



AnuMS 2018 Atlantic Hurricane Season Forecast

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The *AnuMS (Antigua Met Service) is projecting the 2018 Atlantic hurricane season to be most likely near normal. This undated forecast is calling for a bit less activity than the [previous one issued in July](#). The forecast spans the full season – June 1 to November 30. It does not include Subtropical Storm Alberto, which formed in late May, but includes Hurricanes Beryl and Chris and Tropical Storm Debby. In obtaining the forecast, data available through August 9, 2018 were used.

The reasons for a near normal season being most likely are mainly due to the expected 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. With a warm ENSO likely to kick in after the peak of the hurricane season – August to October, its inhibiting effect will not be as strong compared to if it were to kick in now.

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

- 9 to 15 named storms;
- 3 to 8 becoming hurricanes;
- 1 to 4 becoming major hurricanes and
- 51 to 151 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 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 of the season – August to September.

There is a 31% probability of an above normal season, 40% probability of a near normal season and a 29% 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 as gospel. Notwithstanding, forecasts for the hurricane season in August are generally the most skilful. There will be no further forecast from us for this season. The first forecast for the 2019 hurricane season will be issued early April.

Looking back at the previous forecasts, it is clear that the numbers have declined through the June forecast, rose a bit in July and have now fallen again – moving from an above normal season to near normal to near to above normal and now back to near normal in this forecast (See Table 1 below). So, the most likely category for this hurricane season is the near normal one.

2018 Forecasts for the Atlantic Hurricane Season					
Forecast Parameters and 1981-2010 Avg in [brackets]	Issued April 10, 2018	Issued May 10, 2018	Issued June 11, 2018	Issued July 15, 2018	Issued August 10, 2018
ACE [105.6]	135 (70-200)	119 (63-190)	93 (48-153)	99 (51-167)	93 (51-151)
Named Storms [12]	15 (11-19)	13 (10-17)	11 (8-15)	12 (8-15)	11 (9-15)
Hurricanes [6]	7 (4-10)	6 (4-10)	5 (3-8)	5 (3-8)	5 (3-8)
Major Hurricanes [3]	4 (2-5)	3 (1-4)	2 (1-4)	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 Avg [in brackets]	Issued April 10, 2018	Issued May 10, 2018	Issued June 11, 2018	Issued July 15, 2018	Issued August 10, 2018
ACE [105.6]	A 55, N 30, B 15	A 49, N 34, B 17	A 31, N 38, B 31	A 37, N 37, B 26	A 31, N 40, B 29
Named Storms [12]	A 65, N 26, B 9	A 53, N 35, B 12	A 33, N 42, B 25	A 34, N 44, B 22	A 33, N 43, B 24
Hurricanes [6]	A 39, N 46, B 15	A 39, N 32, B 29	A 26, N 35, B 39	A 26, N 36, B 38	A 22, N 37, B 41
Major Hurricanes [3]	A 60, N 25, B 15	A 40, N 36, B 24	A 29, N 38, B 33	A 35, N 36, B 29	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 shows 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.

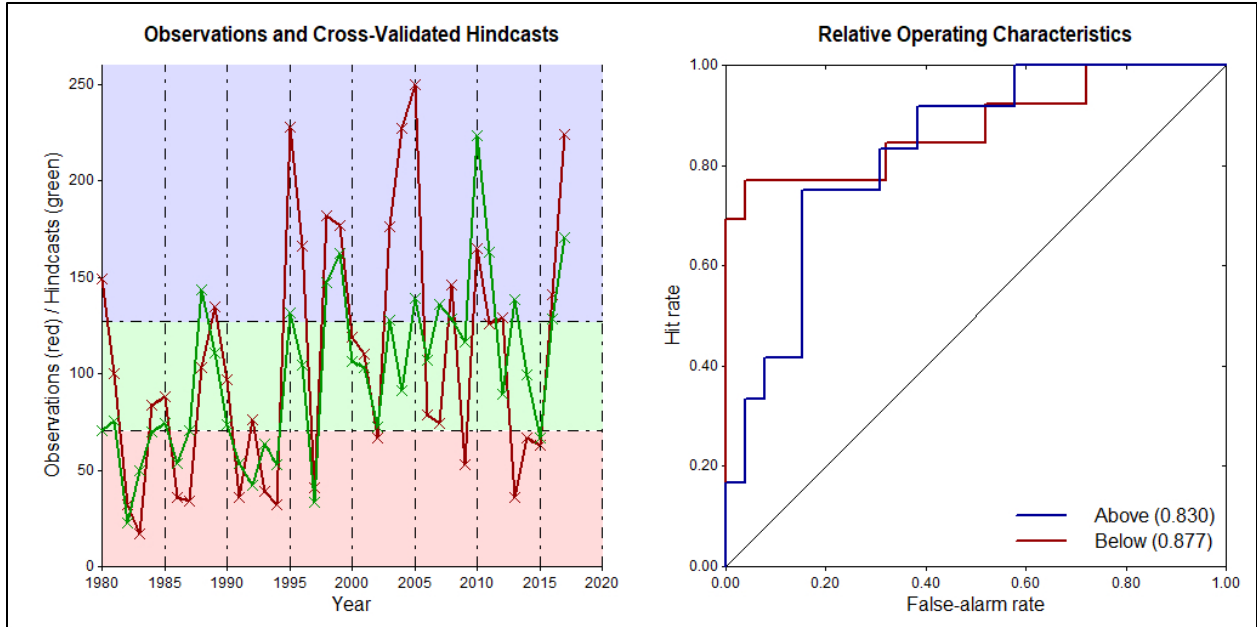


Figure 1a (left): Shows observed vs forecast ACE. The variance is a little over 40%, using GFDL-FLOR mean SSTs for August to November. Figure 1b (right): The ROC diagram shows very high discrimination by the model in forecasting above and below normal ACE for the season using GFDL-FLOR SSTs.

