

## **FORECAST OF ATLANTIC HURRICANE ACTIVITY FOR SEPTEMBER AND OCTOBER 2007 AND SEASONAL UPDATE THROUGH AUGUST**

Slightly above-average activity has occurred so far during the 2007 hurricane season, primarily due to long-lived, intense Hurricane Dean. We expect above-average activity for the remainder of the season. We continue to predict that seasonal activity will be well above the long-term average.

(as of 4 September 2007)

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with special assistance from William Thorson<sup>3</sup>

This forecast as well as past forecasts and verifications are available via the World Wide Web at <http://hurricane.atmos.colostate.edu/Forecasts>

Emily Wilmsen, Colorado State University Media Representative, (970-491-6432) is available to answer various questions about this forecast

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## ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2007

Forecast Parameter and 1950-2000 Climatology (in parentheses)	Full Season Adjusted 3 August 2007 Fcst.	Observed* Activity Through August	Updated Sept. Fcst.	Updated Oct.-Nov. Fcst.	Forecast Activity After 1 Sept.	Full Season Adjusted 4 Sep. 2007 Forecast
Named Storms (NS) (9.6)	15	5	5	5	10	15
Named Storm Days (NSD) (49.1)	75	12	35	24.75	59.75	71.75
Hurricanes (H) (5.9)	8	1	4	2	6	7
Hurricane Days (HD) (24.5)	35	6.50	20	9	29	35.50
Intense Hurricanes (IH) (2.3)	4	1	2	1	3	4
Intense Hurricane Days (IHD) (5.0)	10	3.75	6.5	2	8.5	12.25
Accumulated Cyclone Energy (ACE) (96.2)	150	36	75	37	112	148
Net Tropical Cyclone Activity (NTC) (100%)	160	40	80	42	122	162

\*After additional consideration, we have decided to count Subtropical Storm Andrea in our seasonal statistics. In the future, we will count all subtropical storms, so as to be consistent with other seasonal forecast groups such as the National Oceanic and Atmospheric Administration and Tropical Storm Risk.

### Notice of Author Changes

**By William Gray**

The order of the authorship of these forecasts was reversed in 2006 from Gray and Klotzbach to Klotzbach and Gray. After 22 years (since 1984) of making these forecasts, it is appropriate that I step back and have Phil Klotzbach assume the primary responsibility for our project's seasonal, monthly and landfall probability forecasts. Phil has been a member of my research project for the last seven years and was second author on these forecasts from 2001-2005. I have greatly profited and enjoyed our close personal and working relationships.

Phil is now devoting more time to the improvement of these forecasts than I am. I am now giving more of my efforts to the global warming issue and in synthesizing my projects' many years of hurricane and typhoon studies.

Phil Klotzbach is an outstanding young scientist with a superb academic record. I have been amazed at how far he has come in his knowledge of hurricane prediction since joining my project in 2000. I foresee an outstanding future for him in the hurricane field. I expect he will make many new forecast innovations and skill improvements in the coming years. He was recently awarded his Ph.D. degree.

## ABSTRACT

Information obtained through 31 August 2007 shows that we have so far experienced 40 percent of the average full season Net Tropical Cyclone (NTC) activity. We correctly predicted a slightly above-average August NTC. In an average year, 33 percent of the seasonal average NTC of 100 occurs before the end of August.

Our September-only forecast calls for 5 named storms, 4 hurricanes, 2 major hurricanes and NTC activity of 80 which is well above the September-only average value of 48. Our October-November forecast calls for 5 named storms, 2 hurricanes, 1 major hurricane and NTC activity of 42 which greatly exceeds the October-November average value of 22.

We continue to anticipate that the 2007 Atlantic basin tropical cyclone (TC) season will be more active than the average 1950-2000 season. Atlantic basin sea surface temperatures have remained at near-normal values, while ENSO conditions trended slightly cooler during August. Atlantic sea level pressure values were at near-record low levels during August.

## AUGUST FORECAST VERIFICATION

Our August 2007 forecast called for slightly above-average NTC activity, and this forecast verified well. Long-lived, intense Hurricane Dean was primarily responsible for the high values of NTC that were achieved during the month. A more in-depth analysis of the atmospheric and oceanic conditions that were present during August 2007 follows in our discussion (Section 3).

CSU forecast and verification of August-only hurricane activity made in early August.

