COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM SEPTEMBER 1 – SEPTEMBER 14, 2016

We expect that the next two weeks will be characterized by average amounts (70-130 percent) of activity relative to climatology.

(as of 1 September 2016)

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This forecast as well as past forecasts and verifications are available online at
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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 near-average levels (70-130 percent of climatology). The average ACE accrued during the period from 1981-2010 from September 1- September 14 was 26 units, and consequently, our forecast for the next two weeks is for 19-34 ACE units to be generated.

The average forecast is due to several factors. Hurricane Gaston is likely to generate an additional 5-8 ACE units as it tracks across the North Atlantic. Tropical Storm Hermine has the potential to generate a few ACE units as it moves north through the Gulf of Mexico and then across Florida. Tropical Depression 8, if it develops, should only generate minimal ACE before becoming extra-tropical. One other area is currently being watched by the National Hurricane Center near the Cabo Verde Islands that is given a low chance of development in the next five days. While earlier global model runs developed this system significantly, most of the models have backed off significantly in developing this TC in recent model runs.

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 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.
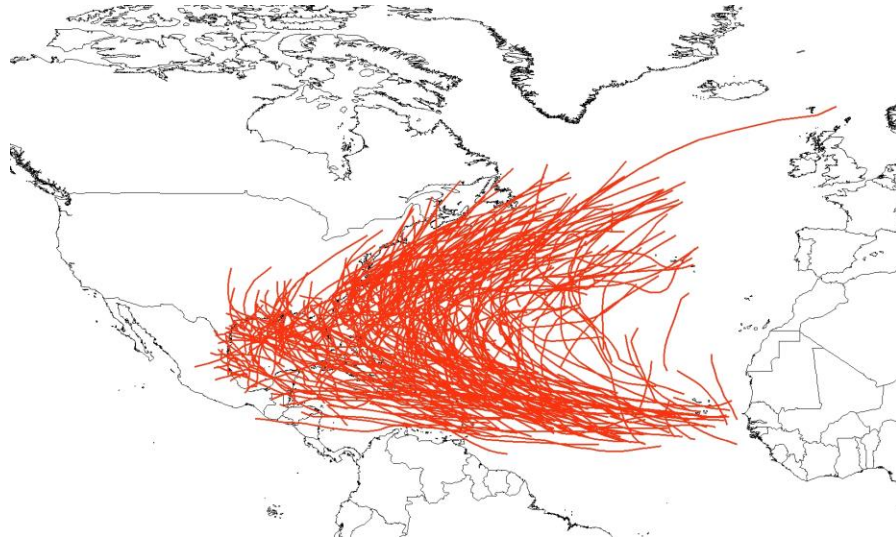

Figure 1: Tracks that named tropical cyclones have taken over the period from September 1 – September 14 for the years from 1950-2008.
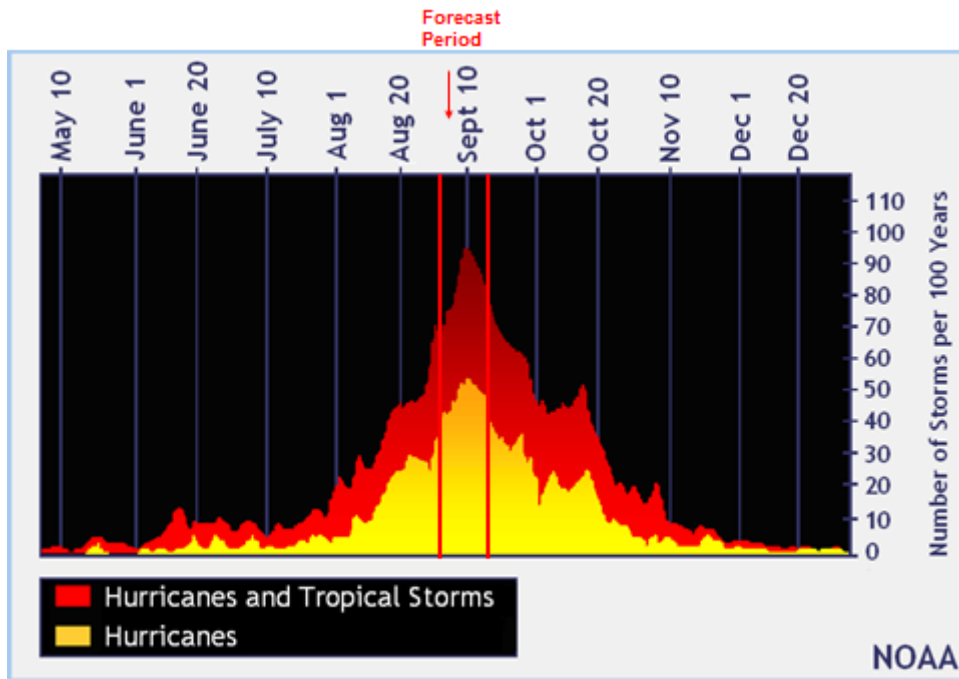

Figure 2: The current forecast period (September 1 – September 14) with respect to climatology. Figure courtesy of NOAA.

