

# TSR Pre-Season Forecast for 2014 Atlantic Hurricane Activity (Less Technical Version)

As we approach the start of the 2014 North Atlantic hurricane season (period 1<sup>st</sup> June to 30<sup>th</sup> November), Tropical Storm Risk (TSR) issues its pre-season hurricane forecast. The main TSR forecast document is available at [www.tropicalstormrisk.com/docs/TSRATLPreSeason2014.pdf](http://www.tropicalstormrisk.com/docs/TSRATLPreSeason2014.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.

The main climate indicators point to the 2014 hurricane season being relatively quiet overall with activity about 30% below the long-term (1950-2012) norm and 45% below the recent 10-year (2004-2013) norm. This would equate to hurricane activity levels similar to those witnessed in 2002, 2006 and 2007. If verified, it would make the two-year period 2013-2014 the quietest for hurricane activity since 1993-1994. Although the TSR pre-season hurricane forecasts have performed well in recent years (excepting 2013), uncertainties remain, especially for U.S. landfalling activity in 2014.

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

- A 48% probability of a below-normal Atlantic hurricane season, a 33% probability of a near-normal season and only a 19% chance of an above-normal season.
- 12 tropical storms including five hurricanes and two intense hurricanes. This compares to long-term norms of 11, six and three respectively.

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

- A 37% probability of below-normal U.S. landfalling hurricane activity, a 27% likelihood of a near-normal season and a 36% chance of an above-normal season.
- Three tropical storm strikes on the U.S., including one hurricane. The long-term norms are 3.1 and 1.5 respectively.

The pre-season outlook also predicts one tropical storm strike on the Caribbean Lesser Antilles.

## The Science Behind the Forecast

Four main climate factors determine the level of hurricane activity in the North Atlantic basin. Three occur in August and September: 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 (ENSO). A fourth occurs in April-May-June and is relevant when ENSO is neutral: the sign and strength of the North Atlantic Oscillation. U.S. landfalling hurricane activity is influenced by the level of hurricane activity occurring at sea 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 stronger than normal in 2014 due to the expected anomalous westward gradient in sea surface temperature at latitudes of 5°-20°N between the Caribbean Sea/tropical North Atlantic and the East Pacific. Stronger trade winds are suppressing for North Atlantic 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 2014 sea temperature in this region is 0.35°C cooler than the 1981-2010 norm. If this cool anomaly persisted to August-September it would favour a quiet hurricane season. We expect a slight warming of this cool anomaly by August but still anticipate this factor to have a suppressing effect on hurricane activity in 2014.

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. Most forecasts anticipate the occurrence of a moderate El Niño event (to 70% likelihood) during the northern hemisphere summer and autumn of 2014, this likely being the strongest El Niño since 2002. The occurrence of El Niño will increase vertical wind shear and suppress Atlantic and U.S. landfalling hurricane activity in 2014. U.S. hurricane landfalls are historically half as likely during El Niño conditions than during La Niña.
4. The sign and strength of the pre-season North Atlantic Oscillation (NAO). Statistical studies show the sign of the late spring (April-May-June) NAO is linked to the level of upcoming North Atlantic hurricane activity. This factor is significant when ENSO is neutral in July-August-September and when the April-May-June NAO is in its upper or lower tercile. Over the past two months the NAO has been of mixed sign and a moderate El Niño is anticipated for July-August-September 2014. Thus this factor is not expected to be important for the 2014 Atlantic hurricane season.
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 of a quiet 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 even larger variance can occur 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 seven hurricanes have struck the U.S.. This represents a shortfall of five major hurricane strikes. Never have more than eight consecutive years passed without a U.S. major hurricane strike (from records commencing in 1851).

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 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.