COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM SEPTEMBER 29 – OCTOBER 12, 2015

We expect that the next two weeks will be characterized by average amounts (70-130 percent) of activity relative to climatology. The average forecast is due to Tropical Storm Joaquin which will likely generate several ACE units.

(as of 29 September 2015)

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

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1 Introduction

This is the seventh 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 average levels (70-130 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 7-12 ACE units to be generated.

The average forecast is due to several factors. The primary reason why average activity is predicted is Tropical Storm Joaquin, which looks likely to generate several ACE units as it meanders westward across the subtropical Atlantic before moving northward later this week. One additional invest (Invest 90L) is given a medium chance of development in the next five days. None of the global models develop anything else significantly in the next seven days.

The Madden-Julian Oscillation is forecast to remain weak over the next two weeks, with any amplification in Phase 8. Phase 8 tends to be characterized by average activity across the Atlantic basin.

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 TC formation during this period tends to shift towards the Caribbean.

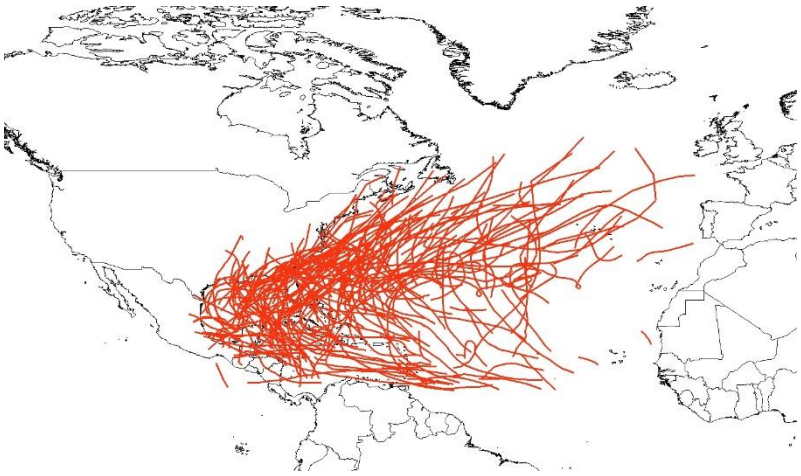

Figure 1: Tracks that named tropical cyclones have taken over the period from September 29 – October 12 for the years from 1950-2008.

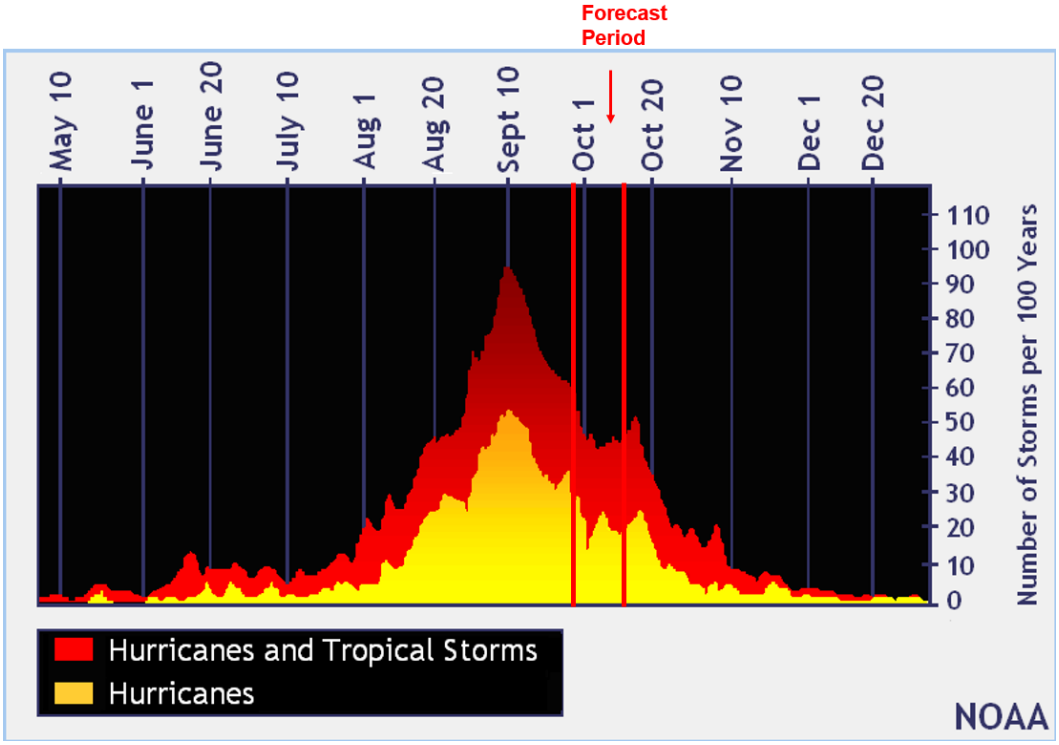

Figure 2: The current forecast period (September 29 – October 12) with respect to climatology. Figure courtesy of NOAA.

