

EXTENDED RANGE FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY AND LANDFALL STRIKE PROBABILITY FOR 2026

We have reduced our 2026 Atlantic basin hurricane season forecast and anticipate a below-normal season. Warm neutral ENSO conditions are likely to transition to El Niño shortly, with a high potential for a moderate/strong El Niño for the peak of hurricane season. Sea surface temperatures in the western tropical Atlantic are near average but are cooler than normal in the eastern and central tropical Atlantic. We anticipate El Niño being the dominant factor for the upcoming hurricane season, driving increased levels of tropical Atlantic vertical wind shear. We are forecasting a below-average probability for major hurricane landfalls along the continental United States coastline and in the Caribbean. As with all hurricane seasons, coastal residents are reminded that it only takes one hurricane making landfall to make it an active season. Thorough preparations should be made every season, regardless of predicted activity.

(as of 10 June 2026)

By Philip J. Klotzbach¹, Michael M. Bell², Levi G. Silvers³, Juhyun Lee⁴, Delián Cólón Burgos⁵ and Nicholas Mesa⁵

With Special Assistance from the TC-RAMS Team⁶ and Carl J. Schreck III⁷
In Memory of William M. Gray⁸

Jennifer Dimas and Joshua Rhoten, Colorado State University media representatives, are coordinating media inquiries in English and Spanish. They can be reached at Jennifer.Dimas@colostate.edu and Joshua.Rhoten@colostate.edu, respectively.

Department of Atmospheric Science, Colorado State University, Fort Collins CO 80523

Project Supporters:



¹ Senior Research Scientist

² Professor

³ Research Scientist

⁴ Post-Doctoral Scientist

⁵ Graduate Research Assistant

⁶ Team members include: Tyler Barbero, Lauren Beard, Deztynee Bryan, Ming-Han Chung, Jen DeHart, Chandler Jenkins, Jinhui Ju and Meghan Stell.

⁷ Research Scholar at NC State University

⁸ Professor Emeritus

ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2026

Forecast Parameter and 1991–2020 Average (in parentheses)	Issue Date 9 April 2026	Issue Date 10 June 2026
Named Storms (14.4)	13	11
Named Storm Days (69.4)	55	45
Hurricanes (7.2)	6	5
Hurricane Days (27.0)	20	15
Major Hurricanes (3.2)	2	2
Major Hurricane Days (7.4)	5	4
Accumulated Cyclone Energy Index (123)	90	70
ACE West of 60°W (73)	50	35
Net Tropical Cyclone Activity (135%)	100	80

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

- 1) Entire continental U.S. coastline – 24% (average from 1880–2020 is 43%)
- 2) U.S. East Coast Including Peninsula Florida (south and east of Cedar Key, Florida) – 11% (average from 1880–2020 is 21%)
- 3) Gulf Coast from the Florida Panhandle (west and north of Cedar Key, Florida) westward to Brownsville – 14% (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)**

- 1) 26% (average from 1880–2020 is 47%)

ABSTRACT

Information obtained through May indicates that the 2026 Atlantic hurricane season will have activity below the 1991–2020 average. We estimate that 2026 will have 11 named storms (average is 14.4), 45 named storm days (average is 69.4), 5 hurricanes (average is 7.2), 15 hurricane days (average is 27.0), 2 major (Category 3-4-5) hurricanes (average is 3.2) and 4 major hurricane days (average is 7.4). The probability of U.S. and Caribbean major hurricane landfall is estimated to be below its long-period average. We predict Atlantic basin Accumulated Cyclone Energy (ACE) and Net Tropical Cyclone (NTC) activity in 2026 to be approximately 55–60 percent of their long-term averages. We have reduced the forecast numbers from our April outlook due to increased confidence in a moderate to strong El Niño for the peak of the Atlantic hurricane season.

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.

Our forecast is built on an extended-range early June statistical prediction scheme that was developed using ~40 years of past data, analog predictors, and four 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. In addition, for the first time this year, we are incorporating forecast output from the Ai2 Climate Emulator – a machine learning-based atmospheric model. Most of this model guidance points towards a somewhat below-normal season.

The tropical Pacific is currently characterized by warm ENSO neutral conditions, but all signs point towards a robust El Niño in the next couple of months. Sea surface temperatures in the western tropical Atlantic are near average, while they are below average in the eastern and central tropical Atlantic. We currently anticipate that the moderate to strong El Niño will dominate the tropical circulation during the peak of the 2026 Atlantic hurricane season, likely driving well above-normal levels of vertical wind shear across the tropical Atlantic and Caribbean.

The early June forecast has moderate 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.

Why issue extended-range 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 June. 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 June 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 this [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, and IAA. 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 current members of the TC-RAMS team who have provided valuable comments and feedback throughout the forecast preparation process. These members include: Tyler Barbero, Lauren Beard, Deztynee Bryan, Ming-Han Chung, Jen DeHart, Chandler Jenkins, Jinhui Ju 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, Brian McNoldy, Paul Roundy, 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 knots²) 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.

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.

Main Development Region (MDR) – The region in the tropical Atlantic and Caribbean where most tropical cyclones that become major hurricanes form. We define the MDR to span 10–20°N, 85–20°W.

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 43rd year in which the TC-RAMS team 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 June forecast. These components are a statistical regression model, a combined statistical/dynamical model, a machine learning-based 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 and the Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC). All of these models show skill at predicting TC activity based on ~25–40 years of historical data. For the first time this year, we are also incorporating forecasts from the Ai2 Climate Emulator (ACE2). 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 June Forecast Methodology

2.1 Statistical Forecast Scheme

Our June statistical forecast scheme uses ECMWF Reanalysis 5 data (ERA5; Hersbach et al. 2020). This forecast model was developed over 1979–2020 and then was tested on the 2021 and 2022 Atlantic hurricane seasons (e.g., those years were purposely left out to see how well the model would work at forecasting these omitted years). The model was then used in real-time during the 2023–2025 hurricane seasons. This model shows significant skill in cross-validated (e.g., leaving the year out of the developmental model that is being predicted) hindcasts of Accumulated Cyclone Energy (ACE) ($r = 0.66$) over the period from 1979–2025 (Figure 1).

Figure 2 displays the locations of both predictors, while Table 1 displays the individual linear correlations between each predictor and ACE over the 1979–2025 hindcast/forecast period. Both predictors correlate significantly at the 5% level using a

two-tailed Student's t-test and assuming that each year represents an individual degree of freedom. Table 2 displays the 2026 observed values for both predictors in the statistical forecast scheme. Table 3 displays the statistical model output for the 2026 hurricane season. Both predictors favor a slightly below-normal Atlantic hurricane season.

