

**COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE  
ACTIVITY FROM AUGUST 19 – SEPTEMBER 1, 2021**

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

(as of 19 August 2021)

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In Memory of William M. Gray<sup>4</sup>

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 13th 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 August 19 – September 1 are classified as the upper tercile, the 18 years with the least active ACE periods from August 19 – September 1 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 August 19 – September 1, 2021.

Parameter	Definition
Above-Normal	Upper Tercile (>22 ACE)
Normal	Middle Tercile (7–22 ACE)
Below-Normal	Lower Tercile (<7 ACE)

# 2 Forecast

We believe that the next two weeks will be characterized by near-normal TC activity (7–22 ACE). Grace and Henri are estimated to combine for 10–15 ACE before dissipation. The National Hurricane Center is not monitoring any other areas for tropical cyclone (TC) development in the next five days. The large-scale pattern looks somewhat less conducive for Atlantic hurricane activity over the next week, with potentially more conducive conditions by late August.

The Madden-Julian Oscillation (MJO) is currently located in phase 2 over the Indian Ocean which is typically favorable for Atlantic TC formation and intensification. The MJO is forecast to weaken over the next two weeks, potentially due to destructive interference with other equatorial waves. A suppressed phase of a convectively-coupled Kelvin wave is likely to hinder TC development for the next several days.

Figure 1 displays the formation locations of tropical cyclones from August 19–September 1 for the years from 1966–2019 (e.g., the satellite era), along with the maximum intensities that these storms reached. Figure 2 displays the August 19–September 1 forecast period with respect to climatology. This period typically marks the

real ramp-up for Atlantic tropical cyclone activity. The primary threat formation area for major hurricanes in late August is in the eastern and central tropical Atlantic.

