FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY AND LANDFALL STRIKE PROBABILITY FOR 2025

We have maintained our forecast for a slightly above-normal 2025 Atlantic basin hurricane season, although noting lower-than-normal confidence with this outlook. Sea surface temperatures across the eastern and central Atlantic have anomalously warmed over the past few weeks and are now somewhat warmer than normal. Multiple indicators anticipate likely cool ENSO neutral conditions during the peak of the Atlantic hurricane season. Warm sea surface temperatures and ENSO neutral conditions typically provide a more conducive dynamic and thermodynamic environment for hurricane formation and intensification. The primary reason for the uncertainty in the outlook is the high observed Caribbean shear over recent weeks. Typically, high levels of Caribbean shear in June–July are associated with less active hurricane seasons. We anticipate a slightly above-average probability for major hurricanes making landfall along the continental United States coastline and in the Caribbean for the remainder of the hurricane season. As with all hurricane seasons, coastal residents are reminded that even one hurricane making landfall nearby results in an impactful season. Thorough preparations should be made every season, regardless of predicted activity.

(as of 6 August 2025)

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With Special Assistance from the TC-RAMS Team[4] and Carl J. Schreck III[5]
In Memory of William M. Gray[6]

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ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2025

Forecast Parameter and 1991-2020 Average (in parentheses)	Issue Date 3 April 2025	Issue Date 11 June 2025	Issue Date 9 July 2025	Issue Date 6 August 2025	Observed Thru 5 August 2025	Remainder of Season Forecast
Named Storms (NS) (14.4)	17	17	16	16	4	12
Named Storm Days (NSD) (69.4)	85	85	80	80	4.5	75.5
Hurricanes (H) (7.2)	9	9	8	8	0	8
Hurricane Days (HD) (27.0)	35	35	30	30	0	30
Major Hurricanes (MH) (3.2)	4	4	3	3	0	3
Major Hurricane Days (MHD) (7.4)	9	9	8	8	0	8
Accumulated Cyclone Energy (ACE) (123)	155	155	140	140	3	137
ACE West of 60°W (73)	93	93	87	87	3	84
Net Tropical Cyclone Activity (NTC) (135%)	165	165	145	145	9	136

PROBABILITIES FOR AT LEAST ONE MAJOR (CATEGORY 3-4-5) HURRICANE LANDFALL ON EACH OF THE FOLLOWING COASTAL AREAS (AFTER 5 AUGUST):

1) Entire continental U.S. coastline – 48% (average from 1880–2020 is 43%)

2) U.S. East Coast Including Peninsula Florida (south and east of Cedar Key, Florida) – 24% (average from 1880–2020 is 21%)

3) Gulf Coast from the Florida Panhandle (west and north of Cedar Key, Florida) westward to Brownsville – 31% (average from 1880–2020 is 27%)

PROBABILITY FOR AT LEAST ONE MAJOR (CATEGORY 3-4-5) HURRICANE TRACKING THROUGH THE CARIBBEAN (10–20°N, 88–60°W) (AFTER 5 AUGUST):

1) 52% (average from 1880–2020 is 47%)

ABSTRACT

Information obtained through July indicates that the 2025 Atlantic hurricane season will have activity slightly above the 1991–2020 average. We estimate that 2025 will have 16 named storms (average is 14.4), 80 named storm days (average is 69.4), 8 hurricanes (average is 7.2), 30 hurricane days (average is 27.0), 3 major (Category 3-4-5) hurricanes (average is 3.2) and 8 major hurricane days (average is 7.4). The probability of U.S. and Caribbean major hurricane landfall is estimated to be slightly above its long-period average. We predict Atlantic basin Accumulated Cyclone Energy (ACE) and Net Tropical Cyclone (NTC) activity in 2025 to be approximately 115 percent of their long-term averages. We have maintained our forecast numbers from our July update, which is a slight reduction from our April and June outlooks, due primarily to heightened levels of June and July Caribbean wind shear.

Coastal residents are reminded that it only takes one hurricane making landfall to make it an active season for them. Thorough preparations should be made for every season, regardless of how much activity is predicted.

This forecast is based on two August statistical prediction schemes that were developed using ~40 years of past data. Analog predictors are utilized as well. We are also including statistical/dynamical models based on 25–40 years of past data from the European Centre for Medium Range Weather Forecasts, the UK Met Office, the Japan Meteorological Agency and the Centro Euro-Mediterraneo sui Cambiamenti Climatici model as four additional forecast guidance tools. While most of our model guidance is pointing towards an active or hyperactive season, we stress the higher levels of uncertainty associated with this outlook given the aforementioned heightened Caribbean shear.

The tropical Pacific is currently characterized by cool ENSO neutral conditions. Our best estimate is that cool ENSO neutral conditions will likely persist throughout the hurricane season. Sea surface temperatures in the eastern and central tropical Atlantic have anomalously warmed over the past few weeks and are now somewhat warmer than normal, although not as warm as they were last year at this time. A warmer-than-normal Atlantic combined with cool ENSO neutral conditions typically favors an active Atlantic hurricane season via dynamic and thermodynamic conditions that are conducive for developing hurricanes (e.g., low vertical wind shear, increased upper ocean heat content).

The early August forecast has good long-term skill when evaluated in hindcast mode. The skill of CSU's forecast updates increases as the peak of the Atlantic hurricane season approaches. We note that this forecast has higher uncertainty than usual due to the mixed signals of a warm tropical Atlantic and cool neutral ENSO conditions but also heightened Caribbean shear.

Starting today and issued every two weeks following (e.g., 6 August, 20 August, 3 September, etc.), we will issue two-week forecasts for Atlantic TC activity during the peak of the Atlantic hurricane season from August–October.

Why issue forecasts for seasonal hurricane activity?

We are frequently asked this question. Our answer is that it is possible to say something about the probability of the coming year's hurricane activity which is superior to climatology. The Atlantic basin has the largest year-to-year variability of any of the global tropical cyclone basins. People are curious to know how active the upcoming season is likely to be, particularly if you can show hindcast skill improvement over climatology for many past years.

Everyone should realize that it is impossible to precisely predict this season's hurricane activity in early August. There is, however, much curiosity as to how global ocean and atmosphere features are presently arranged with respect to the probability of an active or inactive hurricane season for the coming year. Our early August statistical and statistical/dynamical hybrid models show strong evidence on ~25–40 years of data that significant improvement over a climatological forecast can be attained. We would never issue a seasonal hurricane forecast unless we had models developed over a long hindcast period which showed skill. We also include probabilities of exceedance to provide a visualization of the uncertainty associated with these predictions.

We issue these forecasts to satisfy the curiosity of the public and to bring attention to the hurricane problem. There is a general interest in knowing what the odds are for an active or inactive season. One must remember that our forecasts are based on the premise that those global oceanic and atmospheric conditions which preceded comparatively active or inactive hurricane seasons in the past provide meaningful information about similar trends in future seasons.

It is also important that the reader appreciate that these seasonal forecasts are based on statistical and dynamical models which will fail in some years. Moreover, these forecasts do not specifically predict where within the Atlantic basin these storms will strike. The probability of landfall for any one location along the coast is very low and reflects the fact that, in any one season, most U.S. coastal areas will not feel the effects of a hurricane no matter how active the individual season is.

Acknowledgment

These seasonal forecasts were developed by the late Dr. William Gray, who was lead author on these predictions for over 20 years and continued as a co-author until his death in 2016. In addition to pioneering seasonal Atlantic hurricane prediction, he conducted groundbreaking research on a wide variety of other topics including hurricane genesis, hurricane structure and cumulus convection that are discussed in a paper highlighting his research legacy. His investments in both time and energy on these forecasts cannot be acknowledged enough.

We are grateful for support from Commodity Weather Group, Gallagher Re, the Insurance Information Institute, Ironshore Insurance, IAA, and Weatherboy. We acknowledge a grant from the G. Unger Vetlesen Foundation for additional financial support.

Colorado State University's seasonal hurricane forecasts have benefited greatly from several individuals that were former graduate students of William Gray. Among these former project members are Chris Landsea, John Knaff and Eric Blake. We also would like to thank Jhordanne Jones and Alex DesRosiers, Ph.D. graduates from Michael Bell's research group, for model development and forecast assistance over the past several years. Thanks also extend to several current members of Michael Bell's research group who have provided valuable comments and feedback throughout the forecast preparation process. These members include: Tyler Barbero, Lauren Beard, Delián Cólon Burgos, Jen DeHart, Chandler Jenkins, Nick Mesa, Isaac Schluesche and Meghan Stell.

We thank Louis-Philippe Caron and the data team at the Barcelona Supercomputing Centre for providing data and insight on the statistical/dynamical models. We have also benefited from meteorological discussions with Louis-Philippe Caron, Dan Chavas, Jason Dunion, Michael Lowry, Brian McNoldy, Paul Roundy, Carl Schreck, Mike Ventrice, and Peng Xian over the past few years.

DEFINITIONS AND ACRONYMS

Accumulated Cyclone Energy (ACE) - A measure of a named storm's potential for wind destruction defined as the sum of the square of a named storm's maximum wind speed (in 10^4 knots^2) for each 6-hour period of its existence. The 1991–2020 average value of this parameter is 123 for the Atlantic basin.

Atlantic Multi-Decadal Oscillation (AMO) – A mode of natural variability that occurs in the North Atlantic Ocean and evidencing itself in fluctuations in sea surface temperature and sea level pressure fields. The AMO is likely related to fluctuations in the strength of the oceanic thermohaline circulation. Although several definitions of the AMO are currently used in the literature, we define the AMO based on North Atlantic sea surface temperatures from 50–60°N, 50–10°W and sea level pressure from 0–50°N, 70–10°W.

Atlantic Basin – The area including the entire North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

El Niño – A 12-18 month period during which anomalously warm sea surface temperatures occur in the eastern half of the equatorial Pacific. Moderate or strong El Niño events occur irregularly, about once every 3–7 years on average.

ENSO Longitude Index (ELI) – An index defining ENSO that estimates the average longitude of deep convection associated with the Walker Circulation.

Hurricane (H) - A tropical cyclone with sustained low-level winds of 74 miles per hour (33 ms^{-1} or 64 knots) or greater.

Hurricane Day (HD) - A measure of hurricane activity, one unit of which occurs as four 6-hour periods during which a tropical cyclone is observed or is estimated to have hurricane-force winds.

Indian Ocean Dipole (IOD) - An irregular oscillation of sea surface temperatures between the western and eastern tropical Indian Ocean. A positive phase of the IOD occurs when the western Indian Ocean is anomalously warm compared with the eastern Indian Ocean.

Madden Julian Oscillation (MJO) – A globally propagating mode of tropical atmospheric intra-seasonal variability. The wave tends to propagate eastward at approximately 5 ms^{-1}, circling the globe in roughly 30-60 days.

Major Hurricane (MH) - A hurricane which reaches a sustained low-level wind of at least 111 mph (96 knots or 50 ms^{-1}) at some point in its lifetime. This constitutes a category 3 or higher on the Saffir/Simpson scale.

Major Hurricane Day (MHD) - Four 6-hour periods during which a hurricane has an intensity of Saffir/Simpson category 3 or higher.

Named Storm (NS) - A hurricane, a tropical storm or a sub-tropical storm.

Named Storm Day (NSD) - As in HD but for four 6-hour periods during which a tropical or sub-tropical cyclone is observed (or is estimated) to have attained tropical storm-force winds.

Net Tropical Cyclone (NTC) Activity –Average seasonal percentage mean of NS, NSD, H, HD, MH, MHD. Gives overall indication of Atlantic basin seasonal hurricane activity. The 1991-2020 average value of this parameter is 135.

Oceanic Nino Index (ONI) – Three-month running mean of SST anomalies in the Nino 3.4 region (5°S–5°N, 170–120°W) based on centered 30-year base periods.

Relative Oceanic Nino Index (RONI) – Three-month running mean of SST anomalies in the Nino 3.4 region (5°S–5°N, 170–120°W) minus tropically-averaged (20°S–20°N) SST anomalies multiplied by a scaling factor.

Saffir/Simpson Hurricane Wind Scale – A measurement scale ranging from 1 to 5 of hurricane wind intensity. One is a weak hurricane; whereas, five is the most intense hurricane.

Southern Oscillation Index (SOI) – A normalized measure of the surface pressure difference between Tahiti and Darwin. Low values typically indicate El Niño conditions.

Standard Deviation (SD) – A measure used to quantify the variation in a dataset.

Sea Surface Temperature Anomaly (SSTA) – Observed sea surface temperature differenced from a long-period average, typically 1991–2020.

Thermohaline Circulation (THC) – A large-scale circulation in the Atlantic Ocean that is driven by fluctuations in salinity and temperature. When the THC is stronger than normal, the AMO tends to be in its warm (or positive) phase, and more Atlantic hurricanes typically form.

Tropical Cyclone (TC) - A large-scale circular flow occurring within the tropics and subtropics which has its strongest winds at low levels; including hurricanes, tropical storms and other weaker rotating vortices.

Tropical Storm (TS) - A tropical cyclone with maximum sustained winds between 39 mph (18 ms^{-1} or 34 knots) and 73 mph (32 ms^{-1} or 63 knots).

Vertical Wind Shear – The difference in horizontal wind between 200 hPa (approximately 40000 feet or 12 km) and 850 hPa (approximately 5000 feet or 1.6 km).

1 knot = 1.15 miles per hour = 0.515 meters per second

1 Introduction

This is the 42nd year in which the CSU Tropical Meteorology Project has made forecasts of the upcoming season's Atlantic basin hurricane activity. Our research team has shown that a sizable portion of the year-to-year variability of Atlantic tropical cyclone (TC) activity can be forecast with skill exceeding climatology. Five components are used to produce our August forecast. These components are two statistical regression models, a combined statistical/dynamical model, a selection of analog seasons, and lastly, qualitative adjustments to accommodate additional processes which may not be explicitly represented by these analyses. The statistical/dynamical models are from the European Centre for Medium-Range Weather Forecasts (ECMWF), the UK Met Office, the Japan Meteorological Agency (JMA) and the Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC) modeling agencies. All of these models show skill at predicting TC activity based on ~25–40 years of historical data. These evolving forecast techniques are based on a variety of climate-related global and regional predictors previously shown to be related to the forthcoming seasonal Atlantic basin TC activity and landfall probability. We believe that seasonal forecasts must be based on methods that show significant hindcast skill in application to long periods of prior data. It is only through hindcast skill that one can demonstrate that seasonal forecast skill is possible. This is a valid methodology provided that the atmosphere continues to behave in the future as it has in the past.

The best predictors do not necessarily have the best individual correlations with hurricane activity. The best forecast parameters are those that explain the portion of the variance of seasonal hurricane activity that are not associated with the other forecast variables. It is possible for an important hurricane forecast parameter to show little direct relationship to a predictand by itself but to have an important influence when included with a set of 2–3 other predictors.

2.1 August Statistical Forecast Scheme using July Data

We developed a 1 August statistical seasonal forecast scheme for the prediction of Accumulated Cyclone Energy (ACE) that has been utilized operationally since 2012. The model was updated in 2023 to use ERA5 data.

The pool of three predictors for the early August statistical forecast scheme is given in Table 1. The location of each of these predictors are shown in Figure 1. Skillful forecasts can be issued for post-31 July ACE based upon cross-validated hindcasts from 1979–2024. When these three predictors are combined, they predict an ACE that correlates at 0.80 with observed ACE using cross-validated hindcasts from 1979–2024 (Figure 2). This model favors slightly above-average Atlantic hurricane activity in 2025.

Table 1: Listing of 1 August 2025 predictors for this year's hurricane activity. A plus (+) means that positive deviations of the parameter indicate increased hurricane activity this year, and a minus (-) means that positive deviations of the parameter indicate decreased hurricane activity this year.

Predictor	Values for 2025 Forecast	Effect on 2025 Hurricane Season
1) July 10 m U (7.5-17.5°N, 85-60°W) (+)	+0.2 SD	Slightly Enhance
2) July SST (20-40°N, 35-15°W) (+)	+0.8 SD	Enhance
3) July 200 hPa U (10-20°N, 30°W-30°E) (-)	+0.1 SD	Neutral

August Seasonal Forecast Predictors – Using July Data

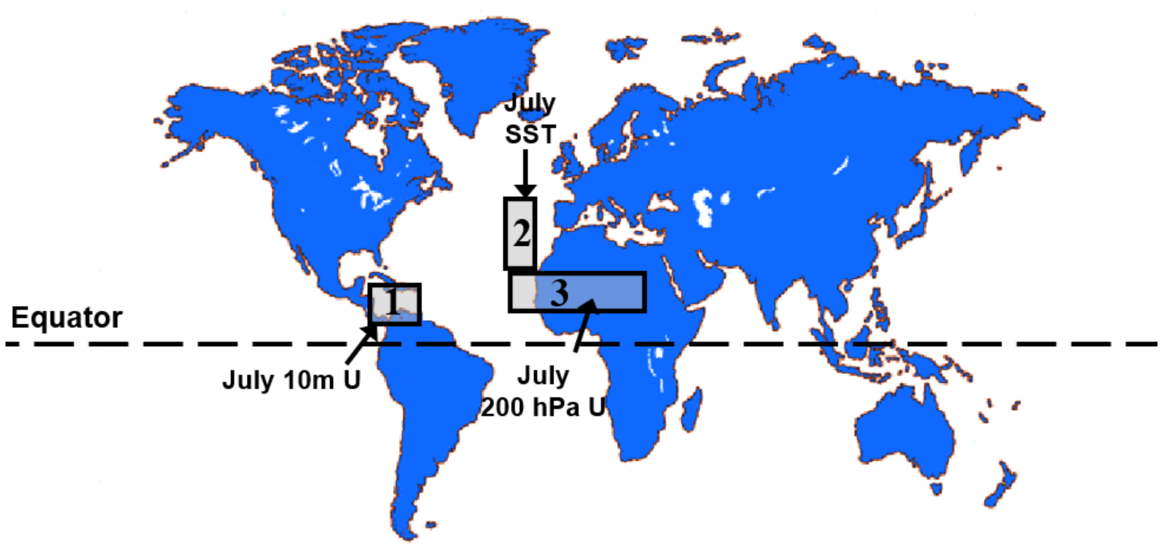

Figure 1: Location of predictors for the post-31 July forecast for the 2025 hurricane season from the July-averaged statistical model.

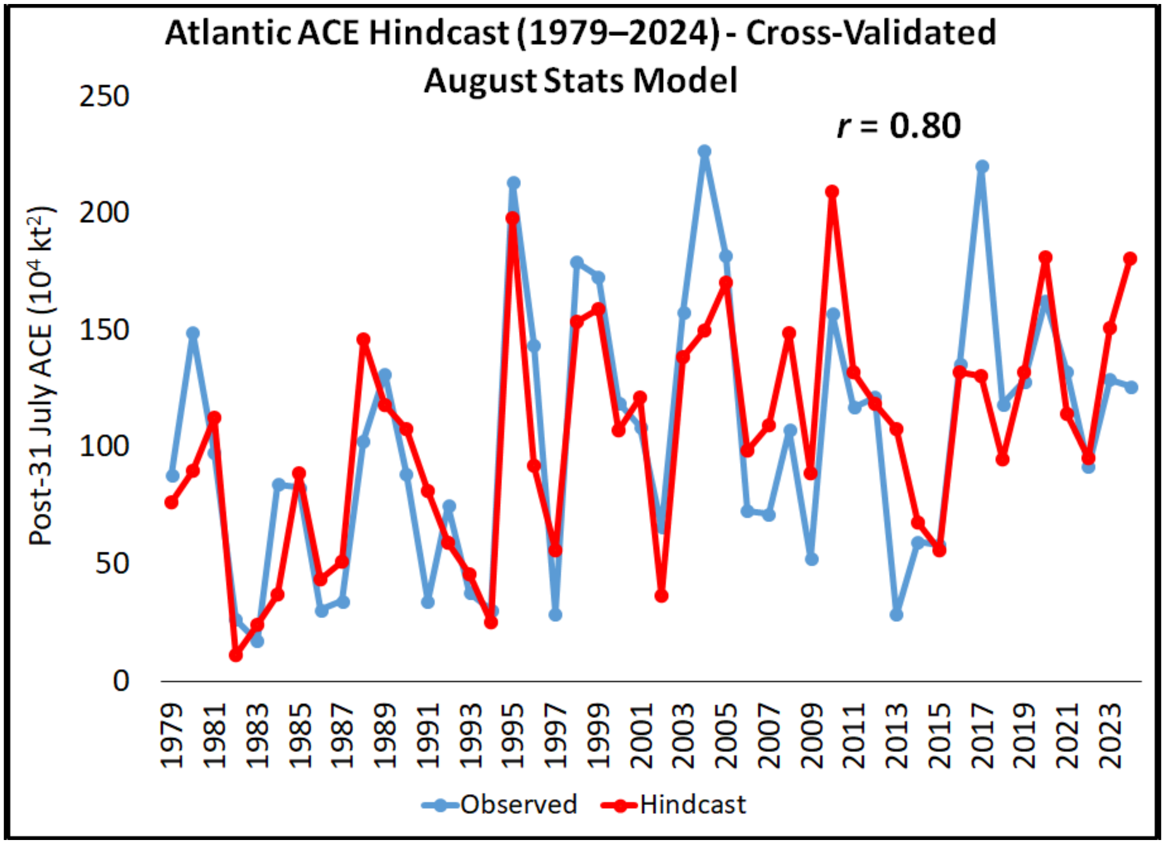

Figure 2: Observed versus hindcast values of post-31 July ACE for 1979–2024 using our statistical scheme that uses July averages.

