)
Bob (1985)
David (1979)
Dora (1964)
Danny (1997)
Erin (1995)
Opal (1995)
Eloise (1975)
Flossy (1956)
Florence (1953)
Agnes (1972)
Earl (1998)
Alma (1966)
Kate (1985)
Camille (1969)
Flossy (1956)
Florence (1988)
Betsy (1965)
Bob(1979)
Carmen (1974)
Juan (1985)
Babe (1977)
Easy (1950)
Gladys (1968)
Donna (1960)
Isbell (1964)
Georges (1998)
Irene (1999)
David (1979)
Erin (1995)
Cleo (1964)
King (1950)
Andrew (1992)
Betsy (1965)
Inez (1966)
Floyd (1987)
Danny (1985)
Edith (1971)
Audrey (1957)
Bonnie (1986)
Cindy (1963)
Chantal (1989)
Debra (1959)
Jerry (1989)
Alicia (1983)
Fern (1971)
Carla (1961)
Frederic (1979)
Georgia (1998)
Ethel (1960)
Elena (1985)
Lili (2002)
Hilda (1964)
Andrew (1992)
Celia (1970)
Bret (1999)
Allen (1980)
Beulah (1967)
Saffir-Simpson Category of Landfalling Hurricanes
Sustained Winds (MPH)
74-95 Category 1
96-110 Category 2
111-130 Category 3
131-155 Category 4
>155 Category 5
NOAA'S NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA