

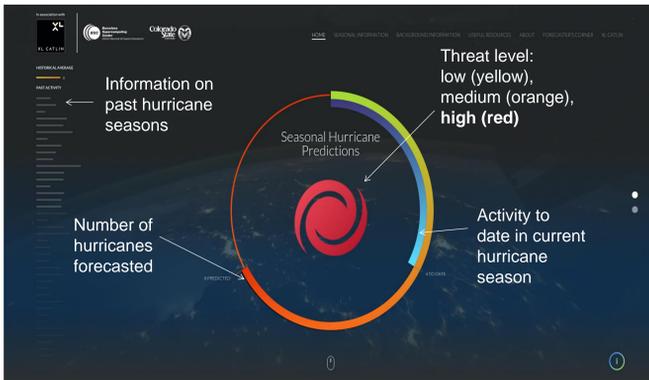
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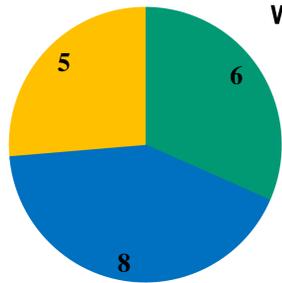
Introduction

Seasonal hurricane forecasts are produced ahead of each hurricane season by a range of different groups, from national meteorological services to academic groups to private weather forecasting companies. While these forecasts are generally made freely available by the groups who produce them (usually on their organization's website), there was, until recently, no website centralizing these predictions. This made gathering that information time consuming (if one was aware of all of the given forecasts in the first place) and made ensemble operations and comparisons between different forecast agencies difficult. In that context, the Barcelona Supercomputing Center, Colorado State University and XL Catlin have collaborated to produce a platform offering the most up-to-date view of upcoming Atlantic hurricane activity.

[www.seasonalhurricanepredictions.org](http://www.seasonalhurricanepredictions.org) aggregates all freely available seasonal forecasts of Atlantic hurricane activity ahead of the hurricane season and displays them on a user-friendly platform. The site offers ensemble forecasts of named storms, hurricane and major hurricane numbers as well as accumulated cyclone energy (ACE) as soon as the first predictions are produced in March and is updated throughout the season as more forecasts become available. The website also supplies supporting information on the forecasts themselves and their performance at the end of the season, but also more broadly on seasonal forecasting and hurricane activity.



Who is participating?



- Universities
- Private
- Government

Governmental Agencies

- NOAA
- Insmet
- Mexican National Meteorological Service
- Met Office
- NMME

Universities

- Coastal Carolina University
- Colorado State University
- North Carolina State University
- Penn State University
- University of Arizona
- University of Colorado

Private entities

- AccuWeather
- MDA Weather Services
- StormGeo
- Tropical Storm Risk
- WeatherBell Analytics
- The Weather Company
- Weather Tiger
- Wilkins Weather Technologies

What else is provided?

- Background information
  - Seasonal forecasting
  - Factors modulating Atlantic hurricane variability
  - Descriptions of the different methodologies
- All if the data in .csv format
- Links to useful resources
  - Current hurricane activity
  - General atmospheric and oceanic conditions
  - Satellite imagery
  - General interests blogs
- Short summary in pdf format

2016 Season

The 2016 Atlantic hurricane season was generally fairly quiet until late September, when long-lived major hurricane Matthew formed. Matthew was responsible for over 40% of all ACE generated during this season. 2016 was the 3rd year in a row where more ACE was generated in October than in September. On average, about three times as much ACE is generated in the Atlantic in September compared with October.

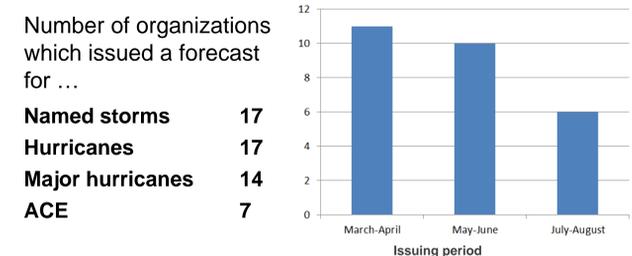
The 2016 Atlantic hurricane season was generally characterized by cool neutral El Niño-Southern Oscillation (ENSO) conditions. Contrary to the past two years, this season was characterized by below-average vertical wind shear when averaged from August-October across most of the tropical Atlantic. Slightly above-average vertical wind shear prevailed over the Caribbean. While the tropical Atlantic was somewhat warmer-than-normal, the mid-levels of the atmosphere were quite dry during this hurricane season. Dry mid-levels enhance downdrafts and suppress the deep convection necessary for supporting hurricanes.