Table 2 shows our forecast for the 2025 hurricane season from the July-averaged statistical model and the comparison of this forecast with the 1991–2020 average. The statistical forecast is calling for an above-average remainder of the season.

Table 2: Post-31 July statistical forecast for 2025 from the July-averaged statistical model.

Predictands and Climatology (1991–2020 Post-31 July Average)	Post-31 July Statistical Forecast	Full Season Statistical Forecast (Activity Thru 31 July Added In)
Named Storms (NS) – 11.6	16.4	20.4
Named Storm Days (NSD) – 61.3	73.8	78.3
Hurricanes (H) – 6.5	7.6	7.6
Hurricane Days (HD) – 25.6	29.4	29.4
Major Hurricanes (MH) – 3.1	3.5	3.5
Major Hurricane Days (MHD) – 7.1	8.2	8.2
Accumulated Cyclone Energy (ACE) – 113	133	136
Net Tropical Cyclone Activity (NTC) – 123	148	157

2.1a Physical Associations among Predictors Listed in Table 1

The locations and brief descriptions of the three predictors for the July-averaged August statistical forecast are now discussed. It should be noted that all forecast parameters correlate significantly with physical features during August through October that are known to be favorable for elevated levels of TC activity. For each of these predictors, we display a four-panel figure showing rank correlations since 1979 between values of each predictor and August–October values of SST, sea level pressure (SLP), 850 hPa (~1.5 km altitude) zonal wind (U), and 200 hPa (~12 km altitude) zonal wind (U), respectively.

Predictor 1. July 10 meter U in the Caribbean (+)

(7.5–17.5°N, 85–60°W)

Low-level trade wind flow has been utilized as a predictor in seasonal forecasting systems for the Atlantic basin (Saunders and Lea 2008). When the trades are weaker-than-normal, SSTs across the tropical Atlantic tend to be elevated, and consequently a larger-than-normal Atlantic Warm Pool (AWP) is typically observed (Wang and Lee 2007) (Figure 3). A larger AWP also correlates with reduced vertical shear across the tropical Atlantic. Weaker trade winds are typically associated with higher pressure in the tropical eastern Pacific (a La Niña signal) and lower pressure in the Caribbean and tropical Atlantic. Both of these conditions generally occur when active hurricane seasons are observed. Predictor 1 also has a strong negative correlation with August–October-averaged 200-850-hPa zonal shear.

Predictor 2. July SST in the Northeastern Subtropical Atlantic (+)

(20°–40°N, 35–15°W)

A similar predictor was utilized in earlier August seasonal forecast models (Klotzbach 2007, Klotzbach 2011). Anomalously warm SSTs in the subtropical North Atlantic are associated with a positive phase of the Atlantic Meridional Mode (AMM), a northward-shifted Intertropical Convergence Zone, and consequently, reduced trade wind strength (Kossin and Vimont 2007). Weaker trade winds are associated with less surface evaporative cooling and less mixing and upwelling. This results in warmer tropical Atlantic SSTs during the August–October period (Figure 4).

Predictor 3. July 200 hPa U over the Tropical Eastern Atlantic and Northern Tropical Africa (-)

(10–20°N, 30°W–30°E)

Anomalous easterly flow at upper levels over the eastern Atlantic and northern tropical Africa provides an environment that is more favorable for easterly wave development into TCs. This anomalous easterly flow tends to persist through August–October, which reduces shear over the Main Development Region (MDR). This predictor also correlates with SLP and SST anomalies over the tropical eastern Pacific that are typically associated with cool ENSO conditions (Figure 5).

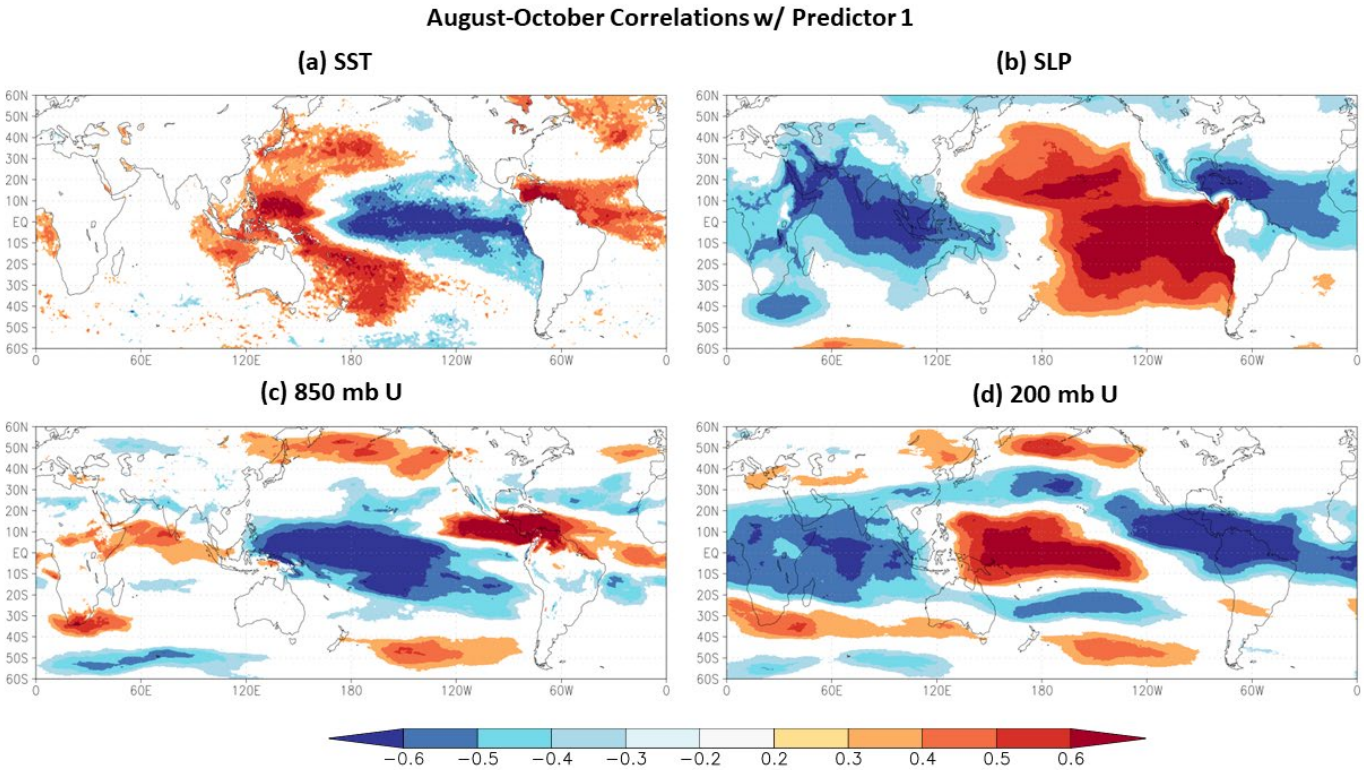

Figure 3: Rank correlations between <u>July 10 meter U</u> in the Caribbean <u>(Predictor 1)</u> and August–October sea surface temperature (panel a), August–October sea level pressure (panel b), August–October 850 hPa zonal wind (panel c) and August–October 200 hPa zonal wind (panel d).

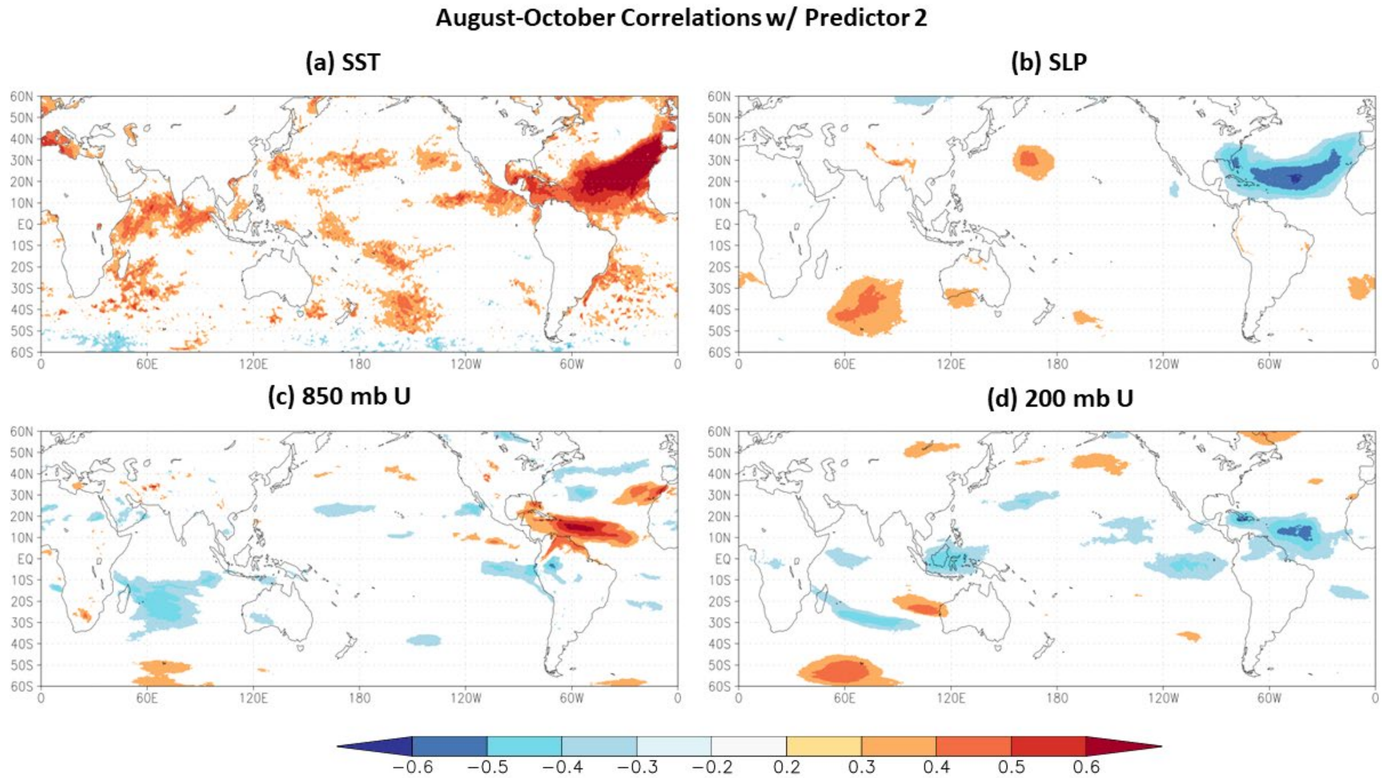

Figure 4: Rank correlations between July sea surface temperature in the subtropical northeastern Atlantic (Predictor 2) and August–October sea surface temperature (panel a), August–October sea level pressure (panel b), August–October 850 hPa zonal wind (panel c) and August–October 200 hPa zonal wind (panel d).

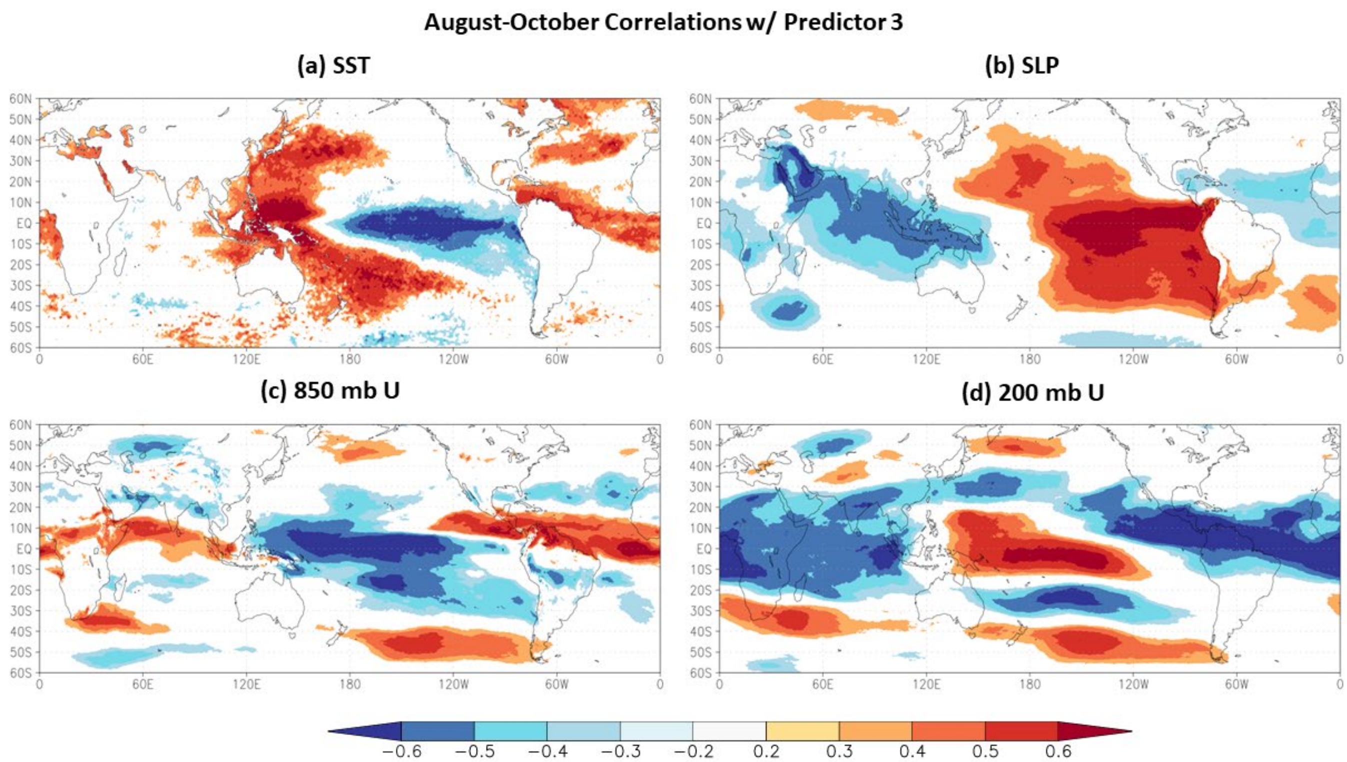

Figure 5: Rank correlations between July 200 hPa zonal wind over tropical north Africa (Predictor 3) and August–October sea surface temperature (panel a), August–October sea level pressure (panel b), August–October 925 hPa zonal wind (panel c) and August–October 200 hPa zonal wind (panel d). Predictor values have been multiplied by -1 so that the signs of correlations match up with those in Figures 4 and 5.

2.2 August Statistical Forecast Scheme using 50-Day Averages

We now include a second August statistical seasonal forecast scheme that uses 50-day averages, to complement the scheme that uses July-only data. The reason for using the longer averages is to reduce the impact of sub-seasonal variability, such as the Madden-Julian oscillation, which can impart atmospheric signals on shorter timescales that may not be representative of the longer-term signal that is critical for seasonal forecasting. This model uses similar predictors to what is used with our model using July averages, with slight tweaks to the predictor boundaries to capture where these predictors showed higher skill in mid- to late June. Given that the boundaries and physical reasonings are similar between our 50-day-averaged and July-averaged statistical model, we do not include a separate discussion of the physical reasoning behind each of the three predictors selected for the 50-day-average model.

This statistical model also uses ERA5 data. The model was developed on data from 1979–2021 and has been issued operationally since 2022.

The pool of three predictors for the 50-day-averaged early August statistical forecast scheme is defined in Table 3. The location of each of these predictors is shown in Figure 6. Skillful forecasts can be issued for post-31 July ACE based upon cross-validated hindcasts from 1979–2021 and real-time forecasts from 2022–2024. When these three predictors are combined, they correlate at 0.77 with observed ACE using cross-validated hindcasts from 1979–2024 (Figure 7). This model calls for an above-average remainder of the Atlantic hurricane season.

Table 3: Listing of 50-day-averaged statistical model values for the August 2025 hurricane forecast. A plus (+) means that positive deviations of the parameter indicate increased hurricane activity this year, and a minus (-) means that positive deviations of the parameter indicate decreased hurricane activity this year.

Predictor	Values for 2025 Forecast	Effect on 2025 Hurricane Season
1) June 12 – July 31 10 m U (5-20°N, 90-60°W) (+)	-0.6 SD	Suppress
2) June 12 – July 31 SST (25-50°N, 30-10°W) (+)	+1.7 SD	Enhance
3) June 12 – July 31 200 hPa U (15°S-15°N, 20°W-40°E) (-)	-0.7 SD	Enhance

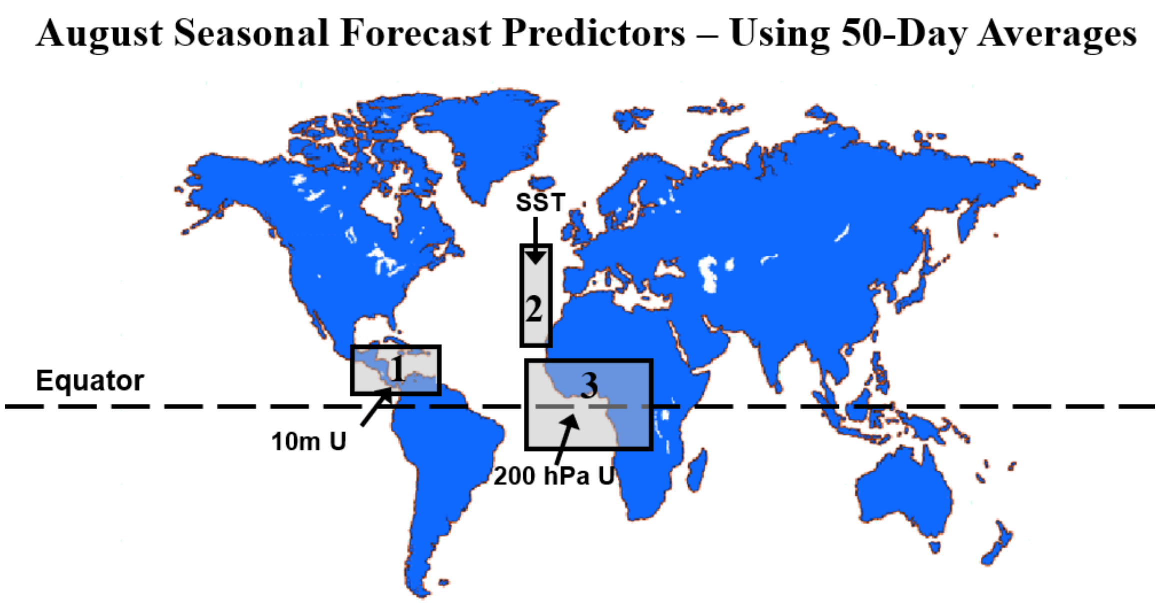

Figure 6: Location of predictors for the post-31 July forecast for the 2025 hurricane season from the 50-day-averaged (e.g., June 12 – July 31) statistical model.

