

**COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE  
ACTIVITY FROM SEPTEMBER 27-OCTOBER 10, 2018**

We expect that the next two weeks will be characterized by above-normal amounts of hurricane activity, primarily due to what we anticipate will be a long-lived Leslie.

(as of 26 September 2018)

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In Memory of William M. Gray<sup>3</sup>

This discussion as well as past forecasts and verifications are available online at  
<http://tropical.colostate.edu>

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# 1 Introduction

This is the tenth year that we have issued shorter-term forecasts of tropical cyclone (TC) activity starting in early August. These two-week forecasts are based on a combination of observational and modeling tools. The primary tools that are used for this forecast are as follows: 1) current storm activity, 2) National Hurricane Center Tropical Weather Outlooks, 3) forecast output from global models, 4) the current and projected state of the Madden-Julian Oscillation (MJO) and 5) the current seasonal forecast.

Our forecast definition of above-normal, normal, and below-normal ACE periods has been changed to better fit, in our view, the observed historical distributions. Our ACE forecasts are now defined by ranking observed activity in the satellite era from 1966–2016 and defining above-normal, normal and below-normal two-week periods based on terciles. Since there are 51 years from 1966–2016, each tercile is composed of 17 years. The 17 years with the most active ACE periods from September 27–October 10 are classified as the upper tercile, the 17 years with the least active ACE periods are classified as the lower tercile, while the remaining 17 years are classified as the middle tercile.

Table 1: ACE forecast definition for TC activity for September 27-October 10.

Parameter	Definition
Above-Normal	Upper Tercile (>11 ACE)
Normal	Middle Tercile (4–11 ACE)
Below-Normal	Lower Tercile (<4 ACE)

# 2 Forecast

We believe that the next two weeks will be characterized by activity at above-normal levels (>11 ACE). The primary reason why we are forecasting above-normal levels is due to Leslie. Leslie is currently post-tropical but is forecast to become a subtropical or tropical cyclone (TC) in the next few days. Global models intensify Leslie somewhat and keep the TC around for the next 7-10 days, likely generating considerable ACE in the process. Kirk is forecast to dissipate in the next couple of days due to strong vertical wind shear and is likely to generate little ACE in the process. No other areas are currently being monitored by the National Hurricane Center for TC development in the next five days. Global models also do not show any consistent TC development in the next week.

The Madden-Julian Oscillation (MJO) is currently in phase 8 and is forecast to propagate into phase 1 during the two-week period. Phase 1 typically favors Atlantic hurricane activity, primarily due to decreases in vertical wind shear.

Figure 1 displays the formation locations of TCs from September 27–October 10 for the years from 1966–2017 (e.g., the satellite era), along with the maximum intensities that these storms reached. Figure 2 displays the September 27–October 10 forecast period with respect to climatology. The hurricane season is still active during this time, but the primary threat formation area for major hurricanes shifts from the eastern and central tropical Atlantic further westward.