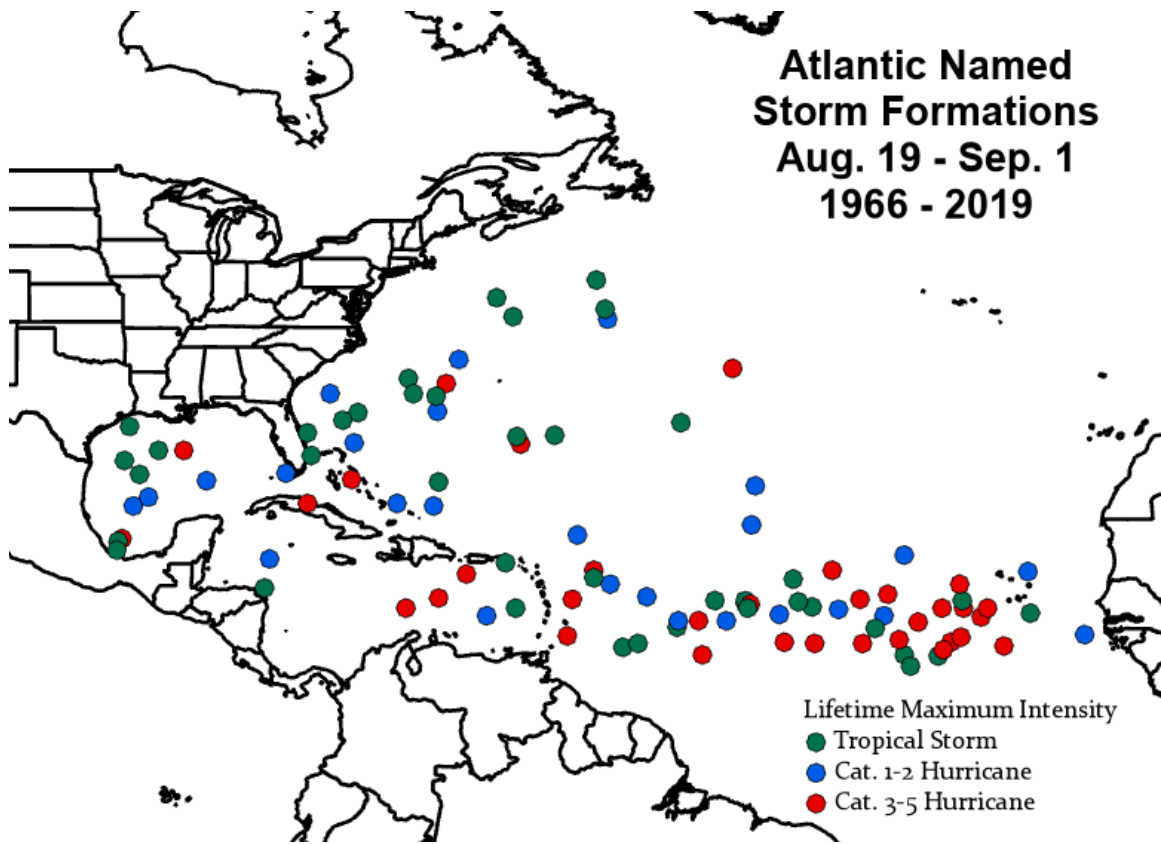


Figure 1: Atlantic named storm formations from August 19 – September 1 during the years from 1966-2019 and the maximum intensity that these named storms reached.

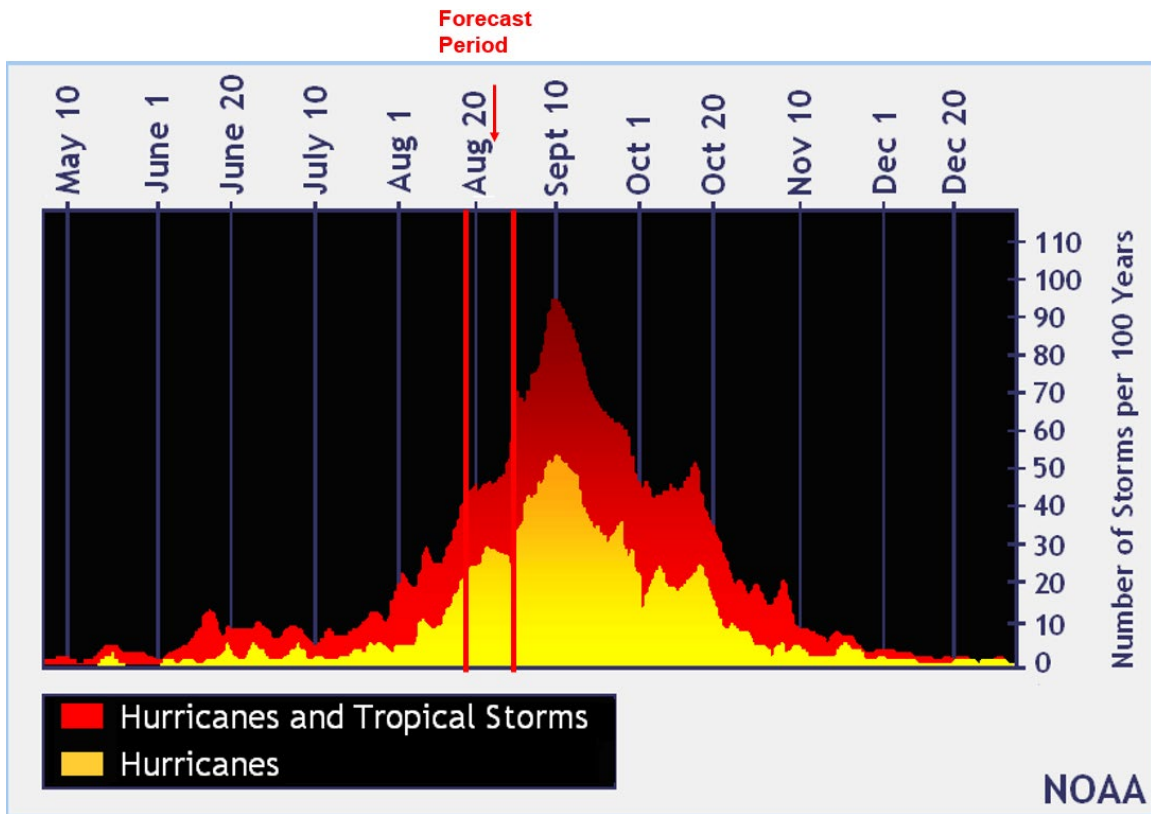


Figure 2: The current forecast period (August 19–September 1) with respect to climatology. Figure courtesy of NOAA.

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 19–September 1.

1) Current Storm Activity

Grace and Henri are estimated to combine for 10–15 ACE before dissipation.

