

**COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE
ACTIVITY FROM SEPTEMBER 1 – SEPTEMBER 14, 2017**

We expect that the next two weeks will be characterized by above-normal activity.

(as of 1 September 2017)

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In Memory of William M. Gray³

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 ninth year that we have issued shorter-term forecasts of tropical cyclone 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) current and projected state of the Madden-Julian Oscillation (MJO) and 5) current seasonal forecast.

The metric that we are trying to predict with these two-week forecasts is the Accumulated Cyclone Energy (ACE) index, which is defined to be all of the named storm's maximum wind speeds (in 10^4 knots²) for each 6-hour period of its existence over the two-week period. These forecasts are too short in length to show significant skill for individual event parameters such as named storms and hurricanes.

Starting with this forecast and continuing for the remainder of the season, we have changed the definition of above-normal, normal, and below-normal ACE periods to better fit, in our view, the observed historical distributions. Our ACE forecasts are now defined by ranking observed activity in the satellite era (since 1966) 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 periods from September 1-14 are classified as the upper tercile, the 17 years with the least active periods from September 1-14 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 1 – September 14, 2017

Parameter	Definition
Above-Normal	Upper Tercile (>31 ACE)
Normal	Middle Tercile (12-31 ACE)
Below-Normal	Lower Tercile (<12 ACE)

2 Forecast

We believe that the next two weeks will be characterized by activity at above-normal levels (>31 ACE). The primary reason for the above-normal forecast is due to Hurricane Irma, which looks likely to generate over 30 ACE units by itself as it tracks across the tropical Atlantic. The hurricane is forecast to have a long track across the basin and potentially be a major hurricane for several days. One additional area is currently being monitored by the National Hurricane Center for development in the eastern tropical Atlantic and is given a medium chance of development over the next five days. If it were to form, it could also considerable ACE as it tracks across the tropical Atlantic.

The Madden-Julian Oscillation (MJO) is forecast to remain weak over the next two weeks when classified by the Wheeler-Hendon index. Any influence of the MJO would tend to suppress TC activity in the Atlantic, due to anomalous sinking motion.

Figure 1 displays the tracks that tropical cyclones have taken during the period from September 1 – September 14 for the years from 1950-2008. Figure 2 displays the September 1 - 14 forecast period with respect to climatology. The September 1 - September 14 period is typically considered to be part of the most active part of the Atlantic hurricane season.

