Second Quarter 2008

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CAT 360

Catastrophe Risk from Every Perspective

Welcome to the first issue of *CAT 360*. This quarterly newsletter will feature articles developed by our Research and Development Team and will cover topics that relate to Catastrophe Modeling, Natural Perils and Information Technology on a global basis. While many "Catastrophe" topics published today focus on the perils in the U.S., our mission is to provide our readers with information for perils on a worldwide basis, ranging from Australian Flooding to Chilean Earthquake. Please feel free to contact the editors if you have any questions or comments regarding any of our publications.

Ed.

The 2008 Atlantic Hurricane Season Forecasts
A Credible Crystal Ball?

Ever since Hurricane Andrew devastated Florida in 1992, the annual Atlantic Hurricane season forecast has always stirred interest in the coastal communities in the United States. But how accurate are these forecasts and what are the factors that influence them? This article will answer those questions with a behind the scenes discussion of the organizations that develop these forecasts along with an update to the 2008 Atlantic Hurricane Season forecast.

Forecast Highlights

- The three major institutes: The National Oceanic and Atmospheric Administration (NOAA), Tropical Storm Risk (TSR), and Colorado State University (CSU) have released their long-term forecast for the upcoming hurricane season. All three forecasts suggest that 2008 will be slightly to moderately above the long term average and close to the mid-term average since 1995**.**
- Current conditions suggest a continued weakening of La Niña through June, and a possible transition to an ENSO neutral state in June-July 2008. This is consistent with dynamic and statistic model forecasts. La Niña years are associated with above normal hurricane activity.
- According to the UK Met Office, sea surface temperatures (SSTs) in the Tropical Atlantic will be close to average in the summer. This is consistent with NOAA's Coupled Forecast System (CFS) model which predicts close to average or slightly above average SSTs in the peak hurricane months.

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Discussion

Table 1 summarizes the forecast from the previously mentioned three institutes. Consistency of these forecasts does not guarantee an accurate forecast will occur, as evidenced in the 2006 and 2007 hurricane seasons. Model forecasting skill needs to be considered when interpreting any forecast. A forecast with marginal accuracy may be no better than using the average or using a pure guess.

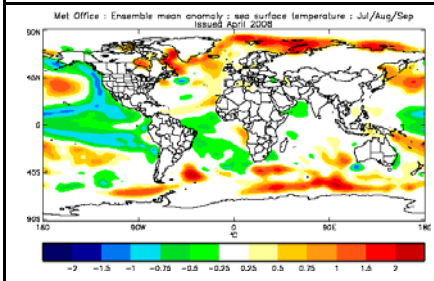
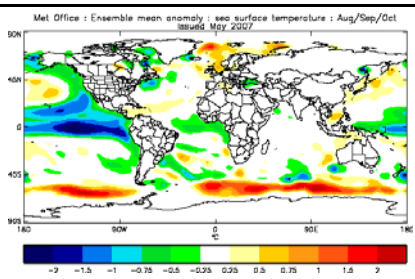
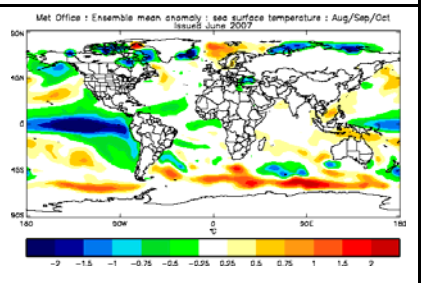
	Climatology Average	NOAA	CSU	TSR
Named Storms	10	12 -16	15	14.8
Hurricanes	6	6 - 9	8	7.8
Major Hurricanes	2.7	2 - 5	4	3.5

Table 1 - Forecast for the 2008 Atlantic Hurricane Season

The forecast scheme at TSR has not changed from prior years. It continues to use forecasted trade winds and sea surface temperatures. The trade wind attribute is highly correlated with the current ENSO condition and is therefore reflected in their forecast. CSU changed its forecast scheme for the 2007 season, and has once again changed it for 2008. Its methodology now uses data from 1950 to 2007 in developing a linear regression. Because it is newly implemented, a testing period is not available to verify this new method.

Last year, the UK Met office drew much attention when it predicted a normal to below normal hurricane season. This was in contrast to the other institutes which predicted an above normal hurricane season for 2007. One major difference is that the UK Met office uses a dynamic ocean model to forecast the SSTs in the summer months. By June of 2007, the dynamic model suggested below average SSTs for the summer months, which was a driving factor for its below normal forecast. This turned out to be the most accurate forecast of the actual season.

