

COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM AUGUST 20–SEPTEMBER 2, 2024

We believe that the most likely category for Atlantic hurricane activity in the next two weeks is normal (55%), with below-normal (25%) and above-normal (20%) being less likely.

(as of 20 August 2024)

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In Memory of William M. Gray⁶

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 16th year that we have issued shorter-term forecasts of tropical cyclone (TC) 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.

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 1966–2023 and defining above-normal, normal and below-normal two-week periods based on terciles. Since there are 58 years from 1966–2023, we include the 19 years with the most ACE from August 20–September 2 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 TC activity for August 20–September 2, 2024.

| Parameter | Definition | Probability in Each Category |
|--------------|----------------------------|------------------------------|
| Above-Normal | Upper Tercile (>22 ACE) | 20% |
| Normal | Middle Tercile (7–22 ACE) | 55% |
| Below-Normal | Lower Tercile (<7 ACE) | 25% |

2 Forecast

While we expect the 2024 Atlantic hurricane season to be an extremely active one, we believe that the next two weeks are most likely to be characterized by activity in the normal category. There are no active tropical cyclones in the Atlantic, and the National Hurricane Center currently is not monitoring any areas for tropical cyclone development in the next seven days. However, large-scale environmental conditions look to get more conducive for tropical cyclone activity towards the end of August. In addition, global model ensembles highlight several potential areas for tropical cyclone formation during the second week of our two-week forecast period. The Madden-Julian Oscillation (MJO) is forecast to persist over the Indian Ocean and then potentially move towards the Maritime Continent, providing large-scale conditions that favor Atlantic hurricane activity.

Figure 1 displays the formation locations of tropical cyclones from August 20–September 2 for the years from 1966–2023, along with the maximum intensities that these storms reached. Figure 2 displays the August 20–September 2 forecast period with respect to climatology. This period typically marks the real ramp-up for Atlantic TC activity. The primary threat formation area for major hurricanes in late August is in the eastern and central tropical Atlantic.

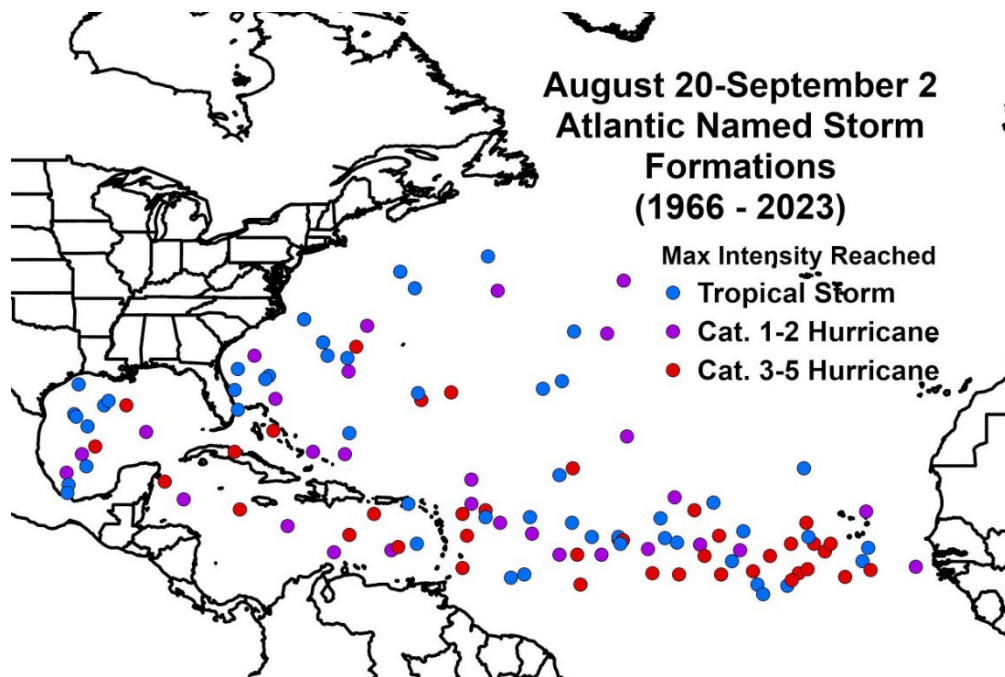


Figure 1: Atlantic named storm formations from August 20–September 2 from 1966–2023 and the maximum intensity that these named storms reached.