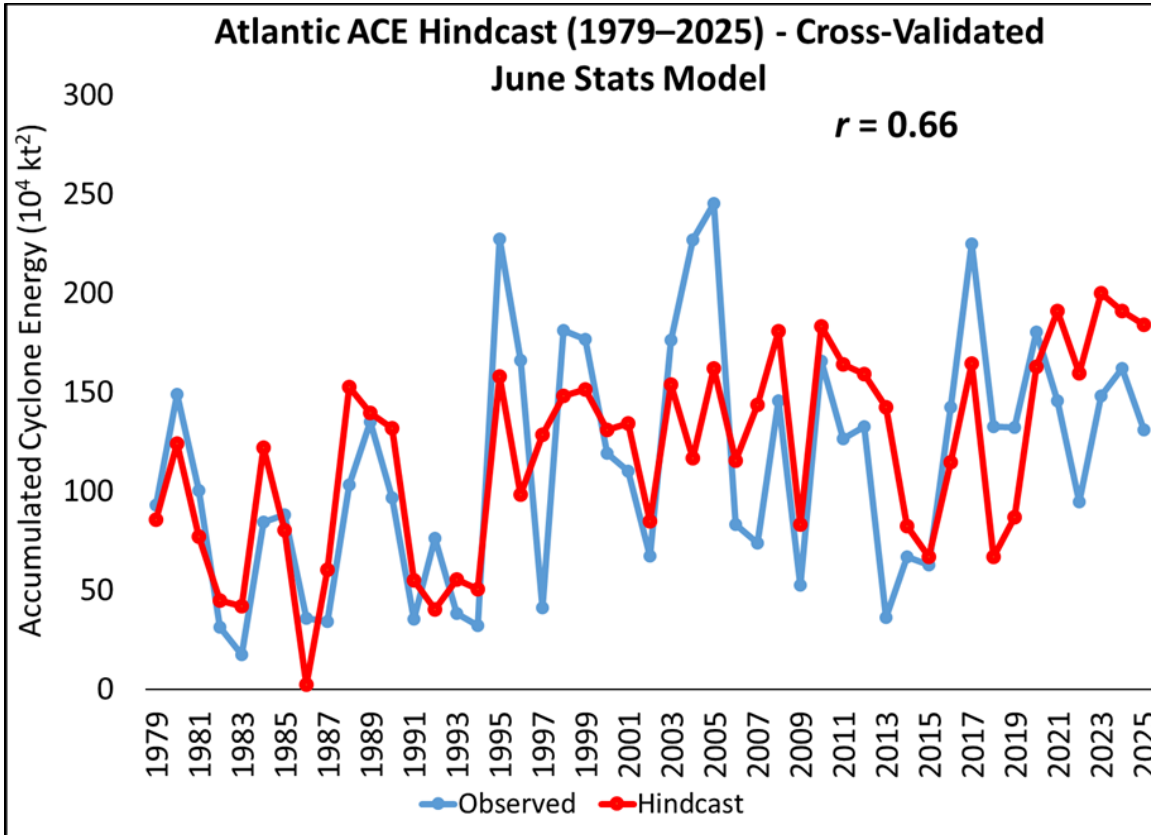


Figure 1: Observed versus early June cross-validated hindcast values of ACE for the statistical model from 1979–2025.

June Forecast Predictors

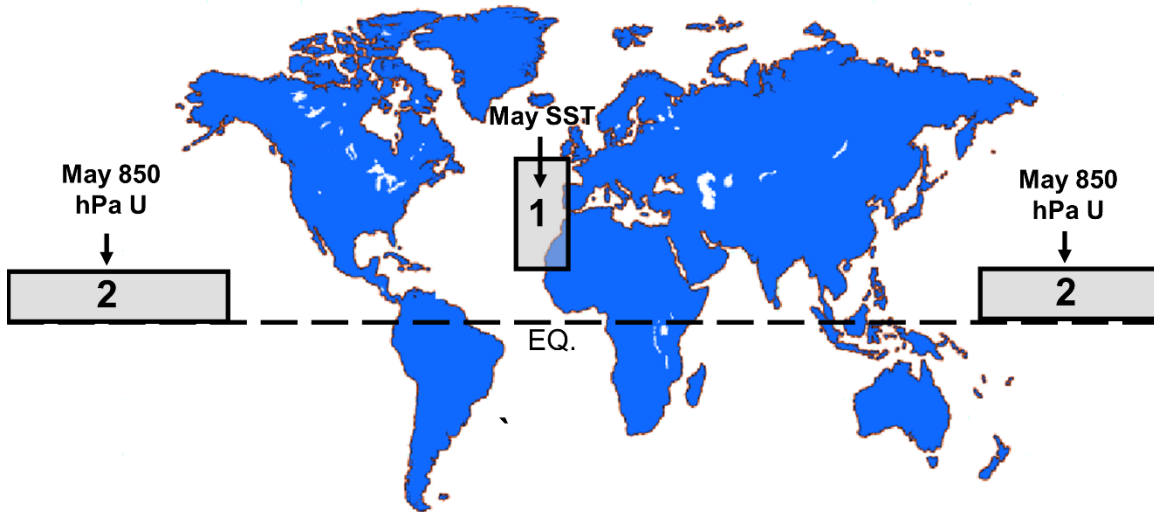


Figure 2: Location of predictors for the early June extended-range statistical prediction for the 2026 hurricane season.

Table 1: Linear correlation between early June predictors and ACE over the period from 1979–2025.

Predictor	Correlation w/ ACE
1) May SST (15°N–50°N, 30°W–10°W) (+)	0.57
2) May 850 hPa U (0°N–20°N, 160°E–140°W) (-)	-0.57

Table 2: Listing of early June 2026 predictors for the 2026 hurricane season. 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. SD stands for standard deviation.

Predictor	2026 Forecast Value	Impact on 2026 TC Activity
1) May SST (15°N–50°N, 30°W–10°W) (+)	-0.6 SD	Suppress
2) May 850 hPa U (0°N–20°N, 160°E–140°W) (-)	+0.3 SD	Slightly Suppress

Table 3: Statistical model output for the 2026 Atlantic hurricane season and the final adjusted forecast.

Forecast Parameter and 1991–2020 Average (in parentheses)	Statistical Forecast	Final Forecast
Named Storms (NS) (14.4)	13.9	11
Named Storm Days (NSD) (69.4)	57.0	45
Hurricanes (H) (7.2)	5.9	5
Hurricane Days (HD) (27.0)	20.2	15
Major Hurricanes (MH) (3.2)	2.4	2
Major Hurricane Days (MHD) (7.4)	4.9	4
Accumulated Cyclone Energy (ACE) (123)	93	70
Net Tropical Cyclone Activity (NTC) (135%)	109	80

The locations and brief descriptions of the predictors for our early June statistical forecast are now discussed. Both predictors correlate with physical features during August–October that are known to be favorable for elevated levels of hurricane activity. These factors are all generally related to August–October vertical wind shear in the Atlantic Main Development Region (MDR) from 10–20°N, 85–20°W, as shown in Figure 3.

