



AnuMS 2018 Atlantic Hurricane Season Forecast

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The *AnuMS (Antigua Met Service) is projecting that the 2018 Atlantic hurricane season to be most likely near normal, much less active than [previously indicated](#). The forecast spans the full season – June 1 to November 30. It does not include Subtropical Storm Alberto, which formed in late May. In obtaining the forecast, data available through June 7, 2018 were used.

The reasons for a near normal season being most likely, as opposed the previously forecast above to near normal season, are mainly due to the likely cooler than normal sea surface temperatures across the tropical North Atlantic (TNA) and the likely warm neutral or weak El Nino Southern Oscillation (ENSO) conditions across the tropical Pacific Ocean. A colder than usual TNA often translates into stronger than usual trade winds and higher than normal vertical wind shear – both very unfavourable for tropical cyclone formation and growth. Warm ENSOs inhibit hurricane activity and cold ENSOs do the opposite. Neutral ENSOs neither inhibit nor enhance. Notwithstanding the forecast, there is notable uncertainty, as it is somewhat unclear as to how cool TNA will get and whether a warm ENSO will develop.

Our forecast calls for 11 named storms with 5 becoming hurricanes and 2 becoming major hurricanes. The Accumulated Cyclone Energy (ACE) is forecast to be 93. Further, there is a 70% likelihood/confidence of

- 8 to 15 named storms;
- 3 to 8 becoming hurricanes;
- 1 to 4 becoming major hurricanes and
- 48 to 153 ACE.

The seasonal activity is expected to fall within these ranges in 70% of seasons with similar SST patterns, across the tropical Pacific and Atlantic Oceans, and uncertainties to those expected this year. These ranges do not represent the total possible ranges of activity seen in past similar years. These expected ranges are centred above or near the 1981-2010 seasonal averages of 106 ACE, 12 named storms, 6 hurricanes and 3 major hurricanes. Most of the predicted activity is likely to occur during the peak months of the hurricane season – August to October.

There is a 31% probability of an above normal season, 38% probability of a near normal season and a 31% probability of a below normal season, based on the ACE for the climate period 1981-

2010. This forecast is to be taken as a guide and not gospel. Forecasts for the upcoming hurricane season from early June, generally only have moderate skill in so doing. The next two forecasts are generally more skilful with should have much less uncertainty.

Looking back at the previous forecast, it is clear the numbers have been declining – trending away from an above normal season to a near normal one (See Table 1 below). Although the near normal category has the highest likelihood, it does not have the majority probability; hence, another way of interpreting the forecast is that there is equal chance of near to above normal and near to below normal activity.

	2018 Forecasts for the Atlantic Hurricane Season		
Forecast Parameters and 1981-2010 Average in [brackets]	Issued April 10, 2018	Issued May 10, 2018	Issued June 11, 2018
ACE [105.6]	135 (70-200)	119 (63-190)	93 (48-153)
Named Storms [12]	15 (11-19)	13 (10-17)	11 (8-15)
Hurricanes [6]	7 (4-10)	6 (4-10)	5 (3-8)
Major Hurricanes [3]	4 (2-5)	3 (1-4)	2 (1-4)

Table 1: Forecast parameters with 70 percent confidence intervals in (parentheses).

	2018 Forecasts for the Atlantic Hurricane Season		
Forecast Parameters and 1981-2010 Average [in brackets]	Issued April 10, 2018	Issued May 10, 2018	Issued June 11, 2018
ACE [105.6]	A 55, N 30, B 15	A 49, N 34, B 17	A 31, N 38, B 31
Named Storms [12]	A 65, N 26, B 9	A 53, N 35, B 12	A 33, N 42, B 25
Hurricanes [6]	A 39, N 46, B 15	A 39, N 32, B 29	A 26, N 35, B 39
Major Hurricanes [3]	A 60, N 25, B 15	A 40, N 36, B 24	A 29, N 38, B 33

Table 2: Forecast parameters expressed probabilistically. A - above normal; N - near normal and B - below normal.

Figures 1 and 2 below show there is good skill in forecasting the season, in this case, using the Climate Forecast System version 2 (CFSv2) sea surface temperatures (SSTs) to predict the ACE.

