

COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM OCTOBER 12–25, 2023

We believe that the most likely category for Atlantic hurricane activity in the next two weeks is above-normal (55%), with normal (40%) and below-normal (5%) being less likely.

(as of 12 October 2023)

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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 15th 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 1966–2022 and defining above-normal, normal and below-normal two-week periods based on terciles. Since there are 57 years from 1966–2022, we include the 19 years with the most ACE from October 12–25 as the upper tercile, the 19 years with the least ACE as the bottom tercile, while the remaining 19 years are counted as the middle tercile.

Table 1: ACE forecast definition for TC activity for October 12–25, 2023.

Parameter	Definition	Probability in Each Category
Above-Normal	Upper Tercile (>8 ACE)	55%
Normal	Middle Tercile (1–8 ACE)	40%
Below-Normal	Lower Tercile (<1 ACE)	5%

2 Forecast

We believe that the next two weeks have the highest probability to be characterized by activity at above-normal levels (>8 ACE). Tropical Storm Sean is the only active named storm in the Atlantic, but it is weak and expected to be short lived. The National Hurricane Center is monitoring one additional area for TC formation in the next seven days (Invest 94L). This system is currently given a 30% chance of TC formation in the next seven days. There is some robust ensemble support for this TC intensifying considerably over the next week to ten days. Global model signals for additional TC development are relatively unclear, although there is potential for additional formation in the western Caribbean in about one week’s time as well as late in the forecast period. The MJO is currently in phase 1 but looks to weaken somewhat over the next two weeks.

Figure 1 displays the formation locations of TCs from October 12–25 for the years from 1966–2022, along with the maximum intensities that these storms reached. Figure 2 displays the October 12–25 forecast period with respect to climatology. The primary threat area for major hurricane formations during mid- to late October is in the western Caribbean.