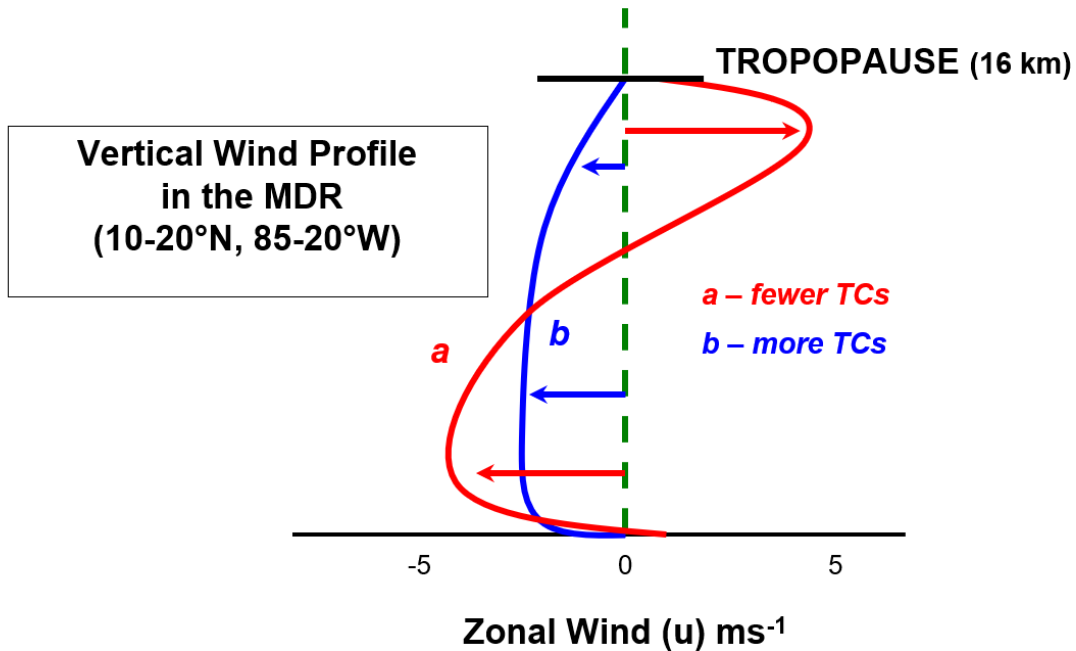


Figure 3: Vertical wind profile typically associated with (a) inactive Atlantic basin hurricane seasons and (b) active Atlantic basin hurricane seasons. Note that (b) has reduced levels of vertical wind shear.

For each of these predictors, we display a four-panel figure showing rank correlations between values of each predictor and August–October values of SST, sea level pressure (SLP), 200 hPa zonal wind, and 850 hPa zonal wind, respectively, since 1979. In general,

higher values of tropical Atlantic SSTs, lower values of tropical Atlantic SLP, anomalous tropical Atlantic westerlies at 850 hPa and anomalous tropical Atlantic easterlies at 200 hPa are associated with active Atlantic basin hurricane seasons. All correlations are displayed using ERA5.

Predictor 1. May SST in the tropical and subtropical eastern Atlantic (+)

(15°N–50°N, 30°W–10°W)

Warmer-than-normal SSTs in the tropical and subtropical Atlantic during May are associated with a weaker-than-normal subtropical high and reduced trade wind strength during the boreal spring and summer (Knaff 1997). Positive SSTs in May are correlated with weaker trade winds and weaker upper tropospheric westerly winds, lower-than-normal sea level pressures and above-normal SSTs in the tropical Atlantic during the following August–October period (Figure 4). All of these August–October features are commonly associated with active Atlantic basin hurricane seasons, through reductions in vertical wind shear, increased vertical instability and increased mid-tropospheric moisture, respectively. Predictor 1 correlates quite strongly ($r = 0.57$) with ACE from 1979–2025. Predictor 1 also significantly correlates ($r = 0.73$) with August–October values of the SST component of the Atlantic Meridional Mode (AMM) (Kossin and Vimont 2007) from 1979–2025. The AMM has been shown to impact Atlantic hurricane activity through alterations in the position and intensity of the Atlantic Inter-Tropical Convergence Zone (ITCZ). Changes in the Atlantic ITCZ bring about changes in tropical Atlantic vertical and horizontal wind shear patterns and in tropical Atlantic SST patterns.

Predictor 2. May 850 hPa U in the tropical central Pacific (-)

(0°N–20°N, 160°E–140°W)

Stronger-than-normal low-level winds during May in the central tropical Pacific are associated with enhanced upwelling which drives anomalous cooling in the central and eastern tropical Pacific, inhibiting the development of El Niño conditions. This relationship can be clearly demonstrated by a significant correlation between Predictor 2 with the August–October-averaged Relative Oceanic Nino Index (RONI; $r = 0.68$) from 1979–2025. Enhanced trade winds in the tropical Pacific favor La Niña, which results in a westward-shifted and stronger Walker Circulation. Associated with this stronger Walker Circulation is anomalous subsidence over the eastern and central tropical Pacific and reduced vertical wind shear during the peak of the Atlantic hurricane season, especially in the Caribbean and western tropical Atlantic, where ENSO typically has its strongest impacts (Figure 5).

August-October Correlations w/ Predictor 1

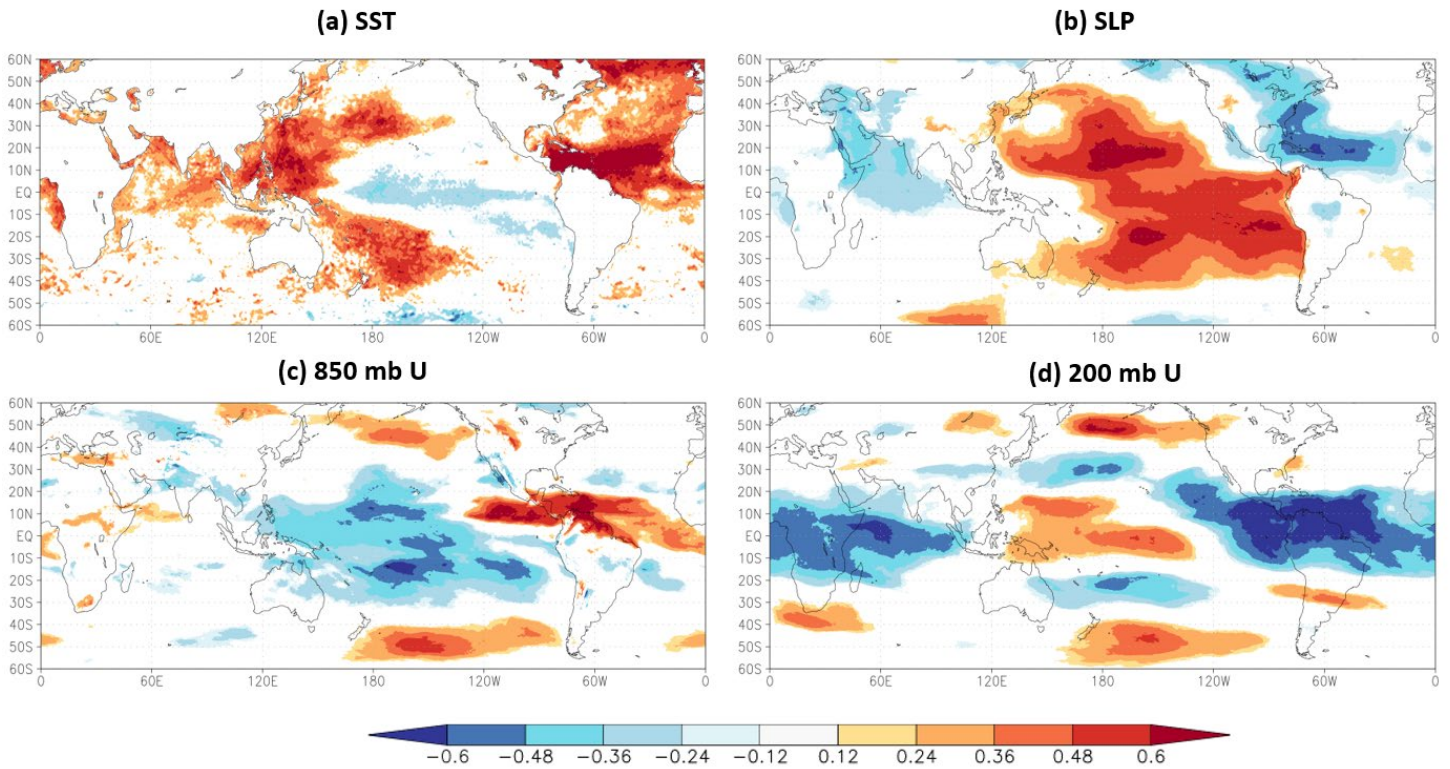


Figure 4: Rank correlations between May SST in the tropical and subtropical Atlantic (Predictor 1) and (panel a) August–October sea surface temperature, (panel b) August–October sea level pressure, (panel c) August–October 850 hPa zonal wind and (panel d) August–October 200 hPa zonal wind. All four of these parameter deviations in the tropical Atlantic are known to be favorable for enhanced hurricane activity.