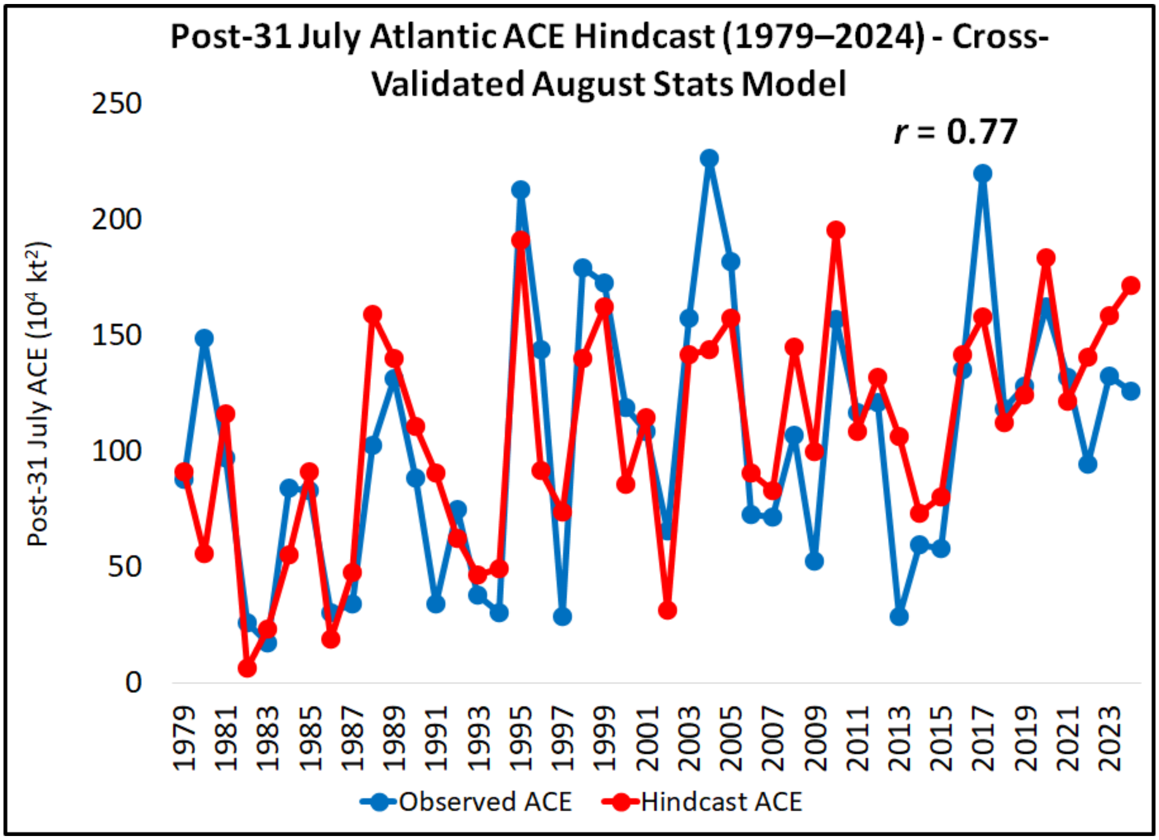

Figure 7: Observed versus hindcast values of post-31 July ACE for 1979–2024 using the 50-day-average statistical model.

Table 4 shows our forecast for the 2025 hurricane season from the statistical model using 50-day averages and the comparison of this forecast with the 1991–2020 average. This statistical forecast model calls for an above-average remainder of the season.

Table 4: Post-31 July statistical forecast for 2025 from the 50-day averaged statistical model.

Predictands and Climatology (1991-2020 Post-31 July Average)	Post-31 July Statistical Forecast	Full Season Statistical Forecast (Activity Thru 31 July Added In)
Named Storms (NS) – 11.6	17.8	21.8
Named Storm Days (NSD) – 61.3	83.0	87.5
Hurricanes (H) – 6.5	8.6	8.6
Hurricane Days (HD) – 25.6	34.4	34.4
Major Hurricanes (MH) – 3.1	4.1	4.1
Major Hurricane Days (MHD) – 7.1	10.0	10.0
Accumulated Cyclone Energy (ACE) – 113	155	158
Net Tropical Cyclone Activity (NTC) – 123	170	179

2.3 August Statistical/Dynamical Forecast Schemes

We developed a statistical/dynamical hybrid forecast model scheme that we used for the first time in 2019. This model, developed in partnership with Louis-Philippe Caron and the data team at the Barcelona Supercomputing Centre, originally used output from the ECMWF SEAS5 model to forecast the input to our early August statistical forecast model. We now use four different models initialized on 1 July, namely, ECMWF, UK Met, JMA and CMCC, to forecast August–September SSTs in the eastern/central equatorial Pacific and in the eastern/central North Atlantic. We then use the forecasts of these individual models to forecast ACE for the 2025 season. ECMWF hindcasts are available from 1981–2024, while all other models have data available spanning the period from 1993–2016. All other predictands (e.g., named storms, major hurricanes) are calculated based on their historical relationships with ACE. All standard deviations are given relative to a 1993–2016 base period – the period for which all four models have hindcasts.

Figure 7 displays the locations of the two forecast parameters, while Table 4 displays the various statistical/dynamical model forecasts for each of these parameters. All models are calling for a very warm eastern and central tropical and subtropical Atlantic and neutral ENSO conditions. Table 5 displays the seasonal TC forecast output for the various statistical/dynamical models. These forecasts all call for a hyperactive[3] 2025 season. Figure 8 displays hindcasts for ECMWF forecasts of ACE from 1981–2024, while Figure 9 displays hindcasts of ACE from all four statistical/dynamical models from 1993–2016 – the joint period where all four models have hindcasts available.

[3] NOAA defines a hyperactive Atlantic hurricane season to have an ACE > 159.6 10^4 kt^2 (https://www.cpc.ncep.noaa.gov/products/outlooks/Background.html)

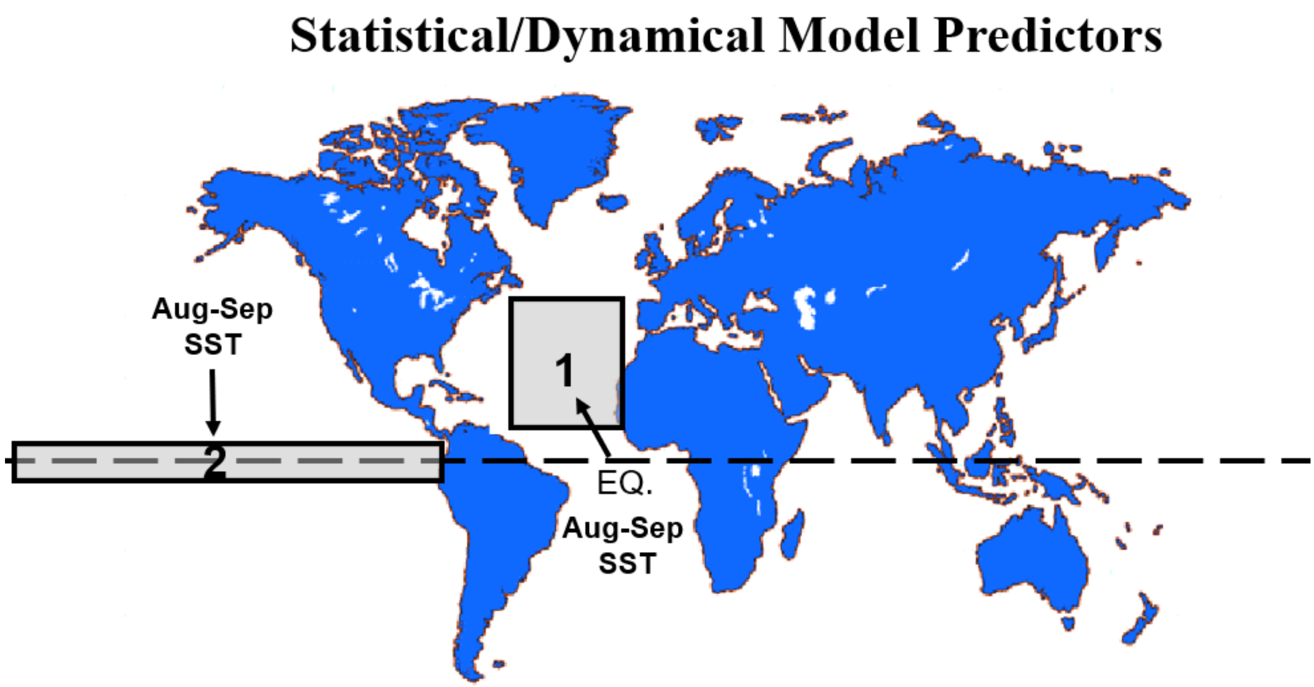

Figure 7: Location of predictors for our early August statistical/dynamical extended-range statistical prediction for the 2025 hurricane season. This forecast uses dynamical model predictions from ECMWF, the UK Met Office, JMA and CMCC to predict August–September SSTs in the two boxes displayed and then uses those predictors to forecast ACE.

Table 4: Listing of predictions of August–September large-scale conditions from our statistical/dynamical model output, initialized on 1 July. A plus (+) means that positive deviations of the parameter are associated with increased hurricane activity, while a minus (-) means that negative deviations of the parameter are associated with increased hurricane activity.

Predictor	ECMWF Forecast	UK Met Forecast	JMA Forecast	CMCC Forecast
1) Aug–Sep SST (10–45°N, 60–20°W) (+)	+2.1 SD	+2.9 SD	+2.3 SD	+3.1 SD
2) Aug–Sep SST (5°S–5°N, 180–90°W) (-)	-0.1 SD	-0.6 SD	-0.5 SD	-0.4 SD

Table 5: Summary of our statistical/dynamical forecasts.

Forecast Parameter and 1991–2020 Average (in parentheses)	ECMWF Scheme	Met Office Scheme	JMA Scheme	CMCC Scheme	Adjusted Final Forecast
Named Storms (14.4)	20.0	22.6	21.2	21.6	16
Named Storm Days (69.4)	97.7	114.9	106.1	108.6	80
Hurricanes (7.2)	10.1	11.9	11.0	11.3	8
Hurricane Days (27.0)	42.4	51.8	47.0	48.3	30
Major Hurricanes (3.2)	5.0	6.0	5.5	5.7	3
Major Hurricane Days (7.4)	12.9	16.3	14.6	15.1	8
Accumulated Cyclone Energy Index (123)	190	231	210	216	140
Net Tropical Cyclone Activity (135%)	204	245	224	230	145

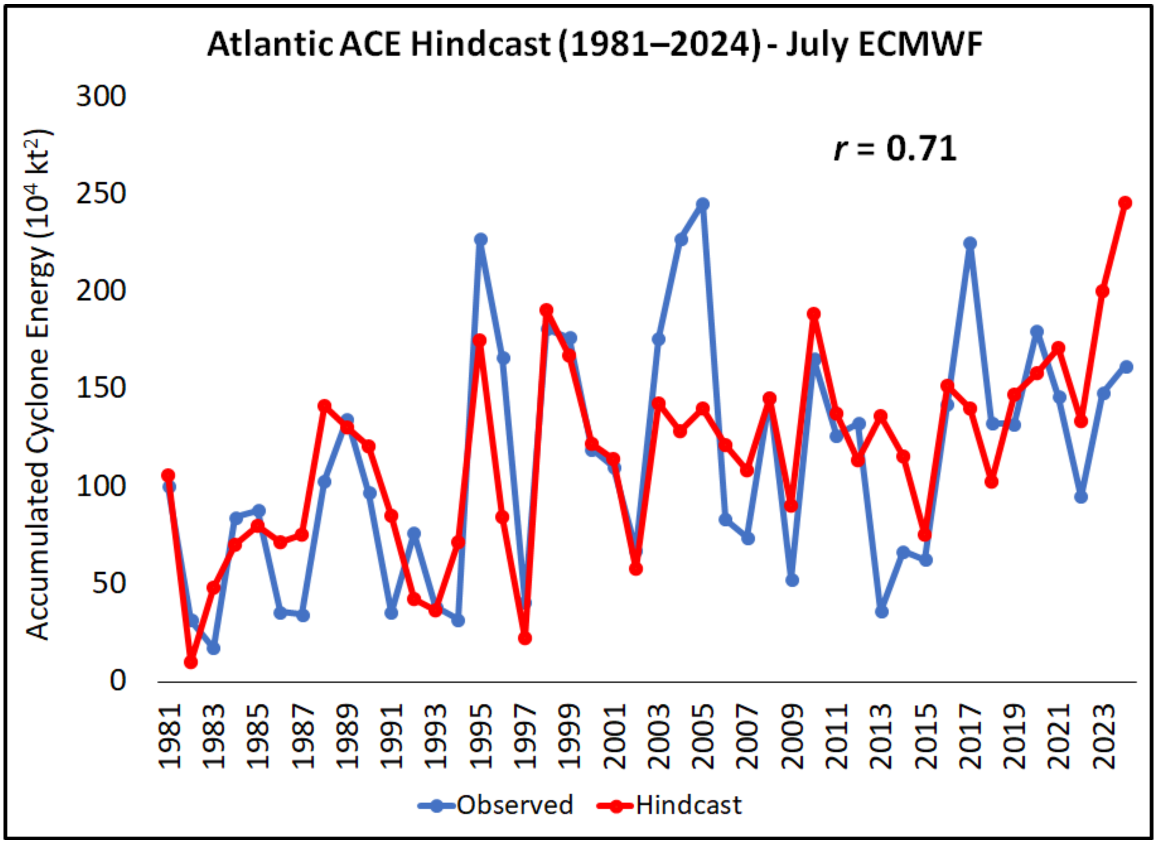

Figure 8: Observed versus statistical/dynamical hindcast values of ACE for 1981–2024 from ECMWF.

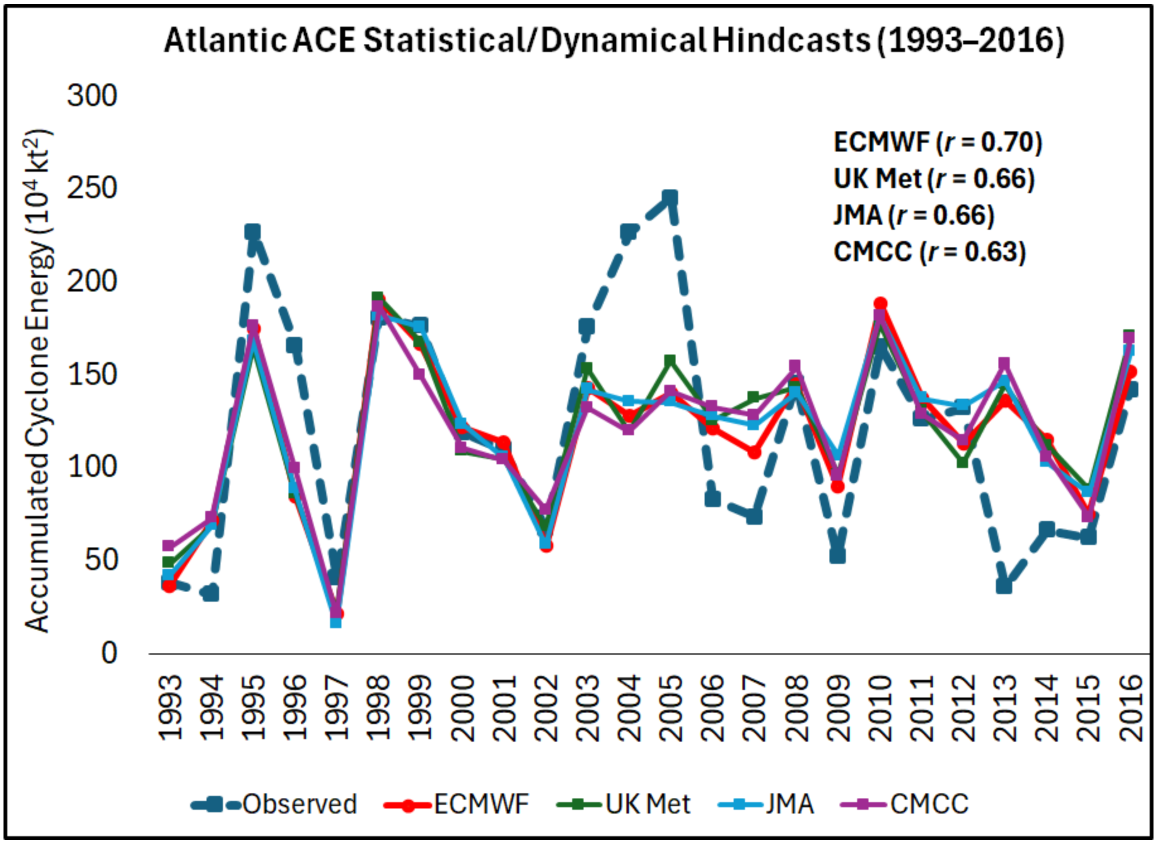

Figure 9: Observed versus statistical/dynamical hindcast values for all four statistical/dynamical models from 1993–2016.

2.4 August Analog Forecast Scheme

Certain years in the historical record have global oceanic and atmospheric trends which are similar to 2025. These years also provide useful clues as to likely levels of activity that the forthcoming 2025 hurricane season may bring. For this early August forecast, we determine which of the prior years in our database have distinct trends in key environmental conditions which are similar to current conditions and, more importantly, projected August–October 2025 conditions. Table 6 lists our analog selections, while Figure 10 shows the composite August–October SST anomalies in our four analog years.

We searched for years that had either cool ENSO neutral or weak La Niña conditions. We also selected years that had tropical Atlantic SST anomalies that were higher than eastern and central tropical Pacific SST anomalies. We anticipate that the 2025 hurricane season will have activity near the average of our four analog years for most parameters.

Table 6: Analog years for 2025 with the associated hurricane activity listed for each year.

Year	NS	NSD	H	HD	MH	MHD	ACE	NTC
2001	15	68.75	9	25.50	4	4.25	110.1	135.3
2008	16	88.25	8	30.50	5	7.50	145.7	162.3
2011	19	89.75	7	26.00	4	4.50	126.3	144.9
2021	21	79.75	7	27.75	4	12.75	145.6	173.7
Average	17.8	81.6	7.8	27.4	4.3	7.3	131.9	154.0
2025 Forecast	**16**	**80**	**8**	**30**	**3**	**8**	**140**	**145**

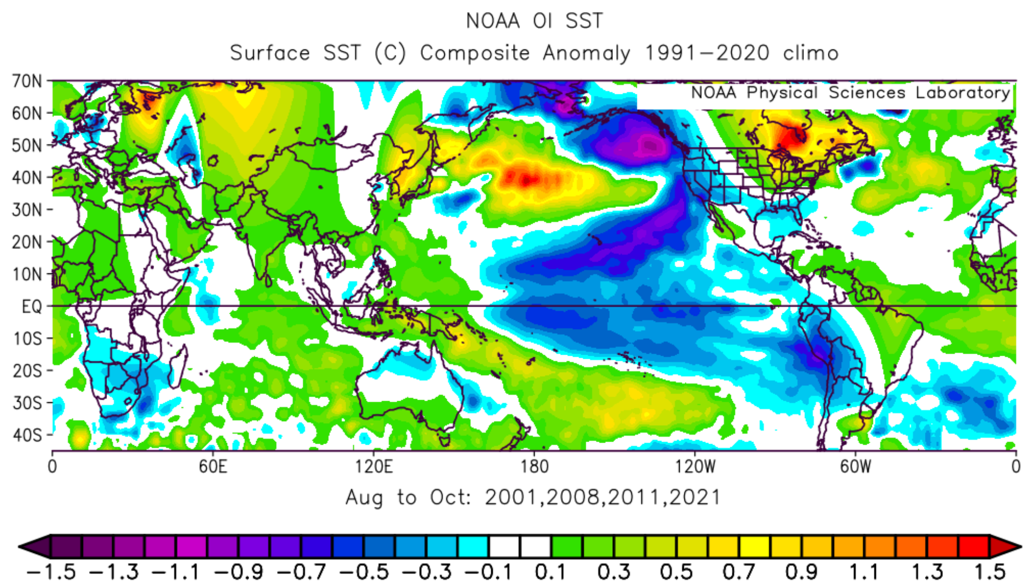

Figure 10: Average August–October SST anomalies in our four analog years.

2.5 ACE West of 60°W Forecast

We now explicitly forecast ACE occurring west of 60°W. While there is a relatively robust relationship between basinwide ACE and North Atlantic landfalling hurricanes (defined as hurricanes making landfall west of 60°W), there is an improved relationship between North Atlantic landfalling hurricanes and ACE west of 60°W (Figures 11 and 12) since 1979. In this analysis, we only count one landfall per storm, regardless if the storm made multiple landfalls at hurricane strength (e.g., Irma–2017).

