COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM SEPTEMBER 17–30, 2025

We believe that the most likely category for Atlantic hurricane activity in the next two weeks is normal (60%), with below-normal (25%) and above-normal (15%) being less likely.

(as of 17 September 2025)

By Philip J. Klotzbach[1], Michael M. Bell[2], and Levi G. Silvers[3]

With Special Assistance from Carl J. Schreck III[4]

In Memory of William M. Gray[5]

This discussion as well as past forecasts and verifications are available online at
http://tropical.colostate.edu

Department of Atmospheric Science
Colorado State University
Fort Collins, CO 80523
Email: philk@atmos.colostate.edu

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[1] Senior Research Scientist
[2] Professor
[3] Research Scientist
[4] Research Scholar at NC State University
[5] Professor Emeritus

1   Introduction

This is the 17th 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, and 4) the current and projected state of the Madden-Julian oscillation (MJO).

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 1966–2024 and defining above-normal, normal and below-normal two-week periods based on terciles. Since there are 59 years from 1966–2024, we include the 20 years with the most ACE from September 17–30 as the upper tercile, the 19 years with the least ACE as the bottom tercile, while the remaining 20 years are counted as the middle tercile.

Table 1: ACE forecast definition and probabilistic forecast for tropical cyclone activity for September 17–30, 2025.

Parameter	Definition	Probability in Each Category
Above-Normal	Upper Tercile (>25 ACE)	15%
Normal	Middle Tercile (11–25 ACE)	60%
Below-Normal	Lower Tercile (<11 ACE)	25%

2   Forecast

While the Atlantic hurricane season has been very quiet recently, with no Atlantic tropical cyclone activity since Fernand dissipated on 28 August until Gabrielle formed earlier today, we anticipate the season picking up somewhat over the next couple of weeks. Gabrielle could generate moderate levels of ACE depending on its exact track, but as noted in the latest National Hurricane Center advisory on the storm, there is high uncertainty in exactly where the system tracks, given it currently lacks a well-defined center of circulation. The National Hurricane Center is monitoring one other area in the eastern Atlantic with a low chance of tropical cyclone development in the next one week. This region could be a small ACE generator but may have issues from shearing northerly winds due to the outflow from Gabrielle. Global model ensembles are hinting at potential additional tropical cyclone development in one to two weeks in both the eastern/central Atlantic as well as the Gulf/western Caribbean. Large-scale environmental vertical wind shear conditions are forecast to become more conducive over the two-week period, as the MJO moves across the Western Hemisphere and potentially over Africa to the Indian Ocean during the two-week period. Historically, MJO events over Africa and the Indian Ocean are associated with above-average Atlantic hurricane activity.