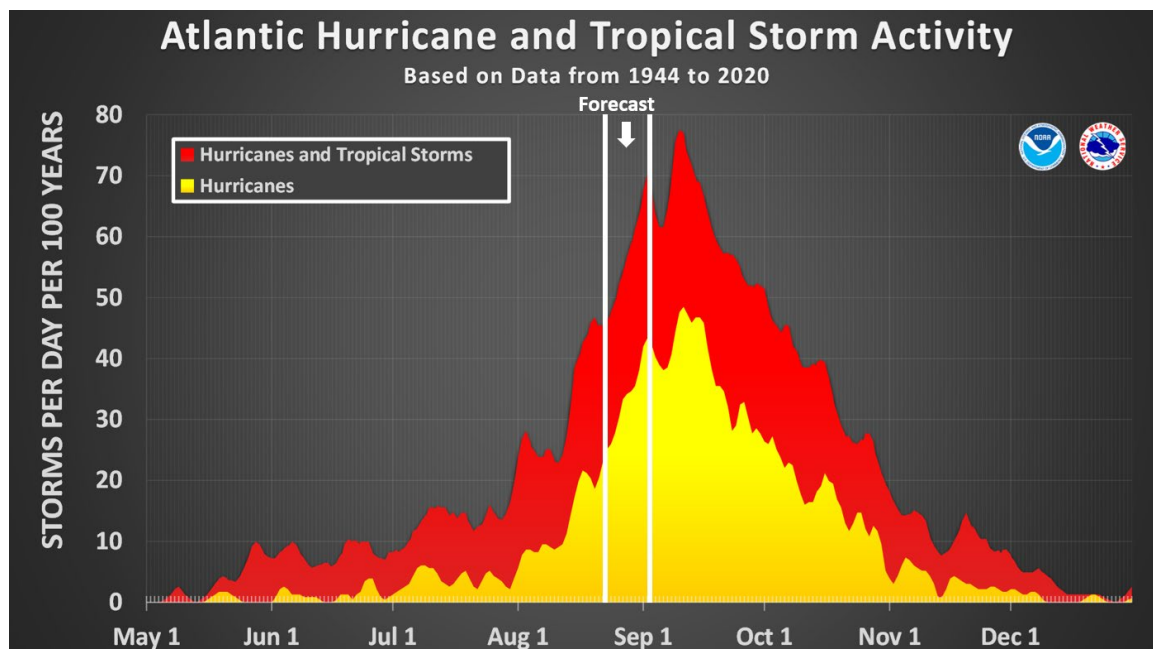


Figure 2: The current forecast period (August 20–September 2) with respect to climatology, delimited with white lines. Figure courtesy of NOAA.

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 20–September 2.

1) Current Storm Activity

There are currently no active Atlantic tropical cyclones.

2) National Hurricane Center Tropical Weather Outlook

The latest NHC Tropical Weather Outlook does not anticipate tropical cyclone formation in the next seven days (Figure 3).