August-October Correlations w/ Predictor 2

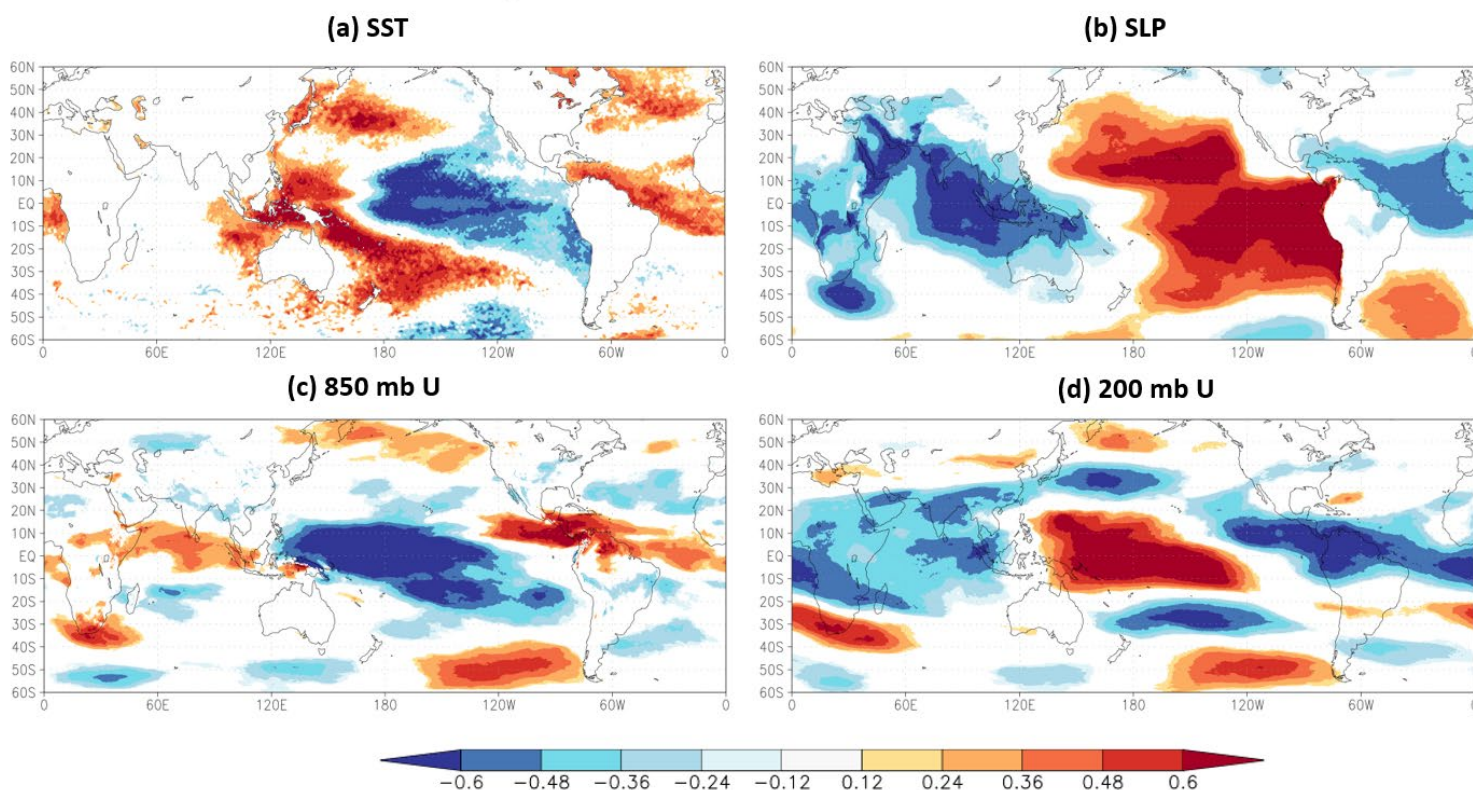


Figure 5: As in Figure 4 but for May 850 hPa zonal wind in the tropical central Pacific. The sign of the predictor has been reversed for ease of comparison with Figure 4.

2.2 Statistical/Dynamical Forecast Schemes

a) Statistical/Dynamical Model Predictor Ensemble Mean Output

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 May, 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 a multiple regression using those two predictors (e.g., forecast August – September SST in the eastern/central equatorial Pacific and in the eastern/central North Atlantic) to forecast ACE for the 2026 season. ECMWF hindcasts are available from 1981–2025, 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 strong El Niño event, while three of the four models are calling for a warm eastern and central tropical and subtropical Atlantic. The CMCC model, however, is calling for a slightly cooler than normal Atlantic, resulting in a forecast that is much lower than the other models. Table 5 displays the seasonal TC forecast output for each of the statistical/dynamical models. Forecasts from ECMWF, UK Met and JMA from our statistical/dynamical model call for a near-normal season, while CMCC calls for a well below-normal season. Given the recent anomalous cooling that has taken place in the Atlantic MDR (discussed in Section 5), we tend to favor a somewhat cooler tropical Atlantic solution than is being forecast by the ECMWF, UK Met and JMA models.

Figure 8 displays hindcasts for ECMWF forecasts of ACE from 1981–2025, while Figure 9 displays forecasts of ACE from all four statistical/dynamical models from 1993–2016 – the joint period where all four models have hindcasts available.

Figure 10 displays the ECMWF ensemble average August–September SST forecast for 45°S–60°N, while Figure 11 displays the ECMWF ensemble average August 0–September 200 minus 850 hPa wind shear forecast for the North Atlantic. As would be expected given the very strong El Niño that is being forecast by the ECMWF ensemble, vertical wind shear across the MDR is forecast to be extremely high – the highest in the ECMWF hindcast/forecast period since 1981.