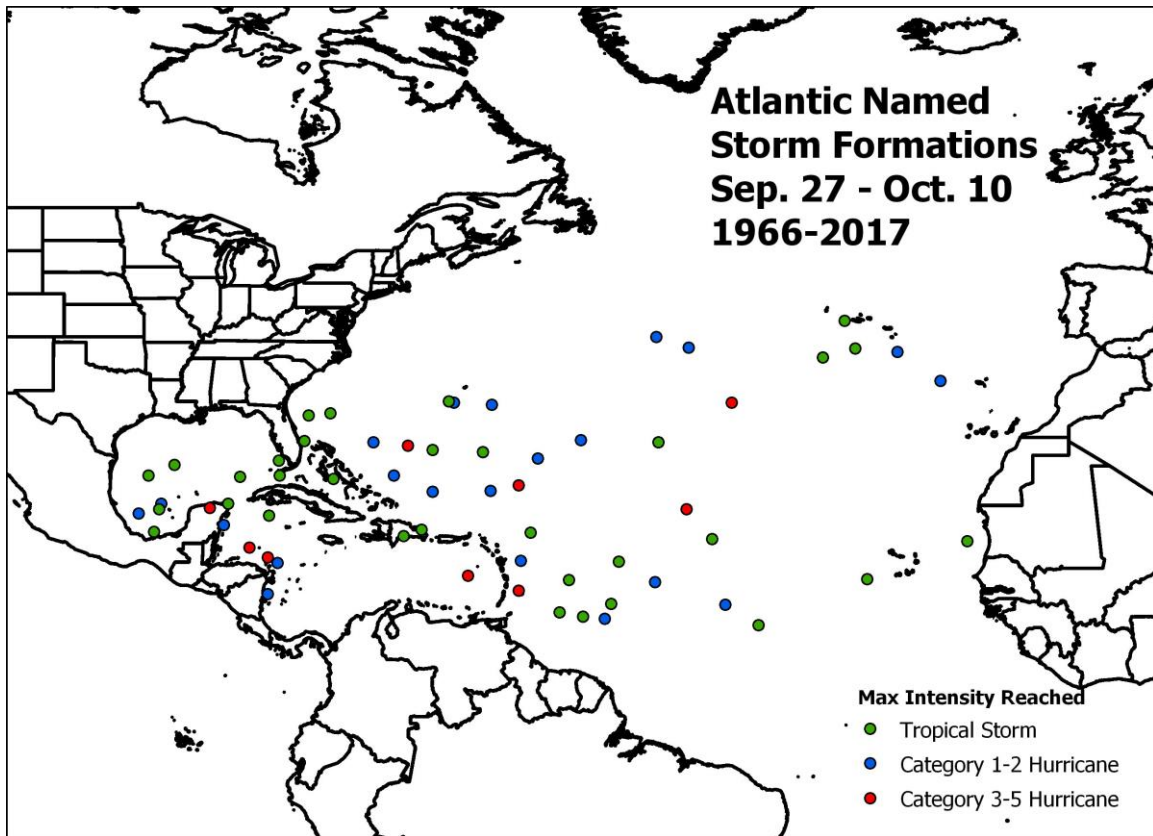


Figure 1: Atlantic named storm formations from September 27–October 10 from 1966–2017 and the maximum intensity that these named storms reached.

