

**COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE
ACTIVITY FROM SEPTEMBER 16 – SEPTEMBER 29, 2020**

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

(as of 16 September 2020)

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In Memory of William M. Gray⁴

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 12th year that we have issued shorter-term forecasts of tropical cyclone activity (TC) 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.

Our forecast definition of above-normal, normal, and below-normal Accumulated Cyclone Energy (ACE) periods is defined by ranking observed activity in the satellite era from 1966-2019 and defining above-normal, normal and below-normal two-week periods based on terciles. Since there are 54 years from 1966-2019, each tercile is composed of 18 years. The 18 years with the most active ACE periods from September 16 – September 29 are classified as the upper tercile, the 18 years with the least active ACE periods from September 16 – September 29 are classified as the lower tercile, while the remaining 18 years are classified as the middle tercile.

Table 1: ACE forecast definition for TC activity for September 16 – September 29, 2020.

Parameter	Definition
Above-Normal	Upper Tercile (>23 ACE)
Normal	Middle Tercile (6–23 ACE)
Below-Normal	Lower Tercile (<6 ACE)

2 Forecast

We believe that the next two weeks will be characterized by above-normal TC activity (>23 ACE). Hurricane Teddy is likely to generate enough ACE by itself to reach the upper tercile. In addition to Teddy, Paulette, Sally and Vicky are likely to generate minimal ACE before dissipation. The National Hurricane Center has three areas that they are currently monitoring for tropical cyclone (TC) development. While the various global models have varying solutions as to how intense these systems will get, both the system in the western Gulf of Mexico and in the eastern tropical Atlantic have the potential to generate small to medium levels of ACE should they develop. The global models also highlight additional potential TC formation off of the west African coast in the 7-10-day period. The large-scale pattern looks to generally remain conducive for Atlantic hurricane formation and intensification, although not as conducive as during the past two weeks.

The Madden-Julian Oscillation (MJO) is currently located in phase 4 over the Maritime Continent and is forecast to continue its eastward propagation across the Maritime Continent at a somewhat weaker magnitude. The latest large-scale forecast from the ECMWF continues to generally indicate enhanced vertical motion over Africa

and the Indian Ocean with suppressed vertical motion over most of the tropical Pacific, which typically favors Atlantic hurricane activity. A convectively-coupled Kelvin wave may suppress convection in the tropical Atlantic around September 20 – 25, potentially hindering MDR development during that time.

Figure 1 displays the formation locations of TCs from September 16 – September 29 for the years from 1966 – 2019 (e.g., the satellite era), along with the maximum intensities that these storms reached. Figure 2 displays the September 16 – September 29 forecast period with respect to climatology. Although after the climatological peak of the Atlantic hurricane season, the tropical Atlantic generally remains quite active during this time. The primary threat formation area for major hurricanes in mid- to late September is in the eastern and central tropical Atlantic.