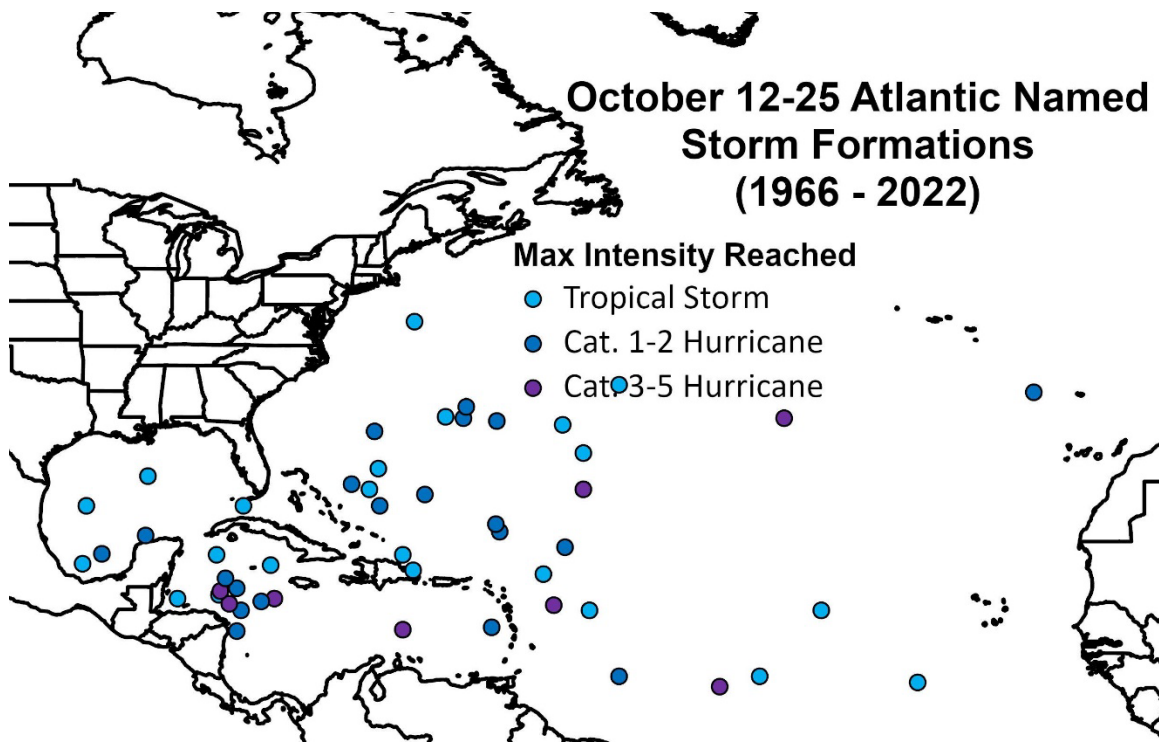


Figure 1: Atlantic named storm formations from October 12–25 during the years from 1966-2022 and the maximum intensity that these named storms reached.

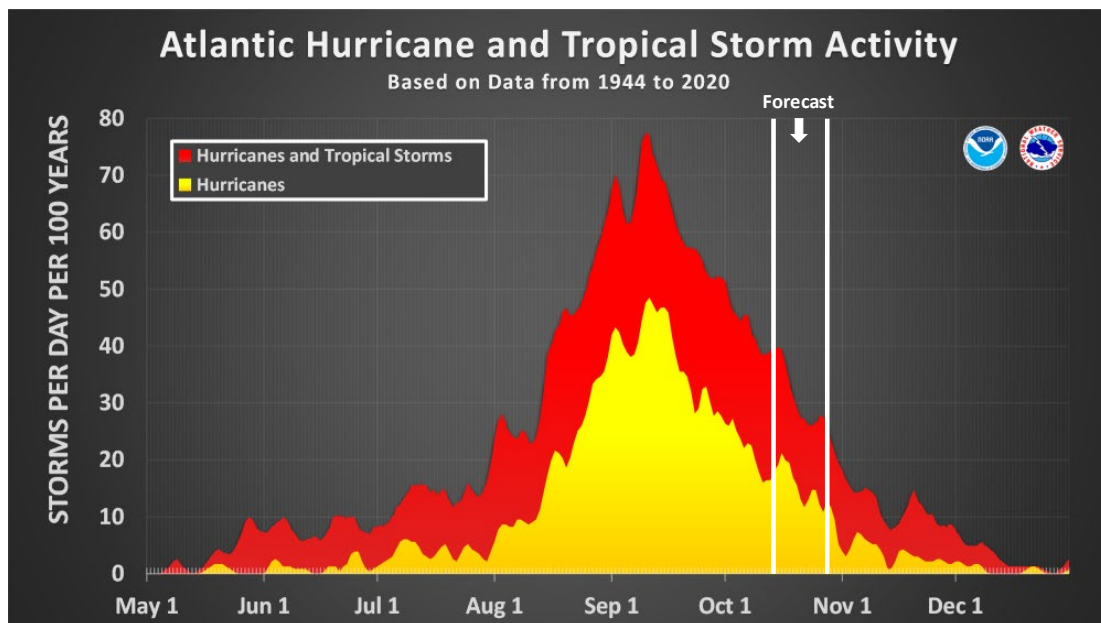


Figure 2: The current forecast period (October 12–25) with respect to climatology, delimited with white lines. Figure courtesy of NOAA.

We now examine how we believe each of the five factors discussed in the introduction will impact Atlantic TC activity for the period from October 12–25.

1) Current Storm Activity

Sean is the only active Atlantic named storm. It is forecast to only be a tropical storm for about one day, so its ACE contribution is expected to be minimal.

2) National Hurricane Center Tropical Weather Outlook

The latest NHC Tropical Weather Outlook is monitoring one area for potential TC formation (Invest 94L). The signal for development of this TC has increased over the past few days, with ensembles becoming much more bullish on intensification in about one week's time. If 94L were to develop, it could have the potential to generate the ACE needed to meet the above-normal threshold. Given its forecast low latitude track, 94L looks to track through a relatively conducive environment of low to moderate shear, warm SSTs and copious mid-level moisture.