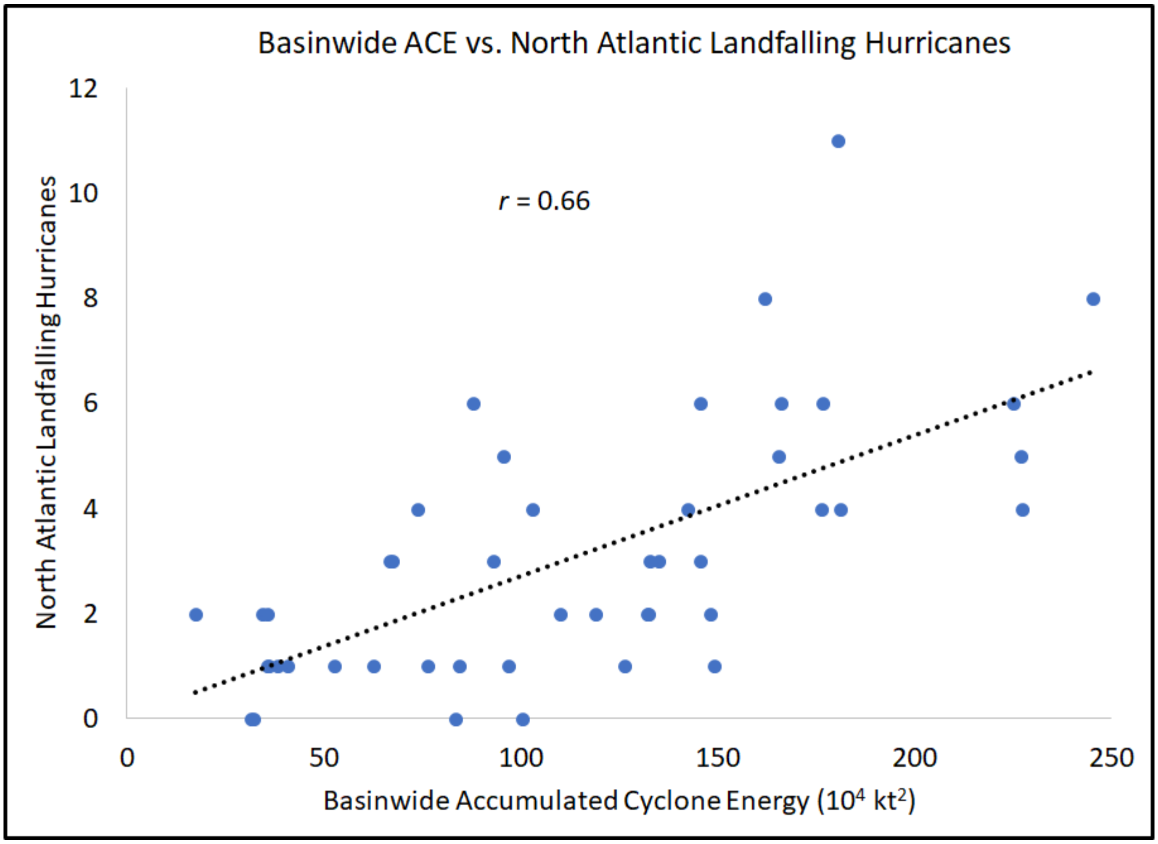

Figure 11: Scatterplot showing relationship between basinwide ACE and North Atlantic landfalling hurricanes.

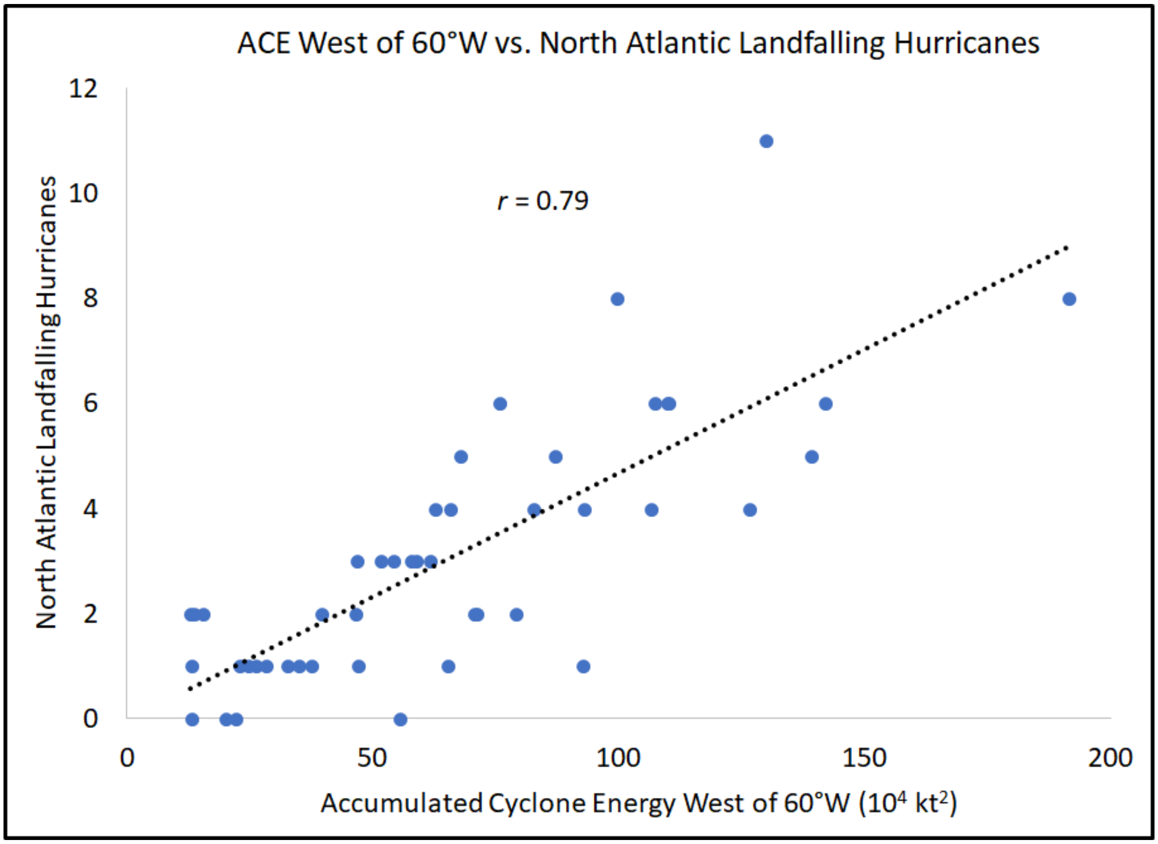

Figure 12: Scatterplot showing relationship between ACE west of 60°W and North Atlantic landfalling hurricanes.

In general, years characterized by El Niño conditions tend to have slightly less ACE west of 60°W than La Niña seasons, likely due to both more conducive conditions in the western Atlantic in La Niña seasons, as well as an increased chance of recurvature for TCs in El Niño seasons (Colbert and Soden 2012). This was certainly the case in 2023 and 2024. In 2023, a strong El Niño occurred, the subtropical high was quite weak, and many of the TCs that occurred recurved east of 60°W. In 2024, the western Atlantic was much busier for TC formations, and 8 of the 11 hurricanes that formed last year made landfall west of 60°W. 48% and 62% of basinwide ACE occurred west of 60°W in 2023 and 2024, respectively.

We use data from 1979–2024 and base ENSO classifications on the August–October-averaged Relative Oceanic Nino Index (RONI). Years with an RONI >= 0.5°C are classified as El Niño, years with an RONI <= -0.5°C are classified as La Niña, while all other seasons are classified as neutral ENSO. The RONI index is calculated by differencing SSTs in the Nino 3.4 region (5°S–5°N, 170–120°W) from tropical mean SST (20°S–20°N, 0°–360°) and scaling the time series to match the variability of the observed SST in the Nino 3.4 region.

We find that 54% of basinwide ACE occurs west of 60°W in El Niño years, while 62% of basinwide ACE occurs west of 60°W in La Niña years. In neutral ENSO years, 58% of basinwide ACE occurs west of 60°W. Given that we believe that the most likely August–October ENSO state is for cool neutral ENSO (e.g., Nino 3.4 SST anomaly between -0.5°C and 0.0°C), we are estimating ~60% of basinwide ACE to occur west of 60°W in 2025.

2.6 August Forecast Summary and Final Adjusted Forecast

Table 7 shows our final adjusted early August forecast for the 2025 season which is a combination of our two statistical schemes, our statistical/dynamical schemes, and our analog scheme as well as qualitative adjustments for other factors not explicitly contained in any of these schemes. We favor our statistical and analog model guidance over our more aggressive statistical/dynamical guidance due to strong observed Caribbean wind shear (discussed in section 5).

Table 7: Summary of our early August statistical forecast, our statistical/dynamical forecasts, our analog forecast, the average of these seven schemes and our adjusted final forecast for the 2025 hurricane season. All schemes have storms before 1 August included.

Forecast Parameter (1991-2020 Average)	July Statistical Scheme	50-Day Stat. Scheme	ECMWF Scheme	Met Office Scheme	JMA Scheme	CMCC Scheme	Analog Scheme	Average	Adjusted Forecast
Named Storms (14.4)	20.4	21.8	20.0	22.6	21.2	21.6	17.8	20.8	16
Named Storm Days (69.4)	78.3	87.5	97.7	114.9	106.1	108.6	81.6	96.8	80
Hurricanes (7.2)	7.6	8.6	10.1	11.9	11.0	11.3	7.8	9.8	8
Hurricane Days (27.0)	29.4	34.4	42.4	51.8	47.0	48.3	27.4	40.1	30
Major Hurricanes (3.2)	3.5	4.1	5.0	6.0	5.5	5.7	4.3	4.9	3
Major Hurricane Days (7.4)	8.2	10.0	12.9	16.3	14.6	15.1	7.3	12.1	8
ACE Index (123)	136	158	190	231	210	216	132	182	140
NTC Activity (135%)	157	179	204	245	224	230	154	199	145

3 Forecast Uncertainty

This season we continue to use probability of exceedance curves as discussed in Saunders et al. (2020) to quantify forecast uncertainty. In that paper, we outlined an approach that uses statistical modeling and historical skill of various forecast models to arrive at a probability that the particular values of hurricane numbers and ACE would be exceeded. Here we display probability of exceedance curves for hurricanes and ACE (Figures 13 and 14), using the error distributions calculated from both normalized cross-validated statistical as well as the cross-validated statistical/dynamical hindcasts from SEAS5. Hurricane numbers are fit to a Poisson distribution, while ACE is fit to a Weibull distribution. Table 8 displays one standard deviation uncertainty ranges (~68% of all forecasts within this range). This uncertainty estimate is also very similar to the 70% uncertainty range that NOAA provides with its forecasts. We use Poisson distributions for all storm parameters (e.g., named storms, hurricanes and major hurricanes) while we use a Weibull distribution for all integrated parameters except for major hurricane days (e.g., named storm days, ACE, etc.). We use a Laplace distribution for major hurricane days.

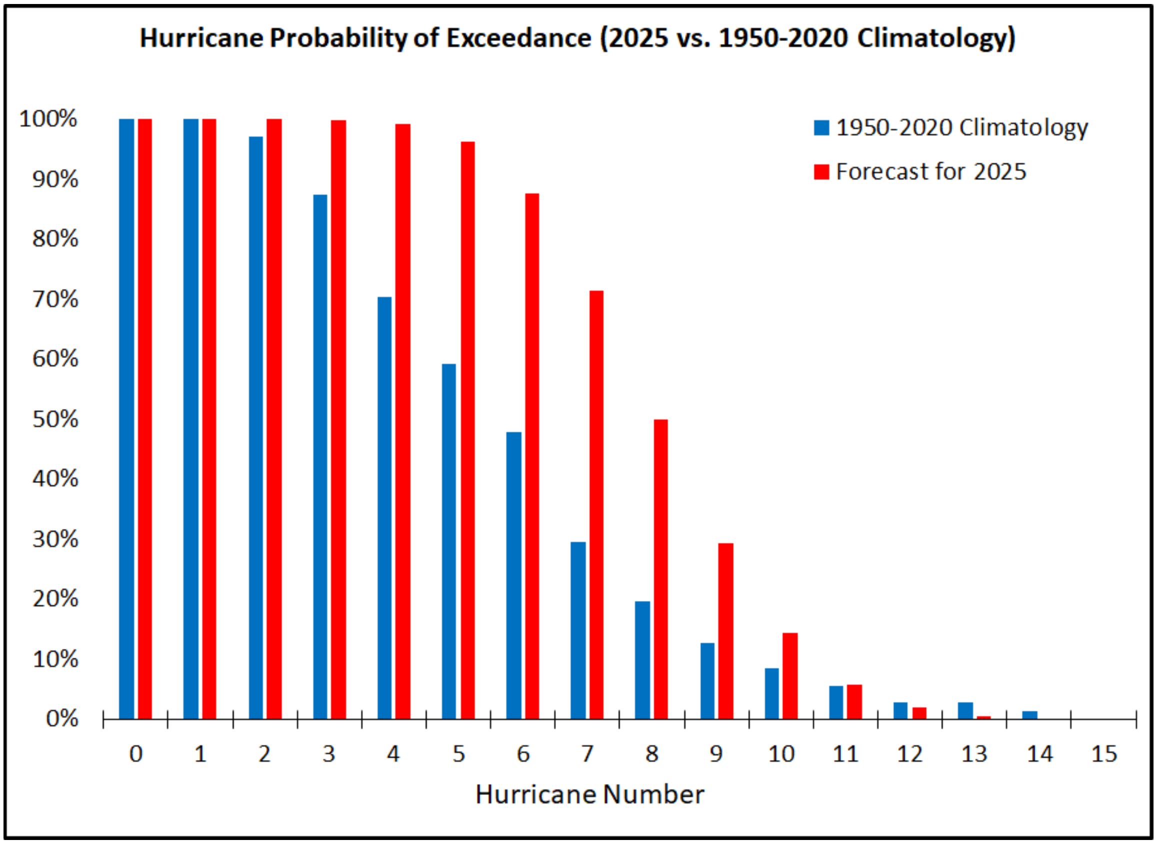

Figure 13: Probability of exceedance plot for hurricane numbers for the 2025 Atlantic hurricane season. The values on the x-axis indicate that the number of hurricanes exceeds that specific number. For example, 97% of Atlantic hurricane seasons from 1950–2020 have had more than two hurricanes.

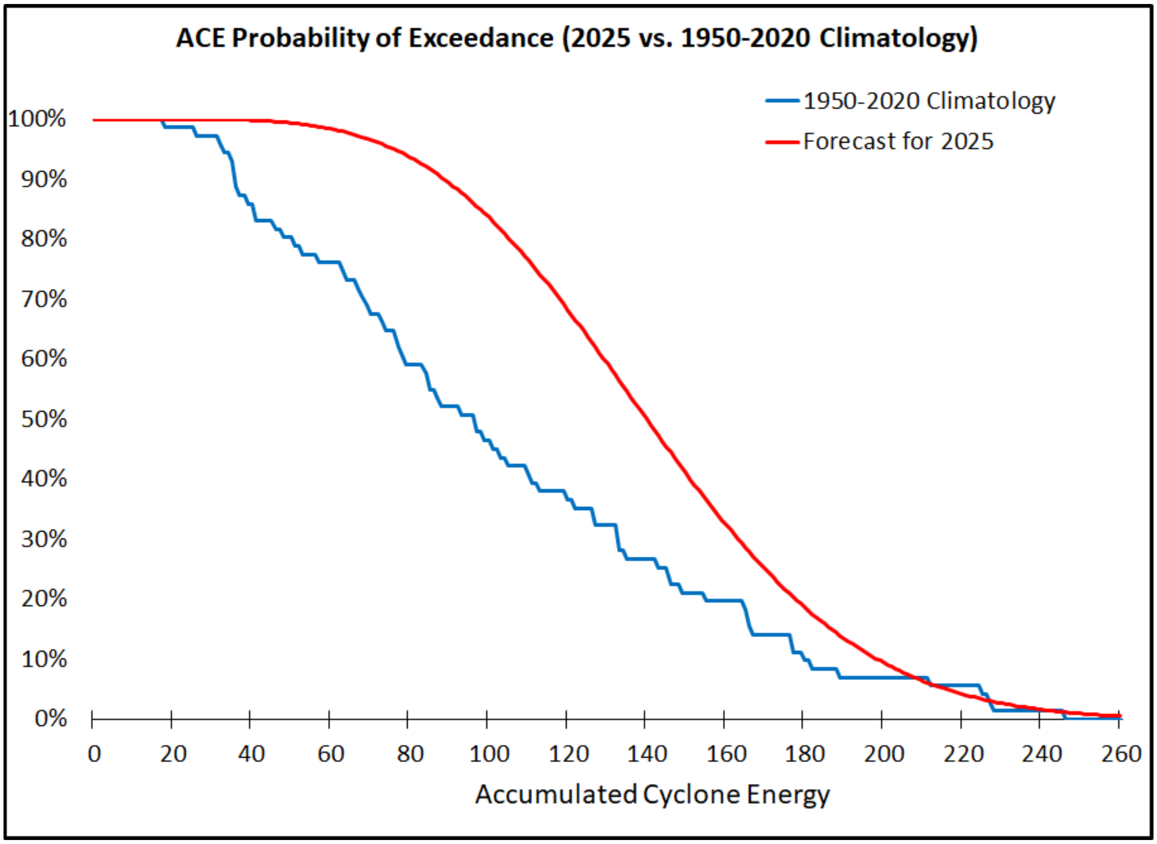

Figure 14: As in Figure 13 but for ACE.

Table 8: Forecast ranges for each parameter. Note that the forecast spread may not be symmetric around the mean value, given the historical distribution of tropical cyclone activity.

Parameter	2025 Forecast	Uncertainty Range (68% of Forecasts Likely to Fall in This Range)
Named Storms (NS)	16	13 – 19
Named Storm Days (NSD)	80	61 – 99
Hurricanes (H)	8	6 – 10
Hurricane Days (HD)	30	20 – 42
Major Hurricanes (MH)	3	2 – 4
Major Hurricane Days (MHD)	8	5 – 12
Accumulated Cyclone Energy (ACE)	140	98 – 187
ACE West of 60°W	87	58 – 121
Net Tropical Cyclone (NTC) Activity	145	104 – 190

4 ENSO

Over the past several weeks, the central tropical Pacific has anomalously cooled slightly (Figure 15), while SST anomalies in the eastern tropical Pacific have changed little. All ENSO indices remain in neutral ENSO territory (e.g., between -0.5°C and 0.5°C). Figure 16 displays the locations of the various Nino regions displayed in Figure

15. Upper ocean heat content anomalies have cooled by ~0.5°C since early July (Figure 17).

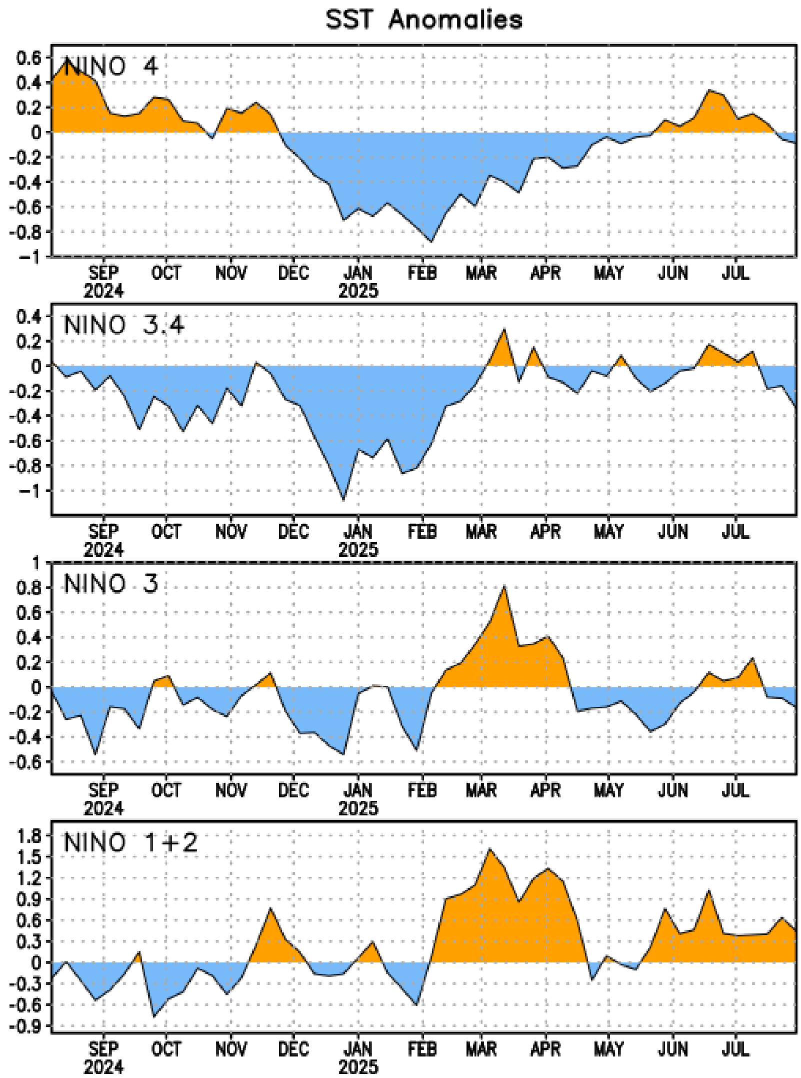

Figure 15: SST anomalies for several ENSO regions over the past year. Figure courtesy of the Climate Prediction Center.