The season was characterized by above-average hurricane activity with a total of 15 named storms, 7 hurricanes, 4 major hurricanes and an Accumulated Cyclone Energy of 141. The ensemble mean forecast called for 15 named storms (-), 8 hurricanes (+1), 3 major hurricanes (-1) and an ACE of 108 (-23%). For comparison, the 1981-2010 median values of these quantities are 12 named storms, 6.5 hurricanes, 2 major hurricanes and an ACE of 92.

The aggregate forecast was relatively successful, accurately predicting the total number of storms, but slightly overestimating the number of hurricanes while at the same time overestimating the number of major hurricanes and the ACE. It should be noted however that Otto was considered a major hurricane for just over 6 hours. The average forecast outperformed a forecast based on climatology.

|                  | Average forecast | Observed | Difference |
|------------------|------------------|----------|------------|
| Named storms     | 15               | 15       | -          |
| Hurricanes       | 8                | 7        | +1         |
| Major hurricanes | 3                | 4        | -1         |
| ACE              | 108              | 135      | -20%       |

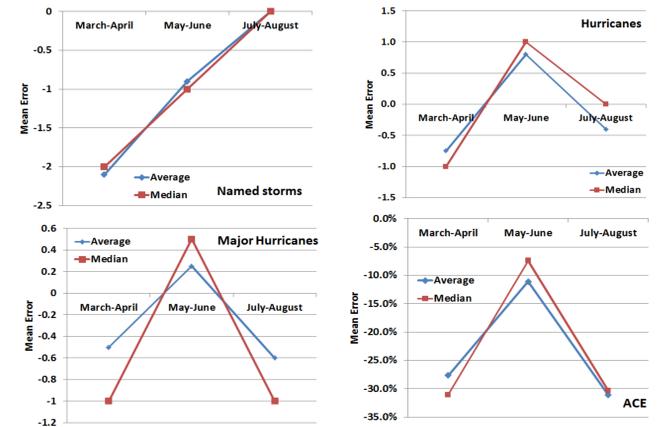


Change in forecast skill with lead time

The average values predicted by all groups issuing forecasts in March/April were 14 named storms, 7 hurricanes, 3 major hurricanes and an ACE of 107. These numbers increased in May/June to 14 named storms, 8 hurricanes, 3 major hurricanes and an ACE of 117. Predictions issued in July/August were generally lower than in the previous period, with 15 named storms, 7 hurricanes, 3 major hurricanes and an ACE of 97. The number of forecasts for each period was 10 for March-April, 10 for May-June and 6 for July-August. Since the number of forecasts and the composition of the ensemble changes for each 2 month period, it is difficult to determine exactly how the skill of the average forecast changed as a function of the forecast time.

2016 Season (continued)

The figure below shows the changes in the forecast error of an ensemble constructed using only the individual forecasts which were updated at least once during the months leading up to the hurricane season.



The tendency to increase the predictions for May-June (compared to March-April) and to revise the forecasts downward after the start of the season is clearly visible. And while one would generally expect an increase in skill with forecast time, except for forecasts of named storms, this is not observed in this case. That being said, forecasts of named storms and hurricanes produced in July-August performed better than those produced in March-April and May-June.

Predictions for 2017

The Atlantic hurricane season is underway, and over one dozen groups have submitted their initial forecasts for the 2017 season. Forecasts that have been submitted so far can be generally characterized as predicting slightly below-normal to slightly above-normal hurricane activity, with the average of seasonal forecasts issued to date calling for a total of six hurricanes (the same as the long-term average). At this point, none of the seasonal forecasting groups that have submitted predictions are forecasting well above-average Atlantic hurricane activity.

One area that is characterized by large uncertainty this year is the potential development of an El Niño by the peak of the Atlantic hurricane season. There are some indications that this could occur, with several forecast models calling for weak to moderate El Niño conditions by September. However, other models are predicting neutral ENSO conditions, and the latest outlook by the National Oceanic and Atmospheric Administration is nearly evenly split between El Niño and neutral ENSO conditions by the August-October period. In general, over the past few weeks, models have backed off on the development of a significant El Niño, but it still remains a possibility. Consequently, the forecasts issued in May have had a tendency to predict a more active season than those issued in March-April.

The tropical Atlantic is currently somewhat warmer than normal, due in large part to a much weaker than normal subtropical high and associated weak trade winds for most of May. Warmer tropical Atlantic SSTs provide more fuel for developing tropical cyclones but also generally drive an environment of lower pressure as well as moister mid-levels of the atmosphere, both of which enhance hurricane formation. It remains to be seen whether those warm anomalies will persist over the next several months.

|                  | Average Forecast (range) | Climatology (1981-2010 median) | Number of forecasts |
|------------------|--------------------------|--------------------------------|---------------------|
| Named storms     | 12 (10-15)               | 12                             | 14                  |
| Hurricanes       | 6 (4-7)                  | 6                              | 13                  |
| Major hurricanes | 2 (2-3)                  | 2                              | 12                  |
| ACE              | 92 (67-110)              | 92                             | 9                   |

Acknowledgments

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