2013 Atlantic Hurricane Season Outlook: June 21, 2013

Introductory comments
This seasonal forecast briefing is the second in a series to be released as new information becomes available. In this document, we provide an update of how the season appears to be shaping up and the potential industry impacts. We anticipate a third briefing in early August as the season gets into full swing.

Current situation
The 2013 Atlantic hurricane season got off to another early start with tropical storm Andrea making landfall in the Big Bend region of Florida. Andrea produced tornadoes in coastal regions of Florida that destroyed a few homes. A moderate storm surge mostly less than 4.5 feet caused only minor localized flooding, but widespread heavy rainfall all the way up the U.S. East Coast triggered flash flood warnings. The early start to this season has extended a run of early starts in recent years with some questioning whether the North Atlantic hurricane season is becoming longer. These early storms nearly always form close to the U.S. coast (e.g. Tropical Storms Alberto and Beryl in 2012) and therefore have a high chance of making landfall. It remains to be seen whether this trend will continue.

The major climate signals continue to point to a highly active season. However, an active year in the North Atlantic does not necessarily correspond to a high number of U.S. landfalls as we have seen over the past 3 years (Done et al. 2012). Despite this low confidence in U.S. landfall probability forecasts, some centers do issue them and are calling for higher than usual landfall probability.

Forecasts
The major centers are again unanimous in forecasting above average activity (Table 1). Reflecting the continued forecast for neutral El Niño Southern Oscillation (ENSO) conditions, the Colorado State University (CSU) forecast remains unchanged across all hurricane Saffir-Simpson intensity categories. CSU also continues to predict increased likelihood of U.S. landfall along the entire hurricane-prone coast. However, we continue to caution that their landfall forecast is based on the long-term relationship between total basin activity and landfall numbers, and the past 3 years have been exceptions to this rule. As can often be the case with weather and climate, long-held statistical relationships can suddenly breakdown owing to changes in the causal relationships.

Tropical Storm Risk (TSR) nudged their forecast numbers of major hurricanes upwards based on enhanced spin in the atmosphere and warm ocean conditions. In agreement with CSU, TSR are also predicting slightly increased probabilities of U.S. landfalling tropical storms and hurricanes.

In summary, this latest round of forecasts is again in strong agreement for a highly active hurricane season. The fact that the different centers use different forecast methods and still come to a consensus view increases our confidence that we shall see an active season.

| Table 1: Summary of 2013 Atlantic Seasonal Hurricane Forecasts as of June 21, 2013 |
|---|---|---|---|---|
| Data Source                                  | Date Issued | # Named Storms (% of normal) | # Hurricanes (% of normal) | # Major Hurricanes (% of normal) | ACE (%) |
| 1981-2010 Median Value (Source CSU)          |              | 12.0                  | 6.5                       | 2.0                             | 92      |
| Average of 5 Analogue Years (Source CSU)     | June 3 2013  | 17.2 (143%)           | 9.0 (138%)                | 5.2 (280%)                      | 164 (178%) |
| Colorado State University                    | June 3 2013  | 18.0 (150%)           | 9.0 (138%)                | 4.0 (200%)                      | 165 (179%) |
| Florida State University                     | May 30 2013  | 15.0 (125%)           | 8.0 (123%)                | n/a                             | 135 (147%) |
| National Oceanic and Atmospheric Administration (NOAA) | May 23 2013 | 13 - 20 (108% - 167%) | 7 - 11 (108% - 169%)      | 3 - 6 (150% - 300%)             | 110 - 189 (120% - 205%) |
| NOAA/GFDL HyHyHuFS2                          | Mar 29 2013  | n/a                   | 8.4 (129%)                | n/a                             | n/a     |
| Tropical Storm Risk                          | June 4 2013  | 15.6 (130%)           | 7.7 (118%)                | 3.5 (175%)                      | 134 (146%) |
| UK Met Office                                | May 20 2013  | 14.0 (117%)           | 9.0 (138%)                | n/a                             | 130 (141%) |

1 Accumulated Cyclone Energy (ACE) is calculated as the sum of the square of the maximum wind speed in each 6-hour period during the life of a tropical cyclone from the time it reaches tropical storm strength (wind speeds ≥ 65 kmph (39 mph)) in units of 104; ACE = 10-4Σv²max, where v is measured in knots.
2 The NOAA/GFDL hybrid (statistical-dynamical) hurricane forecast system is not an official outlook. This is a research product on the continued verification and evaluation of an experimental forecast system. NOAA/GFDL make these experimental forecast results available in order to facilitate and motivate research and discussion on the topic of long-lead seasonal hurricane forecasts.
Analogue years and uncertainties

An alternative view to forecast models is provided by hurricane activity in past years that had similar pre-season climate conditions to this year. CSU uses this approach and has selected years based on similar conditions to the recent April–May period of neutral ENSO conditions and above average ocean temperatures. Average activity over their 5 analogue years of 1961, 1996, 2005, 2007 and 2011 (Table 1) indicates increased activity over the long-term (1981–2010), which is a significant increase from their previous set of analog years issued in April. This comes as no surprise because their set now includes the infamous 2005 season.