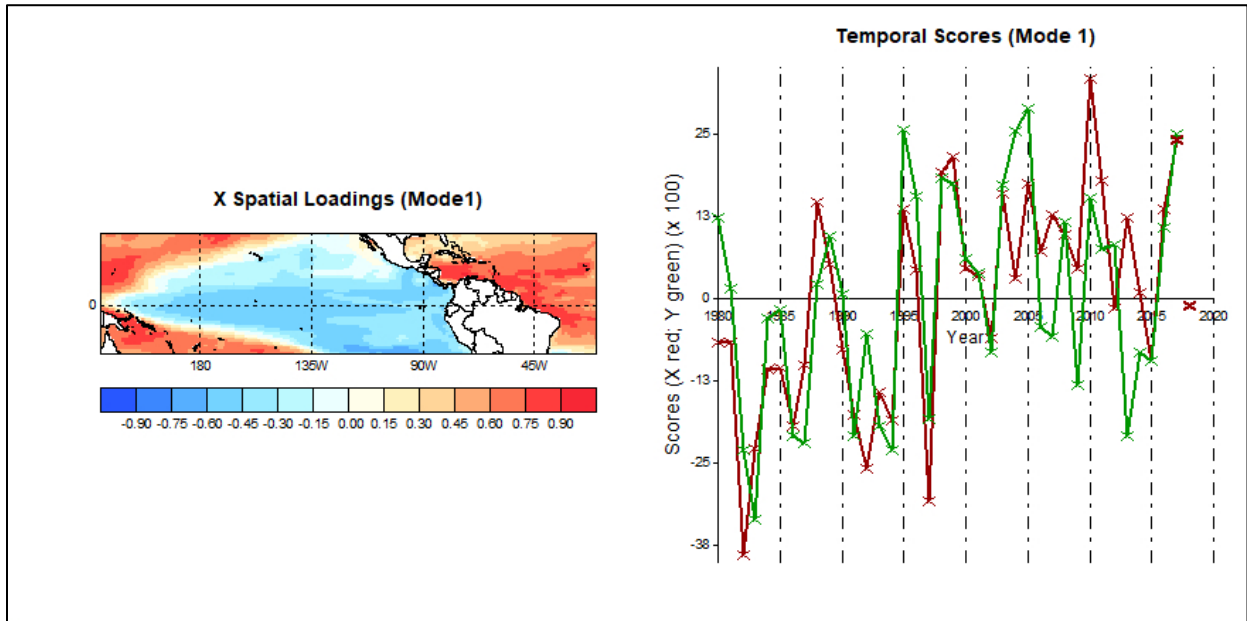


Figure 2: The X special loadings (mode 1) shows the most dominant pattern in SSTs correlation associated with above normal ACE. The canonical correlation for this pair of variable (SSTs and ACE) is over 0.73. From the temporal scores (mode 1), cold SSTs across the tropical Atlantic Ocean simultaneously with warm SSTs across the tropical Pacific Ocean tend to coincide with below normal ACE (or season). Obtained using GFDL-FLOR mean SSTs for August-November 2018, initialized in early August.

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: July 1971-2018 and May to July 1971-2018; CMC4 1981-2018, GFDL-FLOR 1980-2018 and NCAR CCSM4 1982-2018 mean SSTs for August to November, initialized early August 2018. The SSTs for CMC4, GFDL-FLOR and CCSM4 were ensembled (3 Model Ensemble) by finding the simple arithmetic mean of the of the output i.e. the response (Y) variable of all three. The X domain used was 20°S to 30°N and 140°E to 20°W. The 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
	Jul 1971-2018	May to Jul 1971-2018	Aug to Nov 3 Model Ensemble 1982-2018	
ACE	82 (44-139)	105 (57-160)	92 (51-155)	93 (51-151)
Named Storms	11 (8-14)	12 (9-16)	11 (9-16)	11 (9-15)
Hurricanes	5 (3-7)	5 (3-8)	6 (4-9)	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
	Jul 1971-2018	May to Jul 1971-2018	Aug to Nov 3 Model Ensemble 1982-2018	
ACE	A 26, N 39, B 35	A 39, N 39, B 22	A 29, N 41, B 30	A 31, N 40, B 29
Named Storms	A 26, N 44, B 30	A 42, N 43, B 15	A 32, N 42, B 26	A 33, N 43, B 24
Hurricanes	A 19, N 37, B 44	A 21, N 36, B 43	A 25, N 38, B 37	A 22, N 37, B 41
Major Hurricanes	A 26, N 41, B 33	A 28, N 38, B 34	A 36, N 36, B 28	A 29, N 38, B 33

Table 4: Forecast parameters expressed probabilistically. A for above normal; N for near normal and B for 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 April 10, 2019.

**Not to be mistaken for the ABMS*