Figure 1 displays the formation locations of tropical cyclones from September 17–30 for the years from 1966–2024, along with the maximum intensities that these storms reached. Figure 2 displays the September 17–30 forecast period with respect to climatology. This period immediately follows the climatological peak of the season. The primary threat formation area for major hurricanes in mid- to late September is in the eastern and central tropical Atlantic.
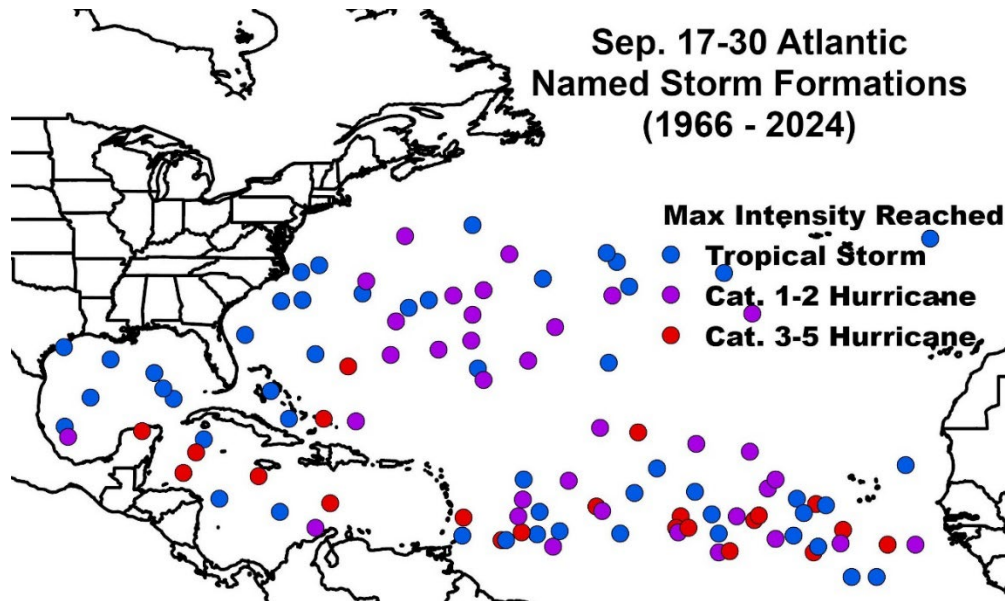
Figure 1: Atlantic named storm formations from September 17–30 from 1966–2024 and the maximum intensity that these named storms reached.
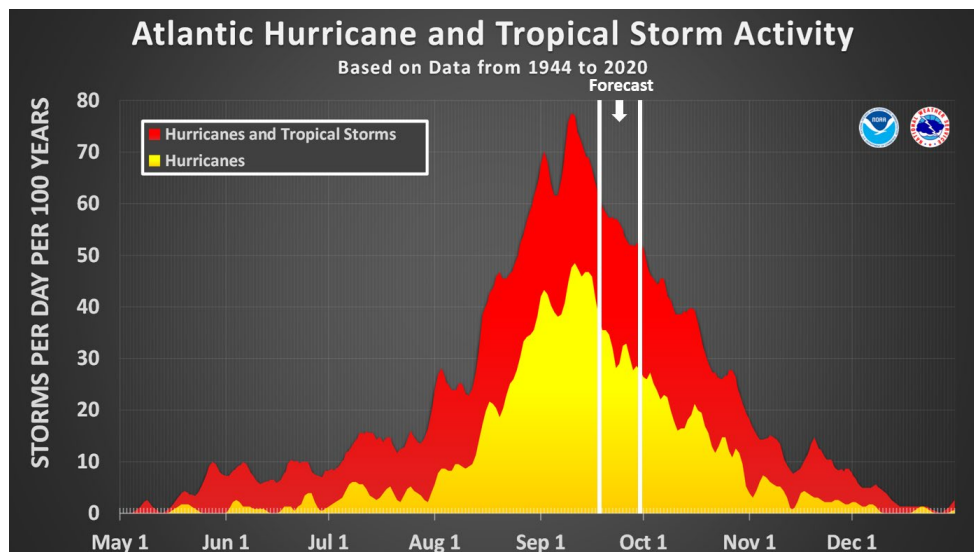
Figure 2: The current forecast period (September 17–30) with respect to climatology, delimited with white lines. Figure courtesy of NOAA.

We now examine how we believe each of the four factors discussed in the introduction will impact Atlantic tropical cyclone activity for the period from September 17–30.

1) Current Storm Activity

Tropical Storm Gabrielle has just formed in the central tropical Atlantic and is currently forecast by the National Hurricane Center to become a hurricane in four days. However, there is considerably uncertainty about Gabrielle's future track/intensity, given both potential future center reformations and how it survives its current interactions with an upper-level low.