Statistical/Dynamical Model Predictors

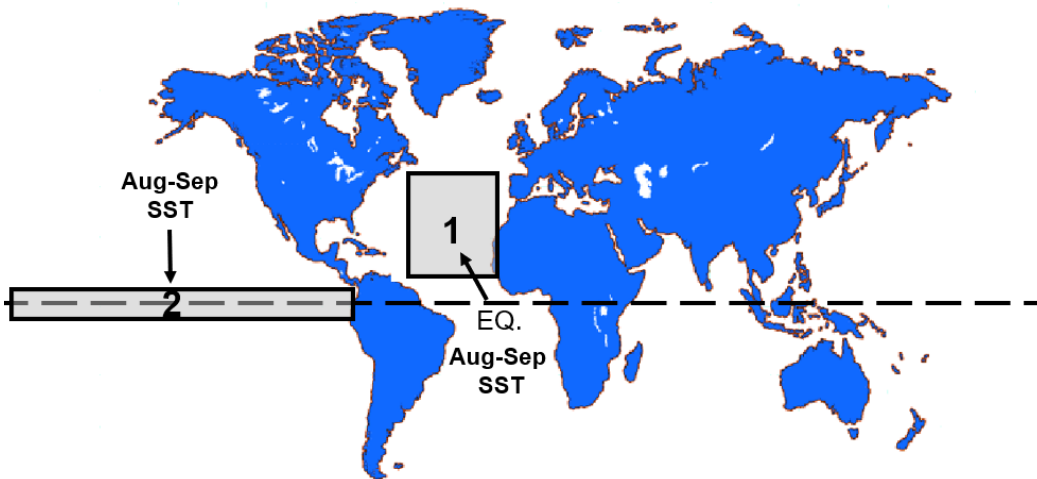


Figure 7: Location of predictors for our early June statistical/dynamical extended-range statistical prediction for the 2026 hurricane season. This forecast uses dynamical model predictions from ECMWF, the UK Met Office, JMA and CMCC to predict August–September SSTs in the two boxes displayed and then 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 May. 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) (+)	+2.0 SD	+3.5 SD	+2.6 SD	-0.3 SD
2) Aug–Sep SST (5°S–5°N, 180–90°W) (-)	+2.8 SD	+2.0 SD	+2.6 SD	+2.5 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)	14.3	15.8	14.8	10.0	11
Named Storm Days (69.4)	59.5	69.1	62.4	30.6	45
Hurricanes (7.2)	6.1	7.1	6.4	3.1	5
Hurricane Days (27.0)	21.6	26.9	23.2	5.8	15
Major Hurricanes (3.2)	2.6	3.2	2.8	0.8	2
Major Hurricane Days (7.4)	5.4	7.3	6.0	1.0	4
Accumulated Cyclone Energy Index (123)	99	122	106	30	70
Net Tropical Cyclone Activity (135%)	114	137	121	45	80

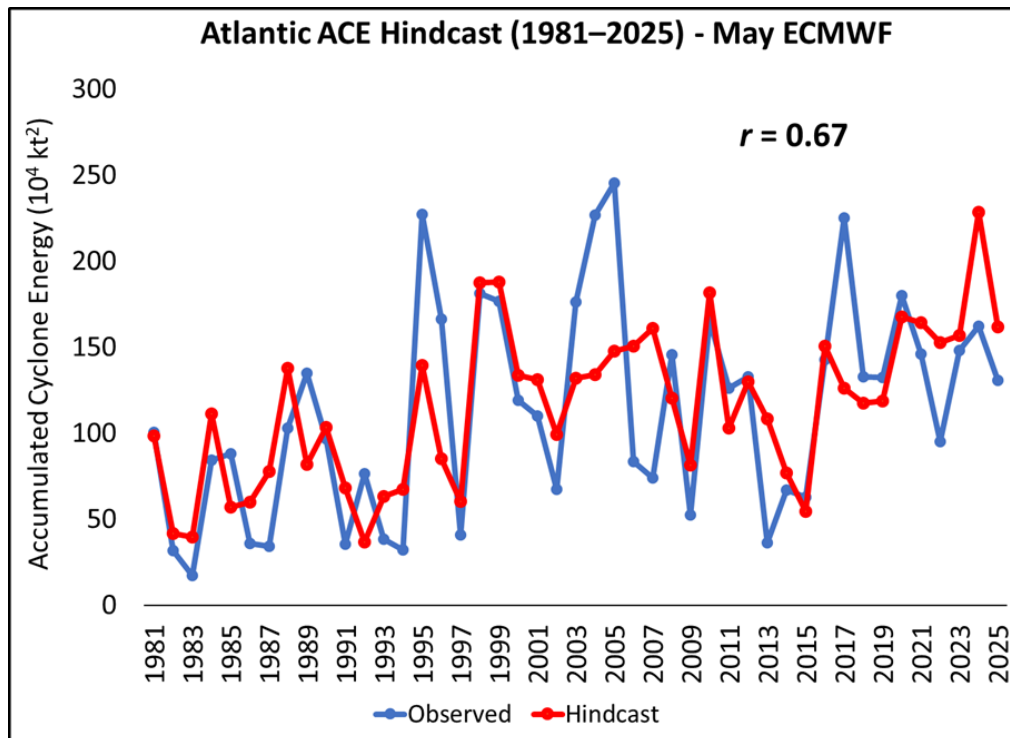


Figure 8: Observed versus statistical/dynamical hindcast values of ACE for 1981–2025 from ECMWF.

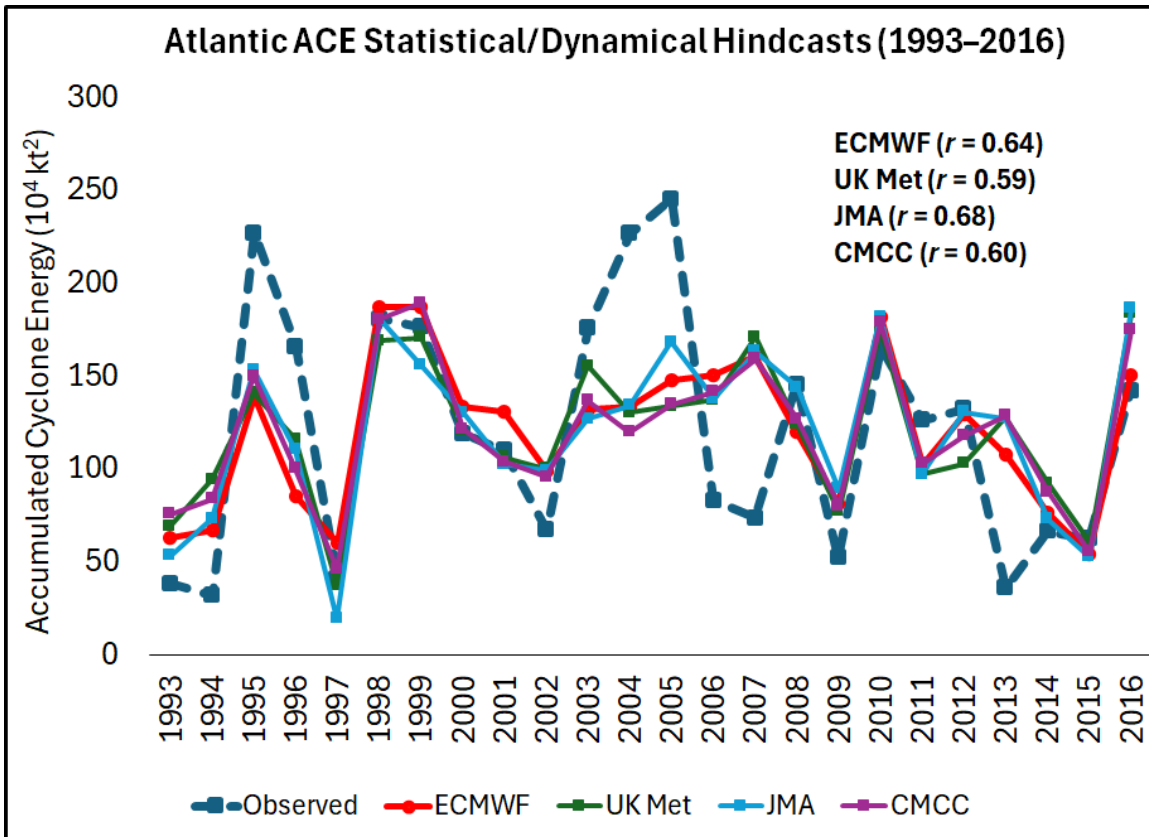


Figure 9: Observed versus statistical/dynamical hindcast values for all four statistical/dynamical models from 1993–2016.

