



SHORELINES – February 2008

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2007 Hurricane Season Recap

As many of us are aware, the sand loss attributed to tropical cyclones usually constitute the bulk of erosion Bogue Banks and many other southeast Atlantic barrier islands sustain on an annual, or even decadal basis. As a quick reminder, a **tropical cyclone** is a warm-core atmospheric closed circulation rotating counter-clockwise in the Northern Hemisphere (that's us) and clockwise in the Southern Hemisphere. A tropical cyclone becomes a **tropical storm** when the maximum sustained surface wind speed ranges from 39 mph to 73 mph using the U.S. 1-minute average, and a **hurricane** is designated when the cyclone reaches a maximum sustained surface wind of 74 mph or more.

While on the surface the 2007 hurricane season will go down in the climatology books as "above average", the season was relatively benign with the exception of two category 5 hurricanes that impacted Central America (Fig. 1). Although cyclones such as *Andrea* in May and *Olga* in December count as part of the 2007 Hurricane Season, the season traditionally runs from June 1st – November 30th.

	NOAA (max.)	Colorado State University, US	University College London, UK	Average (1950-2000)	Actual
Total No. of Named Tropical Cyclones	17	17	16	10	15
Tropical Storms	7	8	7	4	9
Hurricanes / Major	10/5	9/5	9/4	6/2	6/2
Accumulated Cyclone Energy (ACE) Index	168	170	166	96	68

Fig. 1 - Summary comparing publicly available pre-season predictions for the 2007 Hurricane Season with average activity and actual results.

However beneath the surface, the duration and intensity of the 2007 tropical cyclones proved to be the weakest in decades as represented by a statistical parameter known as the *Accumulated Cyclone Energy Index*, which is simply a measurement taking a storm's wind speed strength for each 6-hour period of its existence into account. The 2007 Accumulated Cyclone Energy Index was 68, which if compared to the values collected since 1950, ranked 40 out of the 57-year record (i.e., only 17 other years had a lower Index value). The 2006, 2005, 2004, and 2003 Index figures were 79, 248 (highest on record), 225, and 175, respectively.

The apparent weakness in the 2007 hurricane season has been predominantly attributed to;

(1) Lower than expected sea surface temperatures that could be the result of high African dust levels in the atmosphere that tend to reflect incoming solar radiation back to space, and thereby preventing this radiation from reaching the surface and warming the ocean. Warm water is often considered as "fuel" for tropical cyclones.

(2) A weaker than anticipated El Niño Southern Oscillation (ENSO) cold phase in the tropical Pacific – commonly referred to as *La Niña*. Typically, *La Niña* conditions enhance Atlantic basin hurricane activity by reducing levels of vertical wind shear throughout the atmosphere. The opposite holds true for *El Niño* or ENSO warm phase that tends to enhance winds that shear apart tropical cyclones. Traditionally, ENSO cycles are determined empirically based upon the difference in surface air pressure between Tahiti and Darwin, Australia.

There were only 4 cyclones that made landfall in the continental U.S. in 2007. The only strike on the U.S. Atlantic seaboard was tropical storm *Gabrielle* that formed on September 8th and made landfall a day later near Cape Lookout, N.C. Factors including the storm's intensity, duration, angle of approach, surge, and other parameters relative to Bogue Banks proved to be "favorable" and presented little harm. Subtropical storm *Andrea*, which as mentioned above actually formed in May and before the official beginning of the 2007 hurricane season, created sea conditions off Bogue Banks that could have had the biggest impact along the island for the season.

It's hard to believe the 2008 hurricane season is less than five months away - most experts agree the Atlantic Ocean basin is in the middle of a trend of heightened tropical cyclone activity. It will be interesting to see what pattern ENSO is in and what the 2008 hurricane season will bring (or hopefully not bring) to Bogue Banks.