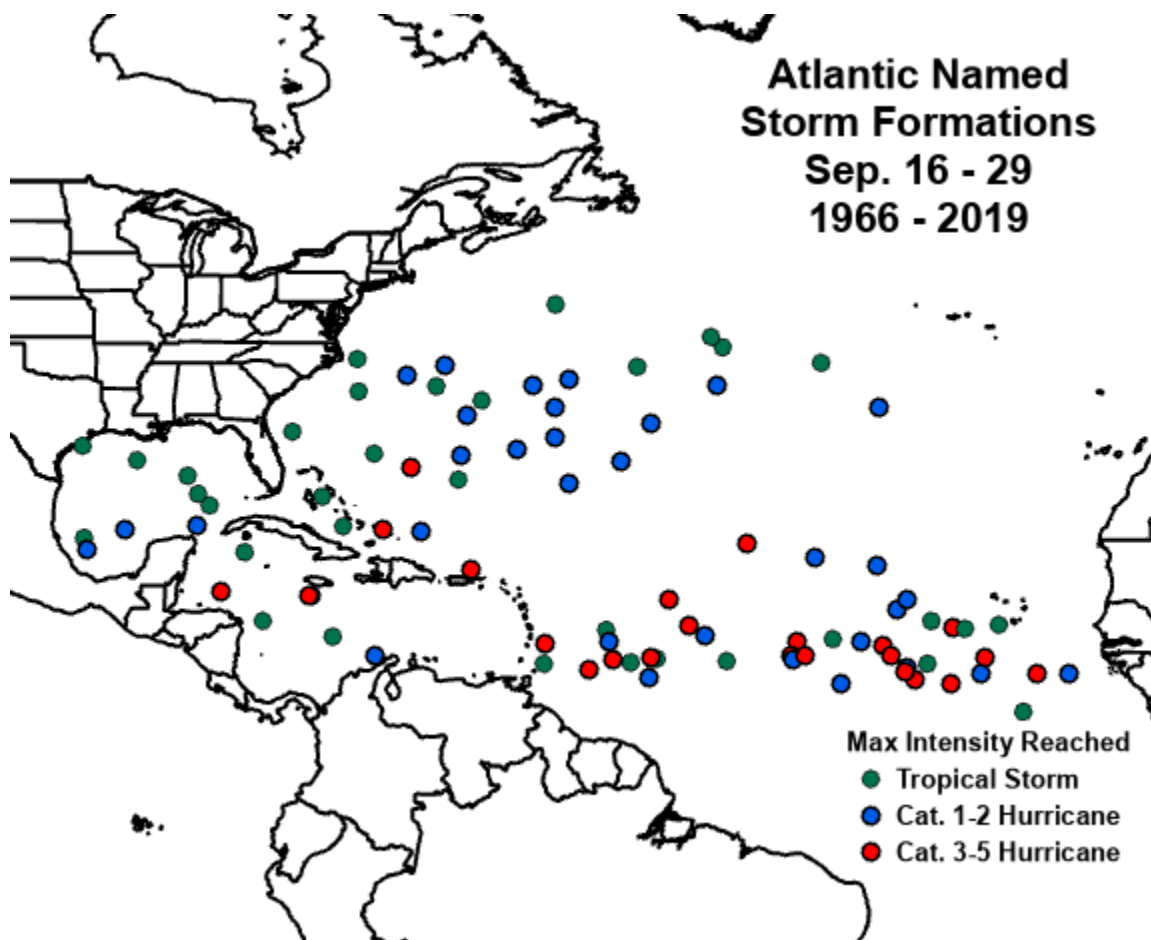


Figure 1: Atlantic named storm formations from September 16 – September 29 during the years from 1966 – 2019 and the maximum intensity that these named storms reached.