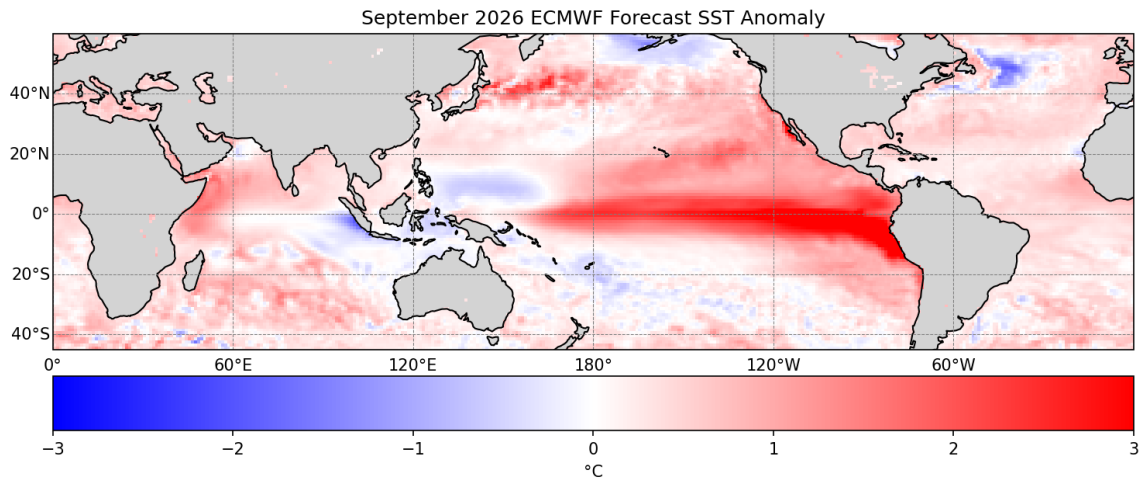


Figure 10: ECMWF ensemble average SST anomaly forecast for September 2026.

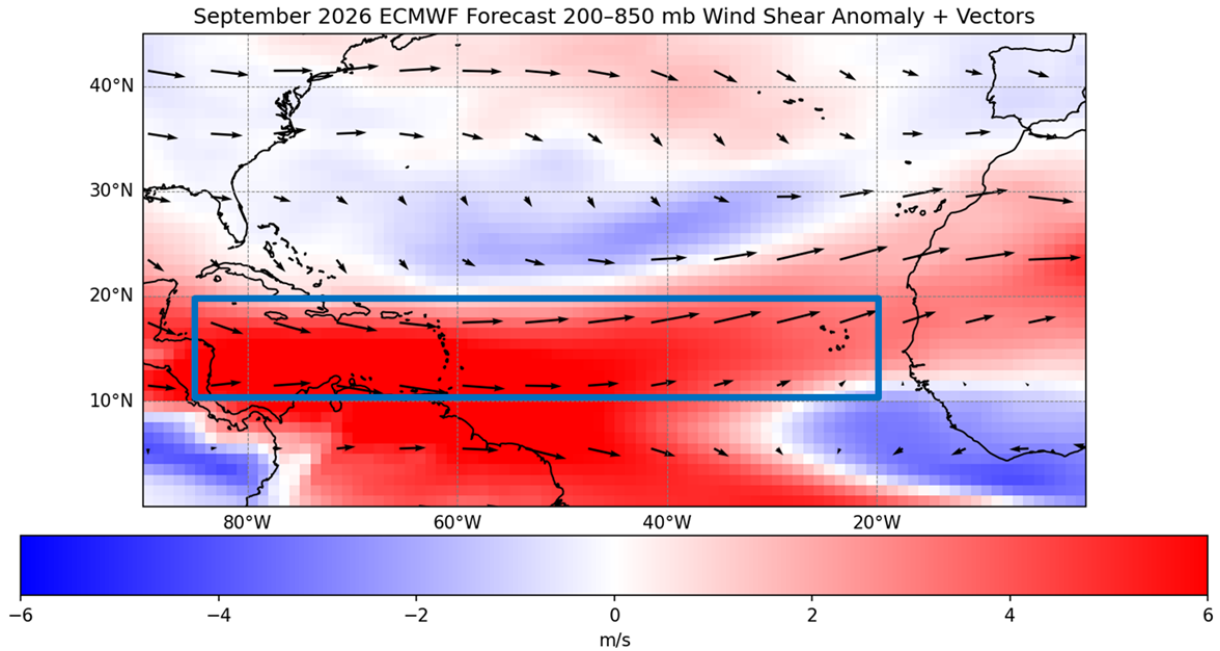


Figure 11: ECMWF ensemble average 200 minus 850 hPa anomalous wind shear forecast for September 2026. The vectors denote the shear direction. The blue rectangle denotes the MDR.

2.3 Artificial Intelligence Model Scheme

This year we are debuting a new analysis technique to our seasonal forecasts. We use the Ai2 Climate Emulator (ACE2) – an artificial intelligence-based atmospheric model – as an additional guidance tool for our outlooks. Two practical benefits of using an AI-based model are the speed of calculations and the resulting improved ability to quantify the uncertainty in our forecast. Recent research has shown that ACE2 can accurately emulate subseasonal and seasonal variability including the Madden-Julian Oscillation and the atmospheric response to El Niño variability over recent decades. The version of ACE2 we use was trained with historically informed, observationally driven data from ERA5. Using as input SST and the concentration of CO₂, ACE2 predicts the state of the atmosphere. We force ACE2 with the 51 members comprising the ECMWF ensemble prediction of SSTs through September 2026. Figure 12 displays the September ensemble mean vertical wind shear from ACE2 across the tropical and subtropical Atlantic. Figure 13 displays the spread in the MDR-averaged September shear, as well as the spread in two sub-regions, the Caribbean and the tropical Atlantic, based on the 51 different SST ensemble member forcings. Figure 14 displays the difference in SST between the ten Septembers with the highest ACE2 shear vs. the ten Septembers with the lowest ACE2 shear. As expected, ensembles with a more robust El Niño and a cooler tropical Atlantic have more MDR shear than ensembles with a weaker El Niño and a warmer tropical Atlantic. The ACE2 model is consistent with results from ECMWF that the MDR-averaged vertical wind shear should be quite pronounced during the peak of the Atlantic hurricane season.