Tropical Cyclone Parameters and 1950-2000 August Average (in parentheses)	August 2007 Forecast	August 2007 Verification
Named Storms (NS) (2.8)	3	2
Named Storm Days (NSD) (11.8)	14	9.75
Hurricanes (H) (1.6)	2	1
Hurricane Days (HD) (5.7)	6	6.50
Intense Hurricanes (IH) (0.6)	1	1
Intense Hurricane Days (IHD) (1.2)	1.5	3.75
Net Tropical Cyclone Activity (NTC) (26.4)	32	34

Our August 2007 forecast successfully predicted a slightly above-average month for NTC. We have now correctly predicted above- or below-average August NTC in six out of eight years.

## **1 Introduction**

Our Colorado State University research project has shown that a sizable portion of the year-to-year variability of Atlantic tropical cyclone (TC) activity can be hindcast with skill significantly exceeding climatology. These forecasts are based on a statistical methodology derived from 55 years of past global reanalysis data and a separate study of prior analog years which have had similar global atmospheric and oceanic precursor circulation features. Qualitative adjustments are added to accommodate additional processes which may not be explicitly represented by our statistical analyses. We believe that seasonal forecasts must be based on methods showing significant hindcast skill in application to long periods of prior seasonal and monthly data.

## **2 Predictions of Individual Monthly Atlantic TC Activity**

A new aspect of our climate research is the development of TC activity predictions for individual months. There are often monthly periods within active and inactive Atlantic basin hurricane seasons which do not conform to the overall season. For example, 1961 was an active hurricane season (NTC of 222), but there was no TC activity during August; 1995 had 19 named storms, but only one named storm developed during a 30-day period during the peak of the hurricane season between 29 August and 27 September. By contrast, the inactive season of 1941 had only six named storms (average 9.3), but four of them developed during September. During the inactive 1968 hurricane season, three of the eight named storms that formed that year did so during June (June average is 0.5).

We have conducted new research to see how well various sub-season or individual monthly trends of TC activity can be forecast. This effort has recently been documented in papers by Blake and Gray (2004) for August and Klotzbach and Gray (2003) for September. We have shown moderate skill with our final qualitative adjustments to our monthly forecasts; however, our statistical forecasts have not shown skill in real-time forecasting. We believe this is due to the schemes being considerably over-fit to the data. Because of this, we are currently in the process of redesigning our monthly statistical forecasts. Therefore, our monthly forecasts for this year are based on a combination of some new research material that we are gathering along with qualitative reasoning.

### **2.1 Seasonal Update through August 2007**

Through August, the 2007 hurricane season has had 40 percent of the NTC activity of the average hurricane season. June-July 2007 had approximately average activity while August has had slightly above-average activity. As of 1 September, 5 named storms, 1 hurricane and 1 major (Cat. 3-4-5) hurricane have developed. Through August, the climatological (1950-2000) average number of named storms, hurricanes and major hurricanes is 4.2, 2.4, and 0.7, respectively. Through August of 2007, the Atlantic

basin has witnessed 119, 42, and 143 percent of average named storm, hurricane, and major hurricane activity, respectively.

## 2.2 September Forecast

Climatologically, September is the most active month of the hurricane season. Through August, we have observed weaker-than-normal trade winds and lower-than-normal sea level pressures in the tropical Atlantic. These conditions tend to persist from month-to-month, and therefore we expect to see fairly weak trade winds and lower-than-normal sea level pressures in the tropical Atlantic during September as well. When trade winds are weaker than normal, we typically observe a warming of SSTs due to less upwelling and mixing. Even if SST values are only near normal, it is typically found that near-normal SSTs combined with weak trade winds and low sea level pressures lead to active Septembers. Table 1 gives our prediction for September 2007. We are forecasting an active month for September. We have kept our September monthly forecast the same as was predicted in early August.

Table 1: September-only prediction of 2007 hurricane activity. September climatology is shown in parentheses.

Parameter	Forecast
NS (3.4)	5
NSD (21.7)	35
H (2.4)	4
HD (12.3)	20
IH (1.3)	2
IHD (3.0)	6.5
ACE (47.6)	75
NTC (48.0)	80

## 2.3 October-November Forecast

Typically, the end of the Atlantic basin hurricane season is governed by rising values of vertical wind shear. We continue to expect either cool neutral or weak La Niña conditions through this fall. Cool ENSO conditions tend to reduce levels of vertical wind shear in the tropical Atlantic, and therefore, the end of the Atlantic basin hurricane will likely be extended this year. We are forecasting a very active October-November compared with climatology (Table 2). We have kept our October-November monthly forecast the same as was predicted in early August.