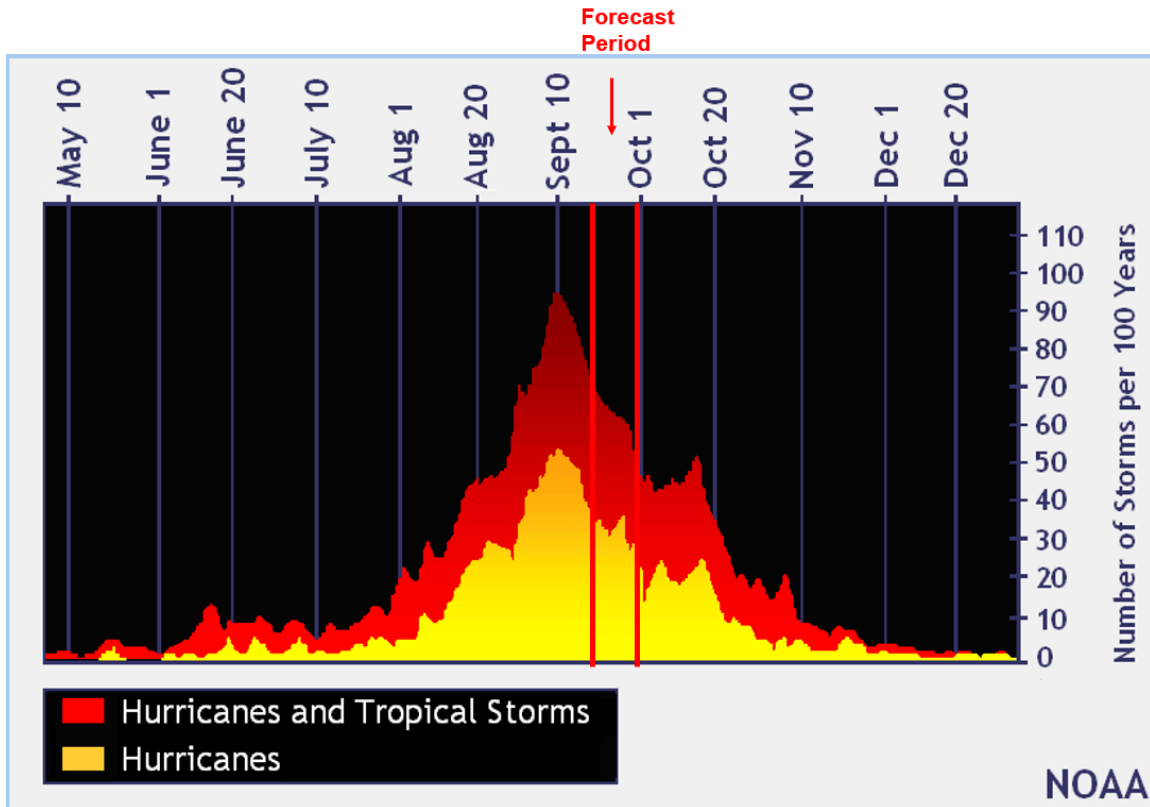


Figure 2: The current forecast period (September 16 – September 29) with respect to climatology. Figure courtesy of NOAA.

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 16 – September 29.

1) Current Storm Activity

Hurricane Teddy is forecast to generate considerable ACE as it tracks across the North Atlantic. We estimate that Teddy will likely generate enough ACE by itself to equal the necessary ACE needed to reach the upper tercile for the two-week period. In addition to Teddy, Paulette, Sally and Vicky should generate minimal ACE before dissipation or undergoing extratropical transition. Paulette may also redevelop as a tropical system as it is forecast to track south by this weekend.

2) National Hurricane Center Tropical Weather Outlook

The latest NHC Tropical Weather Outlook has three areas indicated for potential tropical cyclone formation. The areas highlighted in orange and red have a medium chance and high chance of development in the next five days, respectively. Both of these areas have the potential to generate small to medium levels of ACE should they develop (Figure 3).

The global and regional models vary considerably with how much intensification these systems may undergo.

