COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM AUGUST 18 - 31, 2017

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

(as of 18 August 2017)

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In Memory of William M. Gray[3]

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) 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 (greater than 130 percent of climatology). The average ACE accrued during the period from 1981-2010 for August 14-August 27 was 18 units, and consequently, our forecast for the next two weeks is for greater than 23 ACE units to be generated.

The above-average forecast is due to several factors. Harvey has formed in the central tropical Atlantic and has the potential to generate several ACE units as it tracks across the Caribbean. Two additional tropical waves are given a high and medium chance of forming by the National Hurricane Center in the next five days, respectively. Both of these waves would have the potential to generate moderate levels of ACE if they were to form. Most of the global models are somewhat pessimistic about TC formation over the next week, but these models have struggled with Atlantic TC formation in recent weeks. The ECMWF is also hinting at another potentially very strong wave moving off of Africa in 8-9 days which could generate ACE before the end of the two-week period.

Figure 1 displays the tracks that tropical cyclones have taken during the period from August 18 - August 31 for the years from 1950-2008. Figure 2 displays the August 18 – August 31 forecast period with respect to climatology. The August 18 – August 31 period is just prior to the most active portion of the hurricane season climatologically.

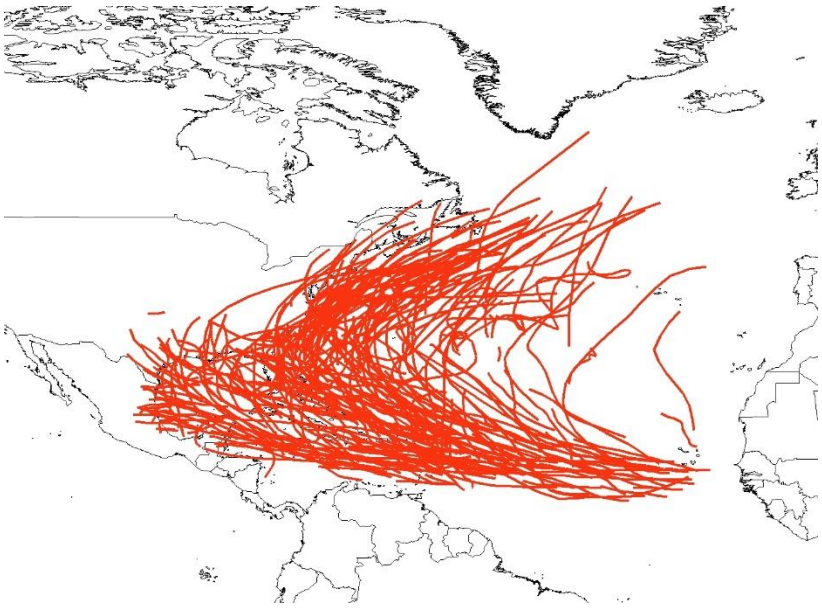

Figure 1: Tracks that named tropical cyclones have taken over the period from August 18 – August 31 for the years from 1950-2008.