The forecasts issued in early June have enhanced skill compared to earlier forecasts, though all seasonal forecasts should be still read with caution. This skill arises largely from the increased confidence in the forecast of ENSO conditions that control a significant portion of the seasonal activity. Forecasts of landfall counts are limited due to the small number of events and the complex and highly sensitive interactions between storm formation, track and coastal orientation that result in landfall.

Climate signals

The waters of the tropical Atlantic and Western Caribbean continue to be warmer than usual (Figure 1) though perhaps not as anomalously warm as they were in May. The formation and development of hurricanes is highly dependent on the available energy in the upper layers of the ocean. That’s why sea surface temperature (SST) is often used as a proxy for available energy as a major factor in determining seasonal activity. Given the tremendous inertia of the oceans, it is expected that these warmer waters will persist throughout the hurricane season and promote hurricane development.

Of course, SSTs are not the only factor controlling the seasonal activity. The orientation of the wind is also critical, and to examine this we need to look at the El Niño Southern Oscillation (ENSO). The latest ensemble ENSO forecast is for neutral conditions to persist throughout the hurricane season (Figure 2), although a few forecasts predict a slide towards weak La Niña conditions. The strong and unfavorable winds associated with El Niño are therefore likely to be absent this year, supportive of an active season.

Expected Damage

Kinetic Analysis Corporation (http://www.kinanco.com/) provides a unique assessment of how the expected seasonal hurricane activity translates into probable physical damages relative to normal years. Based on the high numbers of expected storms and their paths, Kinetic forecasts a higher than average potential for large physical damage values. Specifically, they forecast a 25% chance of a storm causing $25 Billion or more in physical damages in the U.S. compared to the long-term average probability of just 15% for this level of loss (Table 2).

In generating these loss forecasts, Kinetic Analysis Corporation uses a powerful approach of combining global climate models, weather models and impact models to estimate damages and losses for the season. To address uncertainties in understanding the climate states at the beginning of the season, and any single forecast, they use actual climate conditions from March and April to generate 120 forecasts to provide a more robust estimate. Physical damage estimates generated from these 2013 forecast scenarios were then compared with annual average damage levels derived from Kinetic Analysis’ long-term hazard and damage risk analysis.

In additional to this broad-scale impact estimate, they are also able to apply their analysis results to individual portfolios to estimate the potential impacts on portfolio specific exposures.

### Table 2: Kinetic Analysis Corp. Estimates

<table>
<thead>
<tr>
<th>Average Damages</th>
<th>25% Chance Damages will be less than:</th>
<th>25% Chance Damages will be more than:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average year</td>
<td>$12 Billion USD</td>
<td>$0.6 Billion USD</td>
</tr>
<tr>
<td>2013 forecast</td>
<td>$18 Billion USD</td>
<td>$1.5 Billion USD</td>
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Figure 2: Ensemble ENSO forecast using 17 dynamical models and 8 statistical models. Values within ±0.5 indicate neutral ENSO conditions. The envelope of forecasts remains mostly within 0.5, which indicates either neutral ENSO conditions throughout 2013, or weak negative (La Niña) conditions. (Source: International Research Institute for Climate and Society)
Summary

All the major forecast centers continue to predict above-average hurricane activity for 2013, reflecting continued warm ocean temperatures and continuing neutral ENSO conditions. This consensus view using multiple forecast techniques brings higher than normal confidence in the forecasts. Given the overall climate state discussed above, we concur that an active hurricane season is likely.

U.S. landfall probability estimates also remain elevated, though caution should be exercised due to the recent run of years with high basin-wide activity yet low numbers of U.S. landfalling hurricanes.

The powerful and unique assessment of probable physical damage estimates provided by Kinetic Analysis Corporation is for above normal damage potential.

Next briefing and additional advice

This briefing will be updated in early August as the hurricane season gets into full swing. We shall report on the final series of hurricane forecasts from the major forecast centers in addition to summarizing the activity to date.

The Willis Re Analytics Team will report on all tropical storms and hurricanes in the North Atlantic and the Gulf of Mexico. This includes briefings and updates to our clients during hurricane events. These will contain the latest information from the National Hurricane Center, commentary on likely tracks and intensities and, as available, updates and modeling guidance from the catastrophe modeling companies.

In addition, the National Center for Atmospheric Research (NCAR), a member of the Willis Research Network (WRN), will run real-time hurricane forecasts using a state-of-the-art research and forecasting system. The forecast track, intensity and wind fields on 4km resolution will be made available to Willis Re clients in real-time via SpatialKey.

References


Sauders, M., and A. Lea: “June Forecast Update for Atlantic Hurricane Activity in 2013”, 4 June 2013, Department of Space and Climate Physics, University College London, London, UK