COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM SEPTEMBER 29 – OCTOBER 12, 2016

We expect that the next two weeks will be characterized by above-average amounts (>130 percent) of activity relative to climatology. The above-average forecast is due to Tropical Storm Matthew which is likely to generate considerable ACE while tracking across the Caribbean and western Atlantic.

(as of 29 September 2016)

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In Memory of William M. Gray[2]

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

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1 Introduction

This is the eighth 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) the current and projected state of the Madden-Julian Oscillation (MJO) and 5) the 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 knots^2) 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. We issue forecasts for ACE using three categories as defined in Table 1.

Table 1: ACE forecast definition.

Parameter	Definition
Above-Average	Greater than 130% of Average ACE
Average	70% - 130% of Average ACE
Below-Average	Less than 70% of Average ACE

2 Forecast

We believe that the next two weeks will be characterized by activity at above-average levels (>130 percent of climatology). The average ACE accrued during the period from 1981-2010 from September 29 – October 12 was 9 units, and consequently, our forecast for the next two weeks is for 13 or more ACE units to be generated.

The above-average forecast is due to Tropical Storm Matthew which has recently formed in the eastern Caribbean. Matthew is forecast to intensify into a hurricane and track slowly across the Caribbean before turning northward. Assuming that the National Hurricane Center's track and intensity forecast are correct for the next five days, and the numerical guidance has a reasonably good idea of its future intensity, Matthew should generate enough ACE to qualify the two-week period as above average. The National Hurricane Center is not looking for any additional TC development in the next five days. None of the reliable global models develop any significant TCs in the next week.

The Madden-Julian Oscillation is forecast to remain weak over the next two weeks.

Figure 1 displays the tracks that tropical cyclones have taken during the period from September 29 – October 12 for the years from 1950-2008. Figure 2 displays the September 29 – October 12 forecast period with respect to climatology. The September

29 – October 12 period is after the climatological peak of the Atlantic hurricane season. Typically, intense TCs during this period tend to shift towards the Caribbean.

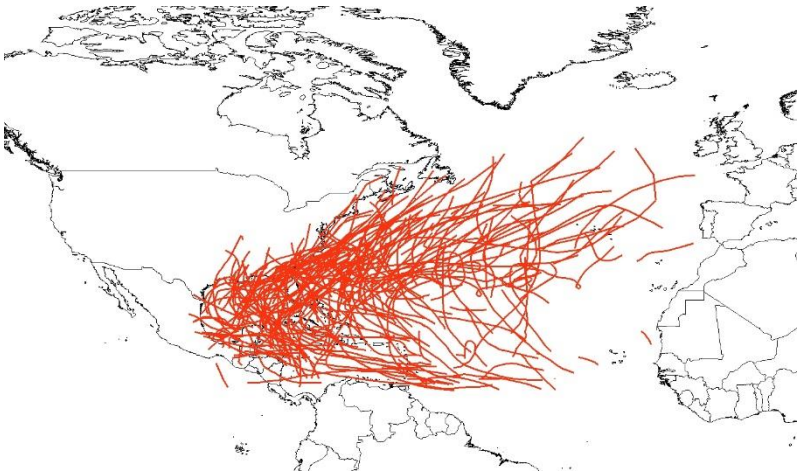

Figure 1: Tracks that named tropical cyclones have taken over the period from September 29 – October 12 for the years from 1950-2008.

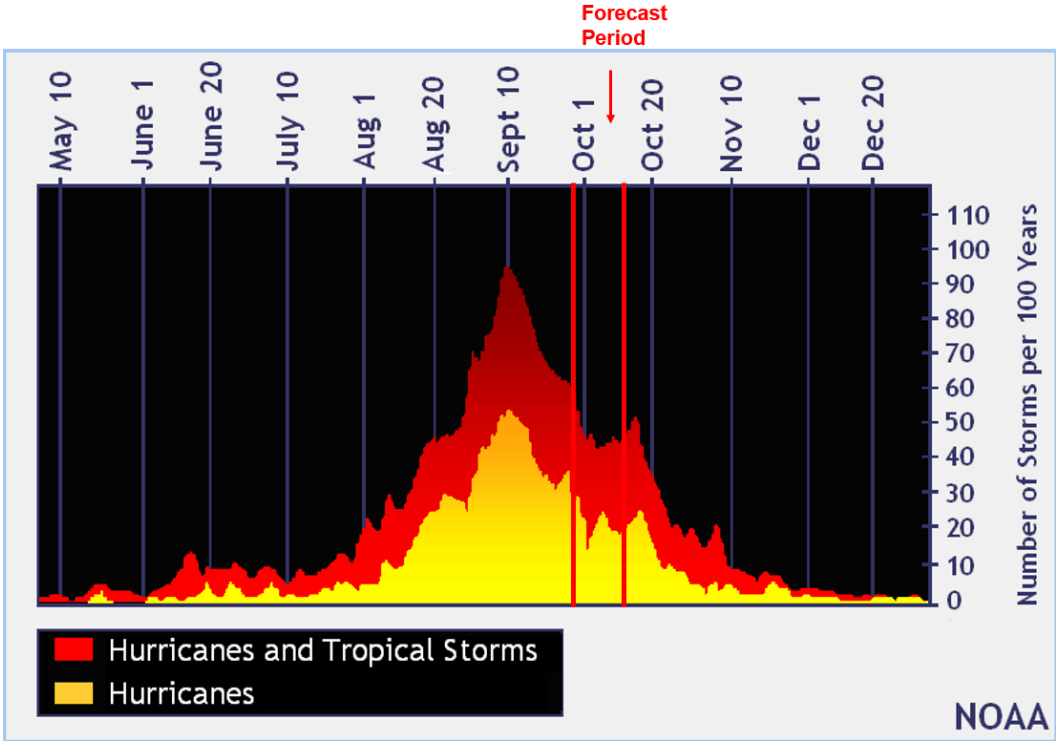

Figure 2: The current forecast period (September 29 – October 12) with respect to climatology. Figure courtesy of NOAA.

