

**COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE
ACTIVITY FROM SEPTEMBER 15 – SEPTEMBER 28, 2017**

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

(as of 15 September 2017)

By Philip J. Klotzbach¹ and Michael M. Bell²

In Memory of William M. Gray³

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

Department of Atmospheric Science
Colorado State University
Fort Collins, CO 80523
Email: philk@atmos.colostate.edu

¹ Research Scientist

² Associate Professor

³ Professor Emeritus of Atmospheric Science

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.

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 (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 ACE periods from September 15-28 are classified as the upper tercile, the 17 years with the least ACE active periods from September 15-28 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 15 – September 28, 2017

Parameter	Definition
Above-Normal	Upper Tercile (>25 ACE)
Normal	Middle Tercile (10-25 ACE)
Below-Normal	Lower Tercile (<10 ACE)

2 Forecast

We believe that the next two weeks will be characterized by activity at above-normal levels (> 25 ACE). The above-normal forecast is due to several factors. Tropical Storm Jose is forecast to re-intensify into a hurricane and has the potential to generate 10-15 ACE units before becoming post-tropical as it moves slowly northward. Tropical Depression 14 may intensify into a tropical storm and generate minimal ACE before being hit by very strong vertical wind shear from an upper-level trough. Invest 96L is forecast to develop into a tropical cyclone in the next few days, and while models disagree on its intensity, it has the potential to generate moderate levels of ACE as it transits the central and western Atlantic. Global models disagree about other potential areas of development further into the future, but they are in general agreement that the active Atlantic hurricane season is likely to continue.

The Madden-Julian Oscillation is forecast to remain weak over the next two weeks, with any MJO signal residing in phases 6-7. These two phases are generally associated with suppressed Atlantic hurricane activity, but overall MJO-related sub-seasonal variability is limited right now.

Figure 1 displays the tracks that tropical cyclones have taken during the period from September 15 – September 28 for the years from 1950-2008. Figure 2 displays the September 15 - 28 forecast period with respect to climatology. The September 15 - September 28 period is considered to be part of the climatologically most active part of the Atlantic hurricane season.