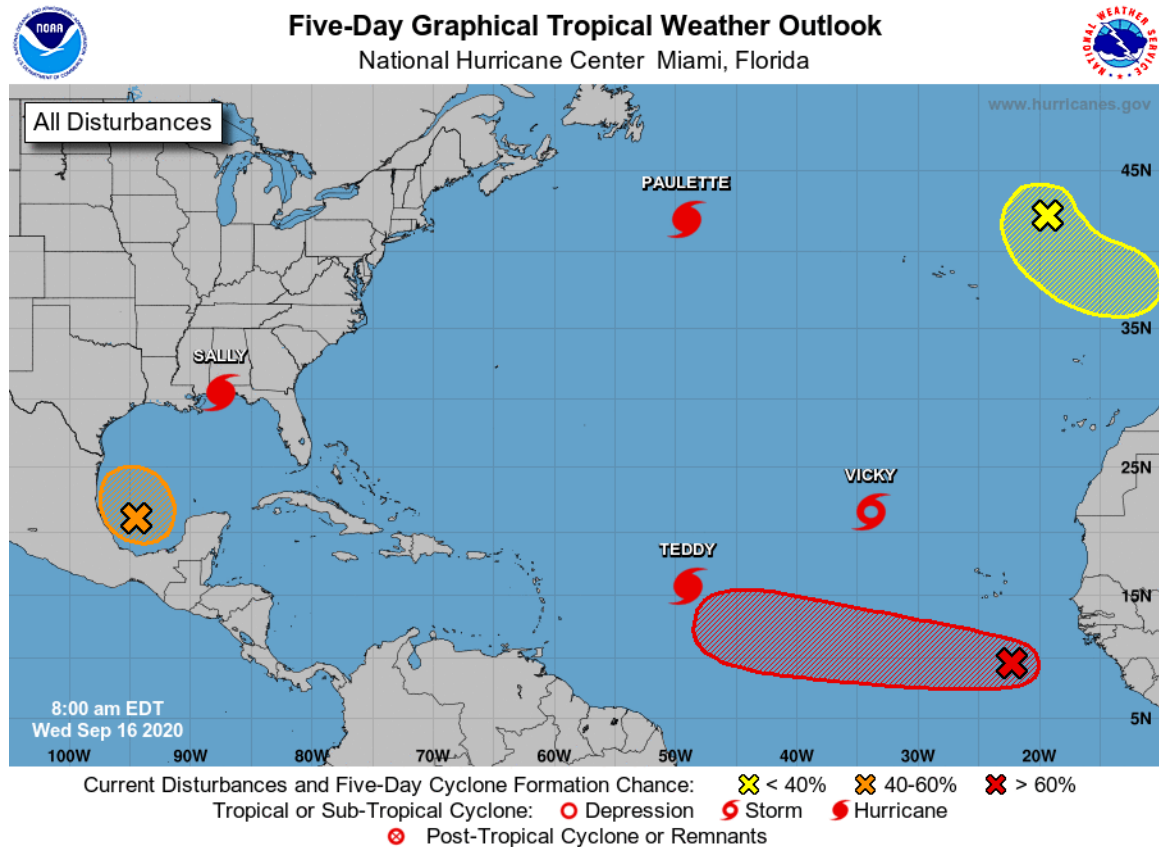


Figure 3: Current five-day Tropical Weather Outlook from the National Hurricane Center. Probabilities in this plot are chances for TC formation in the next 5 days.

3) Global Model Analysis

Both the GFS and ECMWF ensembles have some support for development of these two disturbances as highlighted by NHC. In addition, another easterly wave is forecast to emerge from Africa in about seven days and potentially intensify somewhat in the eastern Atlantic, although a suppressed phase of a convectively-coupled Kelvin wave may stifle development.

4) Madden-Julian Oscillation

The Madden-Julian Oscillation (MJO), as measured by the Wheeler-Hendon index, is currently in phase 4 over the Maritime Continent. The MJO is forecast to propagate into phase 5 and then weaken over the next two weeks, potentially due to the longer-term trend towards La Niña conditions (Figure 4). Table 2 summarizes the typical MJO

impacts on Atlantic TC activity. The upper-level velocity potential field generally favors upward motion over Africa and the Indian Ocean, with suppressed vertical motion over the tropical Pacific (Figure 5). There may be a brief deviation from this pattern due to the suppressed phase of a convectively-coupled Kelvin wave propagating across the Western Hemisphere in week one (Figure 6).

The Climate Forecast System (CFS) model is generally predicting below-normal shear across the eastern tropical Atlantic and Caribbean over the next two weeks, with elevated shear across the central tropical Atlantic around September 20 – 25. We have previously noted that we expect MDR development to potentially be suppressed during that time (Figure 7).