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 Joaquin has recently formed in the subtropical western Atlantic. Joaquin is estimated to generate several ACE units over the next few days, and this TC is the primary reason why we are forecasting average ACE to be generated over the next two weeks.

2) National Hurricane Center Tropical Weather Outlook

The latest NHC Tropical Weather Outlook has one low chance area in the Gulf of Mexico and one medium chance area for development in the subtropical Atlantic. The Gulf of Mexico area looks highly unlikely to develop before tracking over the US coast, while the subtropical Atlantic has the potential to form and intensify into a TC over the next few days.

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 currently quite weak, which is typical of strong El Niño events (Figure 3). Any amplification of the MJO that does occur during the next two weeks looks to do so in Phases 8 (Figure 4). Phase 8 is generally characterized by average TC activity in the Atlantic. Table 2 displays ACE generated in various MJO phases.

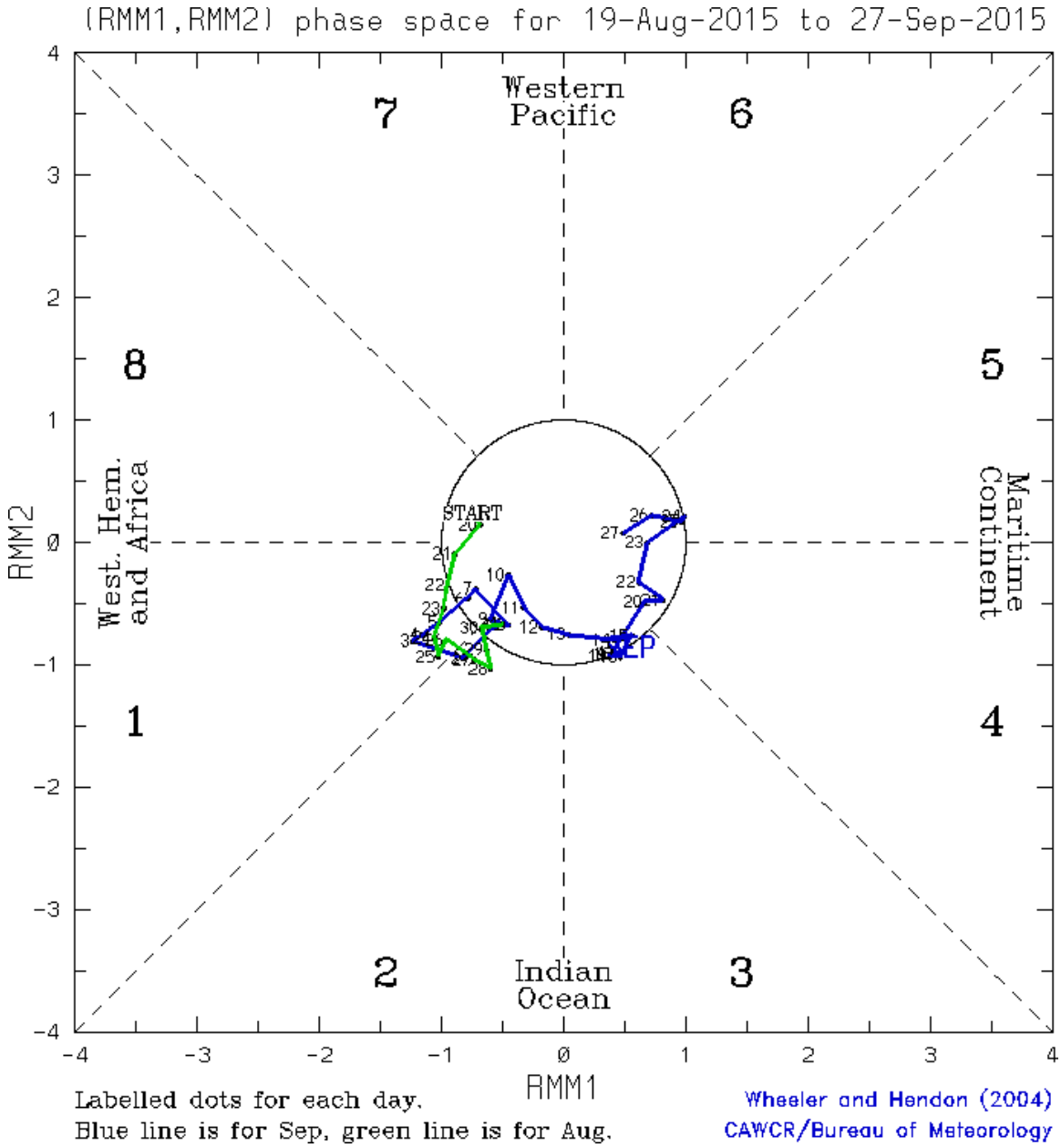

Figure 3: Estimated position of the MJO from August 19, 2015 through September 27, 2015.