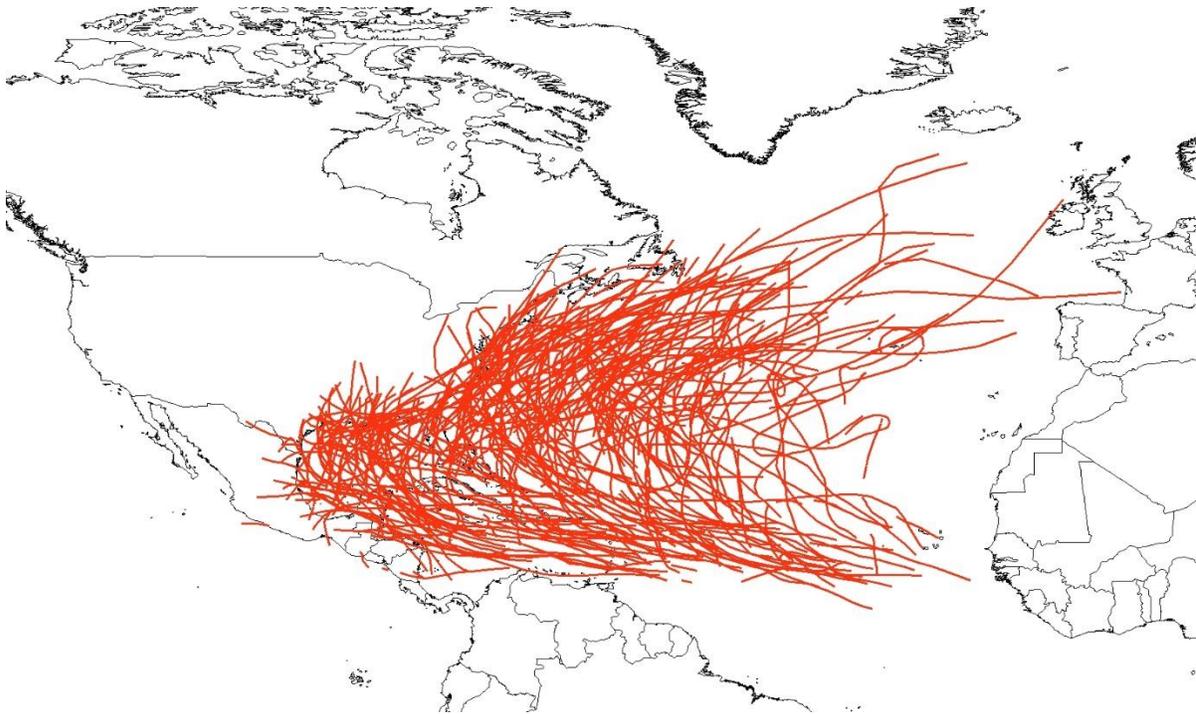


Figure 1: Tracks that named tropical cyclones have taken over the period from September 15 – September 28 for the years from 1950-2008.

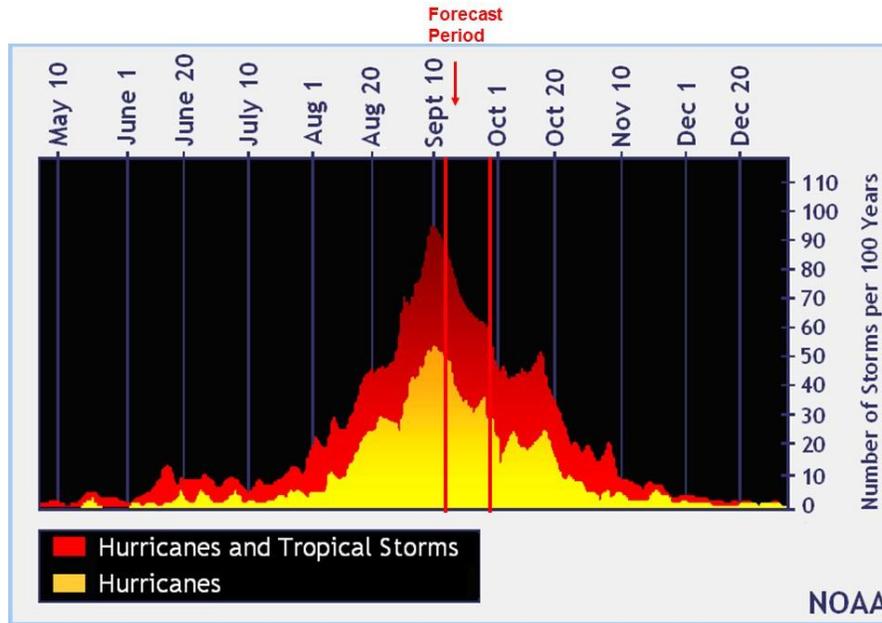


Figure 2: The current forecast period (September 15 – September 28) with respect to climatology. Figure courtesy of NOAA.

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 15 – September 28.

1) Current Storm Activity

Jose is forecast to maintain strong tropical storm to Cat. 1-2 hurricane strength over the next five days. The current National Hurricane Center forecasts for Jose indicate that the storm has the potential to generate 10-15 ACE units before becoming post-tropical. Tropical Depression 14 has the potential to generate a couple of ACE units before being hit by very strong vertical wind shear from an upper-level trough. The future of the storm after that point is uncertain, but it does not look to produce large levels of ACE.

2) National Hurricane Center Tropical Weather Outlook

Invest 96L is predicted by the National Hurricane Center to intensify into a tropical cyclone in the next few days, and the global models agree with this outlook. The future intensity of 96L is uncertain, but most models maintain a well-developed tropical cyclone for several days, indicating the potential for moderate levels of ACE to be generated.

3) Global Model Analysis

While there is not consistency between various global models when looking for other areas of tropical cyclone formation, most models develop another system or two during the next 10 days to two weeks.

4) Madden-Julian Oscillation

The Madden-Julian Oscillation is currently relatively weak. The ECMWF continues to forecast a relatively weak MJO, with a weak signal residing in Phases 6-7 (Figure 3). Phases 6-7 are generally characterized by below-average TC activity in the Atlantic; however, the signal this season is quite weak. Table 2 displays ACE generated in various MJO phases. However, upper-level velocity potential anomalies are fairly disorganized at present, indicating that any impact of the MJO should be limited during the next two weeks (Figure 4).