2) National Hurricane Center Tropical Weather Outlook

The latest National Hurricane Center Tropical Weather Outlook is monitoring an eastern Atlantic tropical wave (20% chance in next seven days) (Figure 3). Given relatively marginal tropical cyclone conditions, the eastern Atlantic region looks to have limited ACE generation potential.
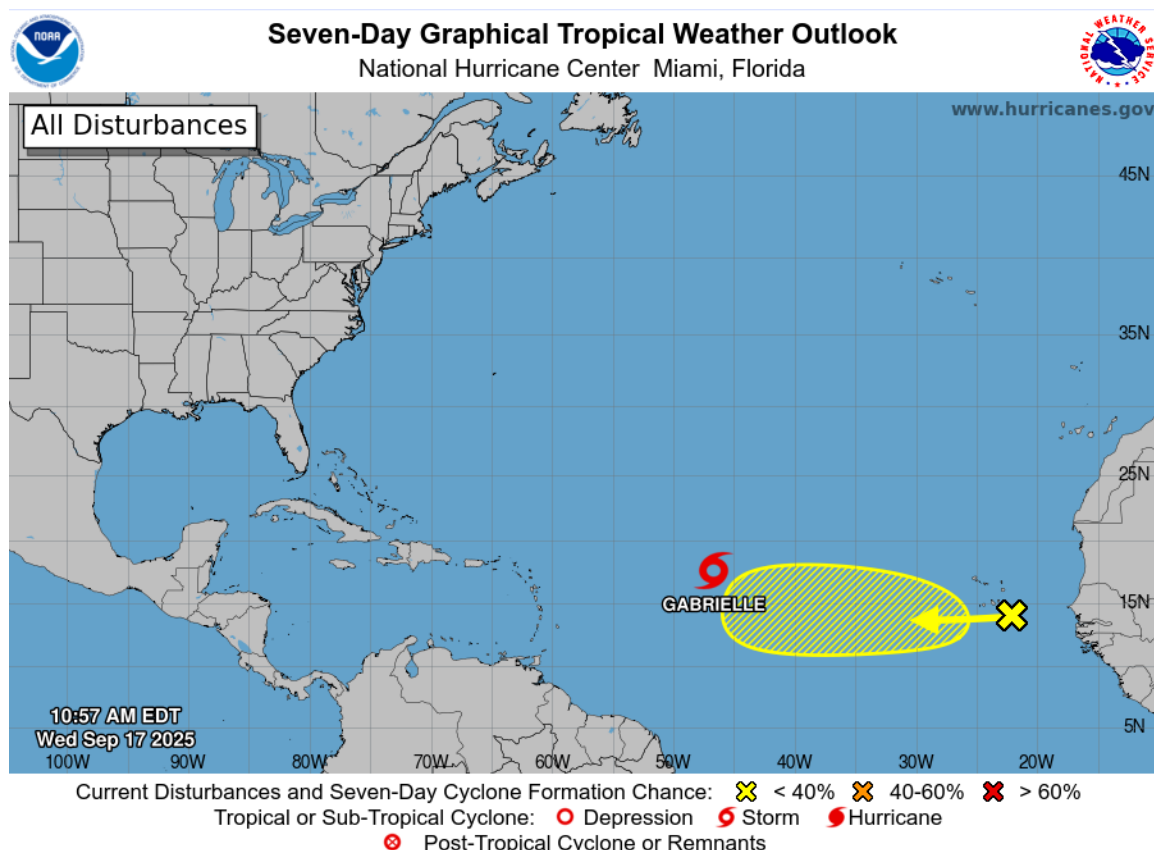

Figure 3: Current National Hurricane Center Atlantic Tropical Weather Outlook.

3) Global Model Analysis

The ECMWF EPS ensemble (Figure 4), the ECMWF AI ensemble (Figure 5), and the GEFS ensemble (Figure 6) are all highlighting potential for intensification into a hurricane from Gabrielle, and have modest signals for potential tropical cyclone formation in the eastern tropical Atlantic from either the current NHC area in the Tropical Weather Outlook or the next tropical wave forecast to emerge into the Atlantic in a couple of days. There are also some hints of development in the western Caribbean/southern Gulf in week two, with the strongest signal in the Google DeepMind model (Figure 7). Obviously any development there would bear watching for potential US impacts. There is also a signal for another robust African easterly wave (or two) emerging into the Atlantic around the end of September. Given the generally tropical cyclone-favorable wind shear patterns forecast later this month, we believe that the season does have the potential to begin picking up.
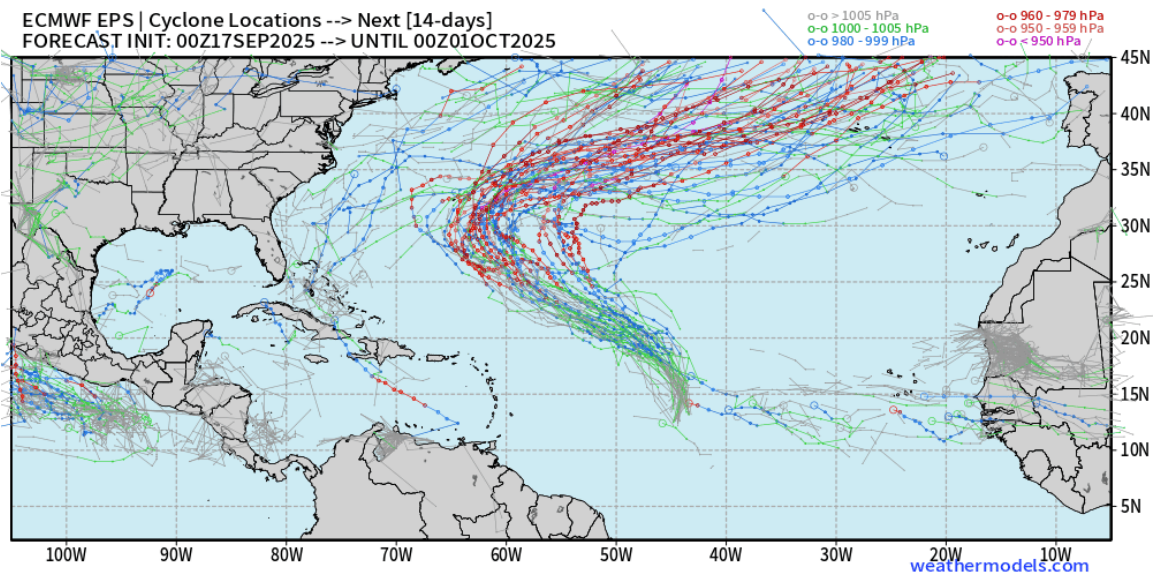