2) National Hurricane Center Tropical Weather Outlook

The National Hurricane Center is not monitoring any areas for Atlantic TC development in the next five days.

3) Global Model Analysis

Both the GFS and ECMWF ensembles are relatively anemic with Atlantic TC development over the next week. There are indications in the ensembles for a greater likelihood of TC development in late August, however.

4) Madden-Julian Oscillation

The Madden-Julian Oscillation (MJO), as measured by the Wheeler-Hendon index, is currently in phase 2 over the Indian Ocean. The MJO is forecast to weaken over the next two weeks, potentially due to destructive interference by other equatorial waves (Figure 3). Table 2 summarizes the typical MJO impacts on Atlantic TC activity. In general, phases 1 and 2 of the MJO are associated with active periods for Atlantic hurricane activity. As noted earlier, the suppressed phase of a convectively-coupled Kelvin wave is likely to limit Atlantic TC activity over the next few days (Figure 4). However, later in the two-week forecast period, conditions should become more conducive for Atlantic hurricane formation, with increased rising motion over both the tropical Atlantic and Africa being forecast by ECMWF (Figure 5). This large-scale setup tends to reduce vertical wind shear over the tropical Atlantic and Caribbean.

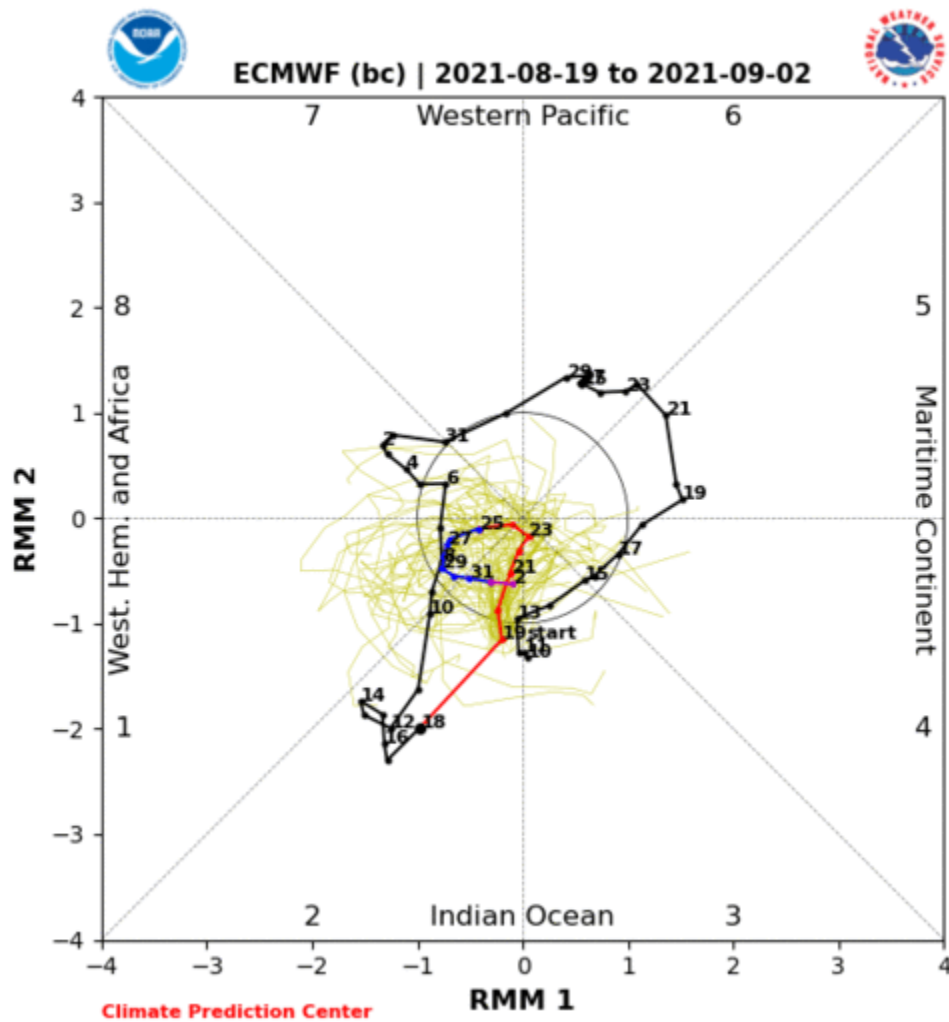


Figure 3: Predicted propagation of the MJO by the ECMWF model. Figure courtesy of NOAA.