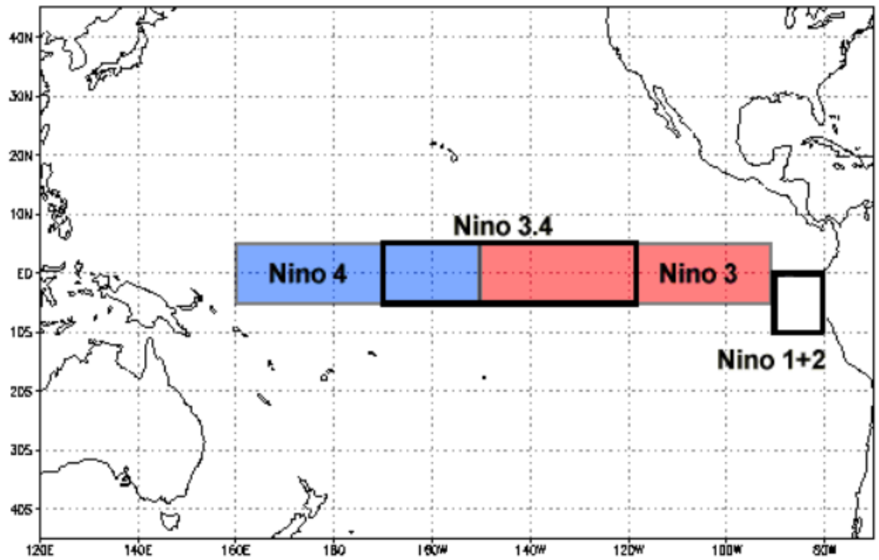

Figure 16: Location of ENSO SST regions used in Figure 15. Figure courtesy of the National Centers for Environmental Information.

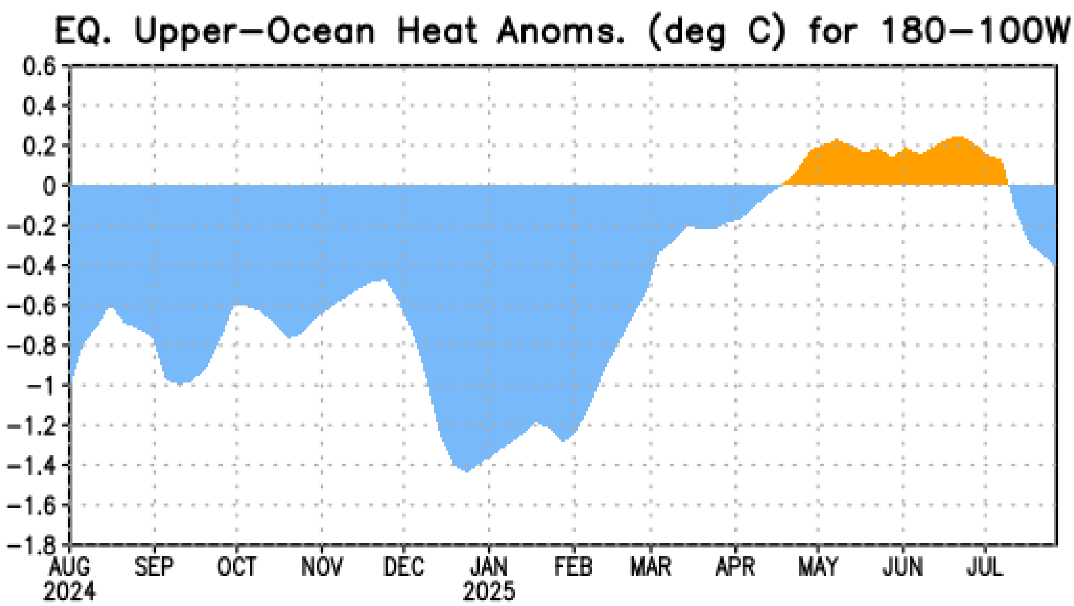

Figure 17: Central and eastern equatorial Pacific upper ocean (0–300 meters) heat content anomalies over the past year. Figure courtesy of Climate Prediction Center.

Current SST anomalies are close to their long-term averages across the entire equatorial eastern and central Pacific (Figure 18).

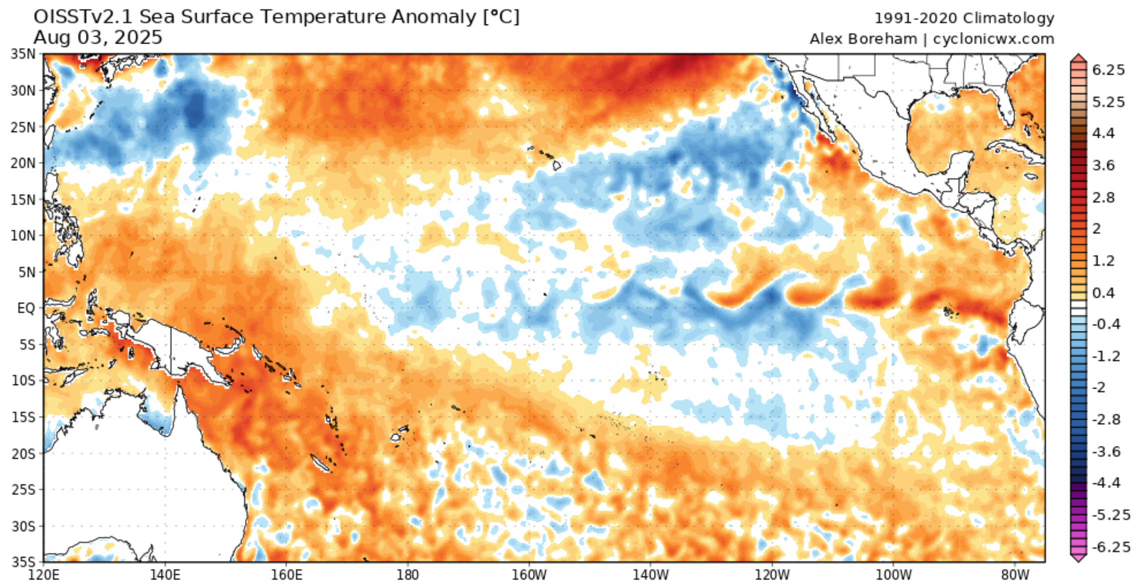

Figure 18: Current SST anomalies across the tropical and subtropical Pacific. Figure courtesy of cyclonicwx.com.

Table 9 displays June and July SST anomalies for several Nino regions. As noted earlier, over the past month, SST anomalies have decreased in the central tropical Pacific and have changed little in the eastern tropical Pacific.

Table 9: June and July SST anomalies for Nino 1+2, Nino 3, Nino 3.4, and Nino 4, respectively. July minus June SST anomaly differences are also provided.

Region	July SST Anomaly (°C)	June SST Anomaly (°C)	July – June SST Anomaly (°C)
Nino 1+2	+0.6	+0.5	-0.1
Nino 3	-0.1	0.0	+0.1
Nino 3.4	0.0	-0.2	-0.2
Nino 4	+0.2	0.0	-0.2

Following robust upwelling (cooling) oceanic Kelvin wave activity throughout the second half of 2024 and during January of 2025 (Figure 19), oceanic Kelvin wave activity has been relatively weak. The continued prevalence of relatively strong trade winds across the central tropical Pacific (Figure 20) has likely helped inhibit any significant development towards El Niño. A strong trade wind surge in recent weeks (Figure 20) has resulted in a substantial reduction in ocean heat content (Figure 17, 19).

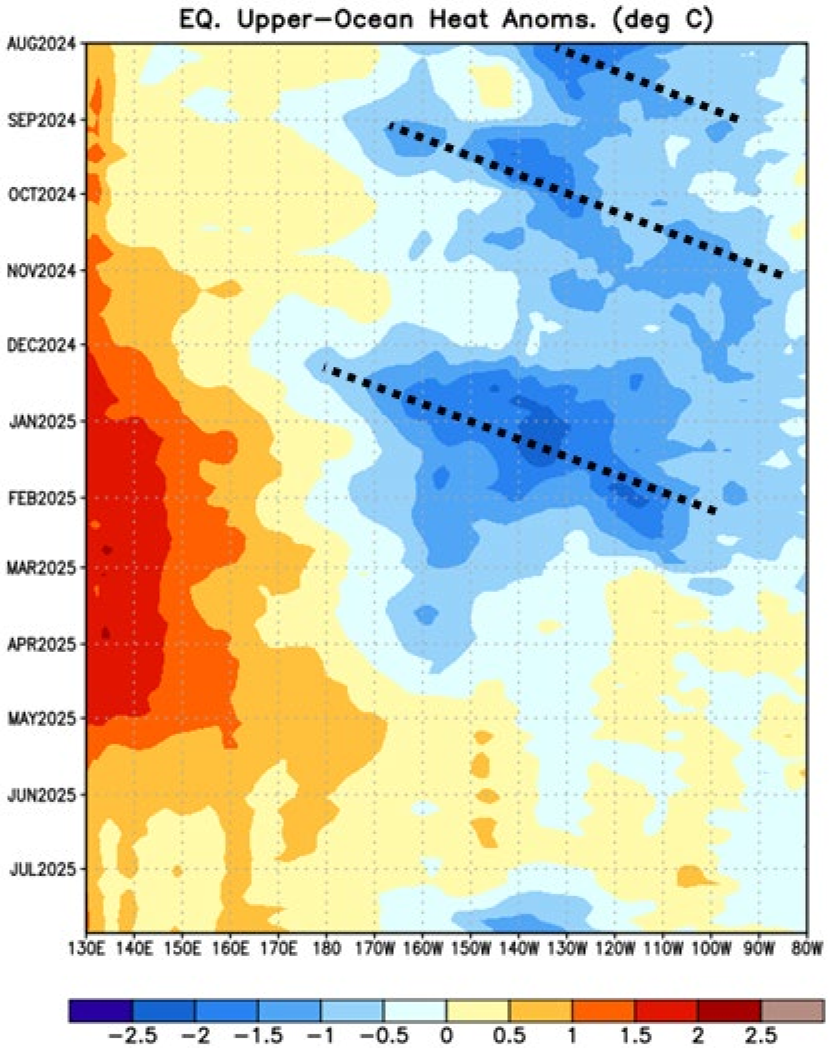

Figure 19: Upper-ocean (0–300 meter) heat content anomalies in the tropical Pacific since August 2024. Long dashed lines indicate downwelling Kelvin waves, while short dashed lines indicate upwelling Kelvin waves. Downwelling Kelvin waves result in upper-ocean heat content increases, while upwelling Kelvin waves result in upper-ocean heat content decreases. Over the past several months, no coherent Kelvin wave activity has been diagnosed per this analysis from the Climate Prediction Center.

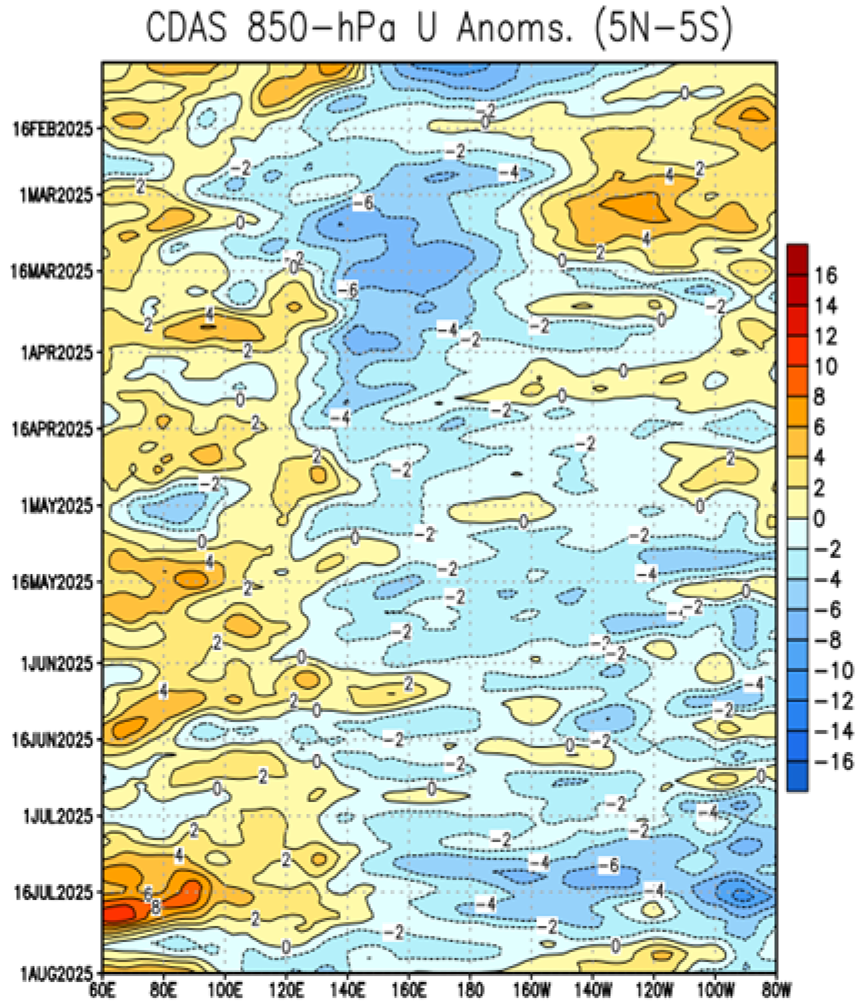

Figure 20: Anomalous equatorial low-level winds spanning from 120°E to 80°W. Figure courtesy of Climate Prediction Center.

Low-level winds are forecast to be stronger than normal across the central tropical Pacific for the next several weeks (Figure 21). These strong trades should inhibit any transition towards El Niño and potentially cause continued anomalous cooling across the various Nino regions as the peak of the Atlantic hurricane season approaches.

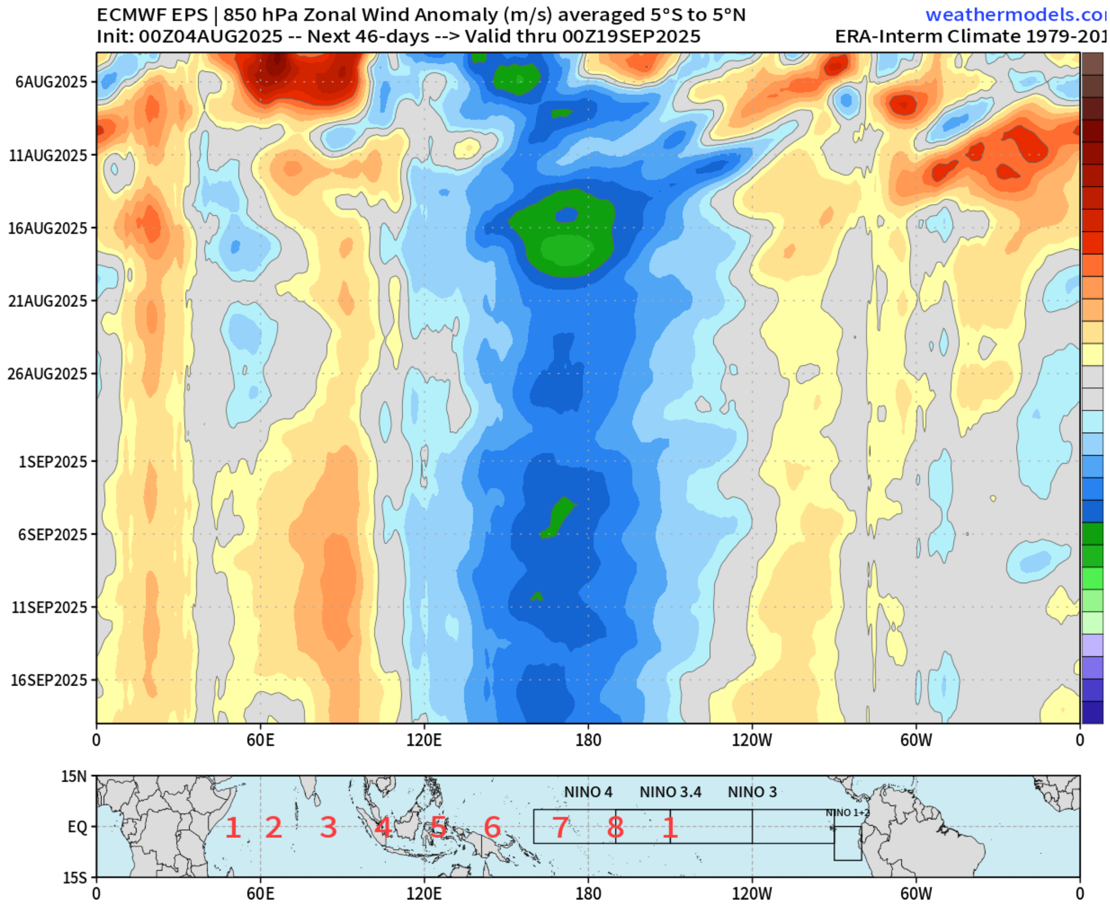

Figure 21: ECMWF forecast 850-hPa zonal equatorial winds through 19 September. Figure courtesy of weathermodels.com.

The latest plume of ENSO predictions from several statistical and dynamical models is primarily clustered around ENSO neutral conditions for the peak of the Atlantic hurricane season from August–October (Figure 22).

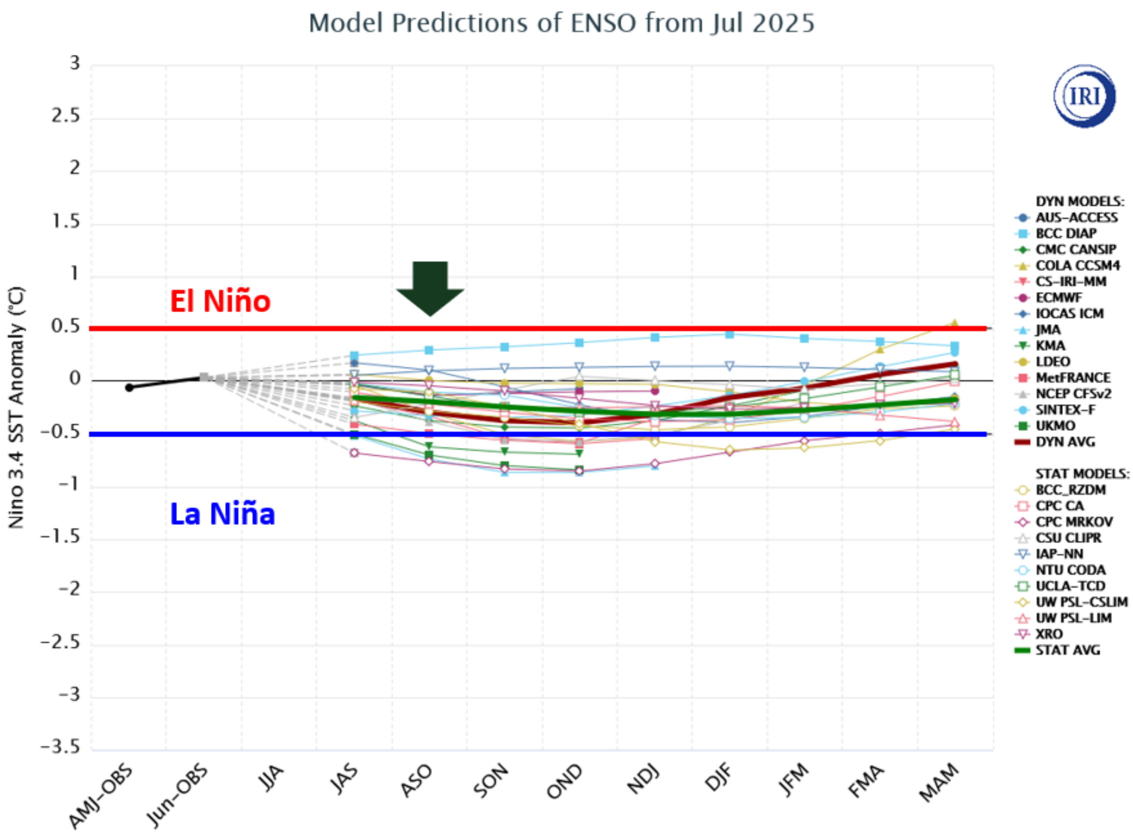

Figure 22: ENSO forecasts from various statistical and dynamical models for Nino 3.4 SST anomalies based on late June to early July initial conditions. The black arrow delineates the peak of the Atlantic hurricane season (August–October). Figure courtesy of the International Research Institute (IRI).