3) Global Model Analysis

The ECMWF Ensemble Prediction System (EPS) (Figure 3) is showing a relatively robust signal for intensification of 94L into a hurricane or major hurricane as it tracks westward across the tropical Atlantic. The Global Ensemble Forecast System (GEFS) is also showing similar intensification potential for 94L (Figure 4). There is also some signal in the GEFS and the deterministic Canadian model for a system in the western Caribbean in about one week's time, with both the GEFS and EPS also hinting at potential development in the western Caribbean late in the forecast period, with the signal being stronger in the GEFS.

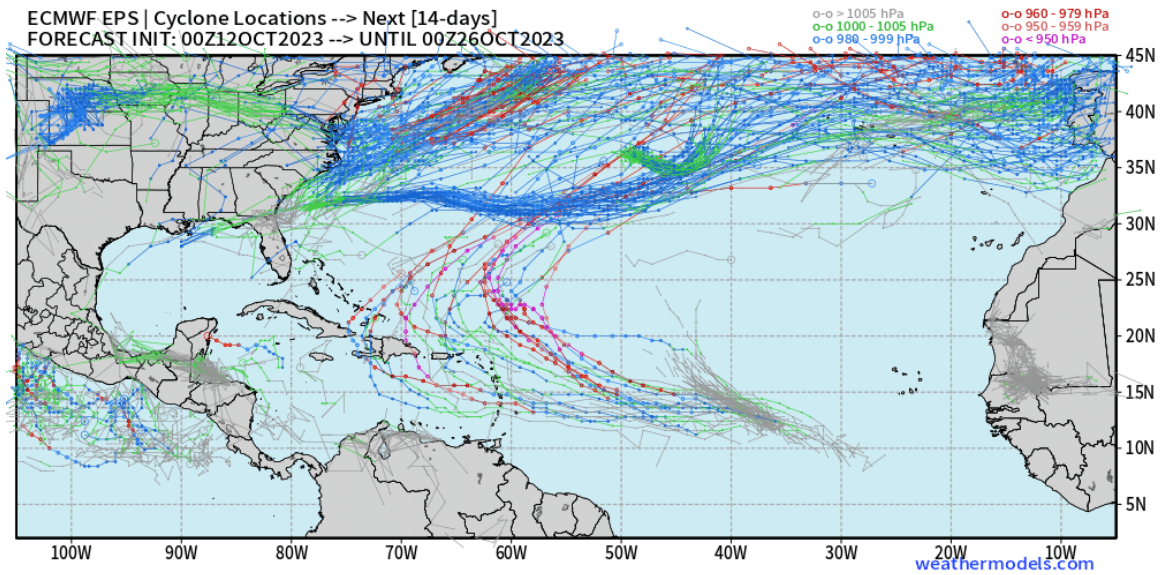


Figure 3: Cyclone locations from the ECMWF EPS ensemble through October 25. Figure courtesy of weathermodels.com.