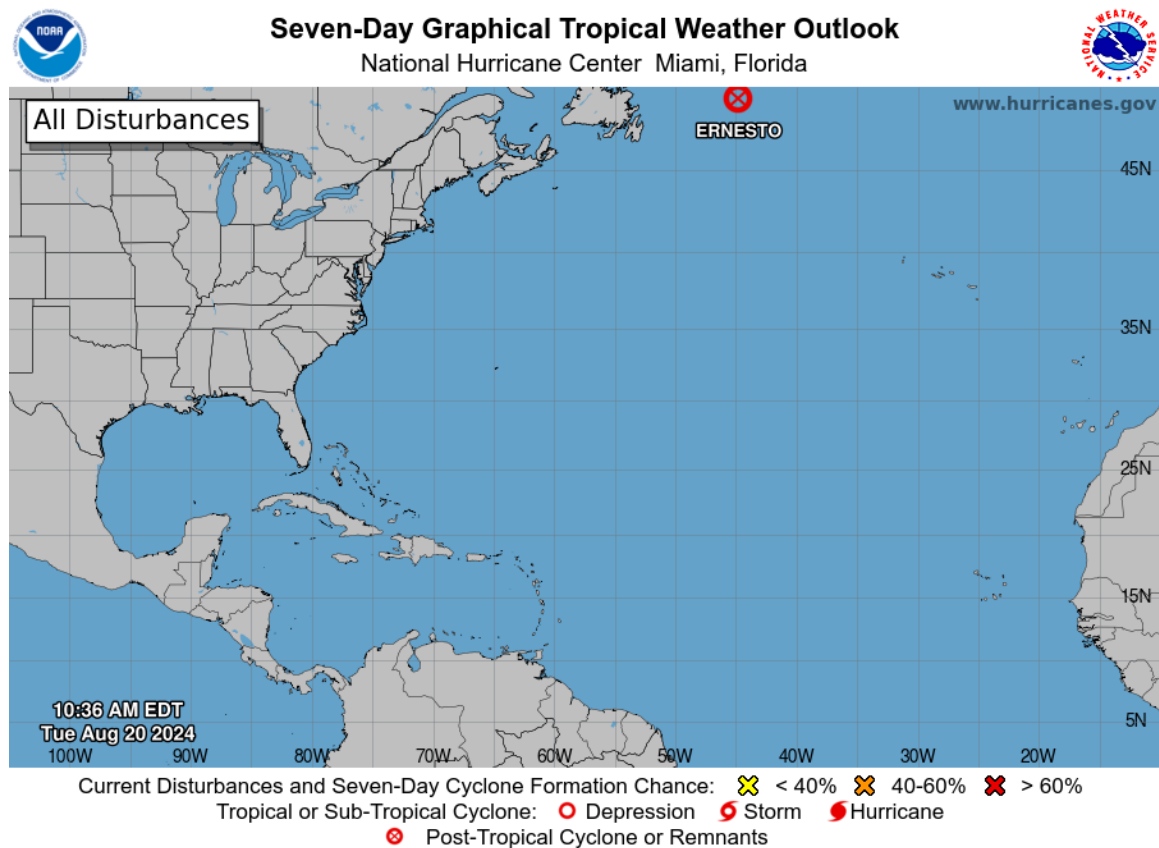


Figure 3: Current National Hurricane Center Atlantic Tropical Weather Outlook.

3) Global Model Analysis

The ECMWF EPS ensemble (Figure 4) and the GEFS ensemble (Figure 5) are highlighting the potential for tropical cyclone formation in the eastern/central Atlantic as well as the Caribbean in 8–14 days. Some of these ensemble members are aggressive with intensification, which makes sense given the low shear that is forecast in week two across the basin.

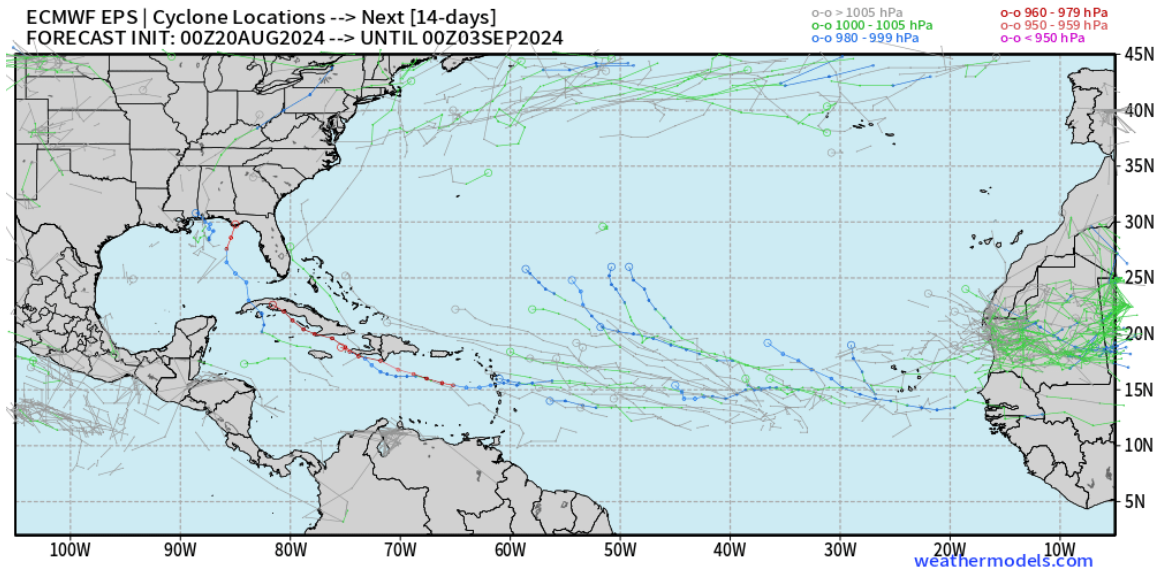


Figure 4: Cyclone locations from the ECMWF EPS ensemble for the next 14 days. Figure courtesy of weathermodels.com