Table 2: October-November prediction of 2007 hurricane activity. October-November climatology is shown in parentheses.

Parameter	Forecast
NS (2.2)	5
NSD (11.5)	24.75
H (1.4)	2
HD (5.2)	9
IH (0.4)	1
IHD (0.9)	2
ACE (16.7)	37
NTC (22.0)	42

## 2.4 Seasonal and Monthly Prediction Summary

Table 3 displays a summary of this year’s hurricane activity through August and our projection for the rest of the season. We expect activity to be well above-average for the remainder of the hurricane season.

Table 3: Summary of hurricane activity through August 2007 and projected hurricane activity for the remainder of the year

Tropical Cyclone Parameters and 1950-2000 Full Season Climatology (in parentheses)	Observed TC Activity through August	Updated Sept. Forecast	Updated Oct.-Nov. Forecast	Updated Full Season Forecast
Named Storms (NS) (9.6)	5	5	5	15
Named Storm Days (NSD) (49.1)	12	35	24.75	71.75
Hurricanes (H) (5.9)	1	4	2	7
Hurricane Days (HD) (24.5)	6.50	20	9	35.50
Intense Hurricanes (IH) (2.3)	1	2	1	4
Intense Hurricane Days (IHD) (5.0)	3.75	6.5	2	12.25
Accumulated Cyclone Energy (ACE) (96.2)	36	75	37	148
Net Tropical Cyclone Activity (NTC) (100)	40	80	42	162

## 3 Discussion

### 3.1 June-July Discussion

June-July 2007 had about average activity with two named storms forming during the two-month period (Barry and Chantal). The long-period average from 1950-2000 is approximately 1.5 named storm formations and 0.6 hurricane formations. We did not see any activity in the deep tropics during June and July 2007.

### 3.2 August Discussion

August 2007 had a slightly below average number of named storm and hurricane formations. However, the one hurricane that did form (Dean) reached Category 5 status and lasted for 3.75 days as a major hurricane. This is the most days that a single major hurricane has accrued during the month of August since 2004 (Frances). When investigating an aggregate measure such as ACE or NTC, August 2007 had slightly above-average activity.

From a large-scale perspective, atmospheric and oceanic conditions provided a mixed bag for the tropical Atlantic. Sea level pressures were quite low (Figure 1). Typically, low sea level pressures lead to active Atlantic basin hurricane seasons through an implied increase in instability and weaker-than-normal trades. August sea level pressures across the tropical Atlantic were estimated to be at their fifth lowest values since 1948. The only lower years were 1955, 1995, 1950 and 1958. All four of those years were very active hurricane seasons.

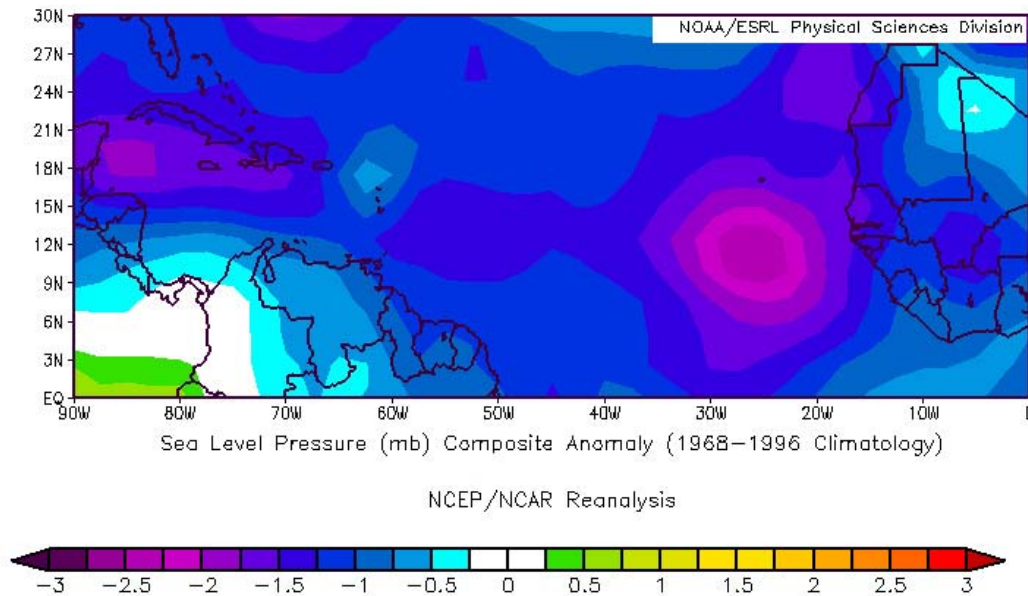


Figure 1: Tropical Atlantic sea level pressure anomalies during August.