Figure 4: Cyclone locations from the ECMWF EPS ensemble for the next 14 days. Figure courtesy of weathermodels.com.
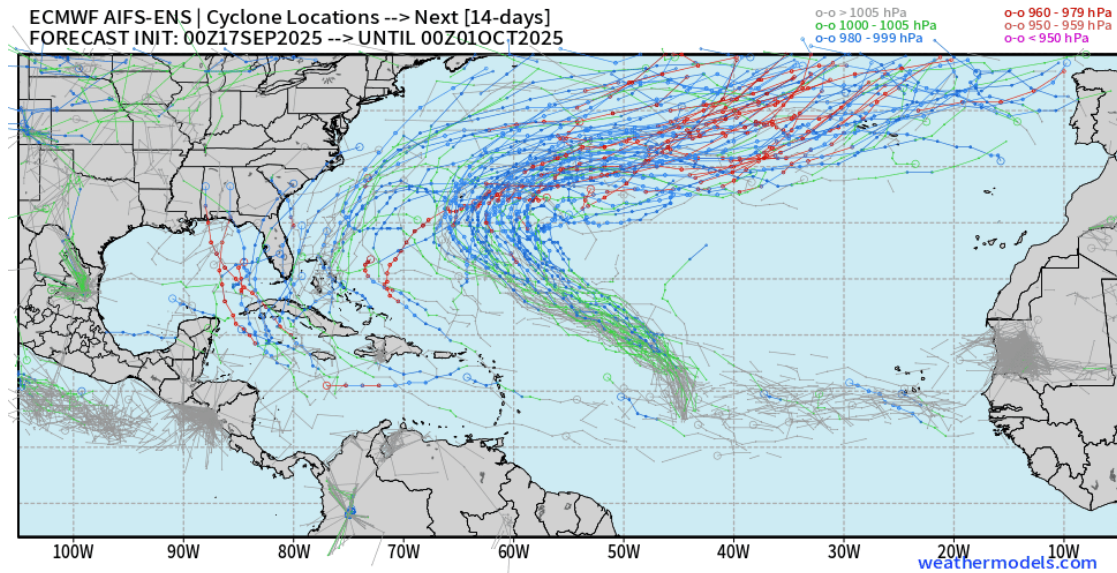
Figure 5: Cyclone locations from the ECMWF AI ensemble for the next 14 days. Figure courtesy of weathermodels.com.
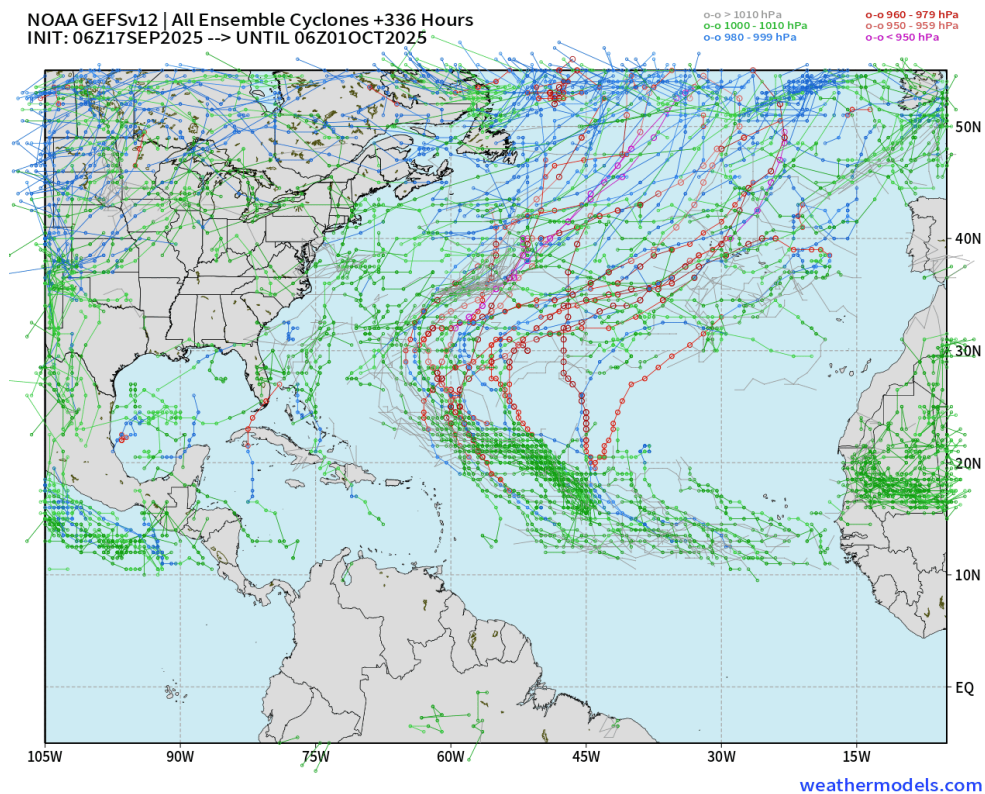