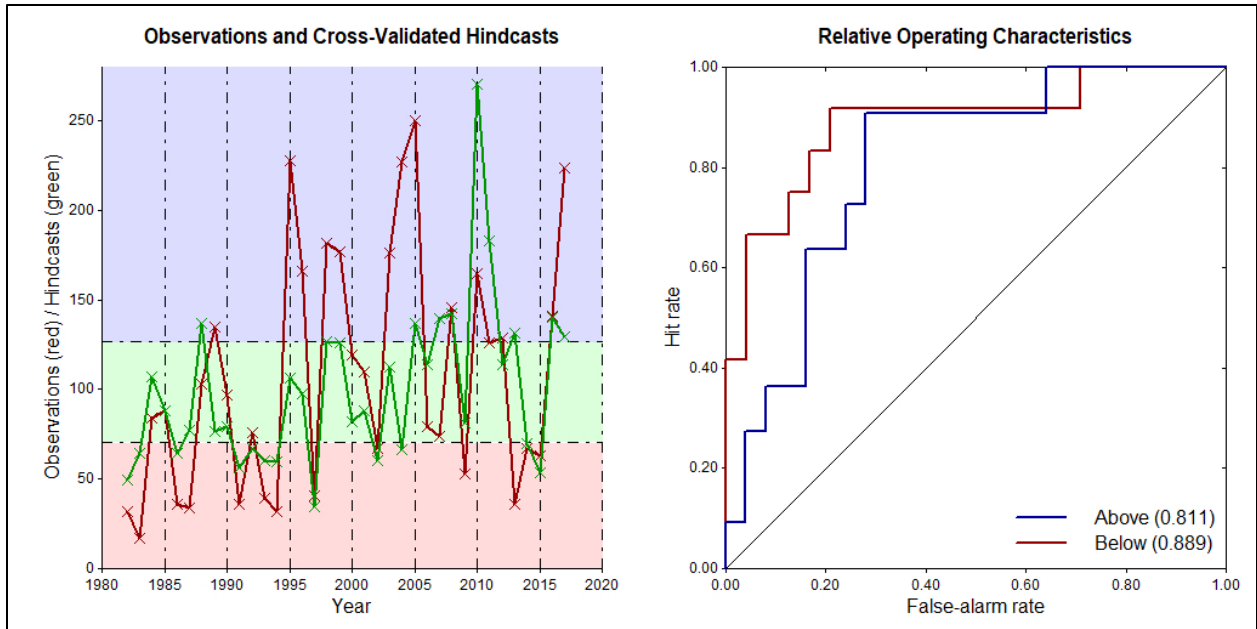


Figure 1a (left): Shows observed vs forecast ACE. The variance is a little 24%, using CFSv2 mean SSTs for June to November. Figure 1b (right): The ROC diagram shows very high discrimination by the model in forecasting above and below normal ACE for the season using CFSv2 SSTs.

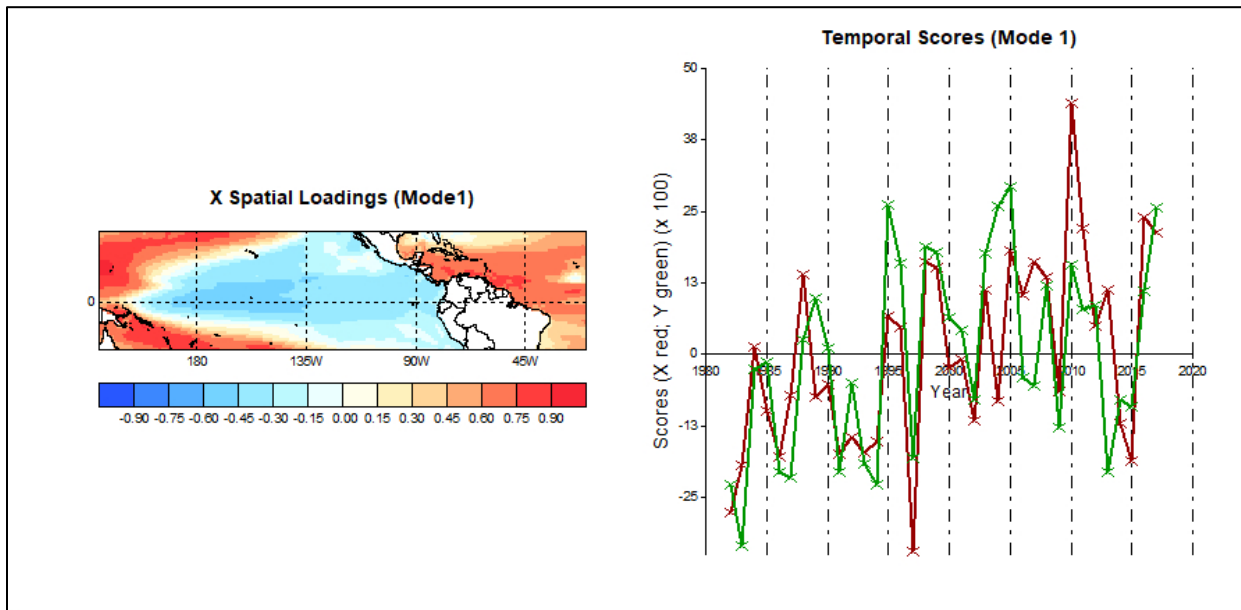


Figure 2: The X special loadings (mode 1) shows the most dominant pattern in SSTs correlation associated with above normal ACE. The canonical correlation for this pair of variable (SSTs and ACE) is over 0.67. From the temporal scores (mode 1), warm SSTs across the tropical Atlantic Ocean simultaneously with cold SSTs across the tropical Pacific Ocean tend to coincide with above normal ACE (or season). Obtained using CFSv2 mean SSTs for June-November 2018, initialized in early June.