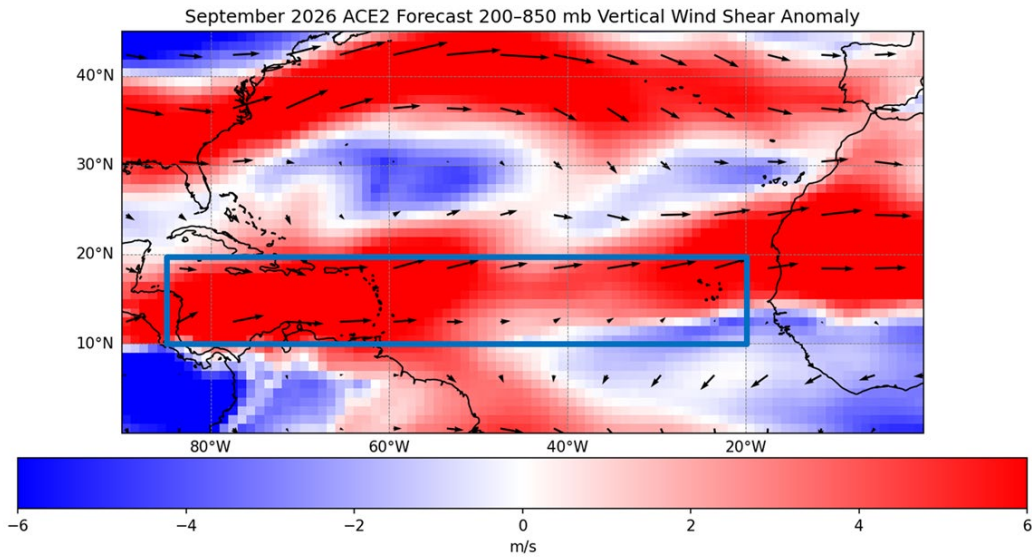


Figure 12: ACE2 ensemble average anomalous vertical wind shear (200 minus 850 hPa) forecast for September 2026. The vectors denote the shear direction. The blue rectangle denotes the Main Development Region.

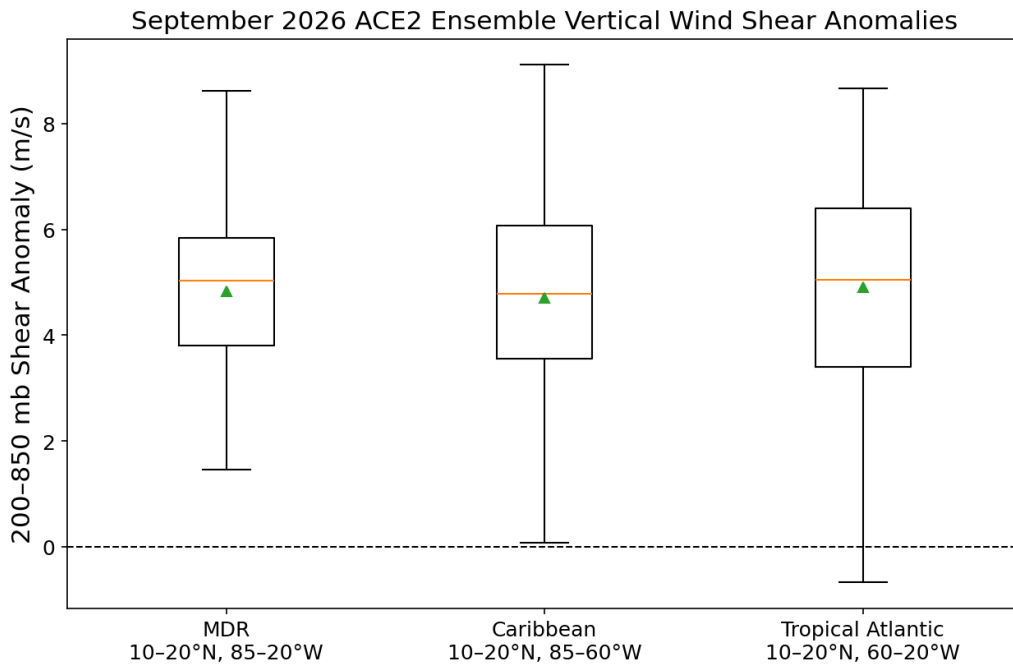


Figure 13: Box and whisker plot displaying ACE2 individual ensemble member September MDR-averaged shear as well as shear in the Caribbean and tropical Atlantic subregions. The orange line represents the median value, while the green triangle denotes the mean value.

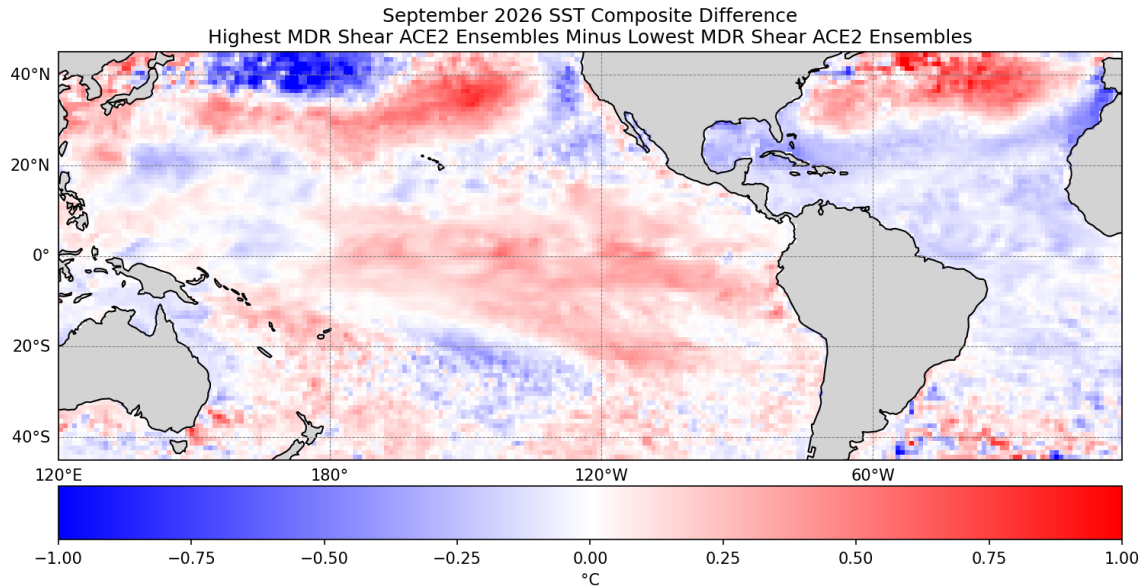


Figure 14: Difference in September SST between the ten ACE2 ensemble members with the highest MDR-averaged September shear versus the ten ACE2 ensemble members with the lowest MDR-averaged September shear.

2.4 June Analog Forecast Scheme

Certain years in the historical record have global oceanic and atmospheric trends which are similar to 2026. These years also provide useful clues as to likely levels of activity that the forthcoming 2026 hurricane season may bring. For this early June extended range 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 2026 conditions. Table 6 lists our analog selections, while Figure 15 shows the composite August–October SST anomalies in our six analog years.

We searched for years that had moderate to strong El Niño conditions and near average tropical Atlantic conditions. We anticipate that the 2026 hurricane season will have activity slightly above the average of our six analog years for most parameters.