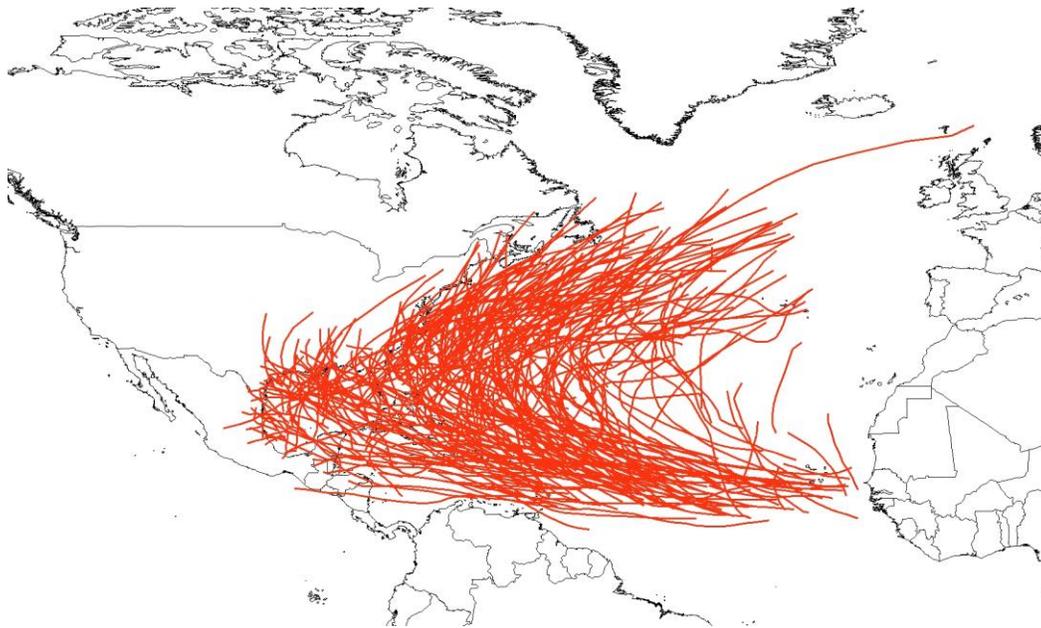


Figure 1: Tracks that named tropical cyclones have taken over the period from September 1 – September 14 for the years from 1950-2008.

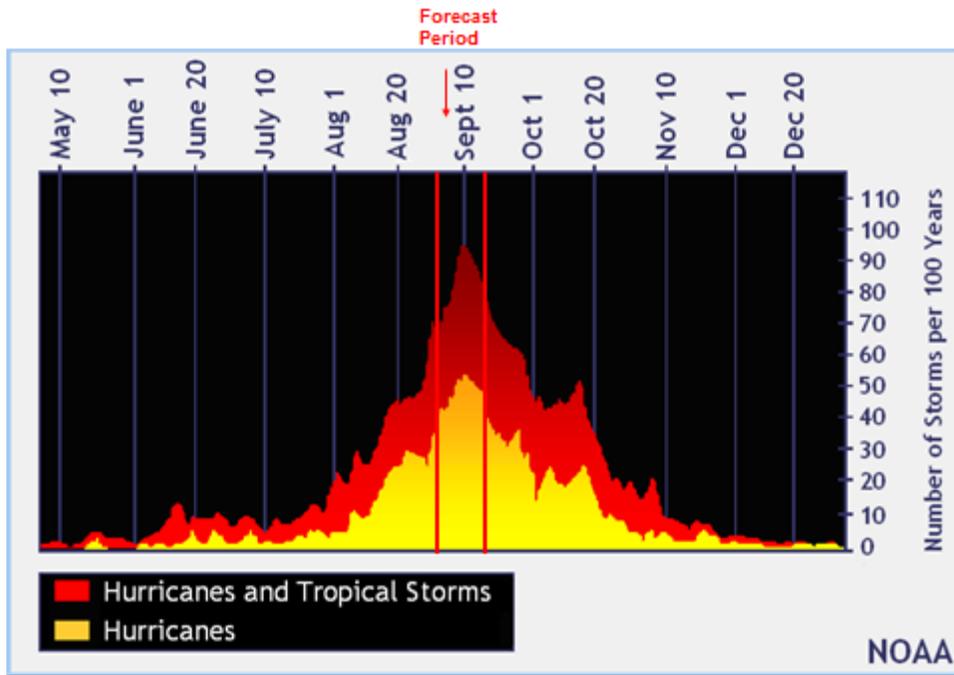


Figure 2: The current forecast period (September 1 – September 14) with respect to climatology. Figure courtesy of NOAA.

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 1 – September 14.

1) Current Storm Activity

The primary reason why we are forecasting above-normal TC activity is Hurricane Irma. Irma by itself could generate the >31 ACE units necessary to classify as an above-normal two-week period.

2) National Hurricane Center Tropical Weather Outlook

The area in the eastern Atlantic that the National Hurricane Center is currently monitoring for TC formation has a medium chance of forming over the next five days. Should it form, it has the potential to generate considerable ACE as it moves across the basin.

3) Global Model Analysis

Most global models do not develop any other significant TCs in the next ten days.

4) Madden-Julian Oscillation

The Madden-Julian Oscillation is predicted by the ECMWF model to remain relatively weak according to the Wheeler-Hendon index (Figure 3). Table 2 displays historical Atlantic TC activity that has occurred based on MJO phase. However, when looking at upper-level velocity potential anomalies, which assess the overall state of upward vs. downward motion in the atmosphere, anomalous downward motion is being predicted over the tropical Atlantic over the next two weeks (Figure 4). This would tend to suppress additional Atlantic TC formation. However, as mentioned earlier, Irma has the potential to meet the above-normal criteria by itself. Upper-level winds are forecast to be near normal anomalies across the tropical Atlantic, indicating that any suppression by the MJO is not having much of an impact on upper-level winds (Figure 5).

