

TSR Pre-Season Forecast for 2013 Atlantic Hurricane Activity (Less Technical Version)

As we approach the start of the 2013 North Atlantic hurricane season (period 1st June to 30th November), Tropical Storm Risk (TSR) issues its pre-season hurricane forecast. The main TSR forecast document is available at www.tropicalstormrisk.com/docs/TSRATLPreSeason2013.pdf. This document is less technical and provides a forecast summary followed by a discussion of the science behind the forecast and the remaining uncertainties. The document is issued to inform industry, government and the public about the likelihood of a stormy season.

At present, the main climate indicators point to the 2013 hurricane season being active with overall activity about 30% above the long-term (1950-2012) norm but 10% below the recent 10-year (2003-2012) norm. This would equate to hurricane activity levels similar to those witnessed in 2012 and 2011. Although the TSR pre-season hurricane forecasts have performed well in recent years, uncertainties remain, especially for U.S. landfalling activity in 2013.

For the Atlantic basin, the pre-season outlook forecasts:

- A 57% probability of an above-normal Atlantic hurricane season, an 30% probability of a near-normal season and only a 13% chance of a below-normal season.
- 15 tropical storms including eight hurricanes and three intense hurricanes. This compares to long-term norms of 11, six and three respectively.

For U.S. landfalling activity the outlook calls for:

- A 63% probability of above-normal U.S. landfalling hurricane activity, a 21% likelihood of a near-normal season and only a 16% chance of a below-normal season.
- Four tropical storm strikes on the U.S., including two hurricanes. This compares to long-term norms of three and 1.5 respectively.

The pre-season outlook also predicts two tropical storm strikes on the Caribbean Lesser Antilles, of which one is expected to be a hurricane.

The Science Behind the Forecast

Three main climate factors will determine the level of hurricane activity in the Atlantic basin. Occurring in August and September, these are the speed of the trade winds over the tropical North Atlantic, the sea temperatures in the tropical North Atlantic where hurricanes form, and the sign and strength of El Niño Southern Oscillation. U.S. landfalling hurricane activity is influenced by the level of hurricane activity occurring at sea, the pre-season North Atlantic Oscillation, and by the July tropospheric winds over the North Atlantic and the U.S.. In more depth, the influencing climate factors are:

1. The speed of the trade winds which blow westward across the tropical Atlantic and Caribbean Sea in August and September. These winds influence both the spinning up of storms (vorticity) and the level of vertical wind shear which either helps or hinders a vertically-stable hurricane being sustained. Our expectation is that the trade winds will be slightly weaker than normal in 2013 due to the expected anomalous zonal (east-west) gradient in sea surface temperature between the East Pacific and the Caribbean Sea/tropical North Atlantic. Weaker trade winds are enhancing for hurricane activity.
2. The temperature of the sea waters between west Africa and the Caribbean where many hurricanes develop during August and September. These waters provide heat and moisture to help power the development of storms within the hurricane main development region. The April-May 2013 sea temperature in this region is about 0.5°C warmer than norm. If this warm anomaly persisted to August-September it would favour an active hurricane season. We expect a slight cooling of this warm anomaly by August but still anticipate this factor to have an enhancing effect on hurricane activity in 2013.

3. The strength of El Niño Southern Oscillation (ENSO) climate conditions in the tropical east Pacific during August-September. ENSO influences Atlantic hurricane activity through its remote effect on atmospheric circulation and vertical wind shear over the North Atlantic. ENSO outlooks expect a continuation of the current neutral-ENSO to weak La Niña (lower sea surface temperatures) conditions through August and September 2013. U.S. hurricane landfalls are twice as likely during La Niña conditions than El Niño. Thus ENSO is likely to be weakly enhancing for Atlantic and U.S. landfalling hurricane activity in 2013.
4. The sign and strength of the pre-season North Atlantic Oscillation (NAO). Statistical studies show the sign of the early summer (May-June) NAO is linked to the strength of the upcoming U.S. landfalling hurricane season. When the NAO is positive the Azores high pressure is stronger and hurricanes tend to recurve out at sea before U.S. landfall. In contrast, a negative NAO implies the Bermuda high pressure is stronger with storms more likely to be steered towards U.S. landfall. However, the merit of the NAO predictor has weakened in recent years. Over the past two months the NAO has been of mixed sign. At present it is unclear what its average will be for May-June and what its influence will be on 2013 U.S. landfalling hurricane activity.
5. July tropospheric wind anomalies between heights of 750 meters and 7,000 meters over North America, the East Pacific and the North Atlantic. These wind anomalies, which cannot be assessed until late July, are a good predictor of the strength of U.S. landfalling hurricane activity and insured loss. They act to steer evolving hurricanes either towards or away from U.S. shores during August and September.

Despite the expectation for a moderately active hurricane season, sources of uncertainty remain. In particular there is uncertainty in how warm the tropical North Atlantic ocean will be in August-September. There is also uncertainty in the forecast ENSO conditions for August-September. Furthermore variance exists in the level of hurricane activity possible from the same August-September climate factors and, as seen in recent years, even larger variance occurs in the level of U.S. landfalling hurricane activity possible from the same basin activity. However, we are overdue U.S. hurricane and, in particular, U.S. major hurricane strikes. Since hurricane Wilma in 2005 no major hurricane and only six hurricanes have struck the U.S.. This represents a shortfall of four major hurricanes. Not since the 1860s have more than 7 years passed without a U.S. major hurricane strike.

TSR will closely monitor the key climate factors and their uncertainty as the main hurricane season approaches, and will incorporate new information into updated outlooks.

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About TSR

Tropical Storm Risk (TSR) offers world-leading products for mapping and predicting the windfields of active tropical cyclones worldwide in real-time. Led by Professor Mark Saunders, TSR is affiliated to University College London (UCL) and co-sponsored by Aon Benfield and Crawford & Company. TSR's products help re/insurers elucidate the potential upcoming and immediate post-event impact of damaging storms on their portfolios. Seasonal outlooks to benefit risk awareness and decision making are also available. TSR is part of Aon Benfield Research's academic and industry collaboration.