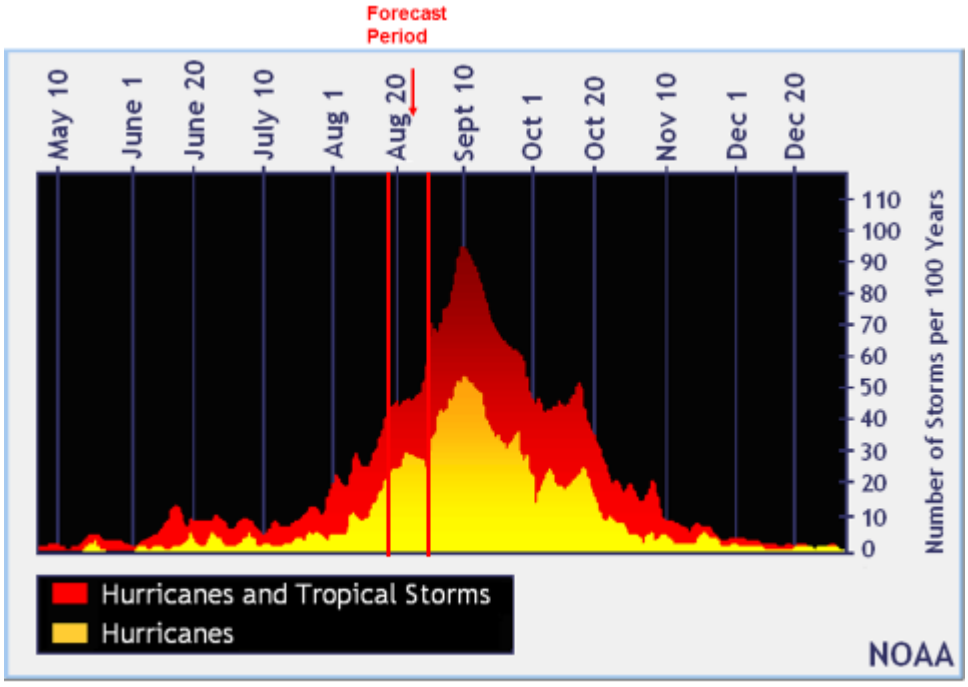

Figure 2: The current forecast period (August 18 – August 31) with respect to climatology. Figure courtesy of NOAA.

We now examine how we believe each of the five factors discussed in the introduction will impact Atlantic TC activity for the period from August 18 – August 31.

1) Current Storm Activity

Tropical Storm Harvey has just formed in the central tropical Atlantic. Harvey has the potential to generate several ACE units as it tracks across the Caribbean.

2) National Hurricane Center Tropical Weather Outlook

The latest NHC Tropical Weather Outlook gives a high chance of TC development for a wave in the central tropical Atlantic and a medium chance of TC development for a wave in the eastern tropical Atlantic. If either of these two waves became a TC, they would have the potential to generate moderate levels of ACE as they tracked across the basin.

3) Global Model Analysis

In addition to the areas already discussed, the ECMWF model is calling for a very strong wave to move off of Africa in 8-9 days. This wave could also generate some ACE during the two-week period being predicted here.

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 upward motion is being predicted over the tropical Atlantic over the next week, with a potential transition to anomalous downward motion being predicted for week two (Figure 4). Upper-level winds are forecast to be near normal or have slight easterly anomalies across the tropical Atlantic. Since upper-level winds in the tropical Atlantic typically blow out of the west, easterly anomalies reduce levels of vertical wind shear (Figure 5).