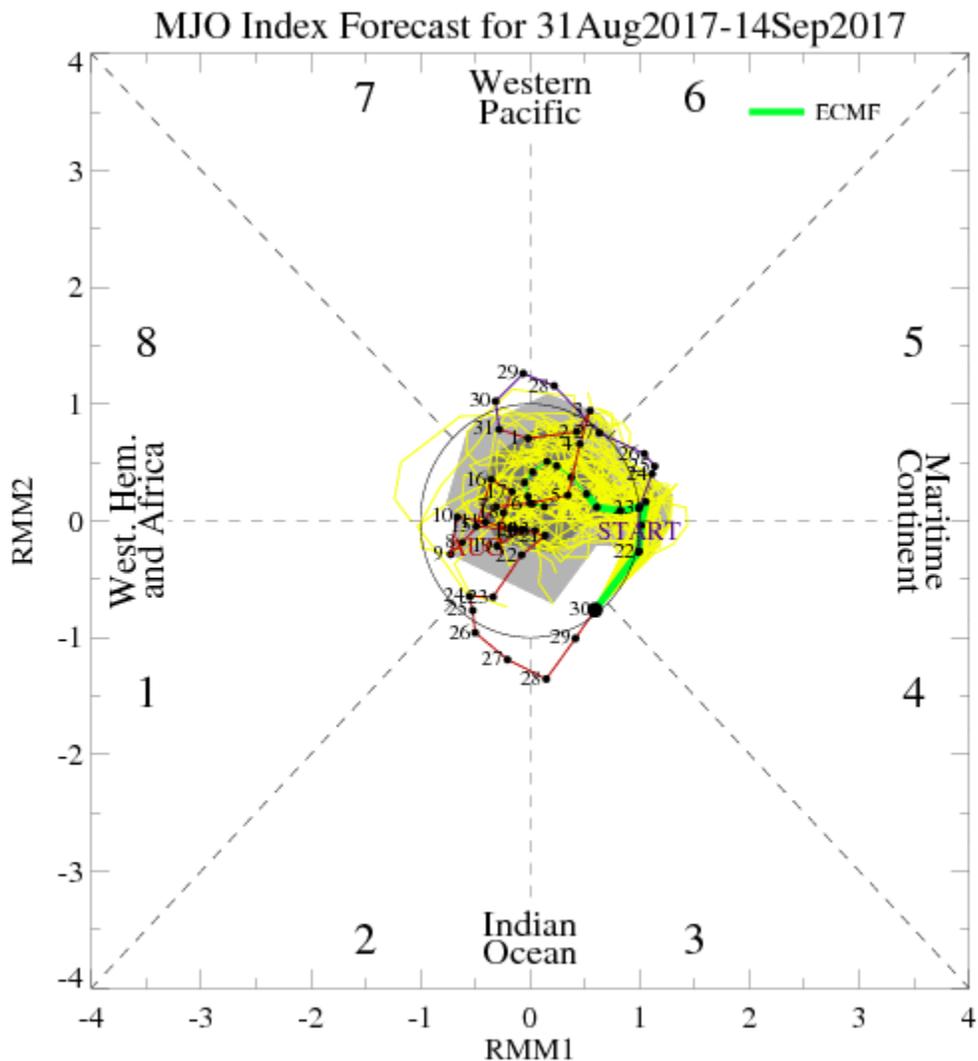


Figure 3: ECMWF forecast for the MJO from August 31, 2017 through September 14, 2017. Generally weak MJO activity is predicted based on the Wheeler-Hendon index.