The latest official forecast from NOAA favors ENSO neutral conditions relative to La Niña for August–October, with a much lower chance of El Niño. NOAA is currently predicting a 56% chance of ENSO neutral, a 38% chance of La Niña, and a 6% chance of El Niño for the peak of the Atlantic hurricane season (Figure 23).

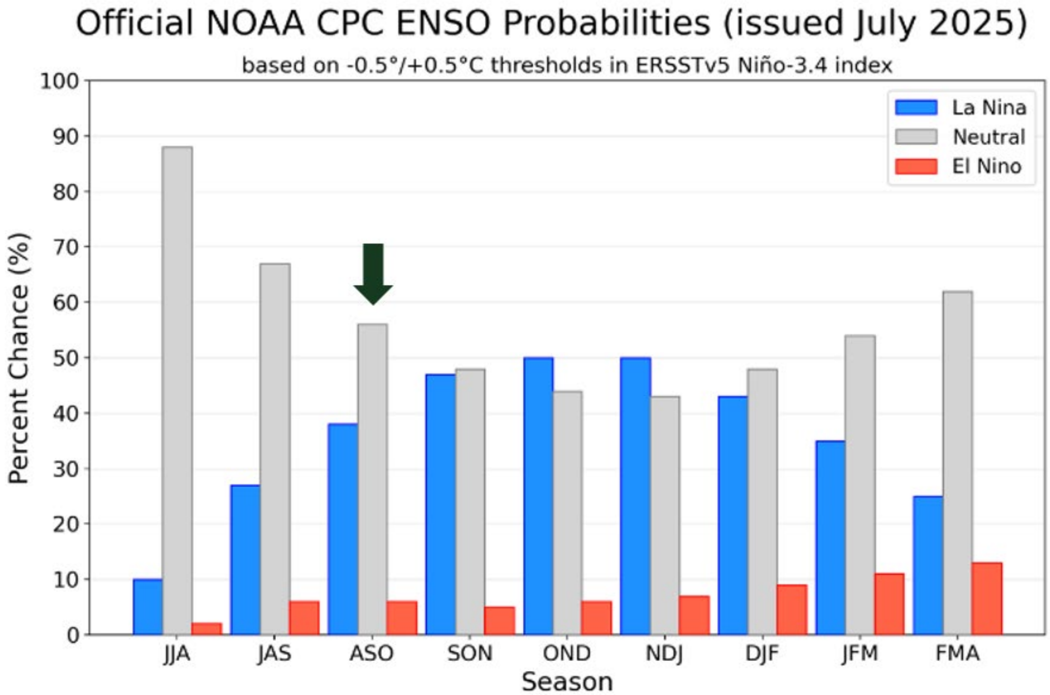

Figure 23: Official probabilistic ENSO forecast from NOAA. The black arrow delineates the peak of the Atlantic hurricane season (August–October). Figure courtesy of NOAA.

Based on the above information, our best estimate is that we will have cool ENSO neutral conditions for the peak of the Atlantic hurricane season.

5 Current Atlantic Basin Conditions

Currently, SSTs are somewhat warmer than normal across the Atlantic's Main Development Region (10–20°N, 85–20°W) (Figure 24). Over the past several weeks, trade winds have generally been weaker than normal across the tropical Atlantic (Figure 25), resulting in anomalous warming (Figure 26). 30-day-averaged SSTs across the Main Development Region are currently tracking between what is typically experienced in an above normal and a hyperactive Atlantic hurricane season (Figure 27).

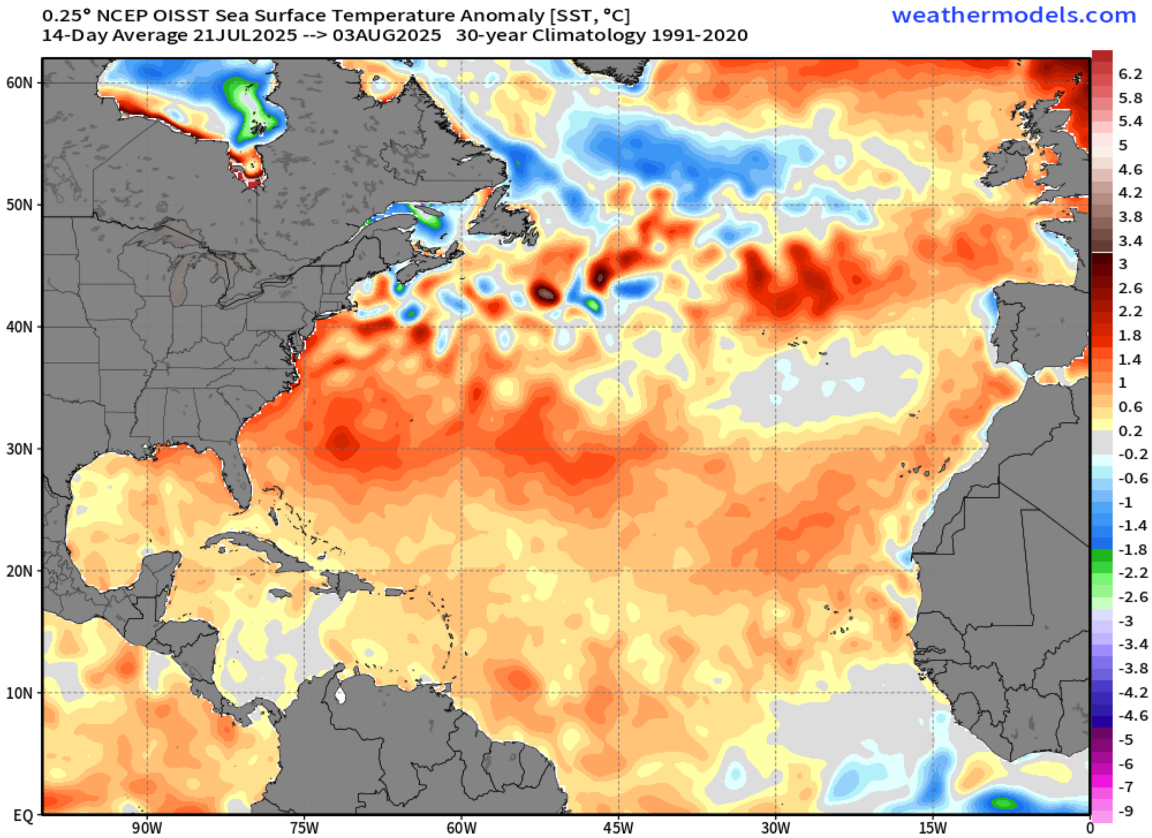

Figure 24: North Atlantic SST anomalies averaged from 21 July – 3 August. Figure courtesy of weathermodels.com.

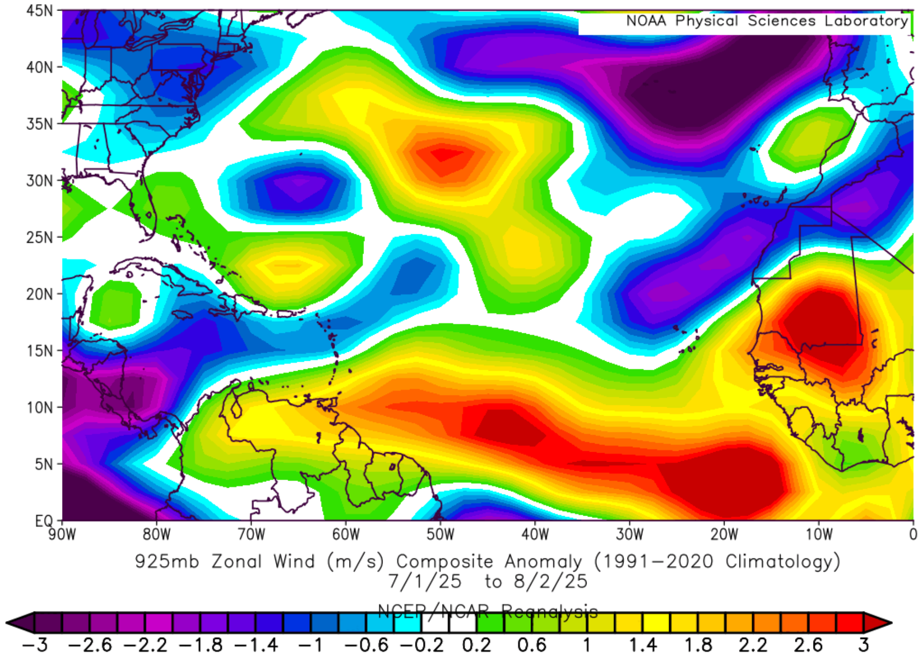

Figure 25: 925 hPa zonal wind anomalies across the North Atlantic Ocean averaged from 1 July – 2 August.

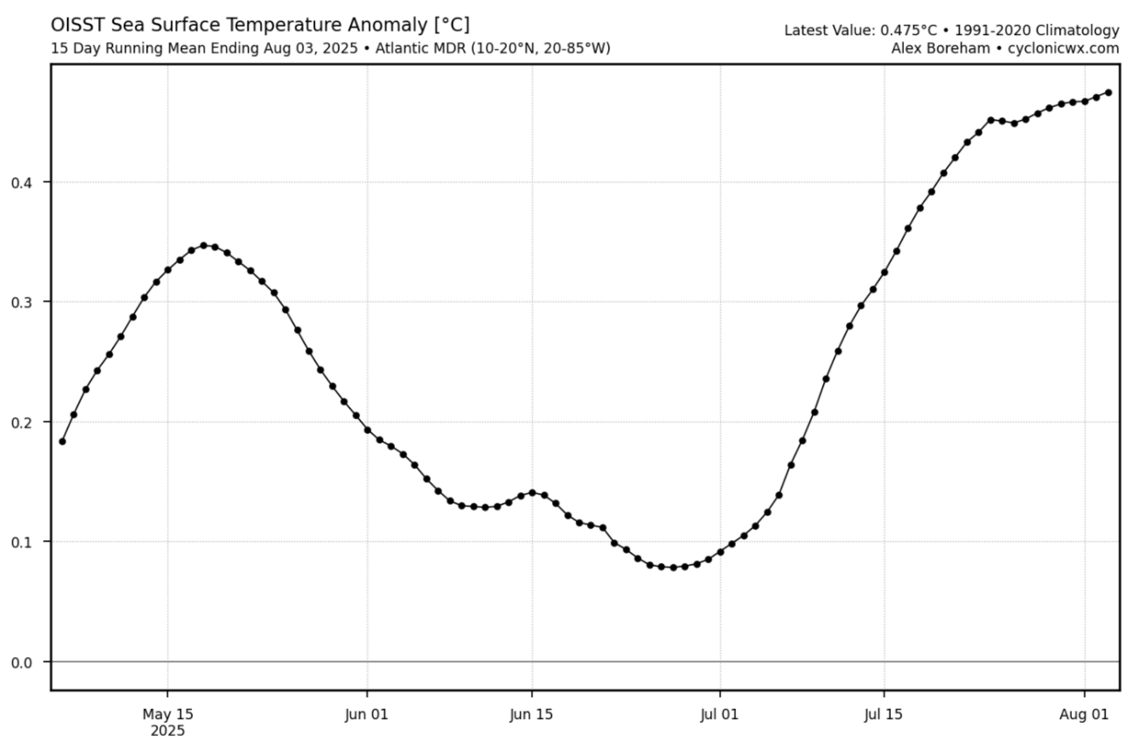

Figure 26: 15-day running average of SST anomalies averaged across the Atlantic's Main Development Region. Figure courtesy of cyclonicwx.com.

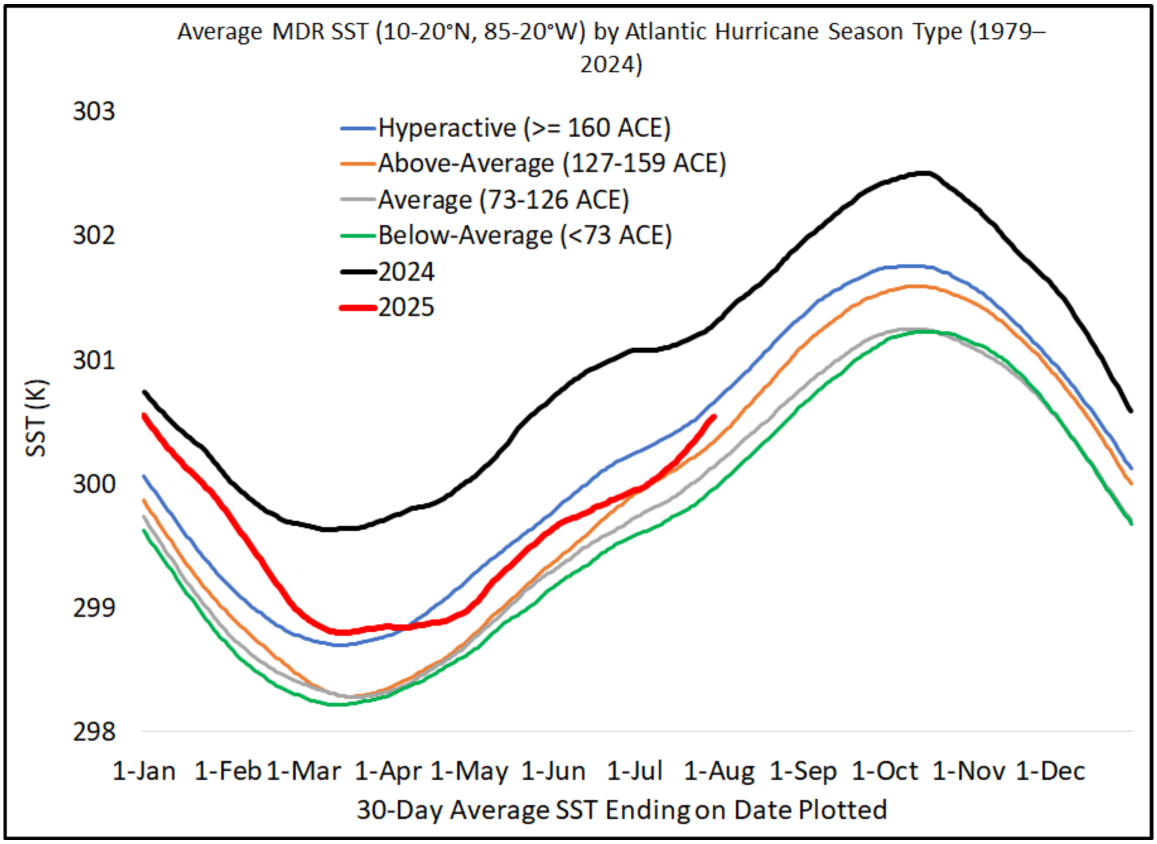

Figure 27: 30-day average SSTs averaged across the Main Development Region for various Atlantic hurricane season types from 1979–2024 based on NOAA's definition. Also plotted are SSTs for 2024 (for comparison). Sea surface temperature anomalies in the tropical Atlantic in 2025 are tracking between an above-average and hyperactive Atlantic hurricane season.

Figure 28 shows the forecast for the next ~4 weeks of low-level winds across the Atlantic. Trade winds are generally forecast to be weaker than normal for the next few weeks, likely resulting in some continued anomalous warming. Overall, the current SST anomaly pattern correlates relatively well with what is typically seen in August of active Atlantic hurricane seasons (Figure 29).

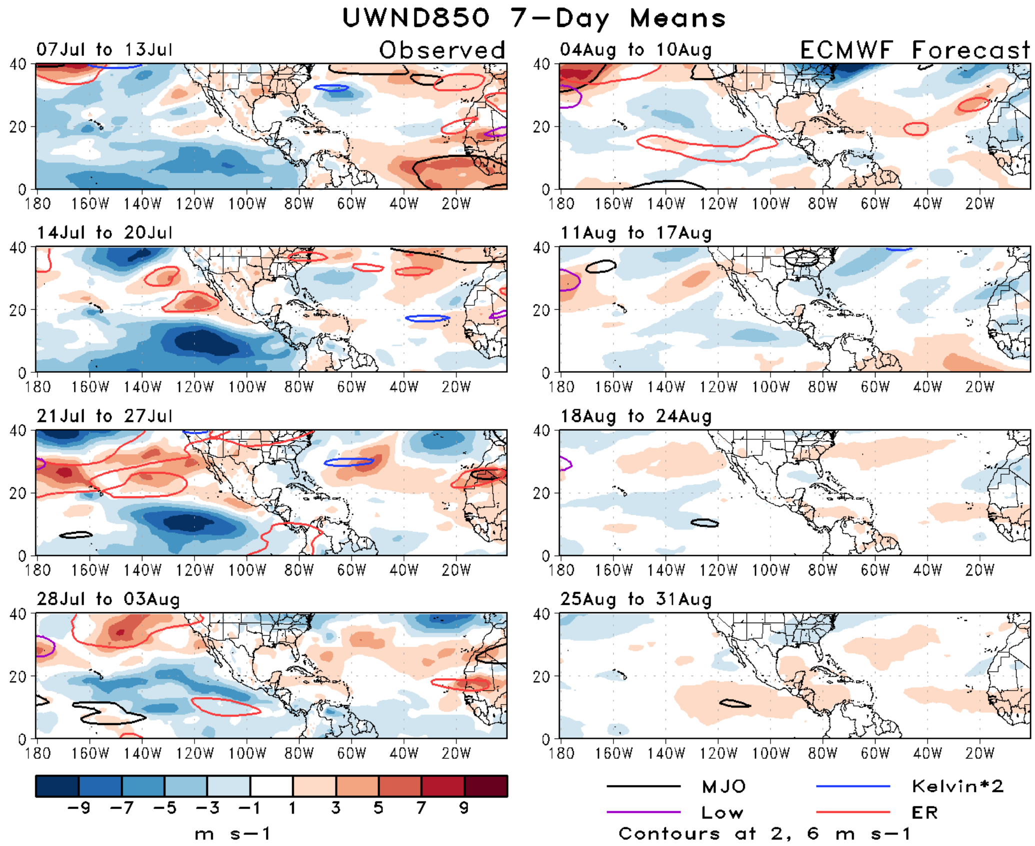

Figure 28: Observed low-level zonal winds across portions of the Western Hemisphere over the past four weeks and predicted low-level zonal winds by ECMWF through 31 August. Figure courtesy of Nick Novella (NOAA/Climate Prediction Center).

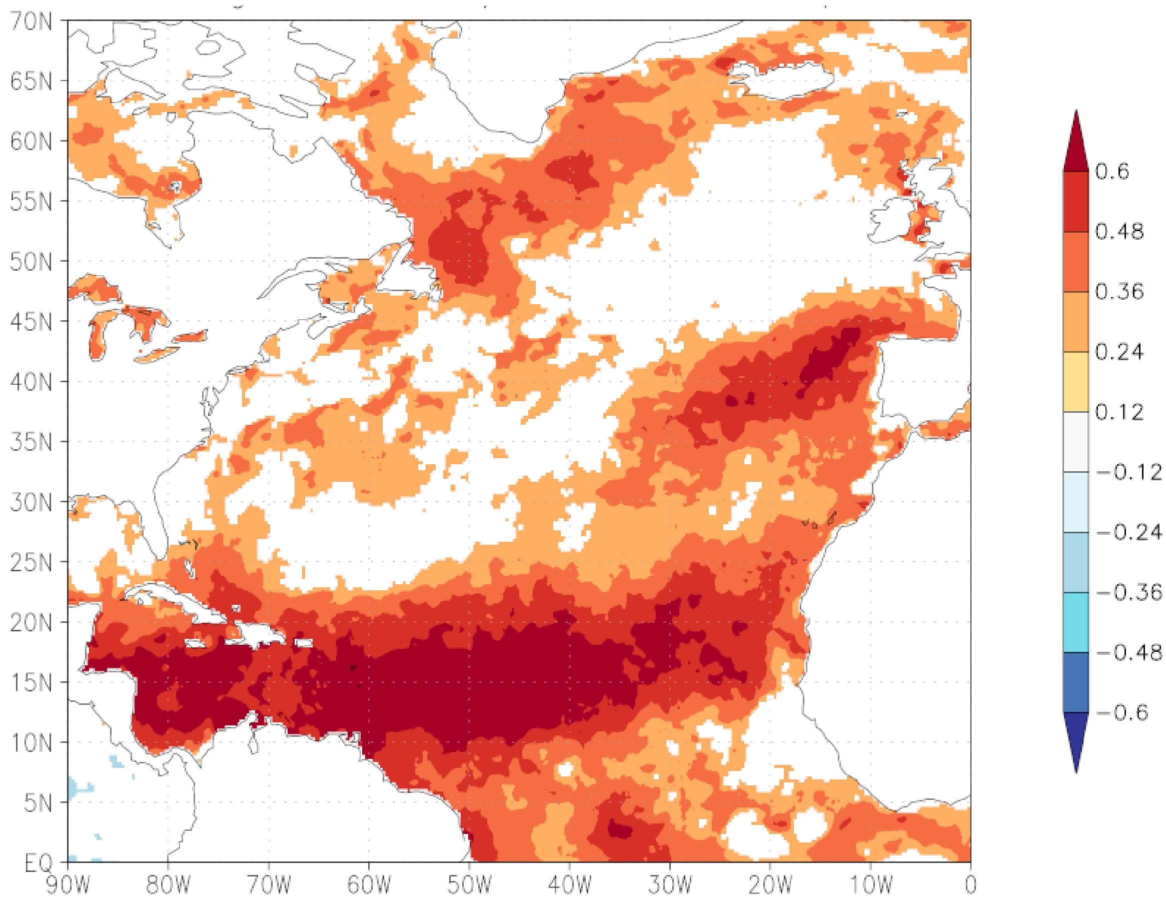

Figure 29: Rank correlations between August sea surface temperatures in the North Atlantic and annual Atlantic ACE from 1982–2024.