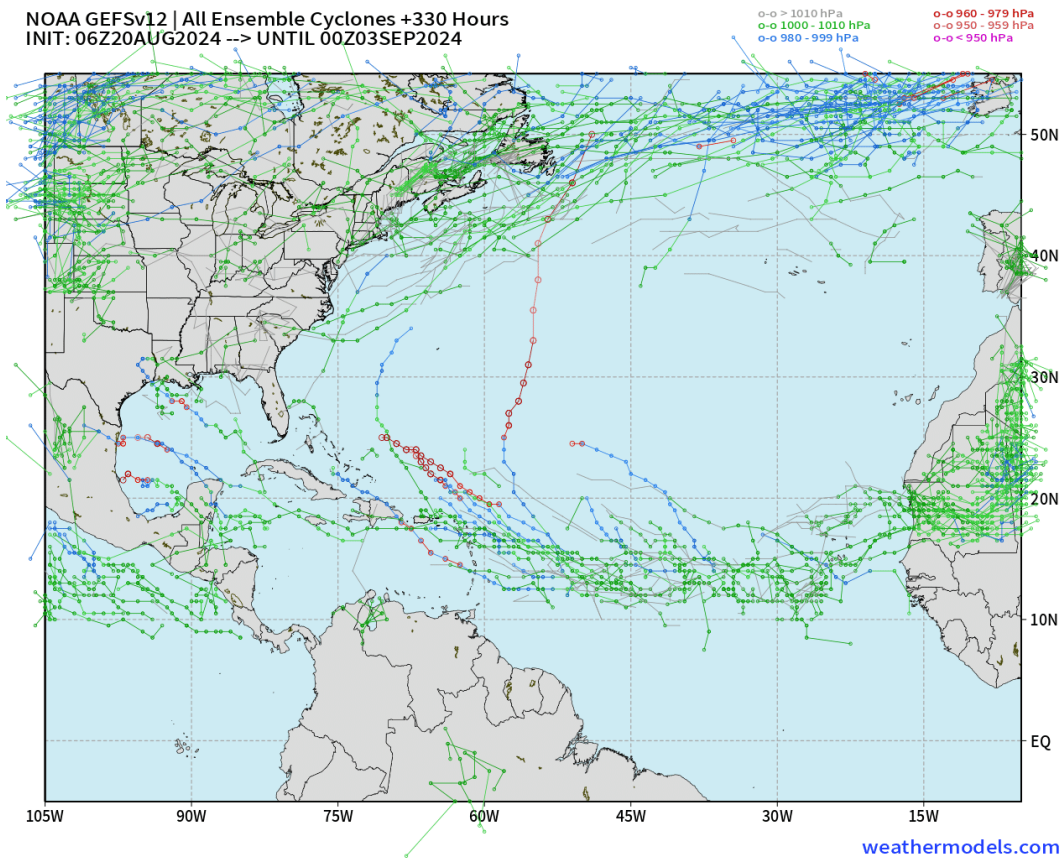


Figure 5: Cyclone locations from the GEFS ensemble for the next 14 days. Figure courtesy of weathermodels.com

4) Madden-Julian Oscillation

The Madden-Julian oscillation (MJO), as measured by the Wheeler-Hendon index, is currently enhancing convection over the Indian Ocean. The MJO is forecast to propagate eastward across the Indian Ocean towards the Maritime Continent over the next two weeks. These phases of the MJO are associated with hurricane-favorable shear conditions in the Atlantic basin (Figure 6).

As would be expected given the favorable seasonal signals of cool neutral ENSO conditions and an extremely warm Atlantic combined with relatively TC-favorable MJO phases, the EPS is generally predicting below-normal vertical wind shear across the tropical Atlantic over the next two weeks (Figure 7). This reduction in shear should favor Atlantic hurricane activity, especially in week two.