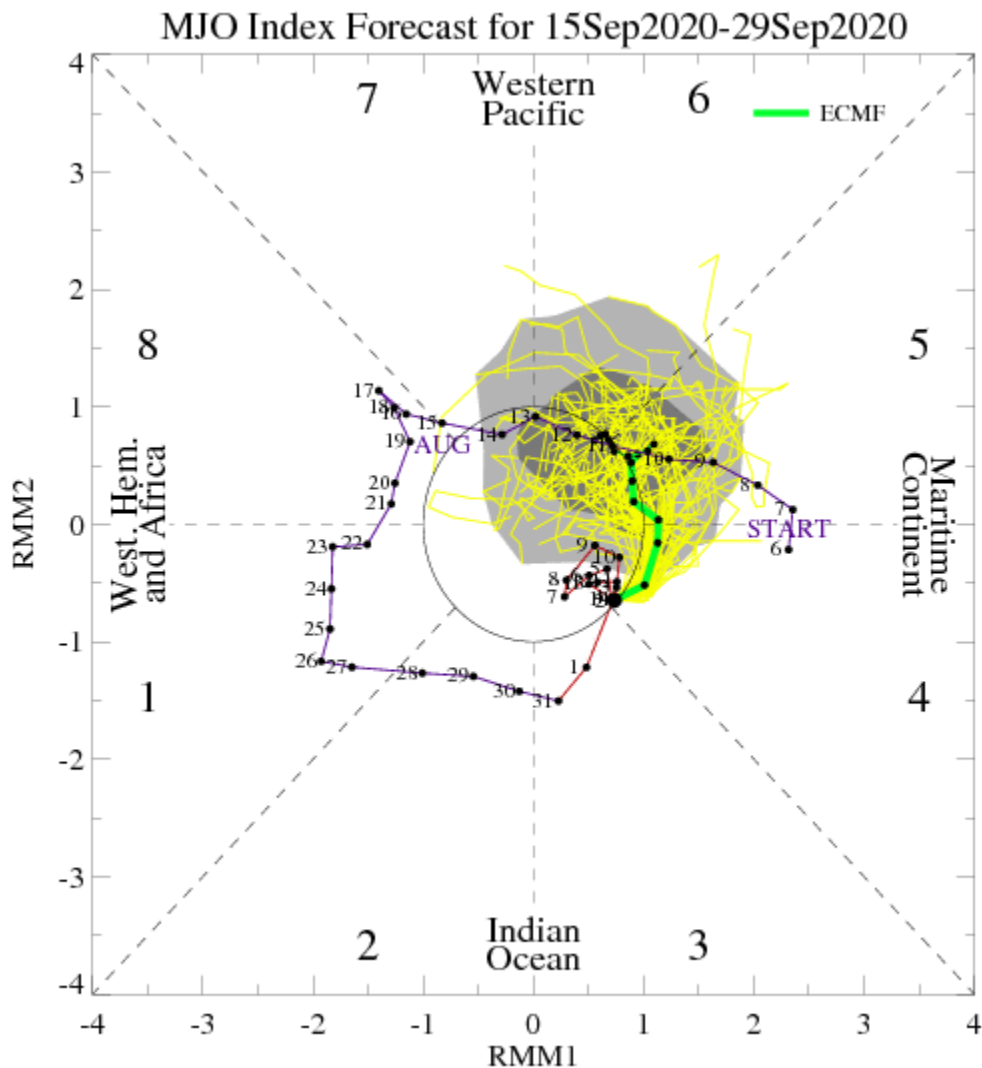


Figure 4: Predicted propagation of the MJO by the ECMWF model. Figure courtesy of NOAA.