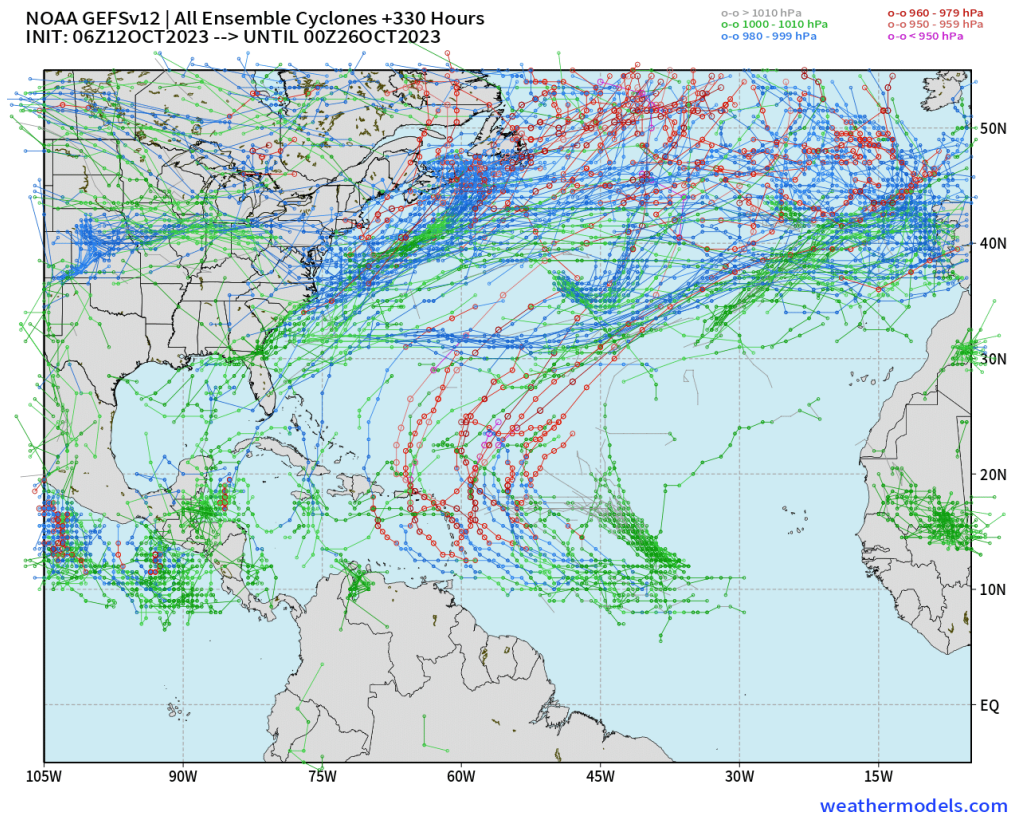


Figure 4: Cyclone locations from the Global Ensemble Forecast System through October 25. Figure courtesy of weathermodels.com.

4) Madden-Julian Oscillation

The MJO, as measured by the Wheeler-Hendon index, is currently in phase 1 which typically favors Atlantic hurricane activity (Figure 5). The MJO is forecast to generally weaken and remain relatively stationary over the next two weeks. Upper-level winds are forecast to be quite conducive for Atlantic TC development over the next two weeks, with upper-level easterly anomalies forecast to persist over the entire tropical Atlantic and Caribbean for the entire forecast period (Figures 6-8). These favorable upper-level winds are one of the reasons why we are forecasting an above-normal two-week period.