As noted earlier, the primary reason for undercutting most of our statistical and statistical/dynamical model guidance is continued strong Caribbean vertical wind shear. Shear since 1 June has been elevated by an average of 10–15 kt relative to normal across the Caribbean (Figure 30). Western tropical Atlantic (10–20°N, 85–50°W) vertical wind shear correlates quite strongly with Atlantic ACE, with 30-day-average correlations growing strongly between late June and mid-July (Figure 31). Currently, western tropical Atlantic vertical wind shear is tracking between what is typically observed in below-normal and average Atlantic hurricane seasons (Figure 32).

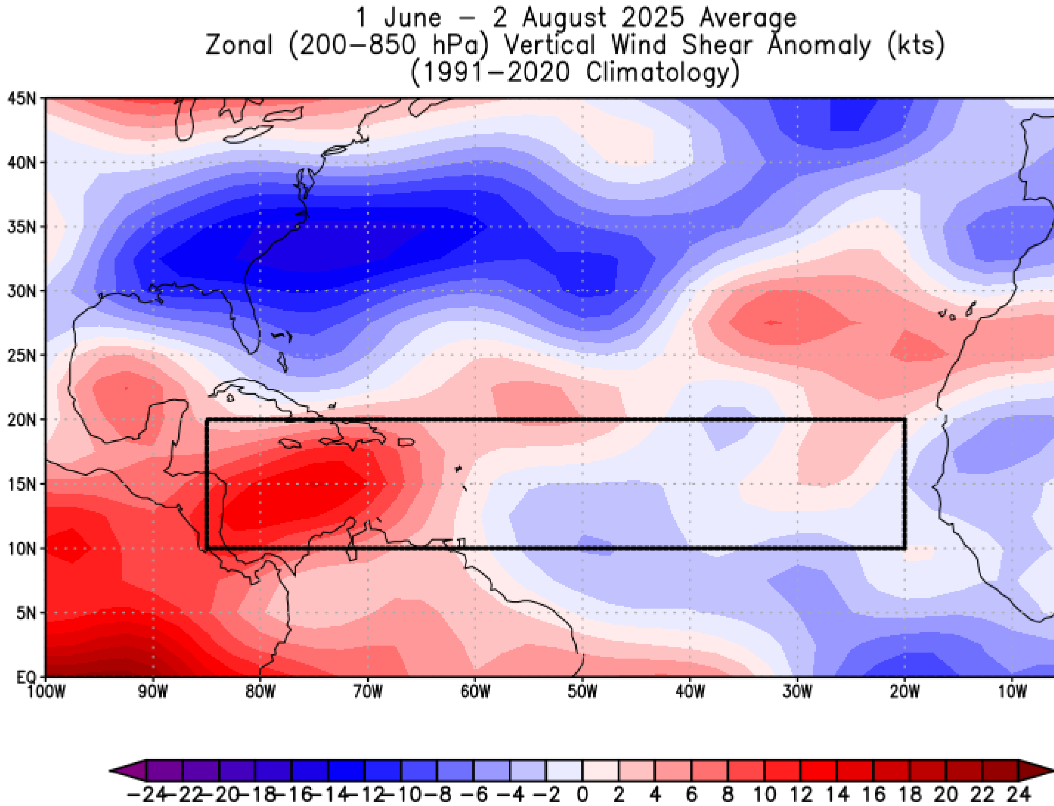

Figure 30: 1 June – 2 August-averaged zonal vertical wind shear anomalies across the tropical and subtropical Atlantic.

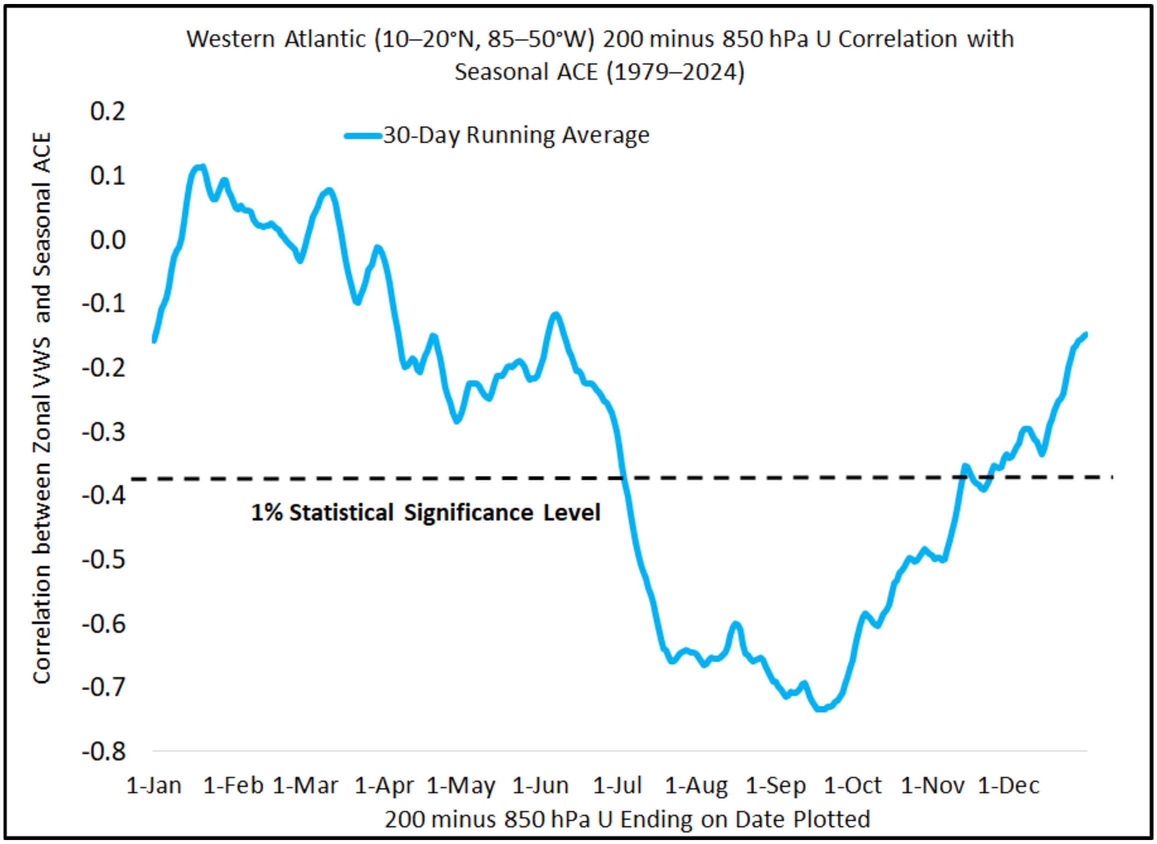

Figure 31: 30-day average correlations between western tropical Atlantic zonal vertical wind shear and seasonal Atlantic ACE.

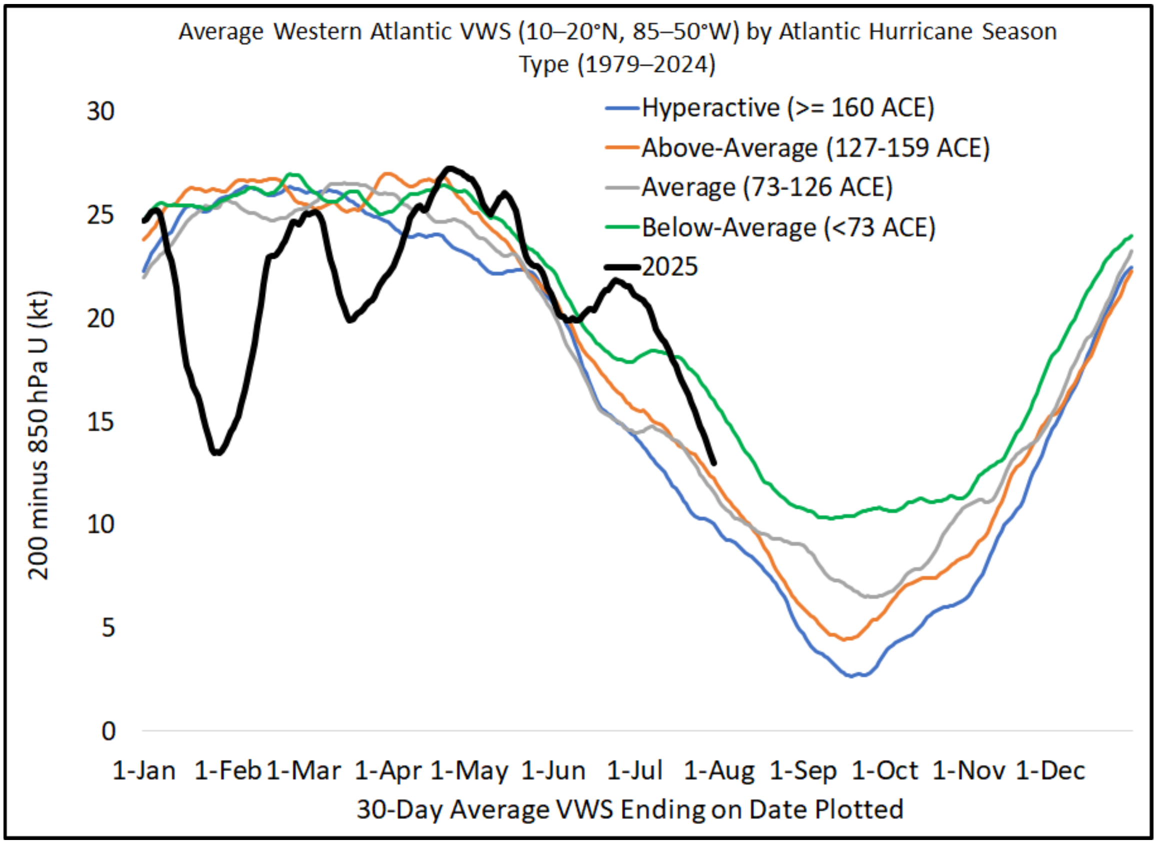

Figure 32: 30-day average western tropical Atlantic zonal vertical wind shear for various Atlantic hurricane season types from 1979–2024 based on NOAA's definition. Western tropical Atlantic zonal vertical wind shear anomalies in the western tropical Atlantic in 2025 are tracking between a below average and an average Atlantic hurricane season.

While normally strong Caribbean vertical wind shear in June and July would warrant a considerable reduction in our seasonal forecast, ECMWF is forecasting a pronounced shift in upper-level winds in the coming weeks, with predominately easterly upper-level zonal wind anomalies forecast for the next several weeks (Figure 33). This marked shift is due to more Atlantic TC-favorable phases of the Madden-Julian oscillation (e.g., phases 1–3; Figure 34). Associated with these phases is anomalous rising motion over Africa and the Indian Ocean and sinking motion over the tropical Pacific (Figure 35), driving upper-level easterly anomalies across the Atlantic's Main Development Region.

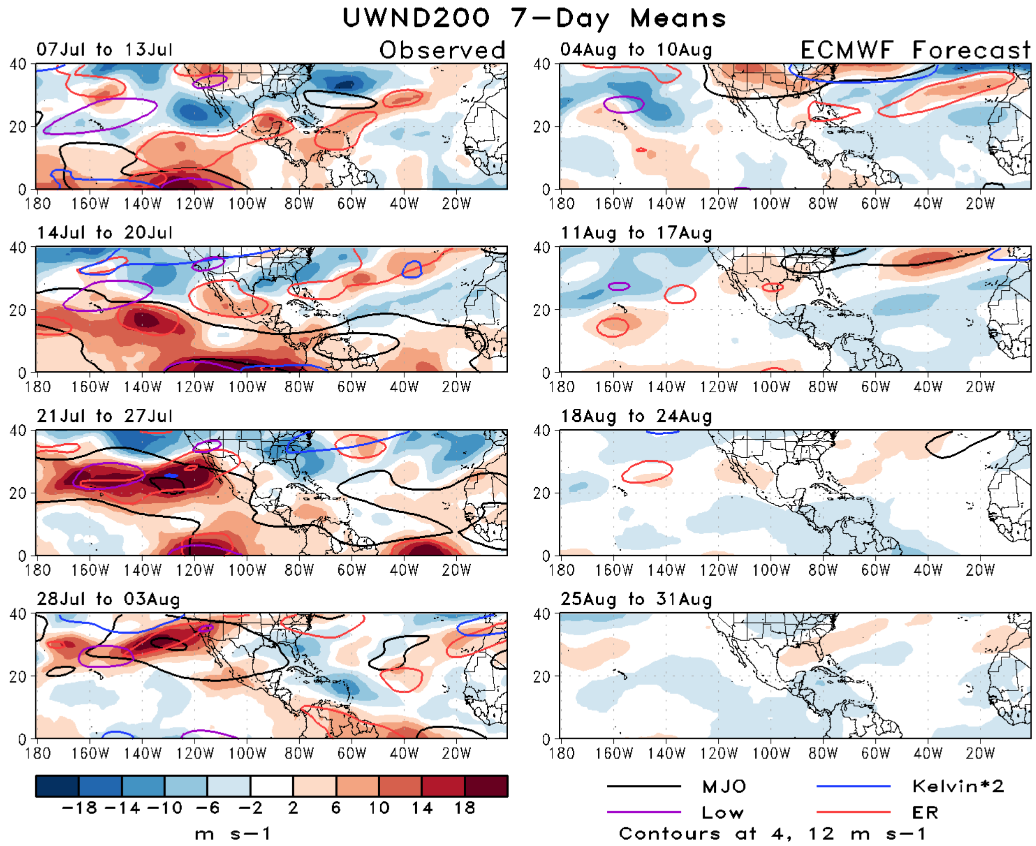

Figure 33: Observed 200 hPa zonal wind anomalies and predicted 200 hPa zonal wind anomalies by ECMWF through 31 August. Figure courtesy of Nick Novella (NOAA/Climate Prediction Center).

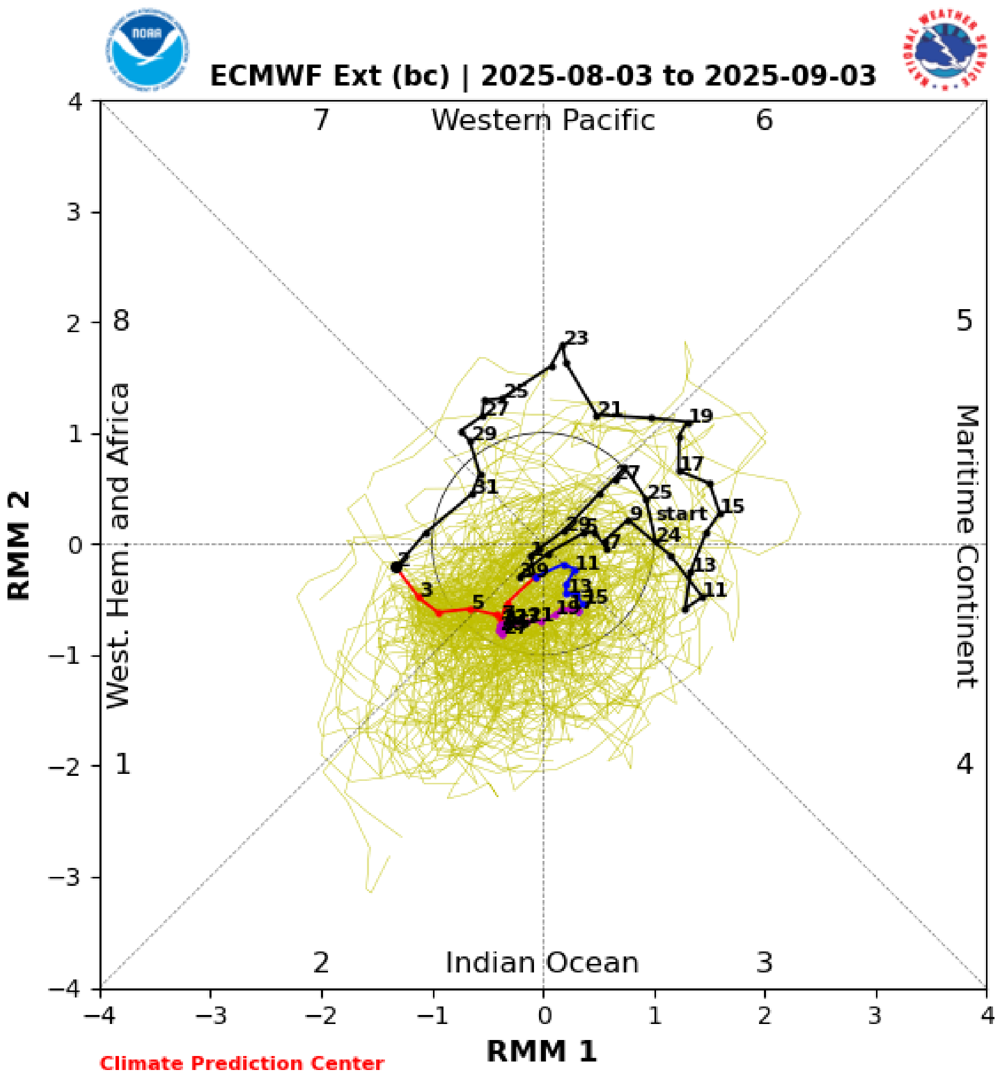

Figure 34: Observed and predicted propagation of the Madden-Julian oscillation by ECMWF through 3 September. Figure courtesy of NOAA.

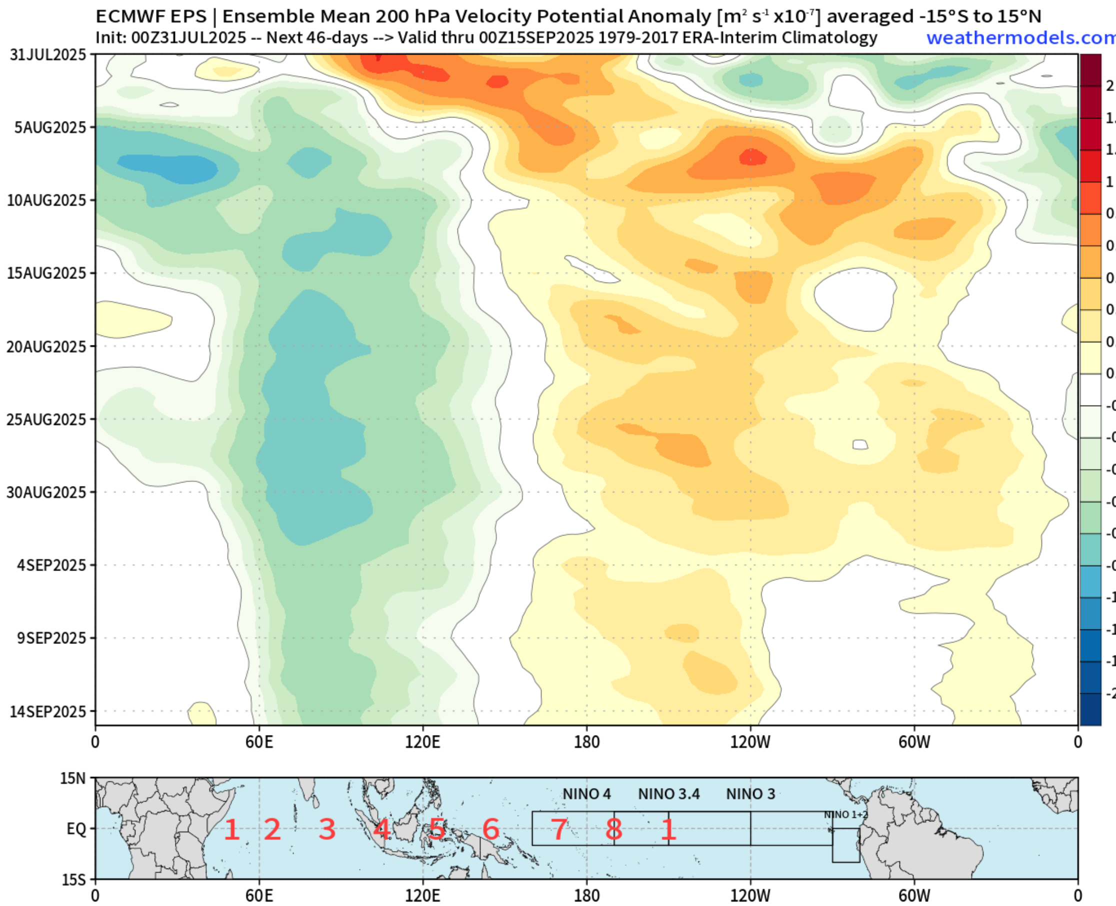

Figure 35: Forecast of 200 hPa tropical velocity potential anomalies by ECMWF through 15 September. Negative upper-level velocity potential anomalies indicate rising motion, while positive upper-level velocity potential anomalies indicate sinking motion. Figure courtesy of weathermodels.com.