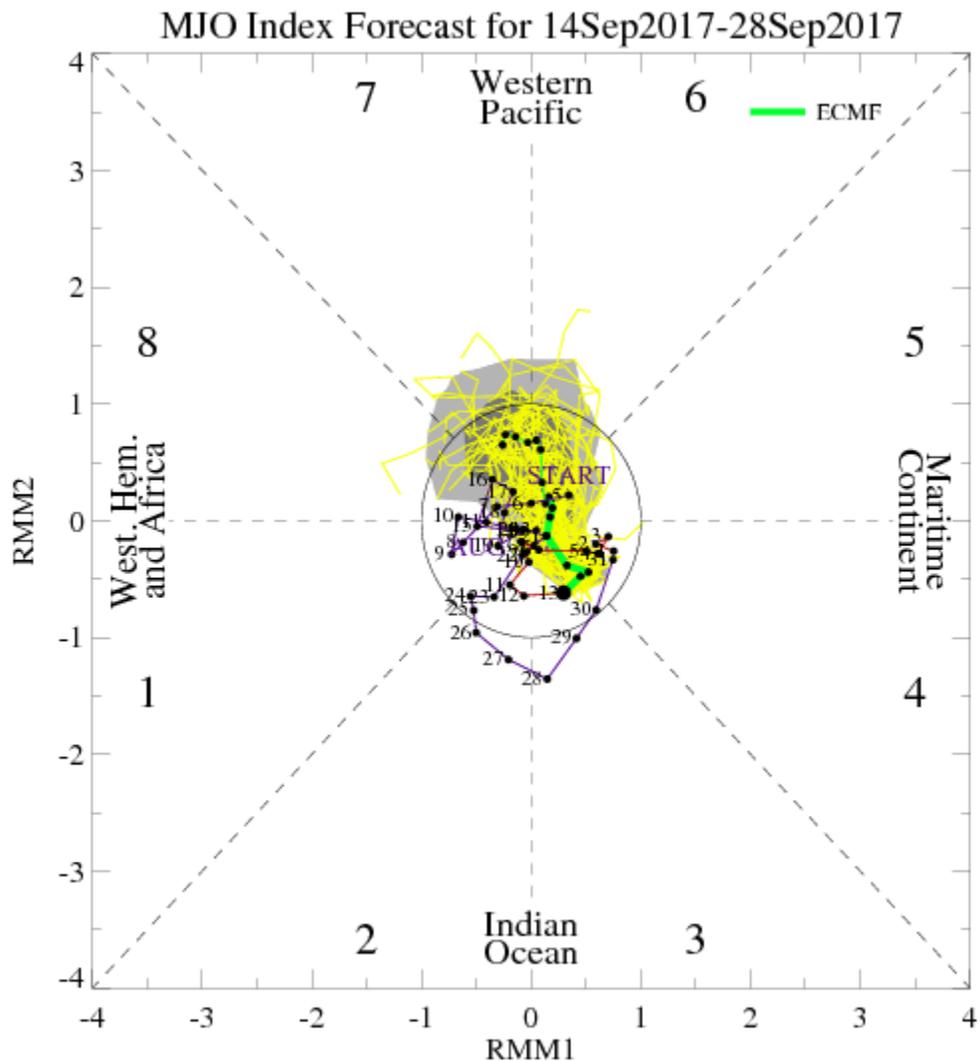


Figure 3: ECMWF forecast of the MJO from September 14, 2017 - September 28, 2017.