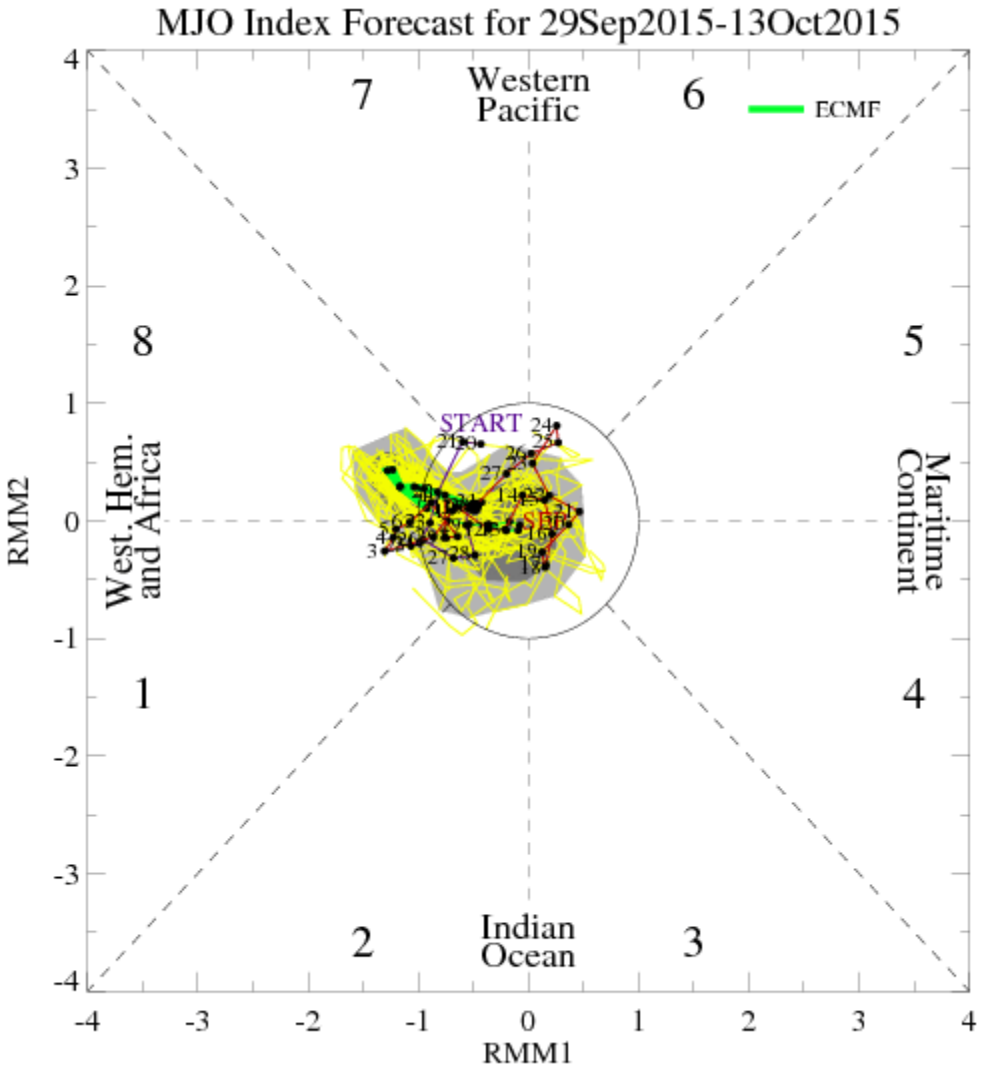

Figure 4: ECMWF forecast of the MJO from September 29, 2015 – October 13, 2015.

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 well below-average season. We utilize the seasonal forecast as a baseline for our two-week forecasts. The strong El Niño currently present in the tropical Pacific has generated extraordinarily harsh conditions across the Caribbean during this year's hurricane season to date. We believe that any development in the Caribbean is highly unlikely for the next two weeks.

3 Upcoming Forecasts

The final two-week forecast for 2015 will be issued on October 13 for the October 13-October 26 period.

VERIFICATION OF SEPTEMBER 15 – SEPTEMBER 28, 2015 FORECAST

The two-week forecast of below-average tropical cyclone activity from September 15 – September 28 verified correctly in the below-average category. Activity at below-average levels was predicted (<=16 ACE units), and observed activity was at well below-average levels (3 ACE units). Ida generated the ACE that was observed during the two-week period.