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

MJO filtered VP200 Forecast

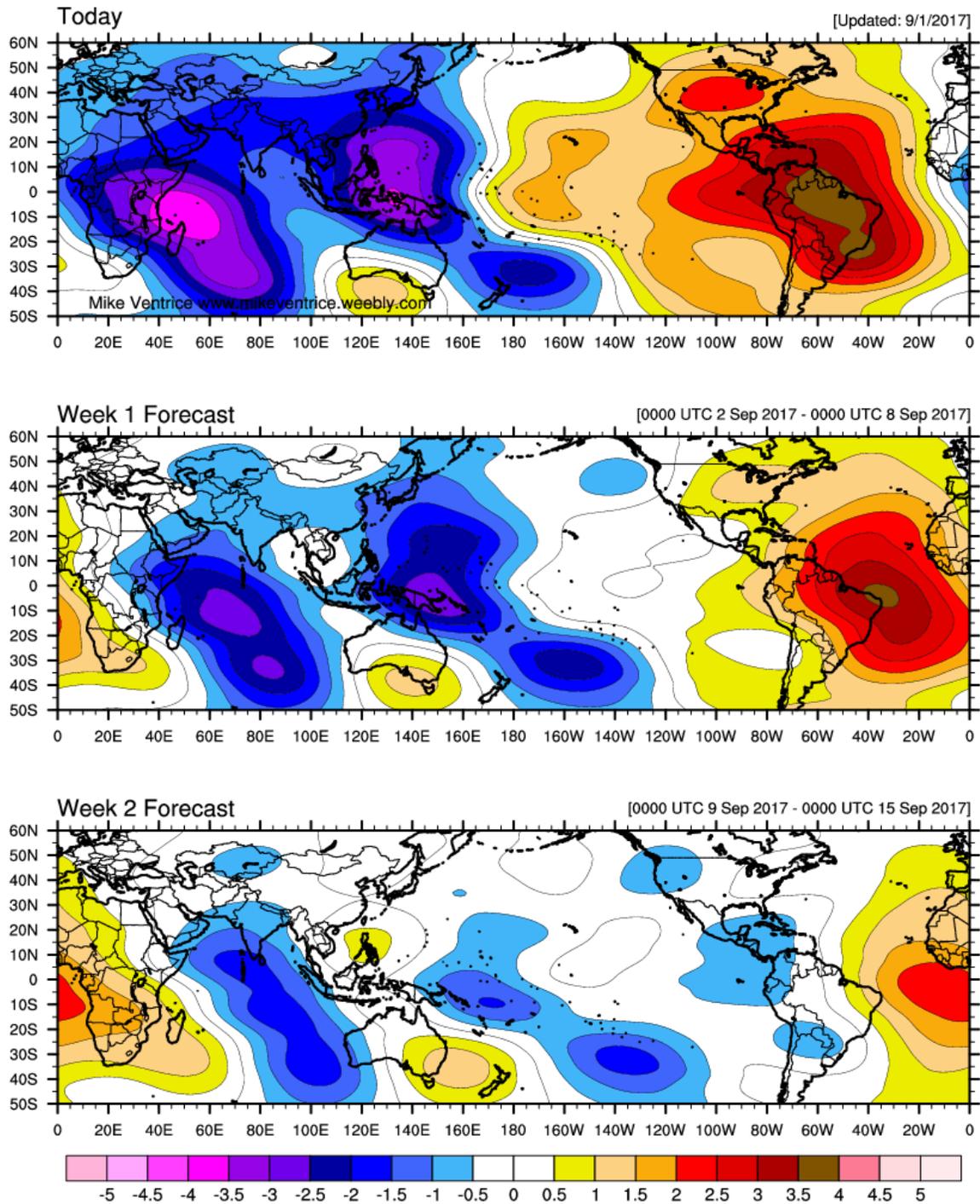


Figure 4: Anomalous velocity potential as predicted by the GFS model for week one, with a statistical extrapolation for week two. Blue colors indicate anomalous upward motion while red colors indicate anomalous downward motion. Figure courtesy of Mike Ventrice.