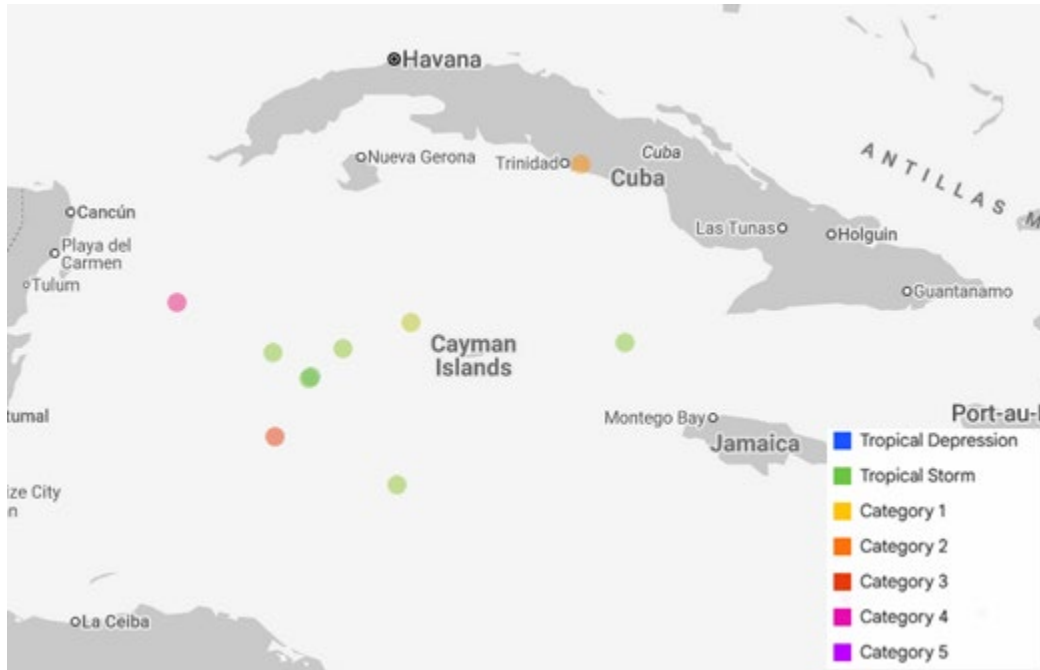Figure 6: Cyclone locations from the GEFS ensemble for the next 14 days. Figure courtesy of weathermodels.com