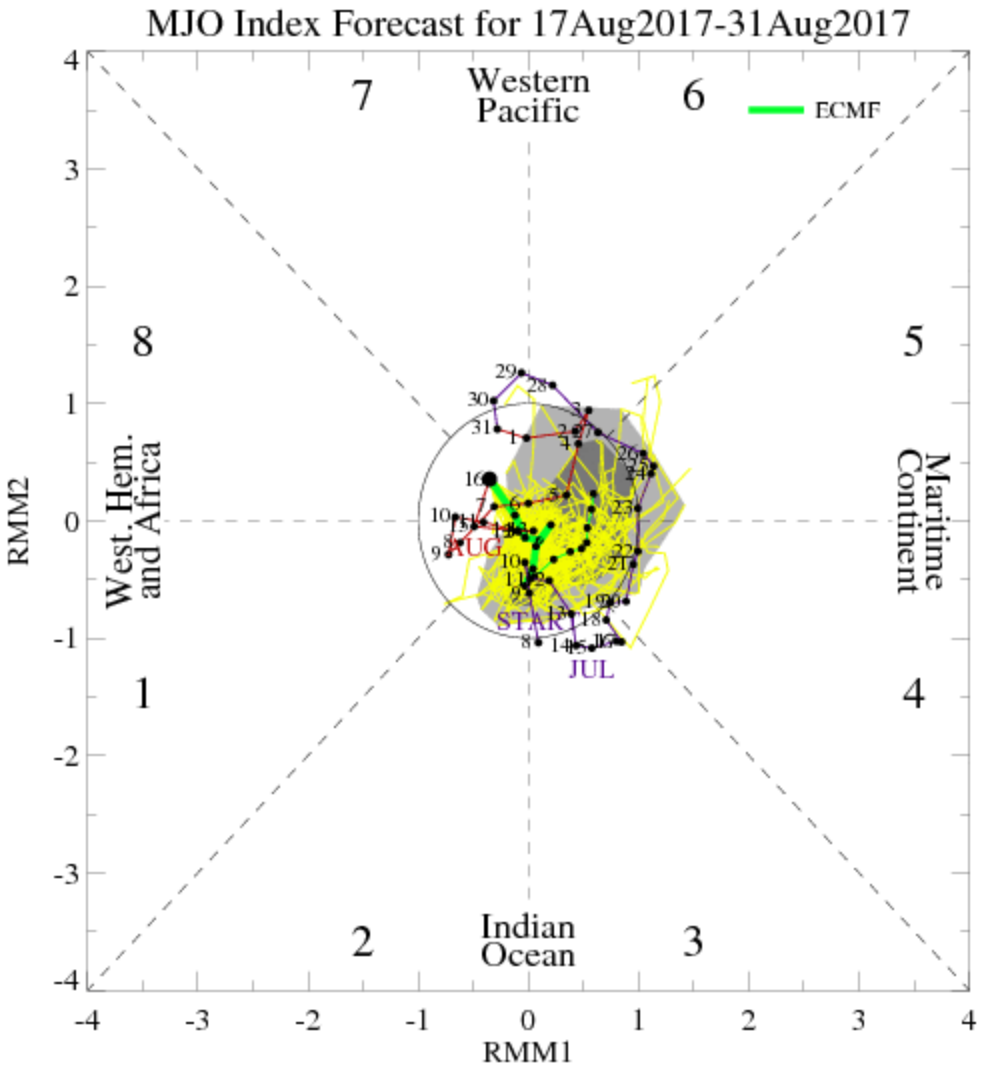

Figure 3: ECMWF forecast for the MJO from August 17, 2017 through August 31, 2017. Generally weak MJO activity is predicted based on the Wheeler-Hendon index.

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

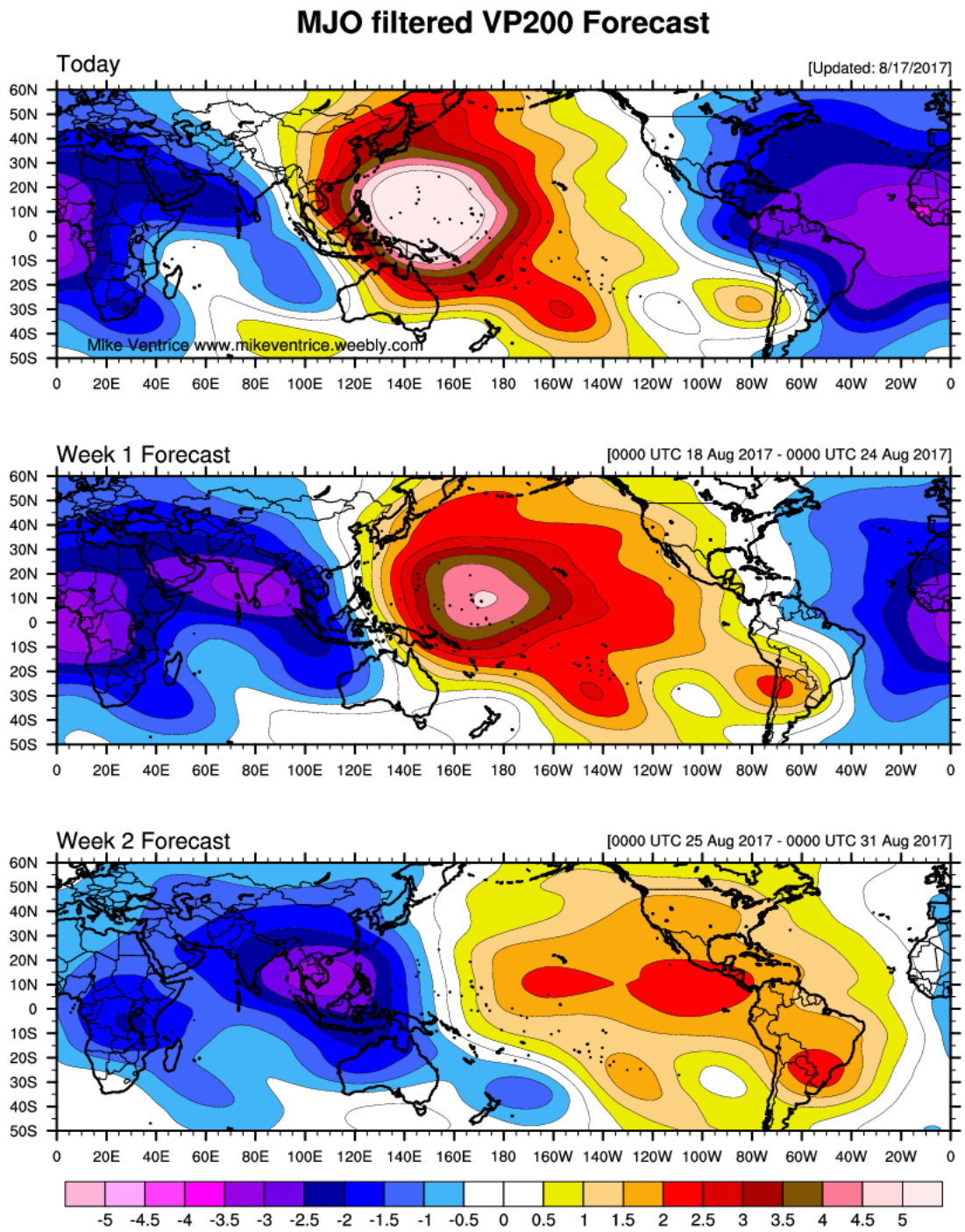

Figure 4: Anomalous velocity potential as predicted by the GFS model for week one, with a statistical extrapolation for week two. Blue colors indicate anomalous upward motion while red colors indicate anomalous downward motion. Figure courtesy of Mike Ventrice.