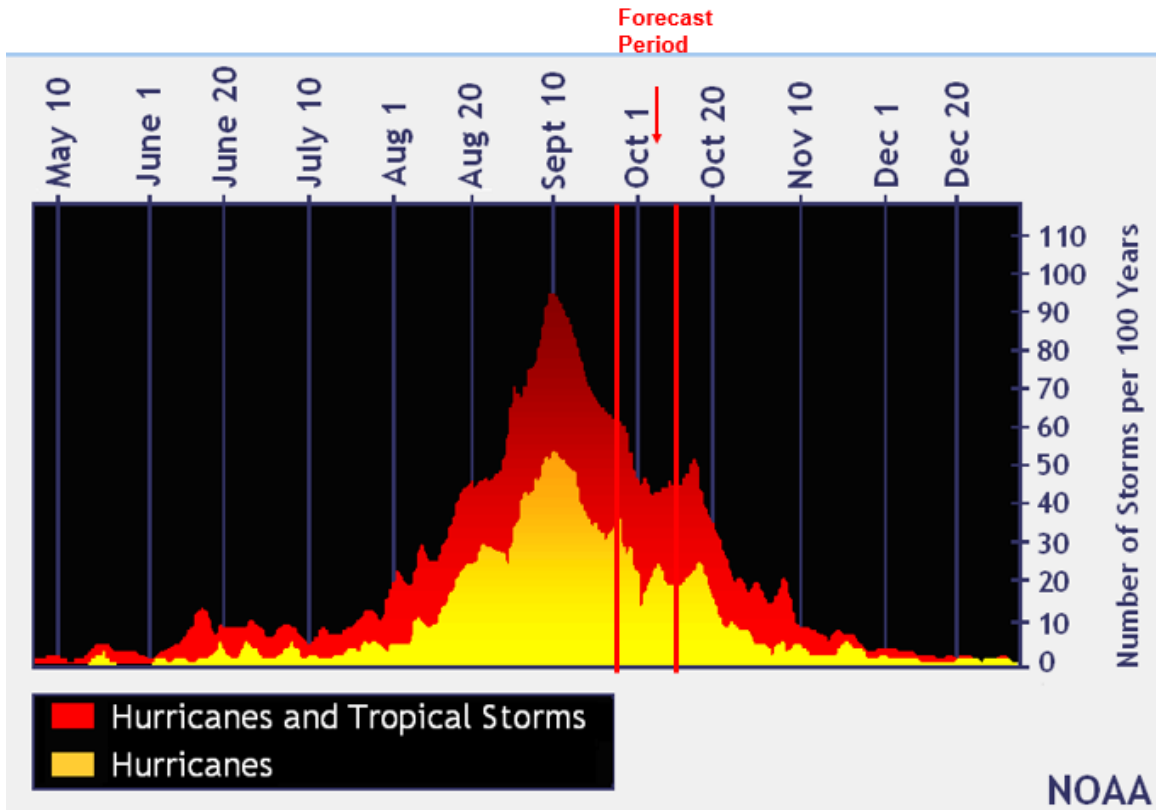


Figure 2: The current forecast period (September 27-October 10) with respect to climatology. Figure courtesy of NOAA.

We now examine how we believe each of the five factors discussed in the introduction will impact Atlantic TC activity for the period from September 27-October 10.

#### 1) Current Storm Activity

Tropical Storm Kirk is currently moving westward across the tropical Atlantic. The storm is forecast to encounter very strong vertical wind shear in the next couple of days and is likely to generate little ACE before dissipation.

#### 2) National Hurricane Center Tropical Weather Outlook

The NHC currently gives a high likelihood of Leslie redeveloping into a subtropical cyclone in the next few days. We anticipate Leslie to generate ~10-15 ACE as it drifts across the North Atlantic over the next 7-10 days.

#### 3) Global Model Analysis

None of the reliable global models indicate additional significant TC development in the next week.

#### 4) Madden-Julian Oscillation

The Madden-Julian Oscillation (MJO), as measured by the Wheeler-Hendon index, is currently in phase 8. The MJO is forecast to continue to propagate from phase 8 into phase 1 over the next two weeks (Figure 3). As would be expected from this MJO phase propagation, vertical wind shear is forecast to weaken in week two in the western Caribbean (Figure 4). This weaker vertical wind shear could potentially favor TC development in this region late in the period.