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

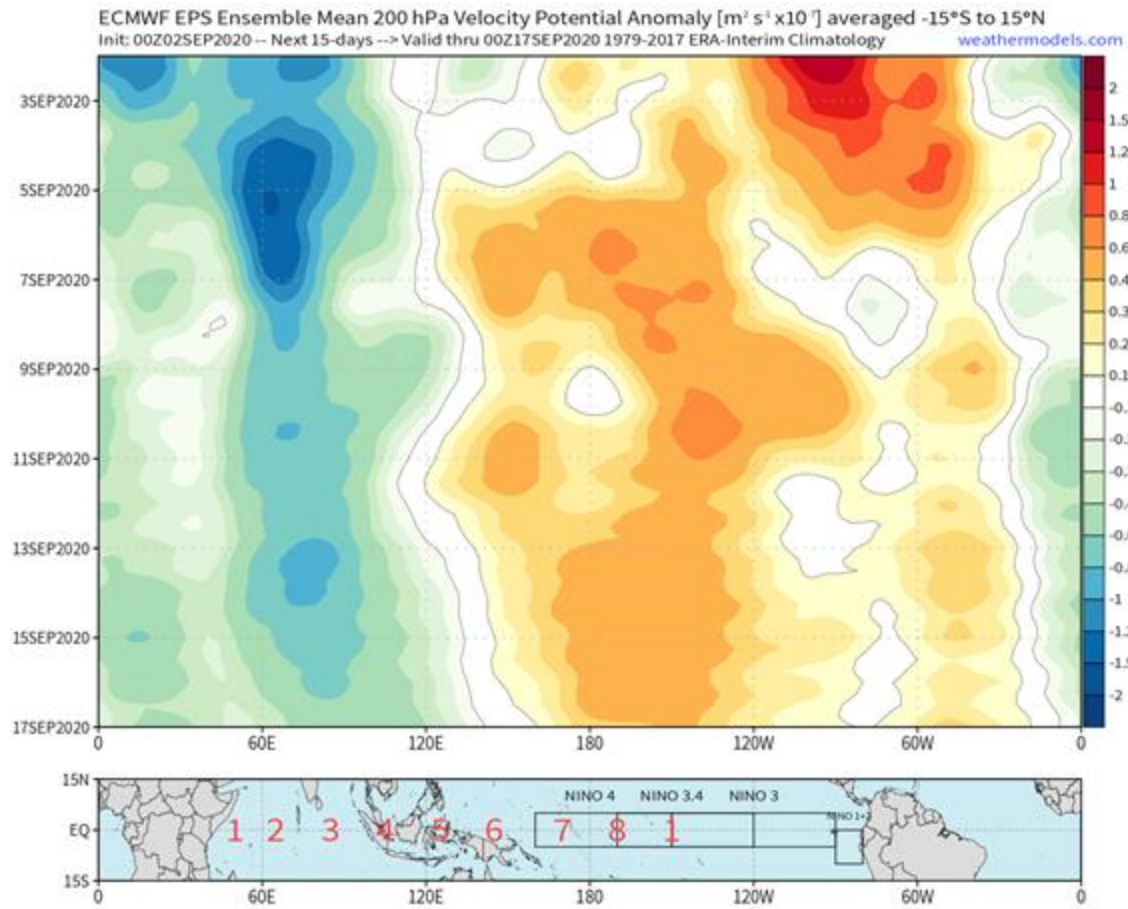


Figure 5: Ensemble mean forecast from the ECMWF model for 200 hPa velocity potential anomalies over the next 15 days.