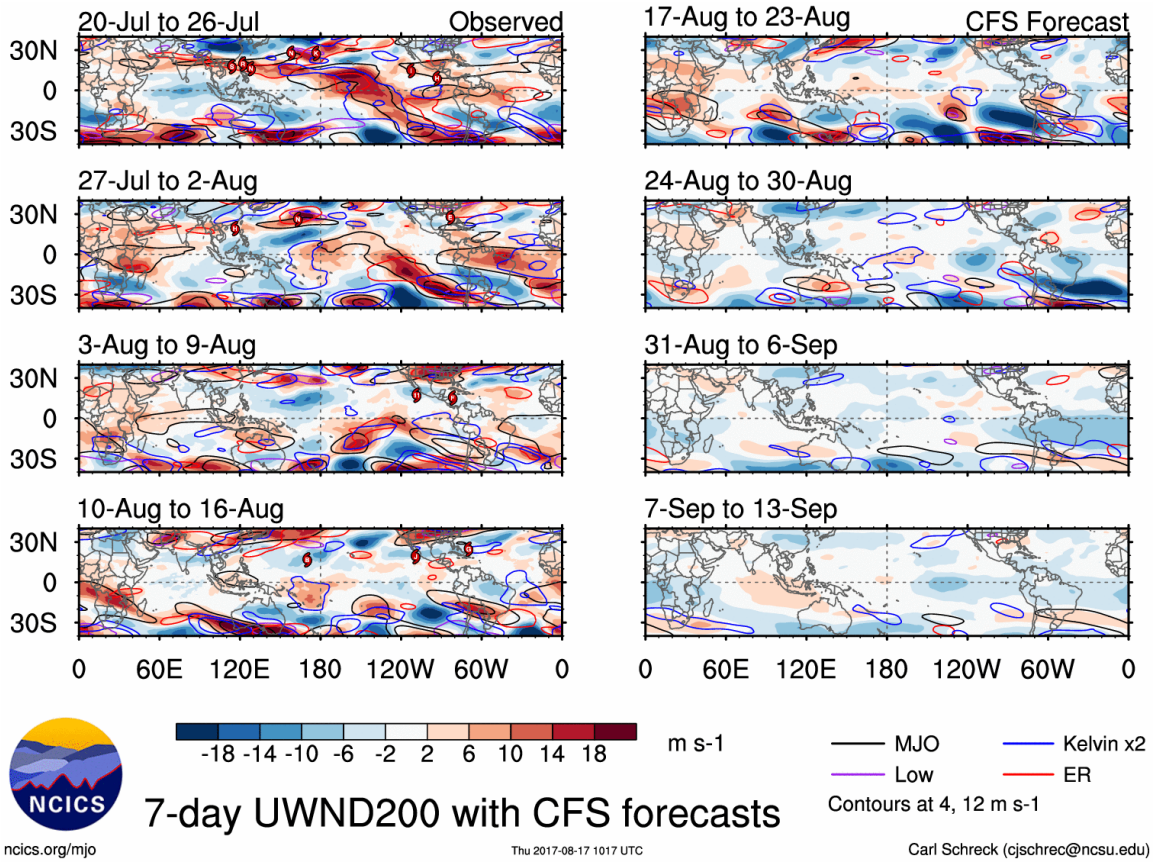

Figure 5: Observed 200-mb zonal winds since July 20 and predicted 200-mb zonal winds from the Climate Forecast System through September 13. Figure courtesy of Carl Schreck.

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 1 for the September 1 – September 14 period. Additional two-week forecasts will be issued on September 15, September 29 and October 13.

VERIFICATION OF AUGUST 4 – AUGUST 17, 2017 FORECAST

The two-week forecast of tropical cyclone activity from August 4 – August 17 verified well. Above-average ACE was predicted (>=11 ACE units). 11 ACE units were generated. Gert generated 7 ACE units, while Franklin generated the other 4 ACE units. Harvey was named right at the end of the two-week forecast period and generated negligible ACE (e.g., 0.1 ACE).