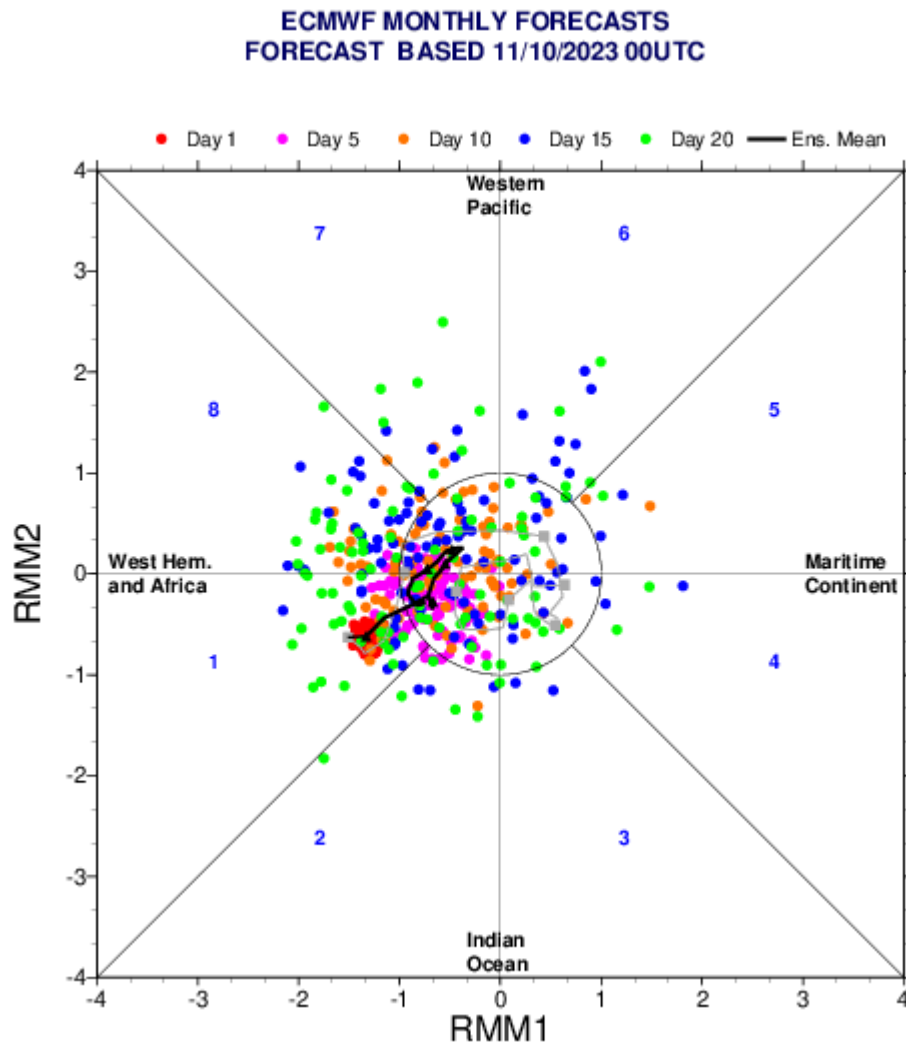


Figure 5: Predicted propagation of the MJO by the ECMWF Ensemble Prediction System. Figure courtesy of ECMWF.