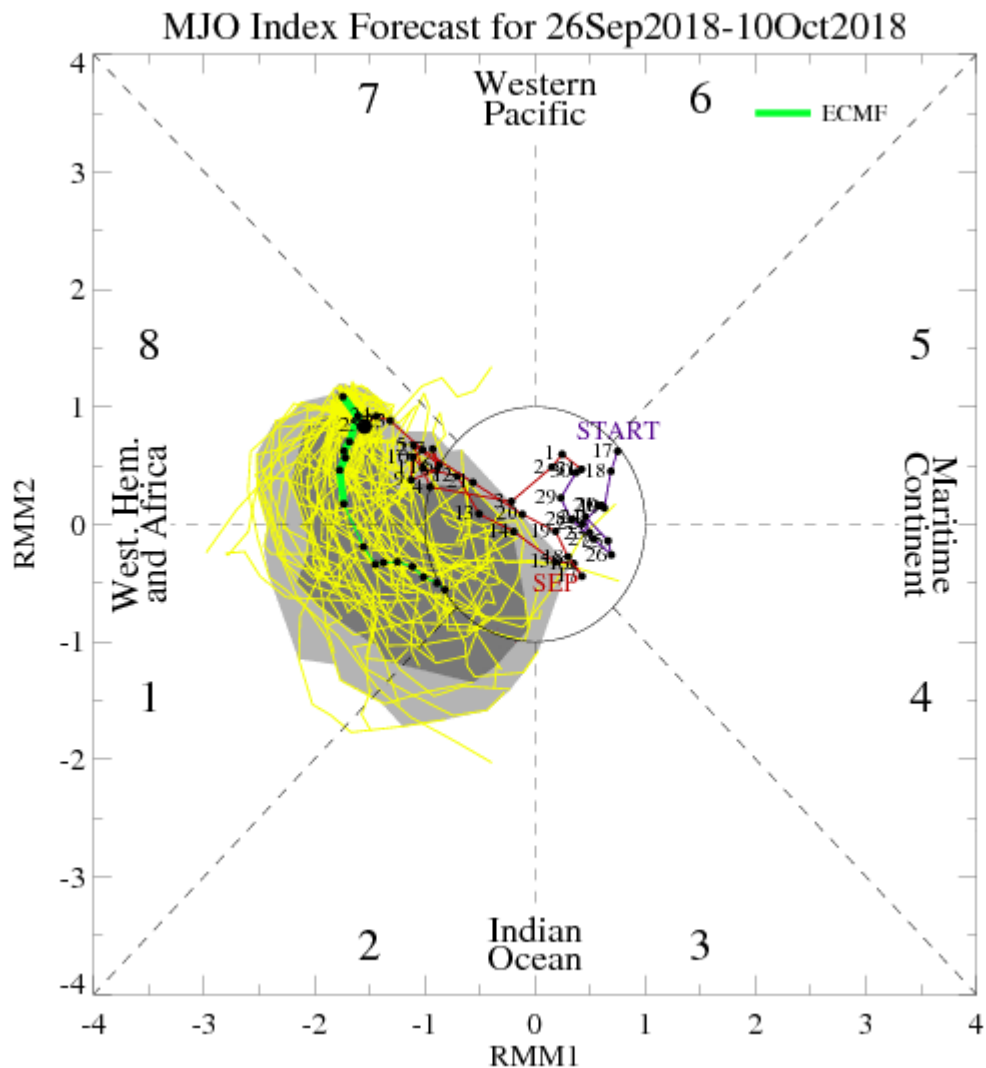


Figure 3: Predicted propagation of the MJO by the ECMWF model.