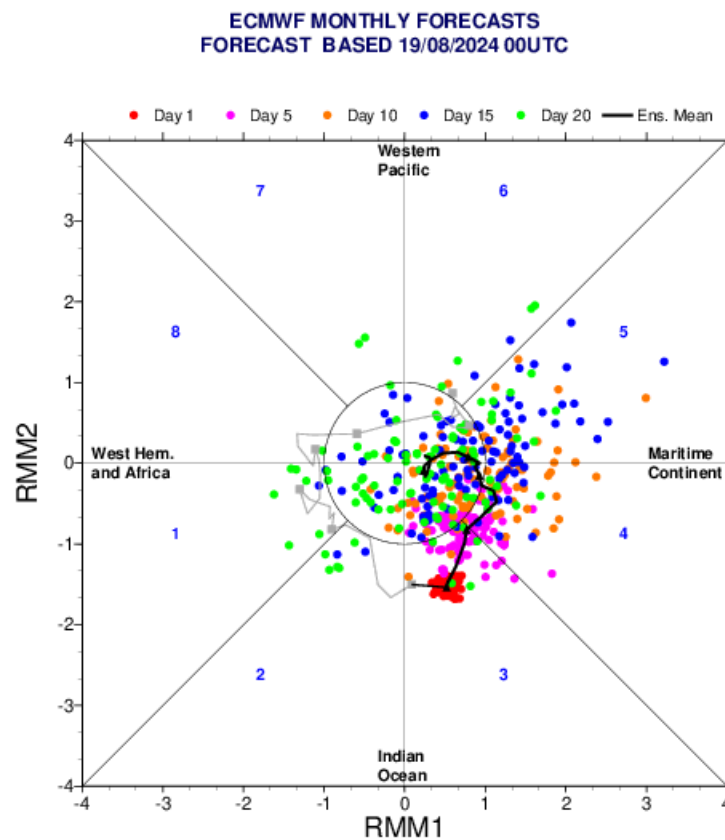


Figure 6: Predicted propagation of the MJO by the EPS. Figure courtesy of ECMWF.

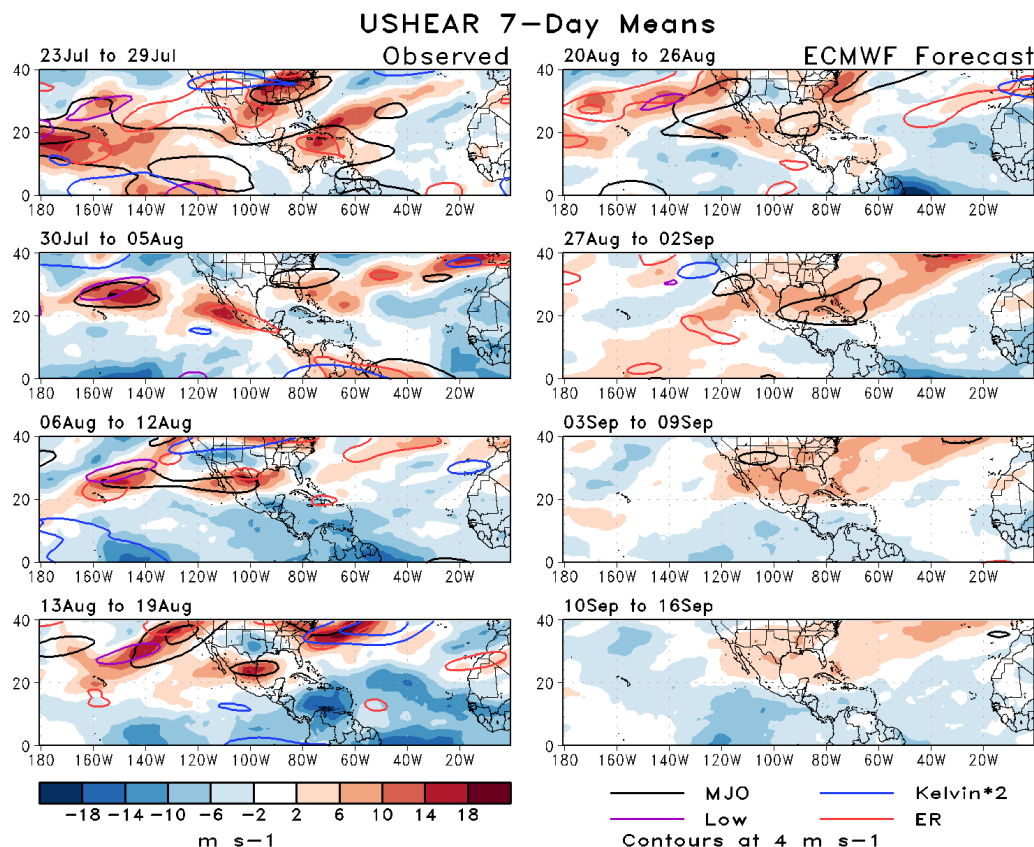


Figure 7: Observed and predicted zonal wind shear by the ECMWF ensemble for the next four weeks. Vertical wind shear is generally forecast to be below normal (e.g., easterly anomalies) across the Atlantic MDR for the next four weeks.