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

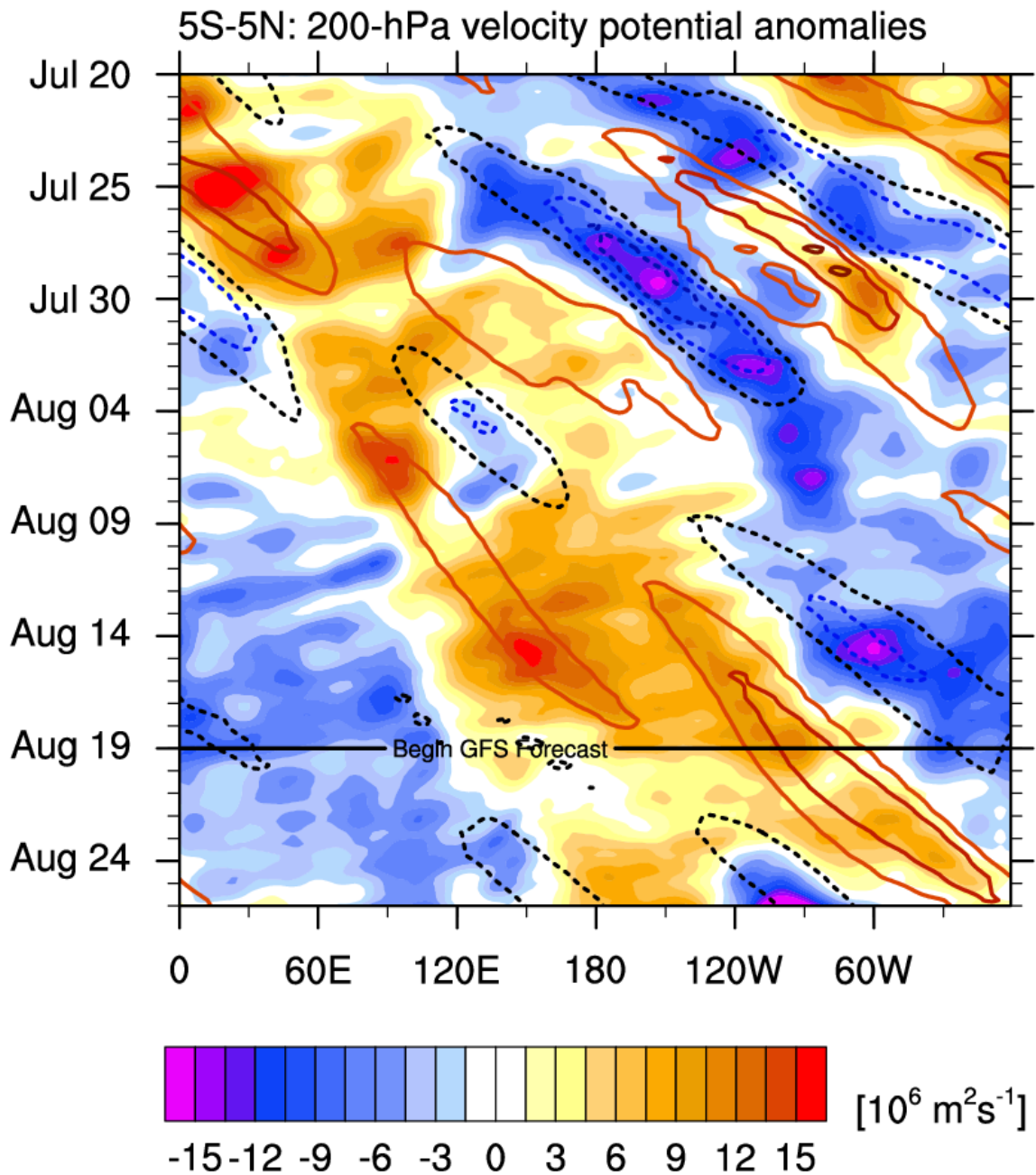


Figure 4: Observed and GFS forecast convectively-coupled Kelvin wave filtered 200 hPa velocity potential anomalies. Positive velocity potential anomalies indicate suppressed vertical motion. Figure courtesy of Mike Ventrice (<http://mikeventrice.weebly.com/cckwmjjo.html>)