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 29 – October 12.

1) Current Storm Activity

Tropical Storm Matthew has recently formed in the eastern Caribbean. We estimate that Matthew will generate considerable ACE as it tracks across the Caribbean and the western Atlantic. This is the primary reason why we are forecasting above-average ACE to be generated over the next two weeks.

2) National Hurricane Center Tropical Weather Outlook

No areas are currently listed in the National Hurricane Center Tropical Weather Outlooks.

3) Global Model Analysis

No reliable global models develop any other TCs significantly in the next seven days.

4) Madden-Julian Oscillation

The Madden-Julian Oscillation is forecast to remain weak over the next two weeks (Figure 3). Table 2 displays ACE generated in various MJO phases.

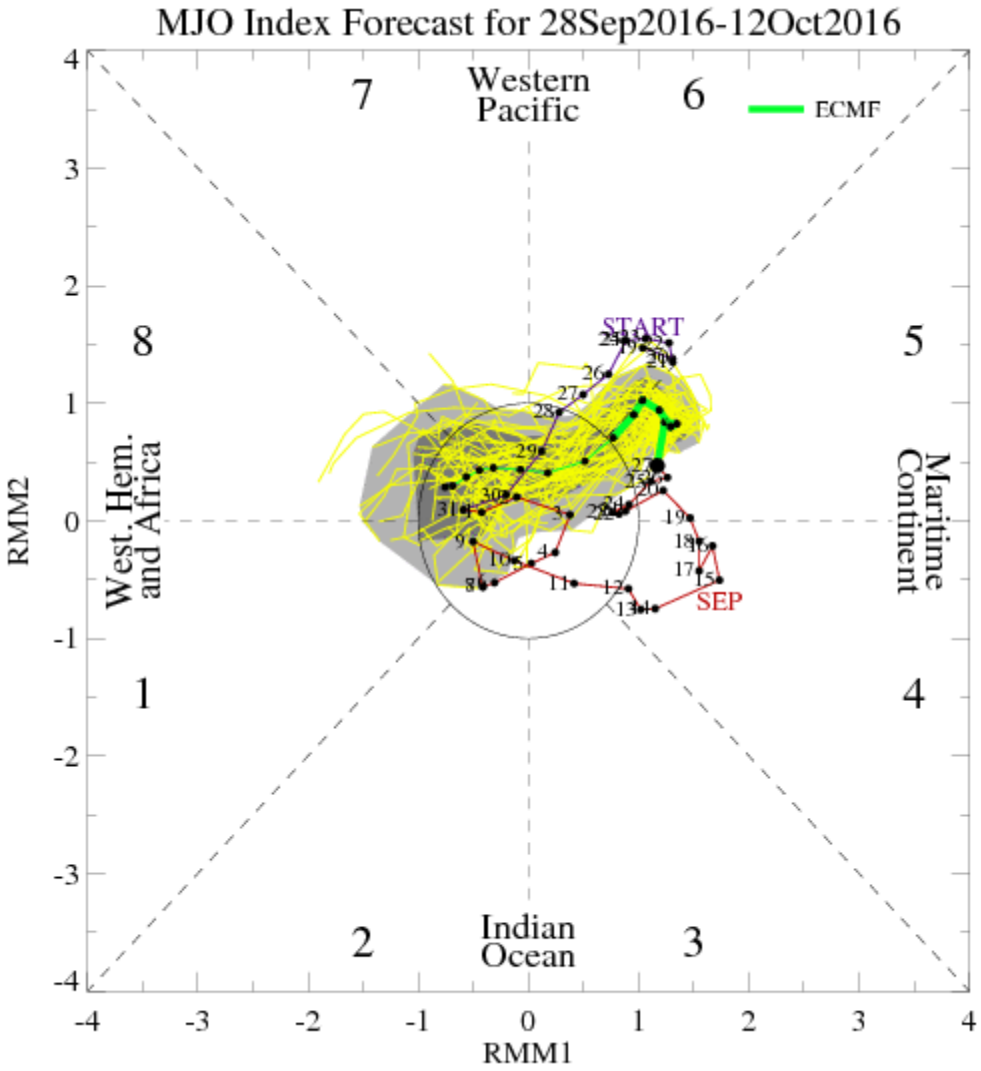

Figure 4: ECMWF forecast of the MJO from September 28, 2016 – October 12, 2016.

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 most recent seasonal forecast called for an average season. To date, the hurricane season has been somewhat less active than normal for ACE. We expect that Tropical Storm Matthew may generate enough ACE to help push ACE values back closer to their seasonal averages.

3 Upcoming Forecasts

The final two-week forecast for 2016 will be issued on October 13 for the October 13-October 26 period.

VERIFICATION OF SEPTEMBER 15 – SEPTEMBER 28, 2016 FORECAST

The two-week forecast of tropical cyclone activity from September 15 – September 28 verified correctly. Activity at below-average levels was predicted (<=16 ACE units), and observed activity was at below-average levels (11 ACE units). Ian, Julia, Karl, Lisa and Matthew all contributed to the ACE generated during the two-week period.