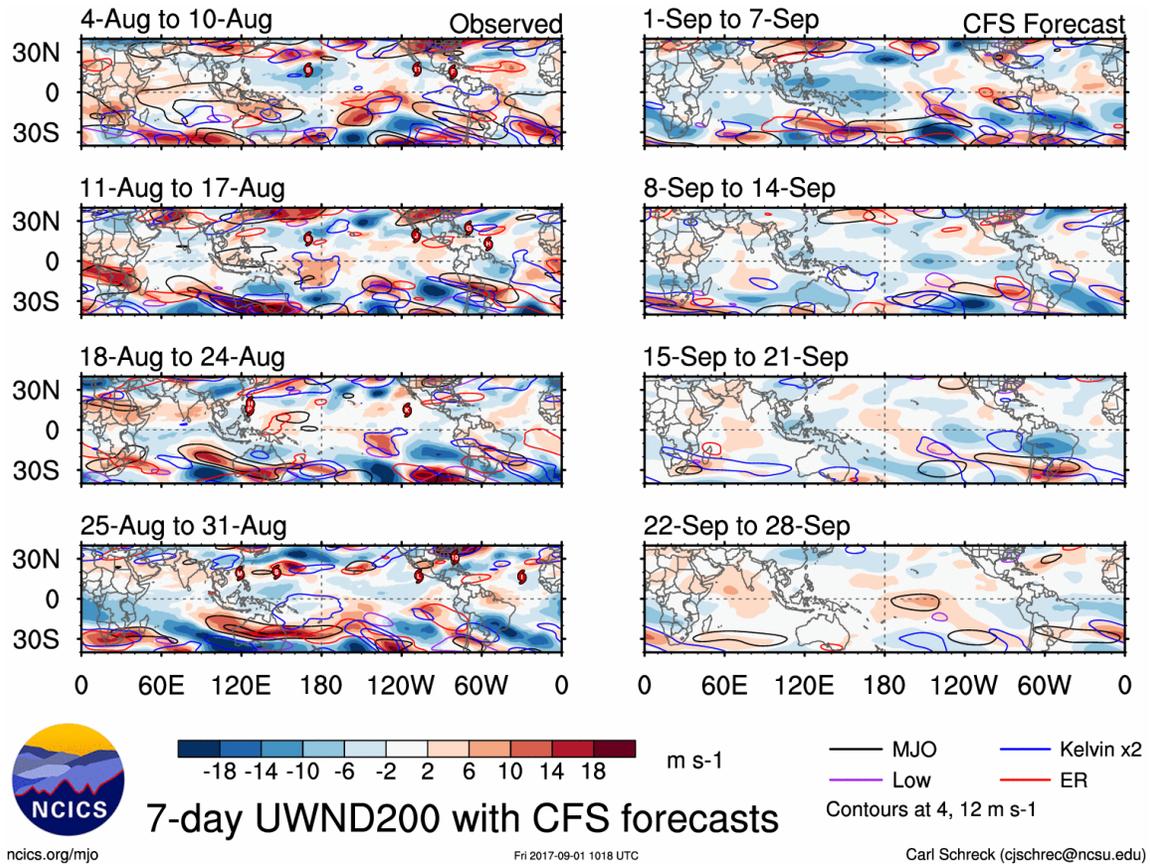


Figure 5: Observed 200-mb zonal winds since August 4 and predicted 200-mb zonal winds from the Climate Forecast System through September 28 across the Western Hemisphere. Figure courtesy of Carl Schreck.

5) Seasonal Forecast

The most recent seasonal forecast calls for an above-average season. We believe that activity over the next two weeks will be in keeping with the seasonal prediction for above-average activity.

3 Upcoming Forecasts

The next two-week forecast will be issued on September 15 for the September 15 – September 28 period. Additional two-week forecasts will be issued on September 29 and October 13.

VERIFICATION OF AUGUST 18 – AUGUST 31, 2017 FORECAST

The two-week forecast of tropical cyclone activity from August 18 – August 31 verified in the near-normal category (13-22 ACE), while our forecast was for above-normal TC activity (23 ACE). From August 18-31, 14 ACE units were observed, compared with the long-term average of 18 ACE. Overall ACE during the two-week period was 78% of normal.

While Harvey became a Category 4 hurricane, it made landfall shortly thereafter and consequently did not generate large values of ACE. It lasted as a named storm for several days thereafter, but tropical storms only add minimally to ACE. Irma generated several ACE units at the end of the forecast period.