There has been considerable discussion as to why the Atlantic has been so dusty recently (Figure 8). One of the primary reasons for the increase in dust in recent weeks has been a pronounced northward shift in the Intertropical Convergence Zone, associated with low-level westerly anomalies reaching north to $\sim 20^\circ\text{N}$ (Figure 9). Associated with this has been African easterly waves emerging from the African continent far north of their usual position. While a northward-shifted Intertropical Convergence Zone is generally taken to be favorable for Atlantic hurricane activity, African easterly waves have been leaving the continent so far north that they have been pulling in lots of dust/dry air, limiting their chances for development.

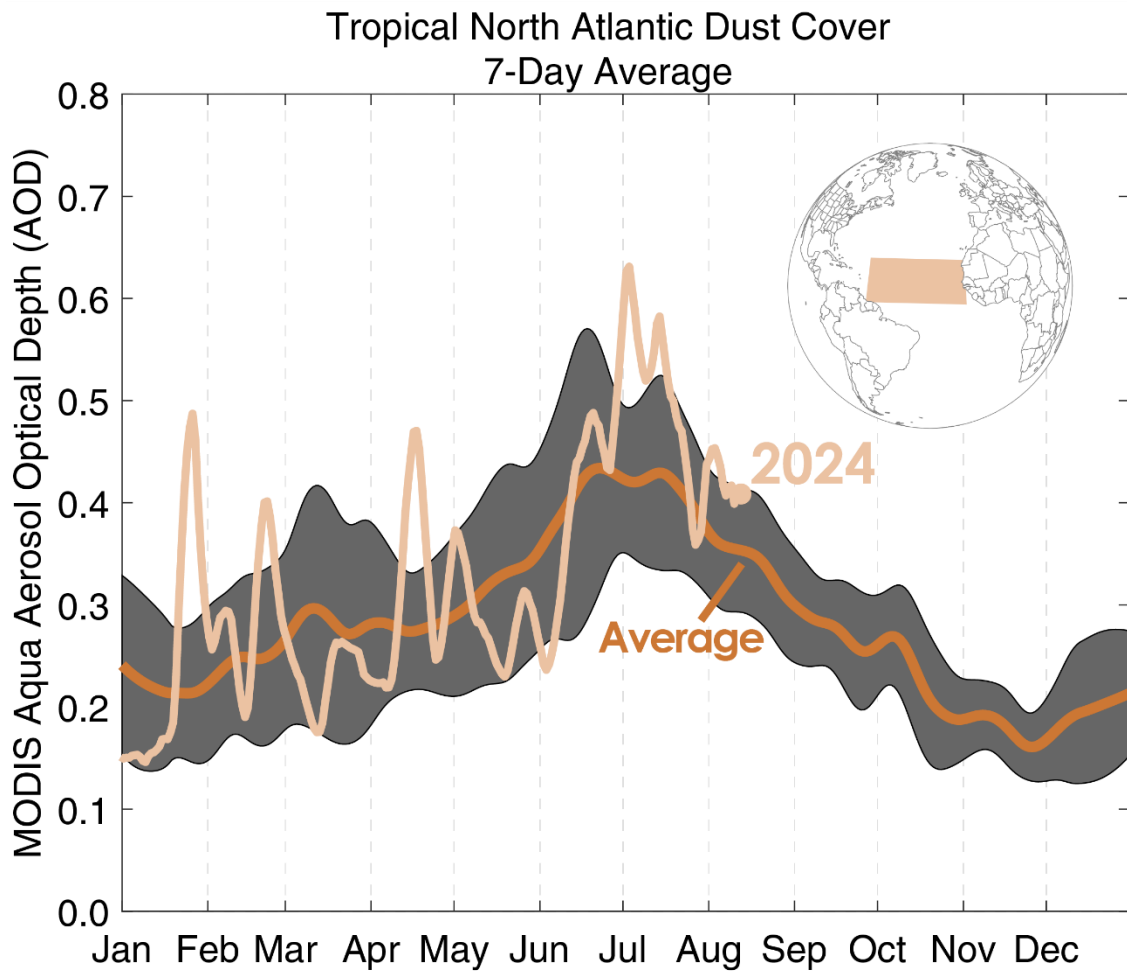


Figure 8: Tropical North Atlantic dust cover in 2024 compared with the 2003–2023 average. Figure courtesy of Michael Lowry.