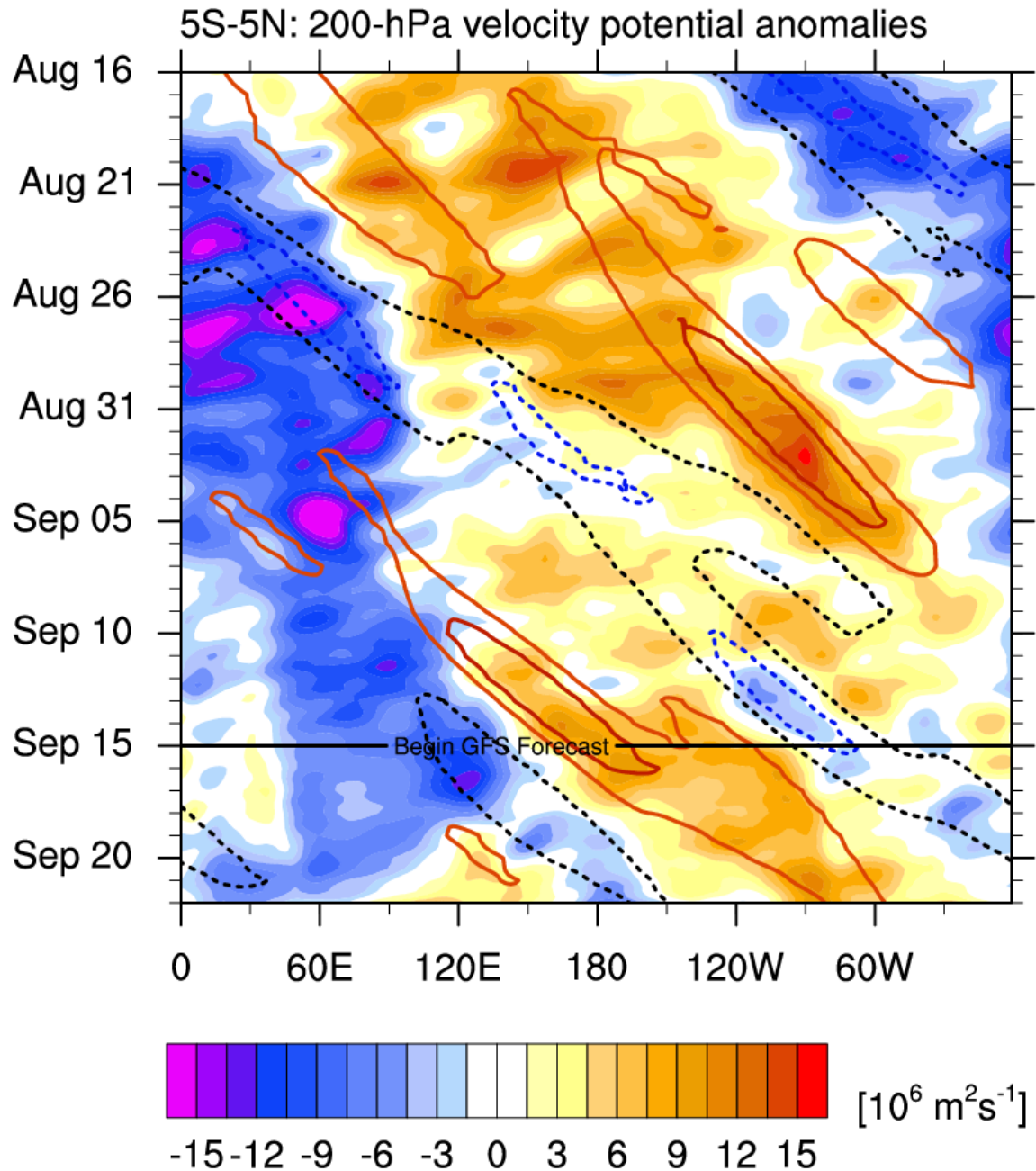


Figure 6: Observed and GFS forecast convectively-coupled Kelvin wave filtered 200 hPa velocity potential anomalies. Positive velocity potential anomalies indicate suppressed vertical motion. Figure courtesy of Mike Ventrice (<http://mikeventrice.weebly.com/cckwmjjo.html>)