Vertical wind shear values across the tropical Atlantic have been slightly above average for the month. Low-level trade winds have been weaker than normal, while upper-level westerlies have been stronger than normal. We think that we will see a transition to easterly upper-level wind anomalies across the tropical Atlantic during the latter portion of the season as the cool ENSO conditions in the eastern and central tropical Pacific continue to establish themselves.

Low- and mid-level moisture values have also been near the long-period average. Atlantic sea surface temperature values remain near average as well. Figure 2 displays the SST anomaly pattern that has been observed across the tropical Atlantic in August.

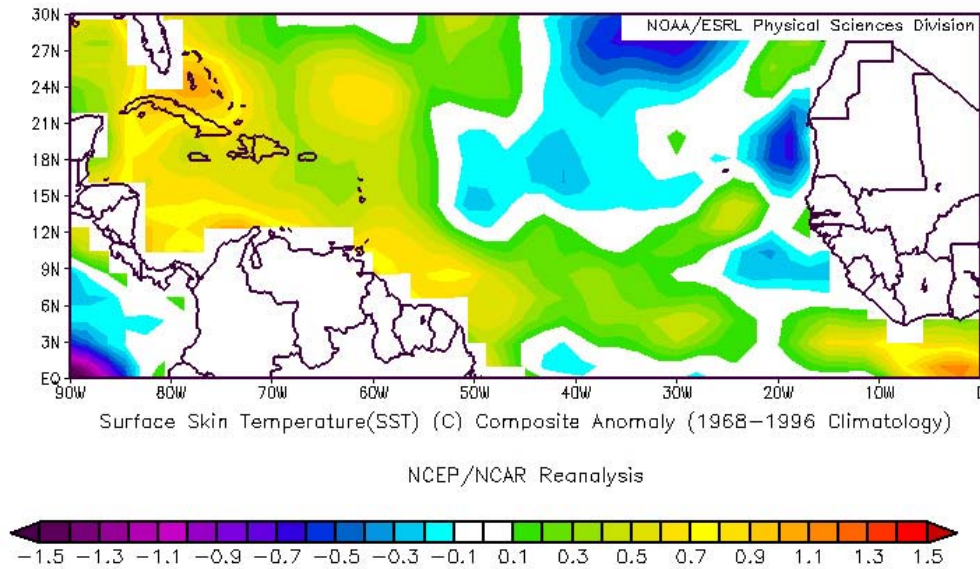


Figure 2: Tropical Atlantic sea surface temperature anomalies during August.

#### 4 Forecast Theory and Cautionary Note

Our forecasts are based on the premise that those global oceanic and atmospheric conditions which preceded comparatively active or inactive hurricane seasons in the past provide meaningful information about similar trends in future seasons. It is important that the reader appreciate that these seasonal forecasts are based on statistical schemes which, owing to their intrinsically probabilistic nature, will fail in some years. Moreover, these forecasts do not specifically predict where within the Atlantic basin these storms will strike. The probability of landfall for any one location along the coast is very low and reflects the fact that, in any one season, most U.S. coastal areas will not feel the effects of a hurricane no matter how active the individual season is. However, it must also be emphasized that a low landfall probability does not insure that hurricanes will not come ashore. Regardless of how active the 2007 hurricane season is, a finite probability always exists that one or more hurricanes may strike along the U.S. coastline or in the Caribbean Basin and do much damage.

#### 5 Forthcoming Updated Forecasts of 2007 Hurricane Activity

We will be issuing a final update to our 2007 Atlantic basin hurricane forecast on **Tuesday 2 October 2007**. In this update, we will issue a final prediction for October-November Atlantic basin tropical cyclone activity. A verification and discussion of all 2007 forecasts will be issued in late November 2007. Our first seasonal hurricane

forecast for the 2008 hurricane season will be issued in early December 2007. All of these forecasts will be available on the web at: <http://hurricane.atmos.colostate.edu/>.