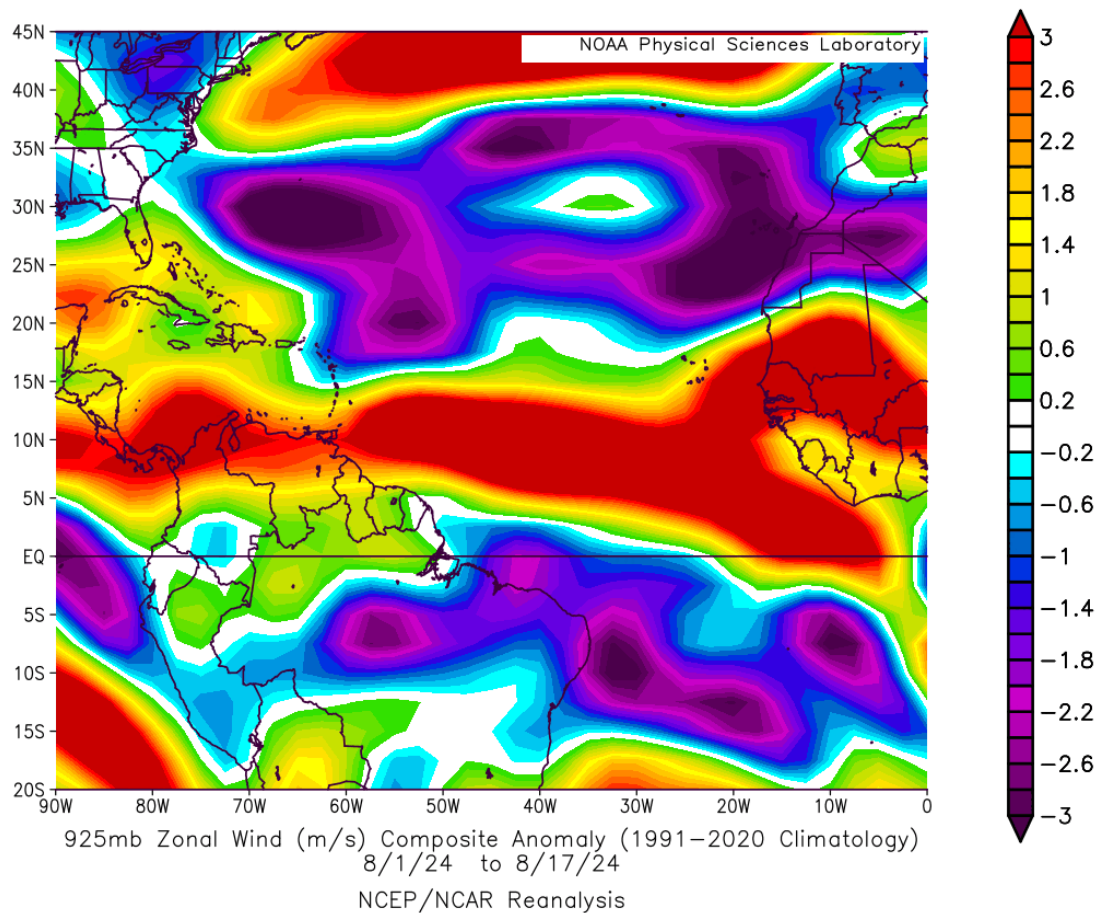


Figure 9: 925 hPa zonal wind anomalies from August 1–17, 2024.

In addition, the African monsoon has been extremely vigorous so far this month (Figure 10). The tropical easterly jet has been much stronger than normal, resulting in moderate to strong easterly shear in the eastern Atlantic in recent weeks. As the MJO propagates away from Africa and heads towards the Maritime Continent, these upper-level easterly anomalies should subside, resulting in enhanced chances for Atlantic tropical cyclone formation in the eastern/central Atlantic.