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

Hurricane Gaston is likely to generate several additional ACE units before becoming extra-tropical in the North Atlantic. Tropical Storm Hermine may generate a few ACE units as it tracks across the eastern Gulf of Mexico and then along the U.S. East Coast. Tropical Depression 8, if it develops, is expected to generate very small levels of ACE.

2) National Hurricane Center Tropical Weather Outlook

There is a low potential for TC development in the eastern Atlantic in the next five days from an easterly wave currently located near the Cabo Verde Islands.

3) Global Model Analysis

Most global models do not develop any new significant TCs in the next week.

4) Madden-Julian Oscillation

The Madden-Julian Oscillation has weakened over the past few days, and the ECMWF model is currently calling for a continued weak MJO signal over the next two weeks (Figure 3). We consequently do not foresee the MJO being a significant factor in Atlantic TC development over the next two weeks. Table 2 shows Atlantic TC activity associated with various phases of the MJO over the period from 1974-2007.
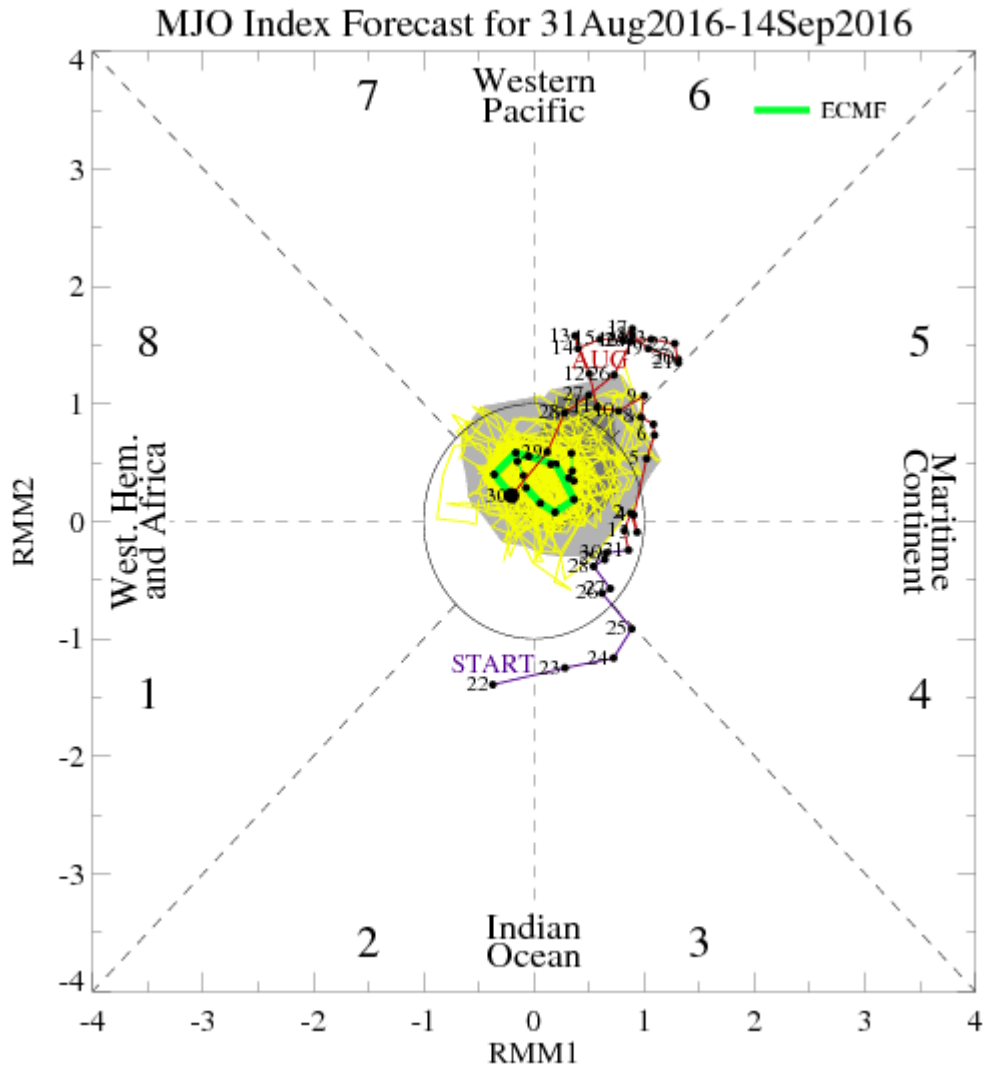
Figure 3: ECMWF forecast of the MJO from August 31, 2016 - September 14, 2016.

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 calls for a near-average season. We utilize the seasonal forecast as a baseline for our two-week forecasts. Given the lack of any significant MJO-driven subseasonal variability over the next two weeks, we expect near-average TC activity in the Atlantic over the next two weeks.

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, 2016 FORECAST

The two-week forecast of below-average tropical cyclone activity from August 18 – August 31 verified in the average category. Activity at below-average levels was predicted (<=13 ACE units), and observed activity was at near-average levels (23 ACE units). The August 18-31 long-term average was 18 ACE units. Hurricane Gaston generated most of the ACE during the period (21 units), while Fiona and Hermine combined for nominal ACE (2 units).