TSR Pre-Season Forecast for 2010 Atlantic Hurricane Activity

As we approach the start of the 2010 Atlantic hurricane season, Tropical Storm Risk (TSR) issues its pre-season hurricane forecast. The forecast includes discussion of the underpinning climate factors and the remaining uncertainties. The report is issued to inform the (re)insurance community and help preparations for a potentially stormy season.

At present every main indicator points to hurricane activity being well-above norm in 2010. TSR predicts that Atlantic basin – including the North Atlantic, the Caribbean Sea and the Gulf of Mexico – and United States (U.S.) landfalling hurricane activity in 2010 will be 55% above the long-term (1950-2009) norm. This above-norm level is expected to be even higher if La Niña (lower than norm sea surface temperatures in the tropical Pacific) develops during the second half of 2010. Even now there is a high likelihood that basin and U.S. landfalling hurricane activity in 2010 will be in the top third of years historically.

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

- A 77% probability of an above-normal Atlantic hurricane season, an 18% probability of a near-normal season and only a 5% chance of a below-normal season.
- 16 tropical storms including eight hurricanes and four intense hurricanes. This compares to long-term norms of 10, six and three respectively.

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

- A 74% probability of above-normal U.S. landfalling hurricane activity, a 19% likelihood of a near-normal season and only a 7% chance of a below-normal season.
- Five 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 trade winds over the tropical North Atlantic, sea temperatures in the tropical North Atlantic, 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 July tropospheric winds over the North Atlantic and U.S.. In more depth, the influencing climate factors are:

1. **The speed of 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. These winds have recently been weaker than normal; an anomaly which if persisted to August-September would translate to an active hurricane season.

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 2010 sea temperature in this region was the warmest on record (+1.5°C); if this warm anomaly persisted to August-September it would favour an active hurricane season.

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. Current outlooks expect neutral ENSO conditions by June 2010 with the growing possibility of a transition to La Niña (lower sea surface temperatures) by the late summer or early autumn. U.S. hurricane landfalls are twice as likely during La Niña conditions than El Niño. Thus ENSO is likely to be either neutral or enhancing for Atlantic and U.S. landfalling hurricane activity in 2010.

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 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 a Bermuda high pressure that is more likely to steer storms towards U.S. landfall. The NAO has been negative persistently from December 2009. If this negative NAO persists through May into June 2010 it will further support the likelihood of an active U.S. 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.

TSR's latest forecast of an active season for the Atlantic and Caribbean basins further builds on its previous forecasts of an active 2010 Atlantic hurricane season. TSR's pre-season outlooks correctly anticipated the active 2004, 2005 and 2008 hurricane seasons and the quiet 2009 season. 2004's hurricanes barraged Florida, 2005's hurricanes Katrina, Rita and Wilma slammed the Louisiana, Mississippi, Alabama and Florida coastlines, and 2008's hurricane Ike affected the major Texas coastal cities of Galveston and Houston. With an active season forecast for 2010, US coastal exposures may be at higher risk of experiencing hurricane damage.

Despite the high confidence in an active hurricane season, sources of uncertainty remain. Of note, there is currently a range of about 1.0°C in model projections for ENSO conditions in August-September. Also variance exists in the level of hurricane activity possible from the same August-September climate factors. Scientists will closely monitor the key climate factors and their uncertainty as the main hurricane season approaches, and will incorporate new information into updated outlooks.

Although uncertainty remains within hurricane forecasts, the industry is increasingly informed by this data source when considering how best to manage their exposure to this risk.

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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, RSA 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.