RFE2 1-Month Total Rainfall Anomaly (mm)

Period: 01Aug2024 – 18Aug2024

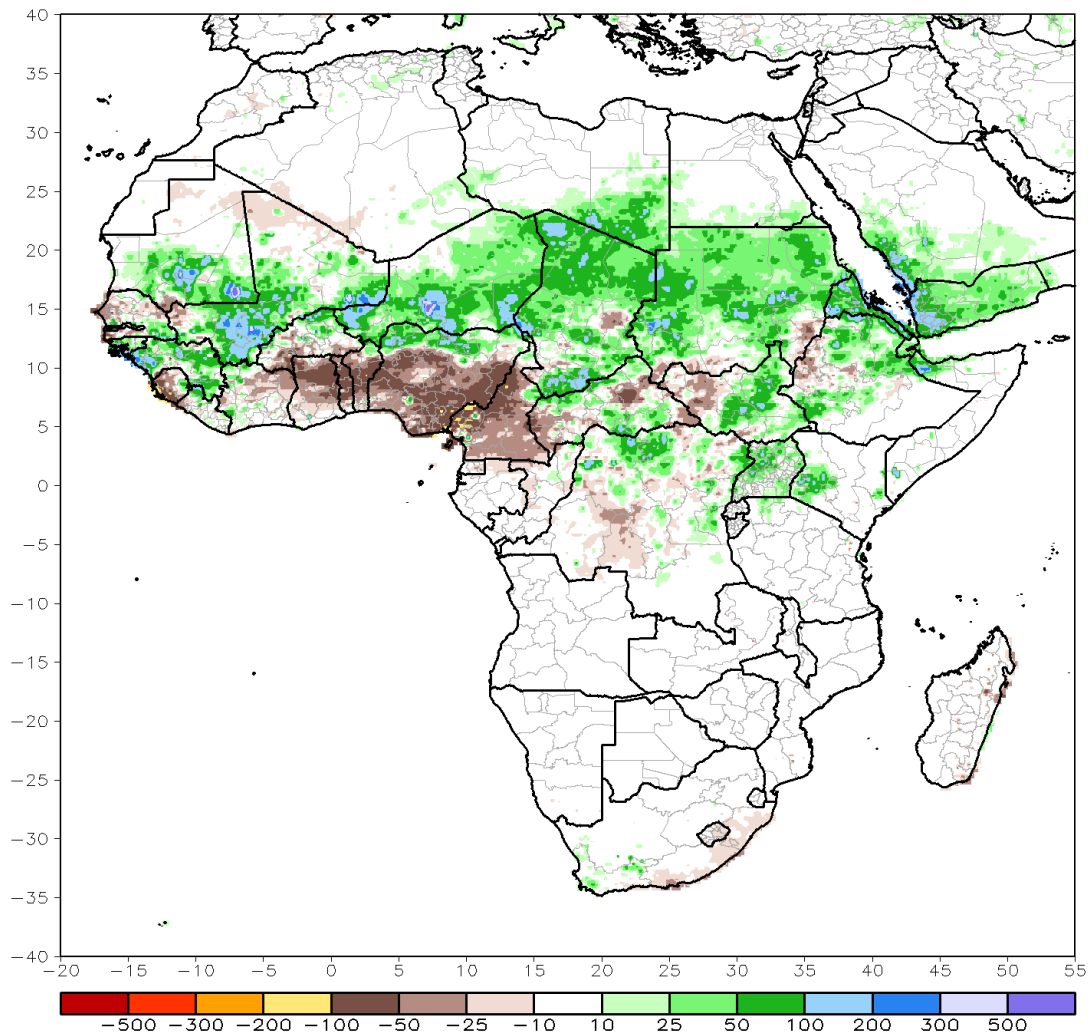


Figure 10: Observed rainfall from August 1–18, 2024 based on the African Rainfall Estimation Algorithm version 2.0.

5) Seasonal Forecast

The most recent seasonal forecast calls for well above-average season. We still believe that this forecast will verify, but we are anticipating a brief break after Ernesto that will likely give us normal tropical cyclone activity for the next two weeks.

3 Upcoming Forecasts

The next two-week forecast will be issued on September 3 for the September 3–16 period. Additional two-week forecasts will be issued on September 17, October 1 and October 15.

VERIFICATION OF AUGUST 6–19 FORECAST

Above-normal tropical cyclone activity occurred during the two-week period from August 6–19. We had assigned an 85% probability of above-normal activity, with a 14% chance of normal and a 1% chance of below-normal activity during the two-week period. Ernesto produced ~14 ACE, while Debby generated 2 ACE.

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

Table 3: ACE forecast for TC activity for August 6–19, the probability assigned for each category being reached and observed ACE.

| ACE Category | Definition | Probability in each Category | Observed ACE |
|--------------|--------------------------|------------------------------|--------------|
| Above Normal | Upper Tercile (>6 ACE) | 85% | 16 |
| Normal | Middle Tercile (2–6 ACE) | 14% | |
| Below Normal | Lower Tercile (<2 ACE) | 1% | |