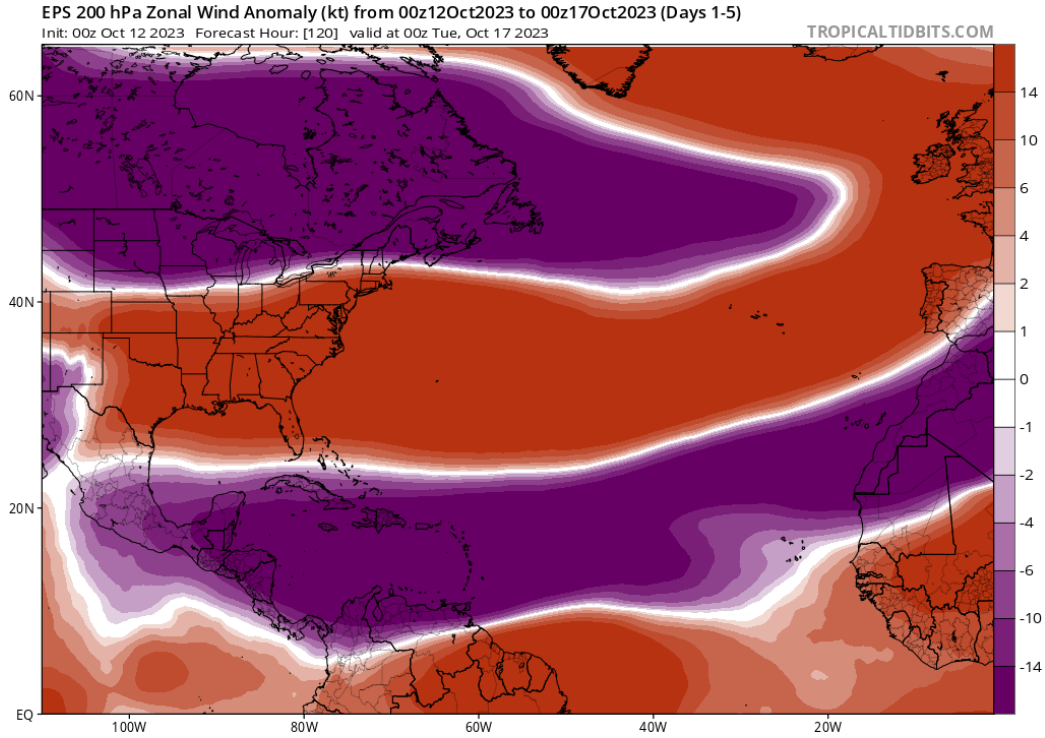


Figure 6: Forecast 200 hPa zonal wind anomalies across the tropical and subtropical Atlantic for October 12-16. Figure courtesy of Tropical Tidbits.

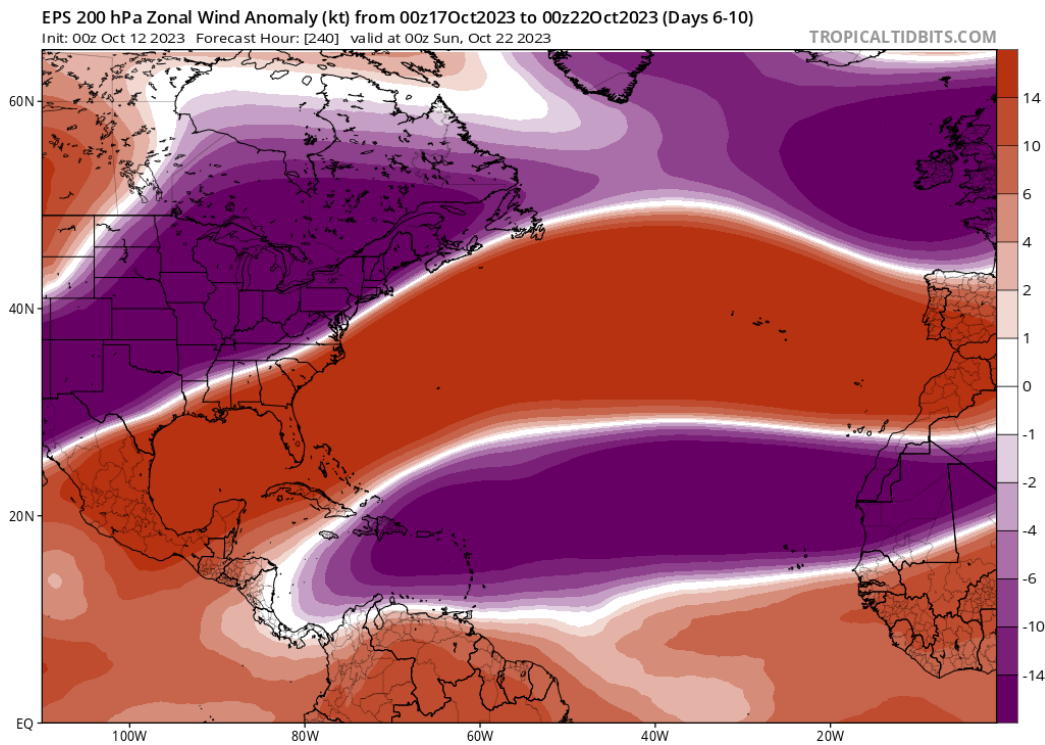


Figure 7: As in Figure 6 but for October 17-21.