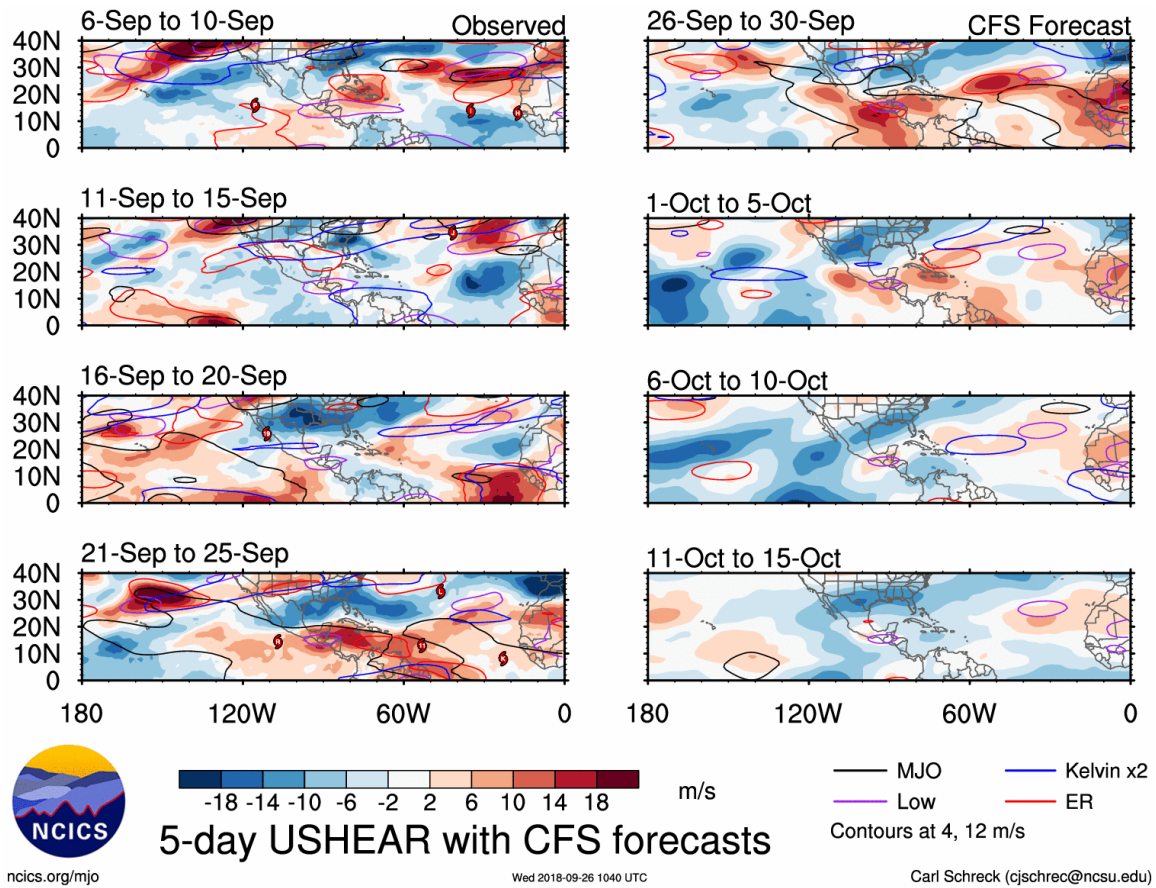


Figure 4: Observed and predicted anomalous 200 minus 850 hPa vertical wind shear from the Climate Forecast System through October 15. Figure courtesy of Carl Schreck.

Table 2: Normalized values of named storms (NS), named storm days (NSD), hurricanes (H), hurricane days (HD), major hurricanes (MH), major hurricane days (MHD) and Accumulated Cyclone Energy (ACE) generated by all tropical cyclones forming in each phase of the MJO over the period from 1974-2007. Normalized values are calculated by dividing storm activity by the number of days spent in each phase and then multiplying by 100. This basically provides the level of TC activity that would be expected for 100 days given a particular MJO phase.

MJO Phase	NS	NSD	H	HD	MH	MHD	ACE
Phase 1	6.4	35.9	3.7	17.9	1.8	5.3	76.2
Phase 2	7.5	43.0	5.0	18.4	2.1	4.6	76.7
Phase 3	6.3	30.8	3.0	14.7	1.4	2.8	56.0
Phase 4	5.1	25.5	3.5	12.3	1.0	2.8	49.4
Phase 5	5.1	22.6	2.9	9.5	1.2	2.1	40.0
Phase 6	5.3	24.4	3.2	7.8	0.8	1.1	35.7
Phase 7	3.6	18.1	1.8	7.2	1.1	2.0	33.2
Phase 8	6.2	27.0	3.3	10.4	0.9	2.6	46.8
Phase 1-2	7.0	39.4	4.3	18.1	1.9	4.9	76.5
Phase 6-7	4.5	21.5	2.5	7.5	1.0	1.5	34.6
Phase 1-2 / Phase 6-7	1.6	1.8	1.7	2.4	2.0	3.2	2.2

### 5) Seasonal Forecast

The seasonal forecast issued by CSU in early August called for a below-average season. The forecast for the next two weeks calls for above-normal activity, however, primarily due to Leslie.

## 3 Upcoming Forecasts

The final two-week forecast will be issued on October 11 for the October 11-24 period.

## **VERIFICATION OF SEPTEMBER 13-26, 2018 FORECAST**

The two-week forecast of tropical cyclone activity from September 13-26, 2018 correctly verified in the near-average category. We predicted near-average activity (11-23 ACE), and a total of 17 ACE were observed. We had six TCs (Florence, Helene, Isaac and Joyce, Kirk and Leslie) contributing to ACE during this time.