Sea level pressure anomalies across the MDR since 1 July have been slightly above average (Figure 36). When July sea level pressure anomalies are high, typically less active Atlantic hurricane seasons are experienced. Higher pressure is often associated with decreased instability, decreased mid-level moisture and increased vertical wind shear. Given that sea level pressure anomalies are only slightly above average since 1 July, we count this as only a slight negative factor for the 2025 Atlantic hurricane season.

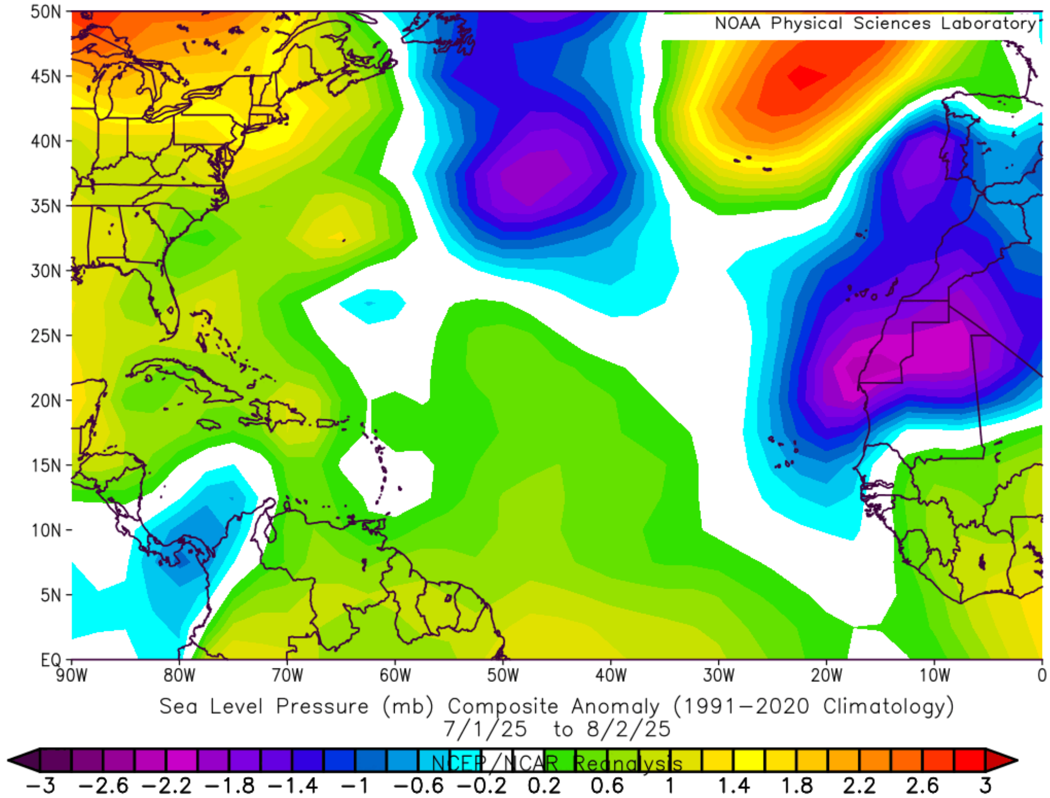

Figure 36: 1 July – 2 August-averaged sea level pressure anomalies in 2025 across the tropical and subtropical North Atlantic.

6 West Africa Conditions

Over the past several weeks, monsoon rainfall over West Africa has been slightly above average (Figure 37). The latest 45-day forecast from ECMWF (Figure 38) indicates that monsoon rainfall across most of West Africa should be above average, with a pronounced northward shift in the Intertropical Convergence Zone (e.g., above-normal precipitation in the Sahel and below-normal precipitation in the Gulf of Guinea). This anomalous precipitation pattern is associated with more vigorous African easterly waves, potentially paving the way for an above-normal Atlantic hurricane season.

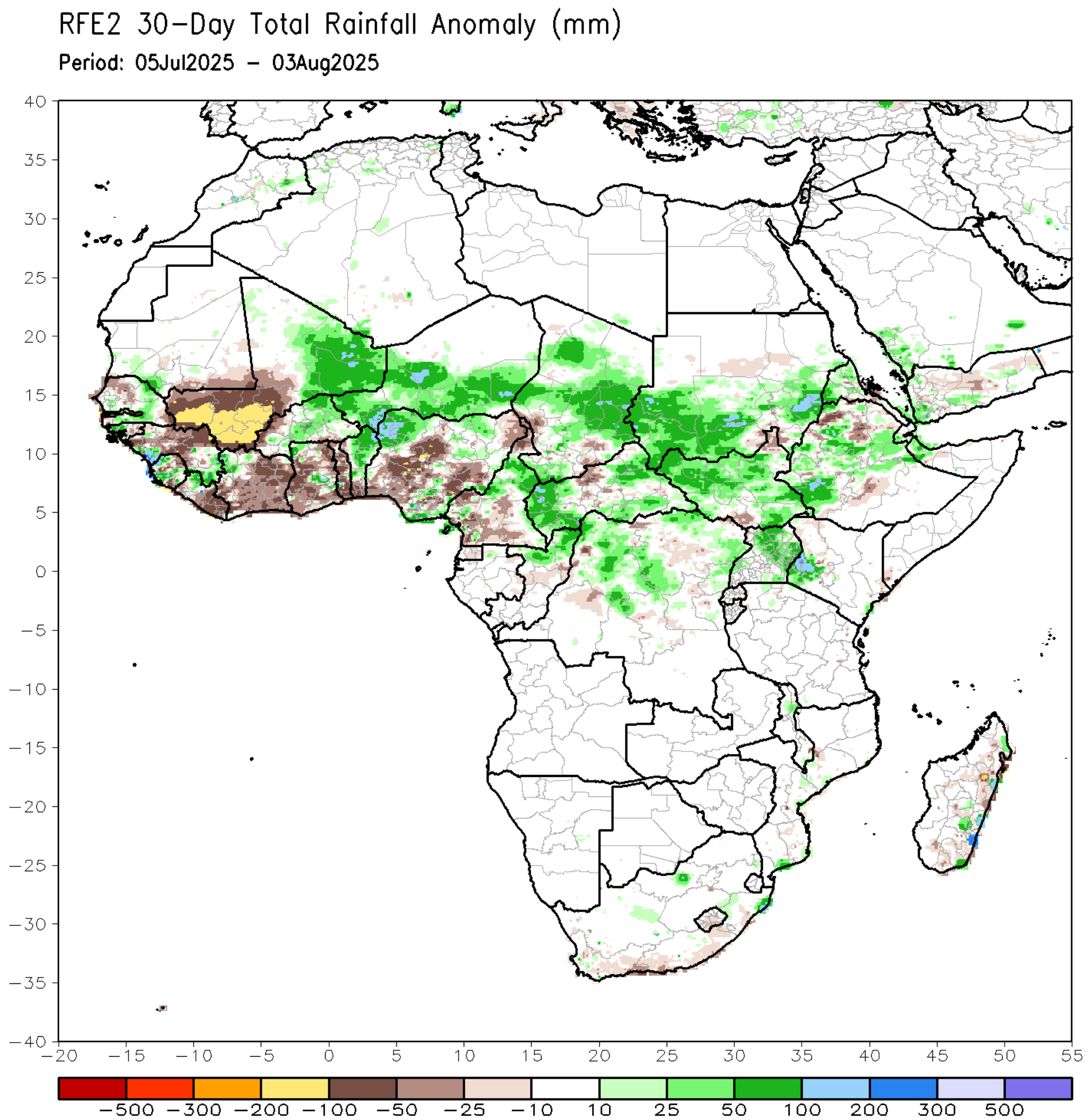

Figure 37: Observed precipitation across Africa from 5 July – 3 August, based on the African Rainfall Estimation Algorithm Version 2.

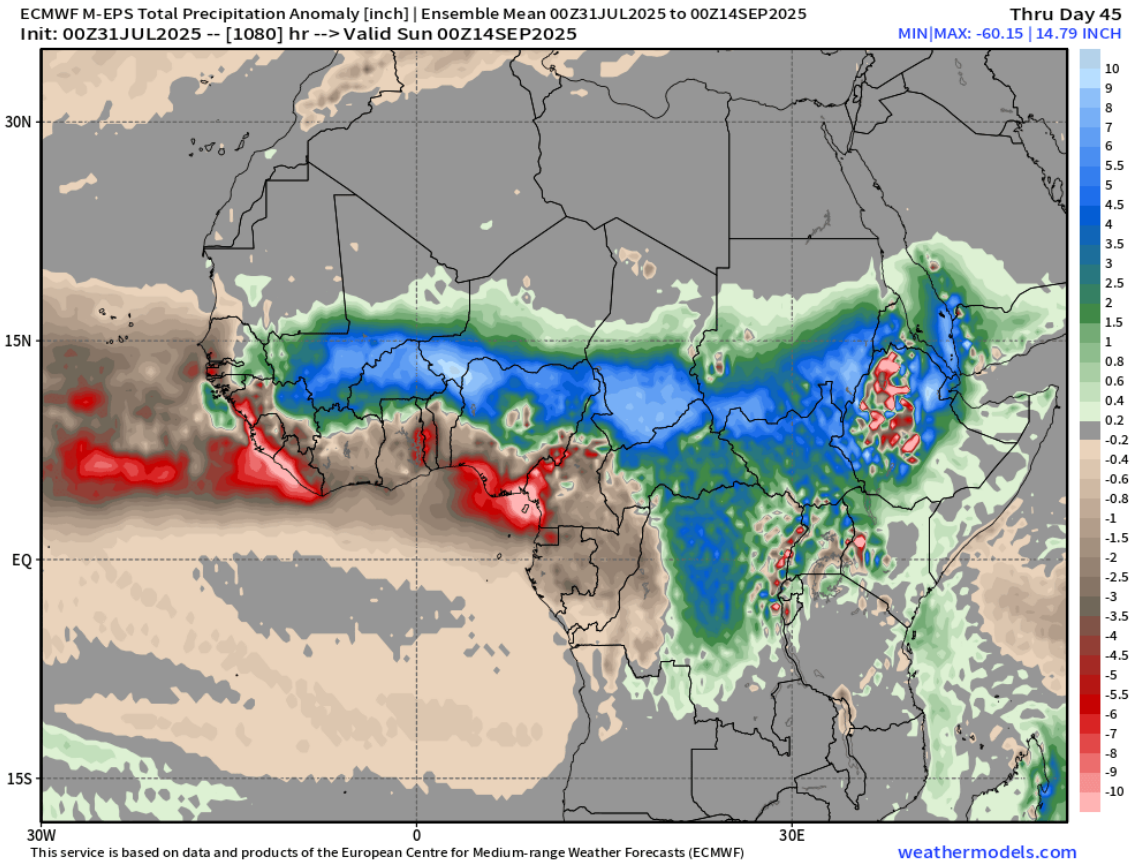

Figure 38: Forecast precipitation across North Africa through 14 September from the ECMWF ensemble.

7 Tropical Cyclone Impact Probabilities for 2025

This year, we continue to calculate the impacts of tropical cyclones for each state and county/parish along the Gulf and East Coasts, tropical cyclone-prone provinces of Canada, states in Mexico, islands in the Caribbean and countries in Central America. We have used NOAA's Historical Hurricane Tracks website and selected all named storms, hurricanes and major hurricanes that have tracked within 50 miles of each landmass from 1880–2020. This approach allows for tropical cyclones that may have made landfall in an immediately adjacent region to be counted for all regions that were in close proximity to the landfall location of the storm. We then fit the observed frequency of storms within 50 miles of each landmass using a Poisson distribution to calculate the climatological odds of one or more events within 50 miles.

We have shown that net landfall probability is linked to overall Atlantic basin ACE. Long-term statistics show that, on average, the more active the overall Atlantic basin hurricane season is, the greater the probability of hurricane landfalls for various landmasses in the basin. As was done last year, we adjust landfall probabilities based on the ratio of predicted ACE west of 60°W to the average ACE west of 60°W, as almost all landmasses that we are issuing probabilities for are west of 60°W.

Table 10 displays the climatological odds of storms tracking within 50 miles of each state along the Gulf and East Coasts along with the odds for the remainder of 2025. Landfall probabilities are slightly above their long-term averages. Probabilities for other Atlantic basin landmasses are available on our website.

Given that landfall rates between 1880–2020 and 1991–2020 are similar for the continental US, we adjust all landfall rates relative to the 1991–2020 Atlantic west of 60°W ACE climatology. We prefer to use 1880–2020 for landfall statistics to increase the robustness of the historical landfall dataset. Also, storms near landfall are likely better observed than those farther east in the basin prior to the satellite era (e.g., mid-1960s). Slight differences in ACE west of 60°W between the two periods (73 for 1991–2020 vs. 66 for 1880–2020) are likely mostly due to improved observational technology in the more recent period.

Table 10: Post 5-August probability of >=1 named storm, hurricane and major hurricane tracking within 50 miles of each coastal state from Texas to Maine. Probabilities are provided for both the 1880–2020 climatological average as well as the probability for 2025, based on the latest CSU seasonal hurricane forecast.

		2025 Probability			Climatological	
	Probability >=1	**event within**	**50 miles**	**Probability >=1**	**event within**	**50 miles**
State	Named Storm	Hurricane	Major Hurricane	Named Storm	Hurricane	Major Hurricane
Alabama	63%	31%	9%	58%	28%	8%
Connecticut	25%	9%	2%	22%	8%	1%
Delaware	25%	7%	1%	23%	6%	1%
Florida	89%	61%	32%	86%	56%	29%
Georgia	68%	34%	7%	63%	30%	6%
Louisiana	71%	43%	16%	66%	38%	14%
Maine	24%	8%	2%	21%	7%	1%
Maryland	35%	12%	1%	31%	11%	1%
Massachusetts	37%	16%	3%	33%	14%	3%
Mississippi	58%	32%	9%	53%	28%	8%
New Hampshire	20%	6%	2%	18%	6%	1%
New Jersey	25%	8%	1%	23%	7%	1%
New York	30%	11%	2%	26%	9%	2%
North Carolina	73%	43%	9%	68%	38%	8%
Rhode Island	23%	9%	2%	20%	8%	1%
South Carolina	62%	32%	9%	57%	29%	8%
Texas	66%	41%	18%	61%	36%	16%
Virginia	50%	22%	2%	46%	20%	1%

8 Summary

An analysis of a variety of different atmosphere and ocean measurements (through July) which are known to have long-period statistical relationships with the upcoming season's Atlantic tropical cyclone activity, as well as output from dynamical models, indicate that 2025 will have slightly above-average activity. While most of our model guidance calls for a hyperactive season, strong Caribbean shear in June – July is the primary reason why we are forecasting a slightly above-normal hurricane season. We stress that there is higher-than-normal uncertainty in this outlook given the mixed signals documented in the preceding pages.

9 Forthcoming Updated Forecasts of 2025 Hurricane Activity

We will be issuing two-week forecasts for Atlantic TC activity during the climatological peak of the season from August–October, beginning today, Wednesday, 6 August and continuing every other Wednesday (20 August, 3 September, etc.) A verification and discussion of all 2025 forecasts will be issued on Tuesday, 18 November. All forecasts and verifications are available on our website.

10 Verification of Previous Forecasts

CSU's seasonal hurricane forecasts have shown considerable improvement in recent years, likely due to a combination of improved physical understanding, adoption of statistical/dynamical models and more reliable reanalysis products. Figure 39 displays correlations between observed and predicted Atlantic hurricanes from 1984–2024, from 1984–2013 and from 2014–2024, respectively. Correlation skill has improved at all lead times in recent years, with the most noticeable improvements at longer lead times. While eleven years is a relatively short sample size, improvements in both modeling and physical understanding should continue to result in future improvements in seasonal Atlantic hurricane forecast skill. More detailed verification statistics are also available at: https://tropical.colostate.edu/archive.html#verification

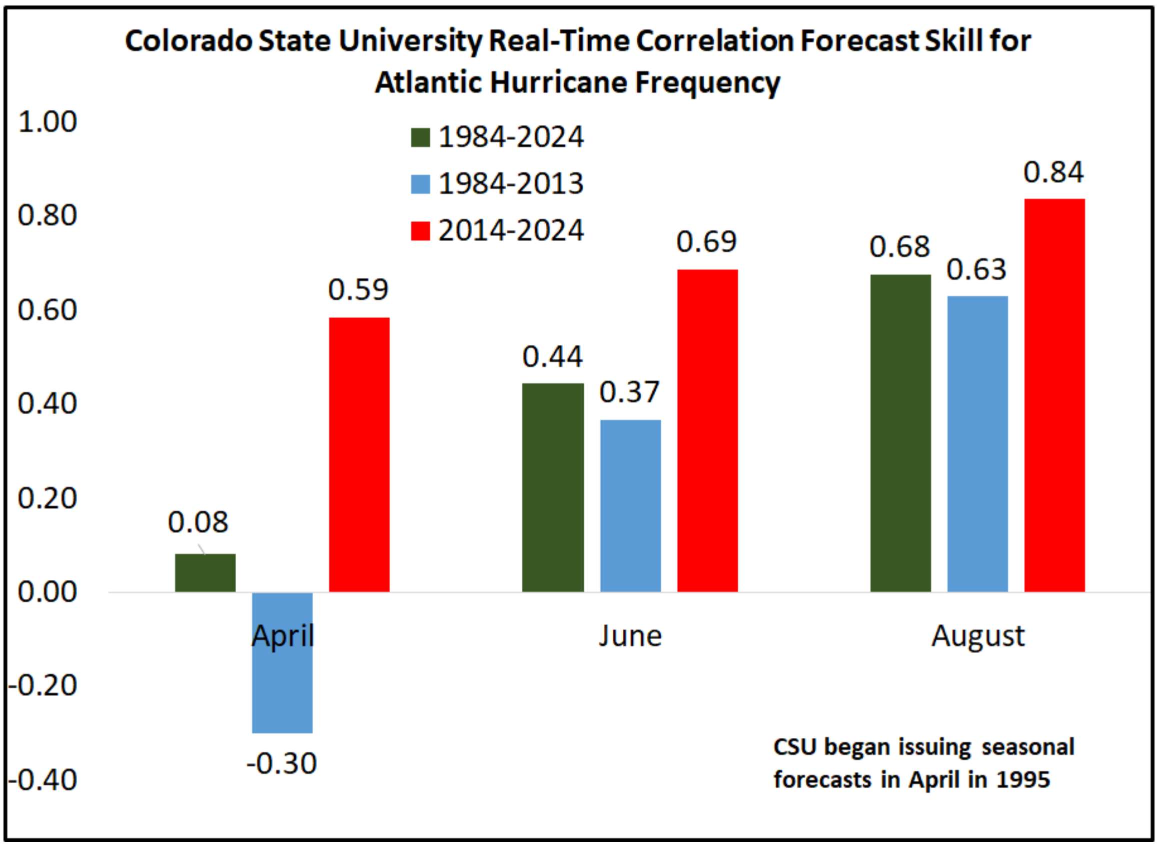

Figure 39: CSU's real-time forecast skill for Atlantic hurricanes using correlation as the skill metric. Correlation skills are displayed for three separate time periods: 1984–2013, 2014–2024 and 1984–2024, respectively.