UK Met Office Summer SST Outlook (Source: UK Met Office)
2008 in Comparison with the Summer of 2007

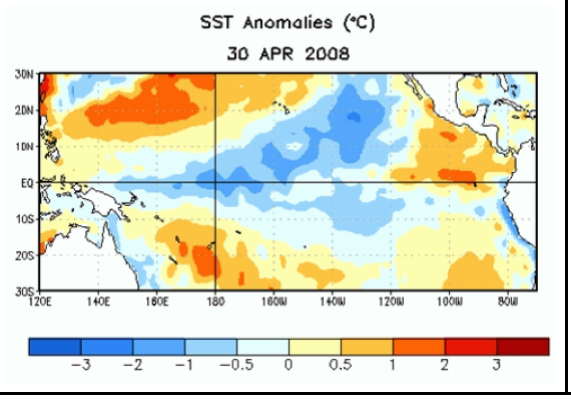
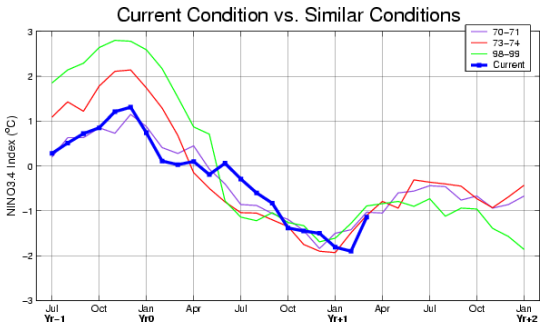
April 2008	May 2007	June 2007
		

The figures above are the UK Met Office's SST forecasts at different times. As of April 2008, the SST in the Tropical Atlantic is expected to be close to average. You can see that compared to May 2007, June 2007 was cooler (areas of green in the Caribbean). Generally speaking, forecasts with a shorter lead time are more credible and in this case, it did make a significant difference. Unlike the other three institutes which release their forecasts in May, the UK Met Office's forecast will not be available until mid-June.

By comparison, the NOAA CFS model is used to develop mid to long term forecasts. This model has been shown to have reasonable forecast accuracy with a three-month lead time for certain parameters. The three-month average SST anomalies are in the range of 0 to 0.5°C. On average, the SST anomalies are about 0.1°C. However, hurricane genesis and intensification are not solely decided by the SST. Low vertical shear accompanying a La Niña event creates a favorable environment for intensification. The correlation skill of the CFS model forecast in the Tropical Atlantic using this lead time is about 0.3 - 0.4. The forecast is more reliable when using a lead time of 1 - 2 months and can increase to 0.8 in the tropics. Interestingly, the CFS model also predicts the dissipation of the current La Niña condition by June and even a shift to above normal SSTs in the Nino 3.4 region (the Pacific off the West South American Coast) in the summer. In contrast, the UK Met Office predicts a longer La Niña event.

The ENSO predictability model is not as accurate in the early part of the year compared to the summer months since the ENSO indicators tend to change sign in the spring. This is commonly known as the spring barrier. Nevertheless, the spread of model results and the similar historical years suggests that a neutral ENSO is very likely this summer. The correlation accuracy with a three month lead forecast is above 0.85.

The Bermuda High is also an important factor in deciding the track of hurricanes. Last year a southerly positioned Bermuda High directed the storms in the Caribbean and Mexico. As a result, the US mainland escaped major hurricane landfalls. In contrast, the position of the 2004 Bermuda High caused three hurricanes (Charley, Frances and Jeanne) to hit a similar region in Florida. The position of the Bermuda High is correlated with the strength of the Northern Atlantic Oscillation (NAO). Negative NAO conditions tend to lead to more US landfalling storms. Unfortunately, forecasting the summer NAO is challenging, with a forecast beyond two weeks considered to be unreliable.

Observed weekly SST anomalies with respected to 1971-2000. (Source: NOAA CPC)	Current ENSO condition in comparison with similar years in the past. (Source: IRI) Index value persistently less than -0.5 indicates La Niña, while index value persistently greater than +0.5 indicates El Niño.
	

While science has made great advancements in understanding the conditions that effect the formation of hurricanes, forecasting the upcoming hurricane season is still as much art as it is science. Information provided by these organizations are state of the art and highly valuable in preparing the public for severe hurricane events. Whether the hurricane forecasts are accurate or completely wrong, the scientific community will continue to gain invaluable knowledge with the completion of every hurricane season and apply what they learn for years down the road.