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

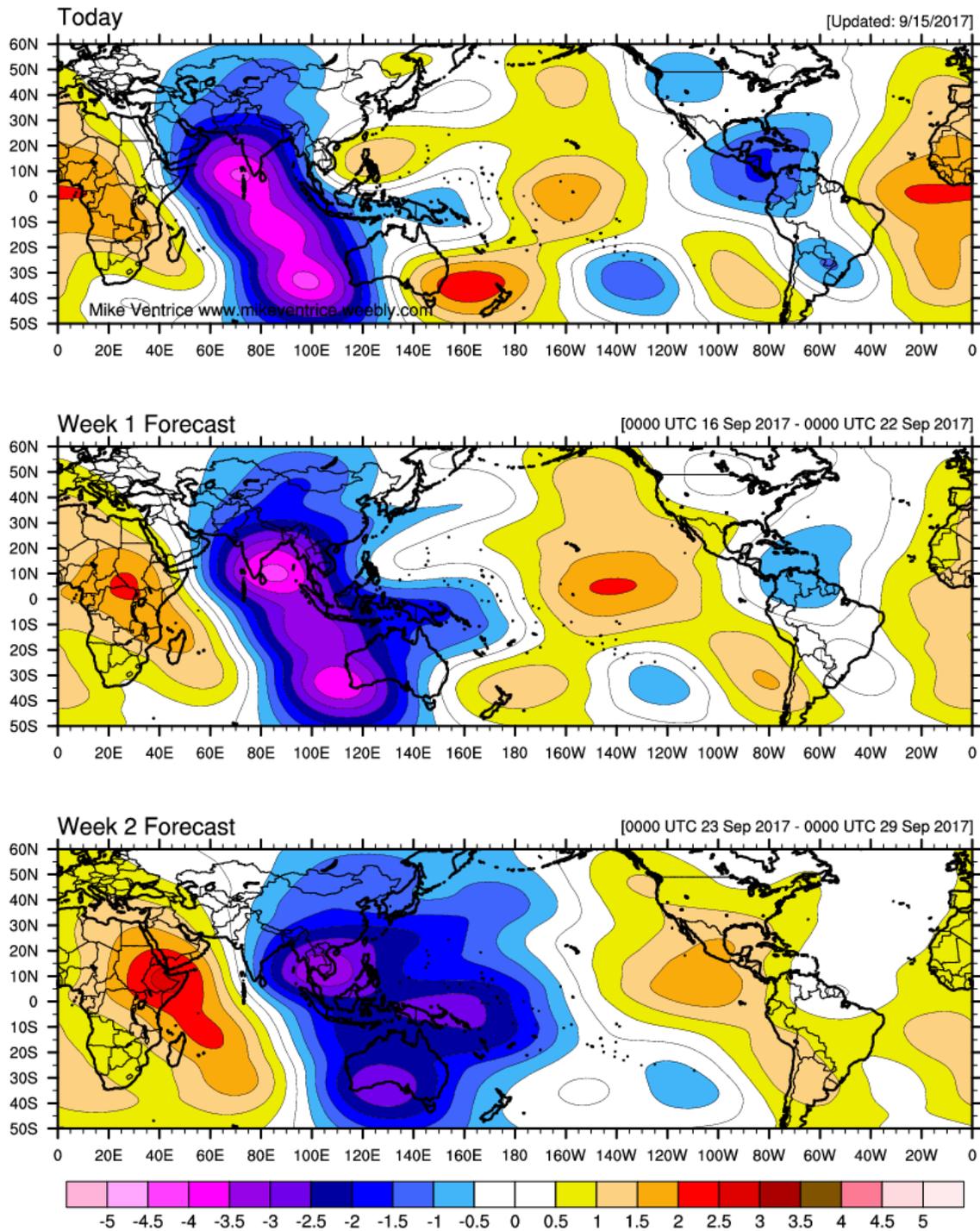


Figure 4: Anomalous velocity potential as predicted by the GFS model for week one, with a statistical extrapolation for week two. Blue colors indicate anomalous upward motion while red colors indicate anomalous downward motion. Figure courtesy of Mike Ventrice.

5) Seasonal Forecast

The most recent seasonal forecast calls for an above-average season. We believe that the next two weeks will continue to be characterized by above-normal activity.

3 Upcoming Forecasts

The next two-week forecast will be issued on September 29 for the September 29 – October 12 period. A final forecast will be issued on October 13.

VERIFICATION OF SEPTEMBER 1 – SEPTEMBER 14, 2017 FORECAST

The two-week period from September 1 – September 14, 2017 was the most active September 1 – September 14 period on record. Hurricane Irma generated near-record Accumulated Cyclone Energy (ACE) during its lifetime, while Hurricane Jose and Hurricane Katia generated lesser amounts of ACE. 101 ACE were generated during the past two weeks, breaking the old September 1 – September 14 record of 94 ACE set in 1961. Needless to say, our above-normal forecast (>31 ACE) for the past two weeks correctly verified.