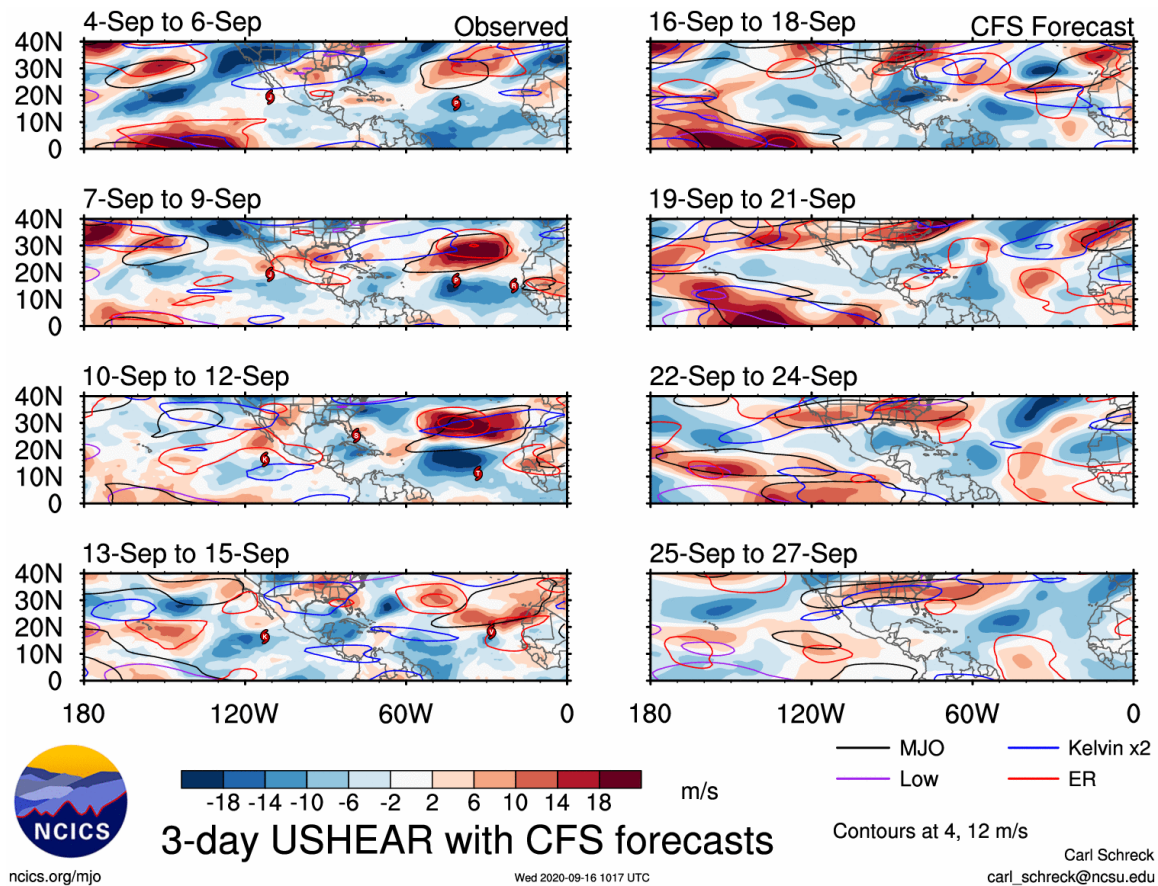


Figure 7: Observed and predicted anomalous 200 minus 850 hPa vertical wind shear from the Climate Forecast System through September 27. Figure courtesy of Carl Schreck.

5) Seasonal Forecast

The most recent seasonal forecast calls for a very active season. The next two weeks are very likely to generate above-normal activity.

3 Upcoming Forecasts

The next two-week forecast will be issued on September 30 for the September 30–October 13 period. A final two-week forecast will be issued on October 14.

VERIFICATION OF SEPTEMBER 2 – SEPTEMBER 15, 2020 FORECAST

The two-week forecast of tropical cyclone activity from September 2 – 15, 2020 verified in the normal category (~25 ACE), while above-normal ACE was predicted (>34 ACE). While the two-week period did not reach the above-normal ACE threshold, it was quite active when evaluated by other metrics, with six named storms and four hurricanes forming. Paulette generated the most ACE during the two-week period (13.5), followed by Sally (4.8), Rene (2.2), Nana (2.1), Teddy (1.5), Vicky (1.1) and Omar (0.4).