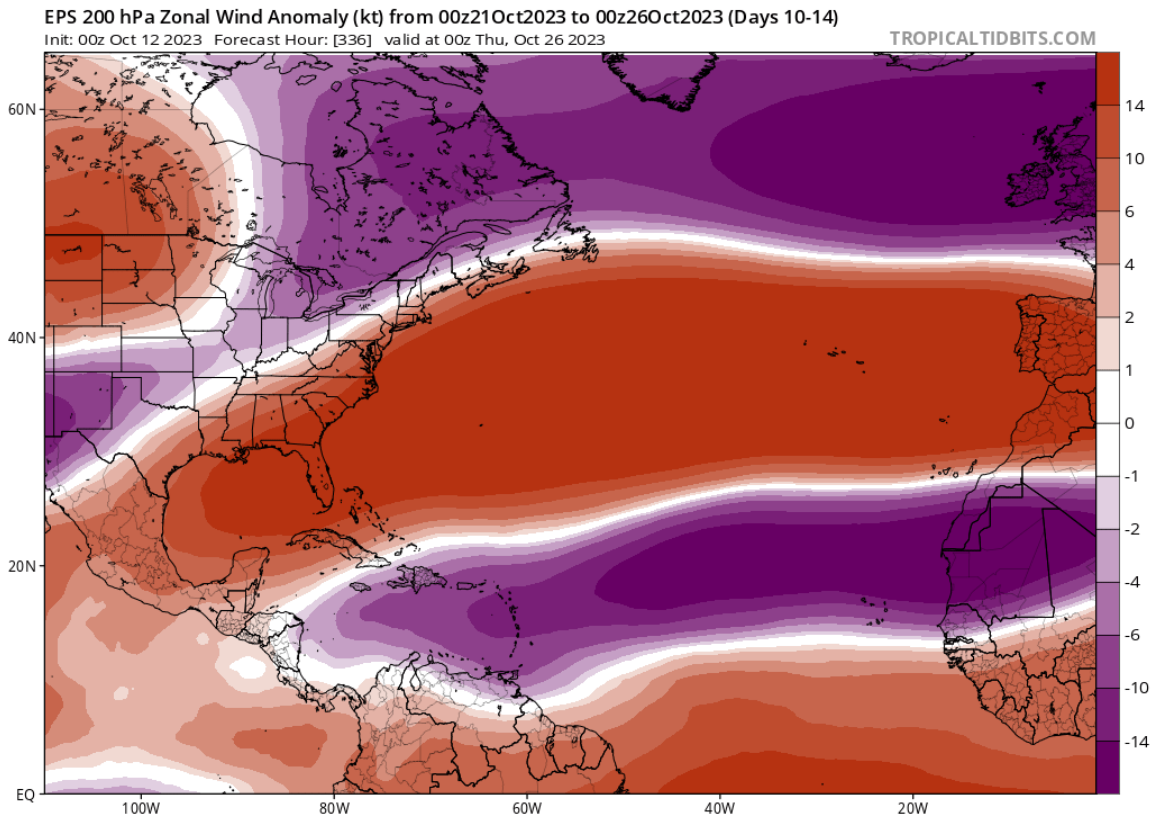


Figure 8: As in Figure 7 but for October 21-25.

5) Seasonal Forecast

The most recent seasonal forecast calls for an above-average season. We favor above-average ACE as the most likely outcome for the next two weeks.

3 Upcoming Forecasts

This is the final two-week forecast for the 2023 Atlantic hurricane season. All two-week forecasts will be fully verified with the 2023 Atlantic hurricane season forecast verification that will be issued in late November.

VERIFICATION OF SEPTEMBER 28–OCTOBER 11 FORECAST

The two-week forecast of tropical cyclone activity from September 28–October 11 verified in the normal category (4–12 ACE). A total of 8 ACE was observed during the two-week period. We assigned a probability of 35% to the normal ACE category. We assigned the highest probability to the above-normal category (60%), given that we anticipated more ACE generated by the Philippe/Rina combination when we issued the forecast. The interaction of these two TCs posed a significant forecast challenge. While Philippe was quite long-lived, it remained weak throughout its lifetime and consequently generated relatively low levels of ACE. During the two-week period, Philippe produced 6 ACE, Rina contributed 2 ACE, while Sean produced <1 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 September 28–October 11, the probability assigned for each category being reached and observed ACE.

ACE Category	Definition	Probability in each Category	Observed ACE
Above-Normal	Upper Tercile (>12 ACE)	60%	8
Normal	Middle Tercile (4–12 ACE)	35%	
Below-Normal	Lower Tercile (<4 ACE)	5%	