Figure 7: Cyclone locations from the Google DeepMind ensemble on 28 September at 0600 UTC. Figure courtesy of https://deepmind.google.com/science/weatherlab

4) Madden-Julian Oscillation

The MJO, as measured by the Wheeler-Hendon index, is currently enhancing convection over the Western Hemisphere. The MJO is forecast to propagate eastward across Africa and potentially into the Indian Ocean over the next two weeks (Figure 7). When the MJO is enhancing convection across Africa, Atlantic TC activity tends to be above average. Vertical wind shear anomalies are forecast to generally become more conducive as the two-week forecast period progresses (Figure 8).
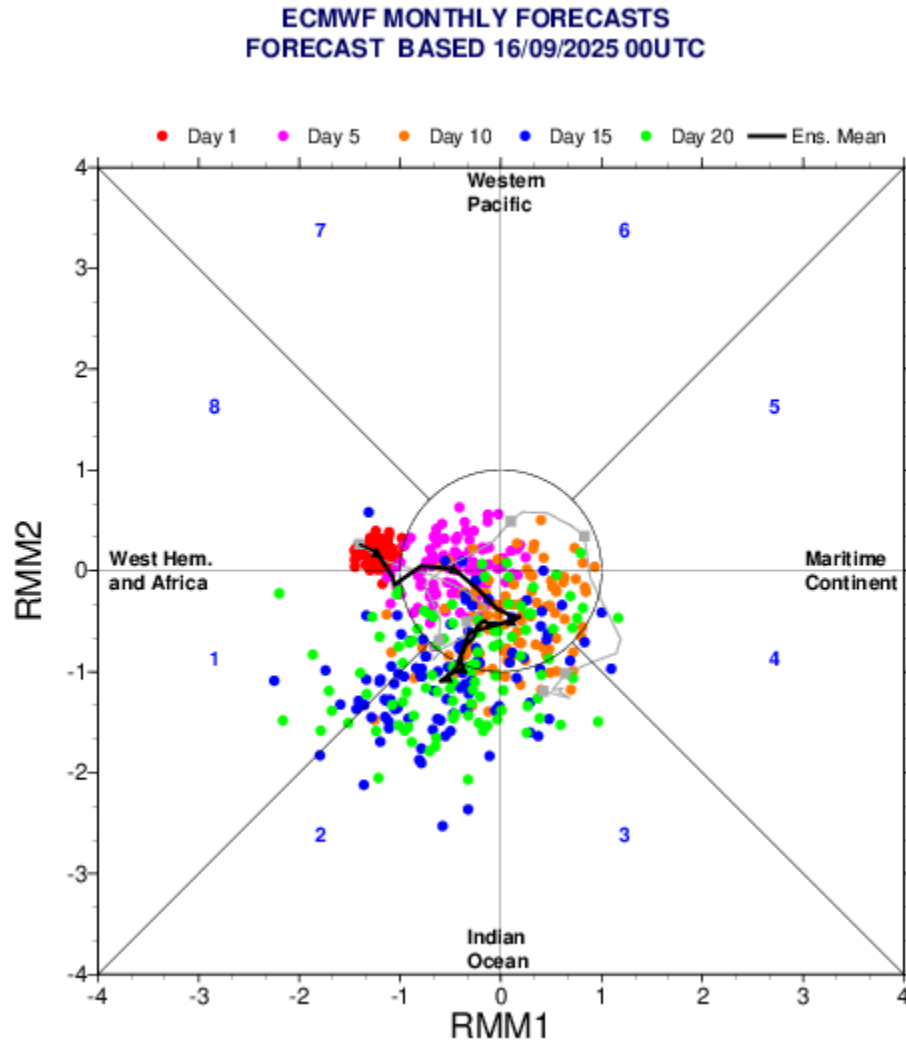
Figure 7: Predicted propagation of the MJO by the ECMWF ensemble. Figure courtesy of ECMWF.
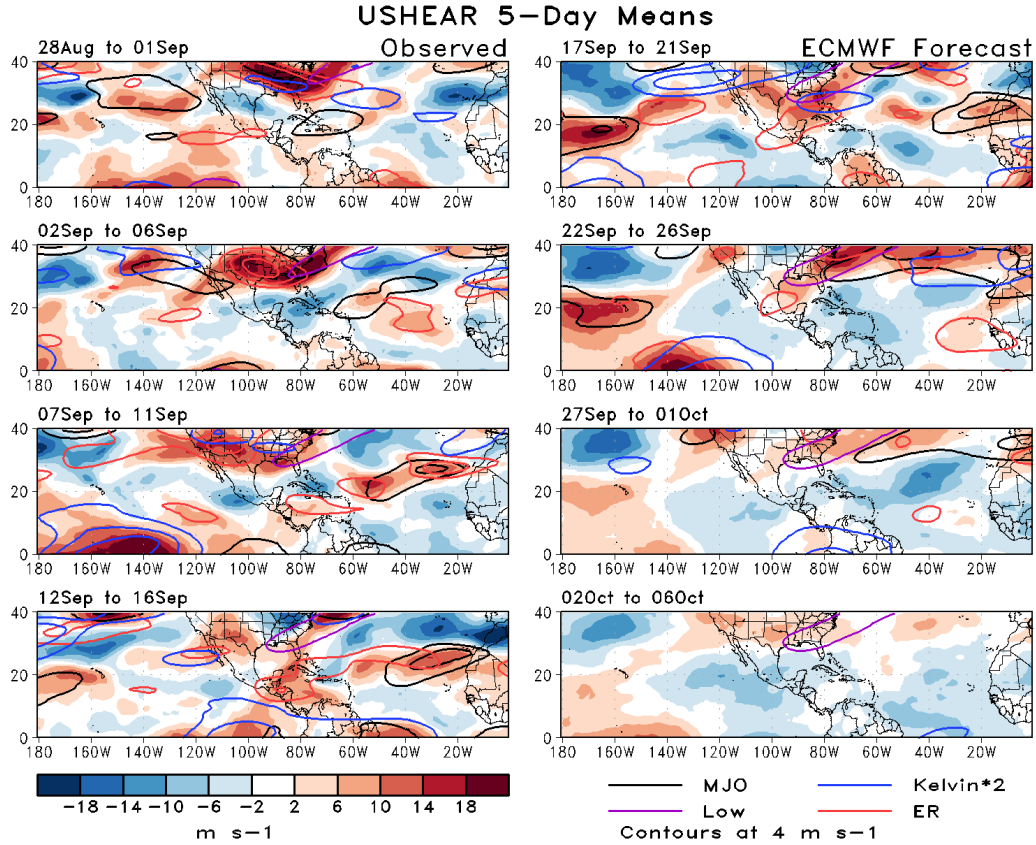
Figure 8: Observed and predicted zonal wind shear anomalies by the ECMWF ensemble for the twenty days. Vertical wind shear anomalies are forecast to decrease across the Atlantic Main Development Region over the next couple of weeks. Figure courtesy of Nick Novella (NOAA/CPC).

3   Upcoming Forecasts

The next two-week forecast will be issued on October 1 for the October 1–14 period. An additional two-week forecast will be issued on October 15.

VERIFICATION OF SEPTEMBER 3–16 FORECAST

The two-week period from September 3–16 verified in the below-normal category with no ACE generated. We had assigned the highest probability to the normal category (9 – 36 ACE), due largely to the strong model support for Invest 91L becoming a powerful hurricane. We had assigned a 65% probability of normal activity, with a 20% chance of above-normal activity and a 15% chance of below-normal activity during the two-week period. There was considerably more upper-level shear and subsidence observed during the two-week period than we anticipated.

Table 3 displays the percentage chance that we gave for each category and observed ACE.

Table 3: ACE forecast for tropical cyclone activity for September 3–16, the probability assigned for each category being reached and observed ACE.

ACE Category	Definition	Probability in each Category	Observed ACE
Above-Normal	Upper Tercile (>36 ACE)	20%	
Normal	Middle Tercile (9–36 ACE)	65%	
Below-Normal	Lower Tercile (<9 ACE)	15%	0