Methodology

This forecast was obtained with the use of the Climate Predictability Tool ([CPT](#)) version 15.5.10, 2017 by Simon J. Mason and Michael K. Tippett. The software was view in canonical correlation analysis (CCA) mode. Input explanatory (X) files used were NOAA NCDC ERSSTv4 mean SSTs for: May 1971-2018; March to May 1971-2018 and NOAA NCEP EMC CFSv2 ensemble mean SSTs for June to November 1982-2018, initialized June 1, 2018. The X domain used was 20°S to 30°N and 140°E to 20°W. The response (Y) variables were ACE values, named storms, hurricanes and major hurricanes for the Atlantic Basin (including the Caribbean Sea and the Gulf of Mexico) for the period 1971 to 2017.

The CPT settings used were:

- X modes: maximum was 8 and the minimum was 1
- Training period: 1971-2017, 47 years.
- Climatological period – 1981-2010
- Transformation setting: Gamma distribution
- Confidence level: 70%
- Missing value replacement: best near-neighbor
- Target season: June to November
- All other settings are by default

Results

Three sets of forecasts were produced and the final forecast issued is the simple arithmetic mean of the three. The individual results are listed below:

Forecast Parameters	SSTs			Ensemble Mean Forecast
	May 1971-2018	Mar to May 1971-2018	Jun to Nov 1982-2018	
ACE	86 (43-142)	99 (50-161)	93 (51-163)	93 (48-153)
Named Storms	10 (7-14)	12 (9-15)	12 (9-16)	11 (8-15)
Hurricanes	5 (3-8)	5 (3-8)	5 (3-8)	5 (3-8)
Major Hurricanes	2 (1-3)	2 (1-4)	2 (1-4)	2 (1-4)

Table 3: Forecast parameters with 70 percent confidence intervals in (parentheses).

Forecast Parameters	SSTs			Ensemble Mean Forecast
	May 1971-2018	Mar to May 1971-2018	Jun to Nov 1982-2018	
ACE	A 27, N 38, B 35	A 36, N 37, B 27	A 30, N 40, B 30	A 31, N 38, B 31
Named Storms	A 24, N 41, B 35	A 37, N 43, B 20	A 37, N 43, B 20	A 33, N 42, B 25
Hurricanes	A 23, N 33, B 44	A 27, N 36, B 37	A 28, N 36, B 36	A 26, N 35, B 39
Major Hurricanes	A 23, N 39, B38	A 31, N 39, B 30	A 33, N 36, B 31	A 29, N 38, B 33

Table 4: Forecast parameters expressed probabilistically. A - above normal; N - near normal and B - below normal.

Definitions and acronyms

Accumulated Cyclone Energy (ACE) – A measure of a named storm’s potential for wind and storm surge destruction defined as the sum of the square of a named storm’s maximum wind speed (in 10^4 knots²) for each 6-hour period of its existence. The 1981-2010 average value of this parameter is 106 for the Atlantic basin.

Atlantic Basin – The area including the entire North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

El Niño – A 12-18 month period during which anomalously warm sea surface temperatures occur in the eastern half of the equatorial Pacific. Moderate or strong El Niño events occur irregularly, about once every 3-7 years on average.

ERSSTv4 – Extended Reconstructed Sea Surface Temperature version four.

CFSv2 – Climate Forecast System version 2.

EMC – Environmental Modeling Center of the United States.

Hurricane (H) – A tropical cyclone with sustained low-level winds of 74 miles per hour (33 ms⁻¹ or 64 knots) or greater.

Major Hurricane (MH) – A hurricane which reaches a sustained low-level wind of at least 111 mph (96 knots or 50 ms⁻¹) at some point in its lifetime. This constitutes a category 3 or higher on the Saffir/Simpson scale.

Named Storm (NS) – A hurricane, a tropical storm or a sub-tropical storm.

NCDC – National Climate Data Center of the United States

NCEP – National Centers for Environmental Prediction of the United States.

NOAA – National Oceanic Atmospheric Administration of the United States.

Saffir/Simpson Hurricane Wind Scale – A measurement scale ranging from 1 to 5 of hurricane wind intensity. One is a weak hurricane; whereas, five is the most intense hurricane. Tropical North Atlantic (TNA) index – A measure of sea surface temperatures in the area from 5.5-23.5°N, 57.5-15°W.

SSTs – Sea surface temperatures.

Tropical Cyclone (TC) – A large-scale circular flow occurring within the tropics and subtropics which has its strongest winds at low levels; including hurricanes, tropical storms and other weaker rotating vortices.

Tropical Storm (TS) – A tropical cyclone with maximum sustained winds between 39 mph (18 ms⁻¹ or 34 knots) and 73 mph (32 ms⁻¹ or 63 knots).

Vertical Wind Shear – The difference in horizontal wind between 200 mb (approximately 40,000 feet or 12 km) and 850 mb (approximately 5000 feet or 1.6 km).

AnuMS will issue its next Atlantic Hurricane Season Forecast around July 10, 2018.

**Not to be mistaken for the ABMS*