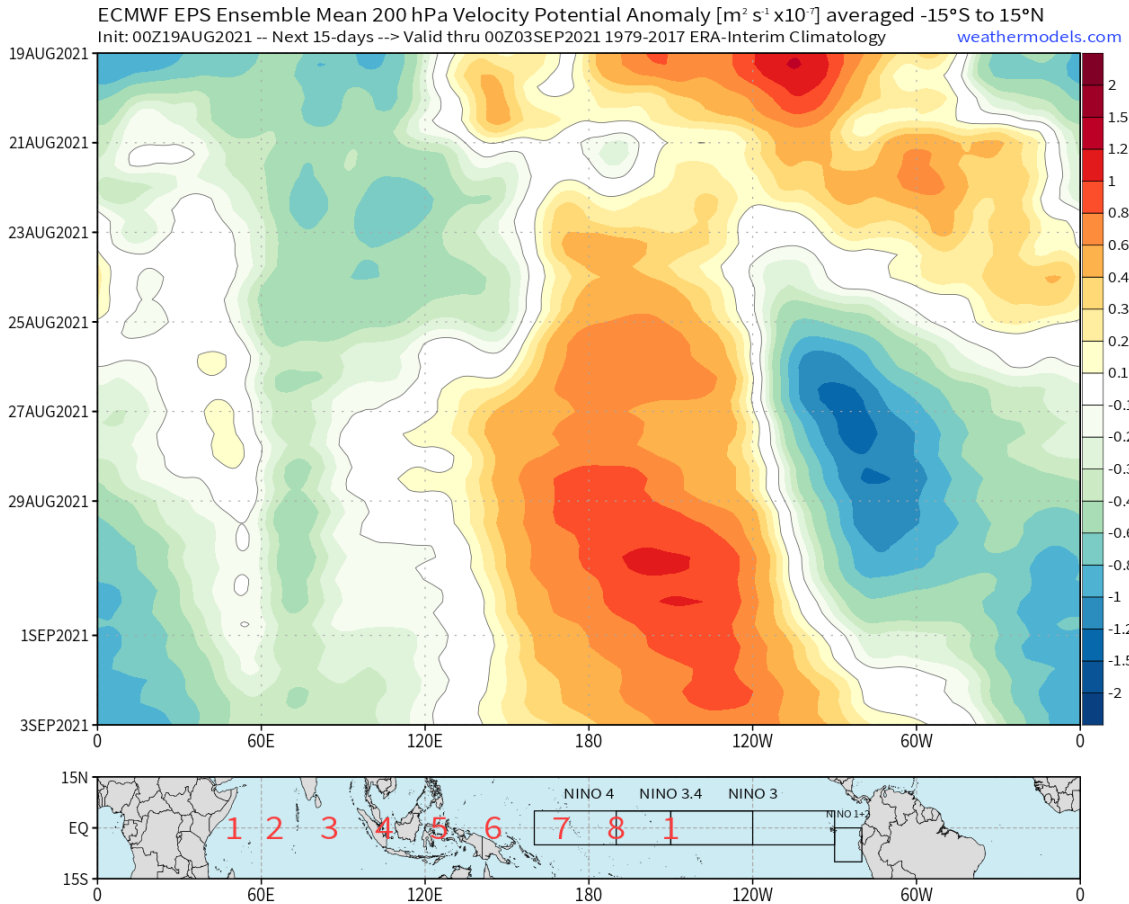


Figure 5: Ensemble mean forecast from the ECMWF model for 200 hPa velocity potential anomalies over the next 15 days.

### 5) Seasonal Forecast

The most recent seasonal forecast calls for an above-normal season. Following Grace and Henri, we do expect a temporary lessening of Atlantic hurricane activity with a potential increase again late this month.

## 3 Upcoming Forecasts

The next two-week forecast will be issued on September 2 for the September 2 – September 15 period. Additional two-week forecasts will be issued on September 16, September 30, and October 14.



## **VERIFICATION OF AUGUST 5–18, 2021 FORECAST**

The two-week forecast of tropical cyclone activity from August 5–18, 2021 correctly verified in the above-normal category. >6 ACE was forecast, and Fred, Grace and Henri combined to generate 7 ACE during the two-week period.