Table 6: Analog years for 2026 with the associated hurricane activity listed for each year.

Year	NS	NSD	H	HD	MH	MHD	ACE	NTC
1957	8	41.25	3	21.00	2	3.75	78.7	77.6
1965	10	48.25	4	19.50	1	6.25	86.7	86.4
1987	7	37.25	3	5.00	1	0.50	34.4	45.6
1997	8	30.00	3	9.50	1	2.25	40.9	53.8
2009	9	30.00	3	12.00	2	3.50	52.6	68.6
2015	11	43.50	4	12.00	2	4.00	62.7	81.2
Average	8.8	38.4	3.3	13.2	1.5	3.4	59.3	68.9
2026 Forecast	11	45	5	15	2	4	70	80

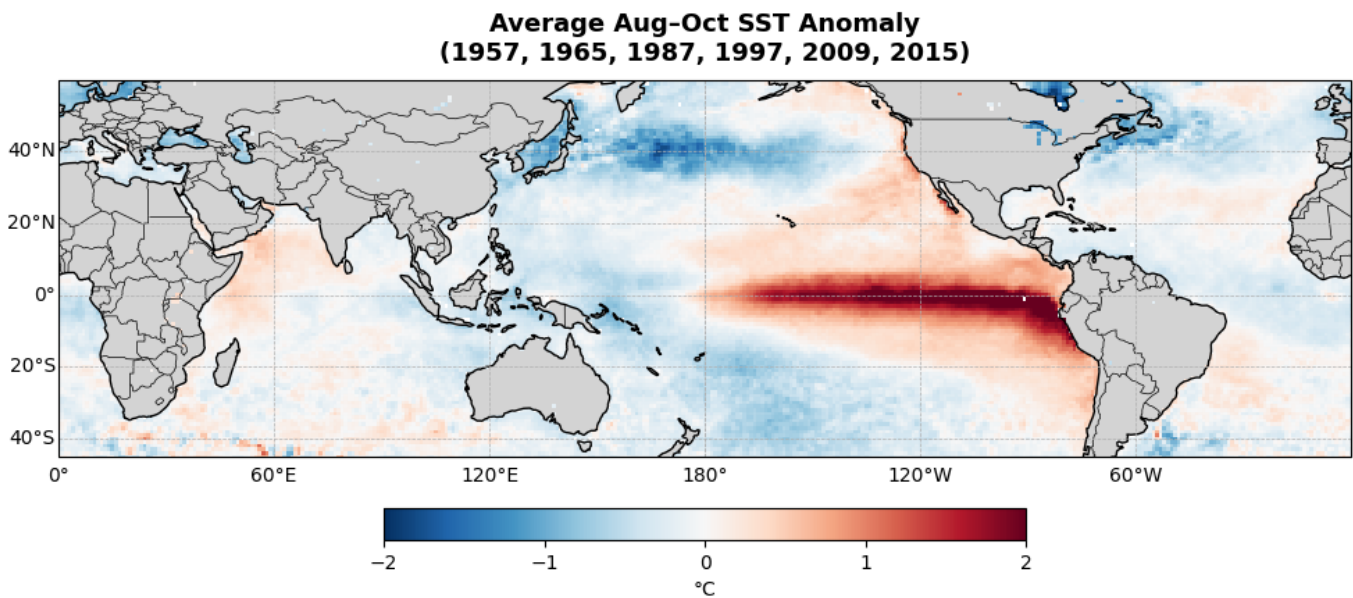


Figure 15: Average August–October SST anomalies of our six analog years.

2.5 ACE West of 60°W Calculation

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 16 and 17) since 1979. In this analysis, we only count one landfall per storm, regardless of whether the storm made multiple landfalls at hurricane strength (e.g., Irma–2017).

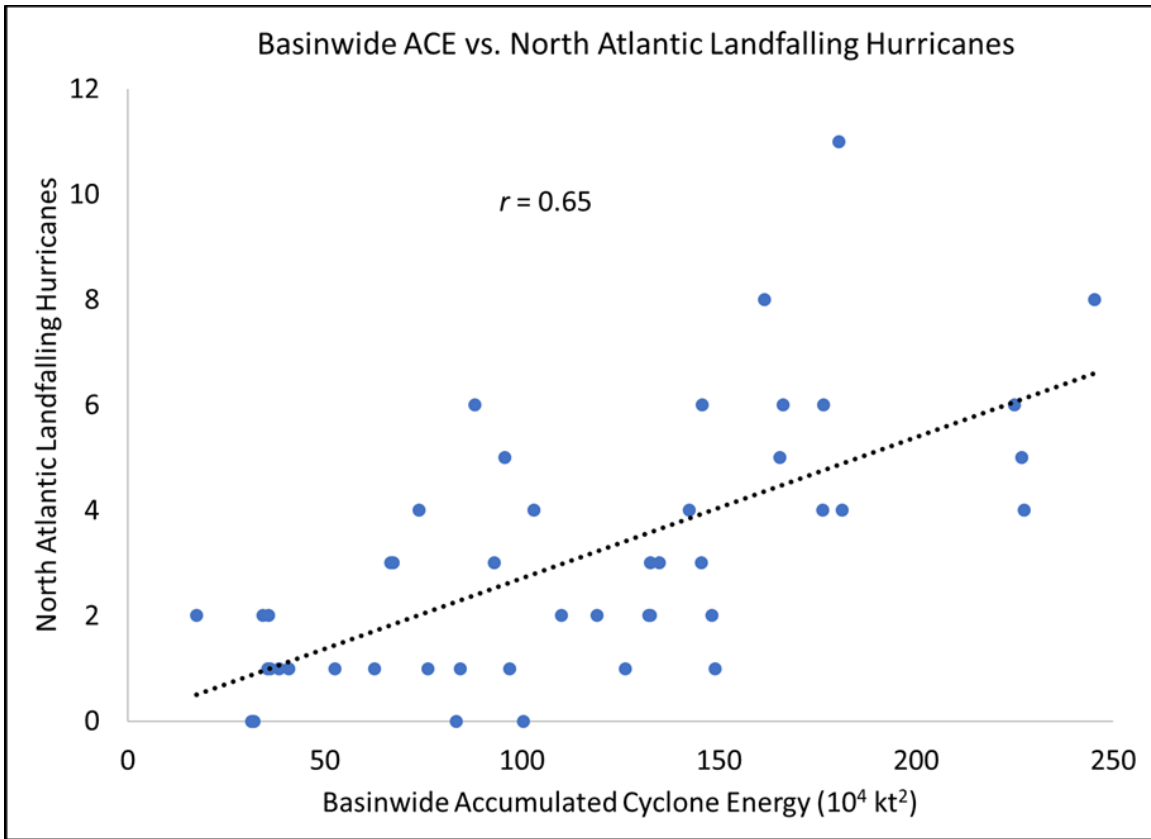


Figure 16: Scatterplot showing relationship between basinwide ACE and North Atlantic landfalling hurricanes.

We find that 54% of basinwide ACE occurs west of 60°W in El Niño years, while 63% of basinwide ACE occurs west of 60°W in La Niña years (Figure 18). In neutral ENSO years, 56% of basinwide ACE occurs west of 60°W. Given that we are expecting moderate to strong El Niño conditions with this outlook, we are estimating 50% of basinwide ACE to occur west of 60°W in 2026.

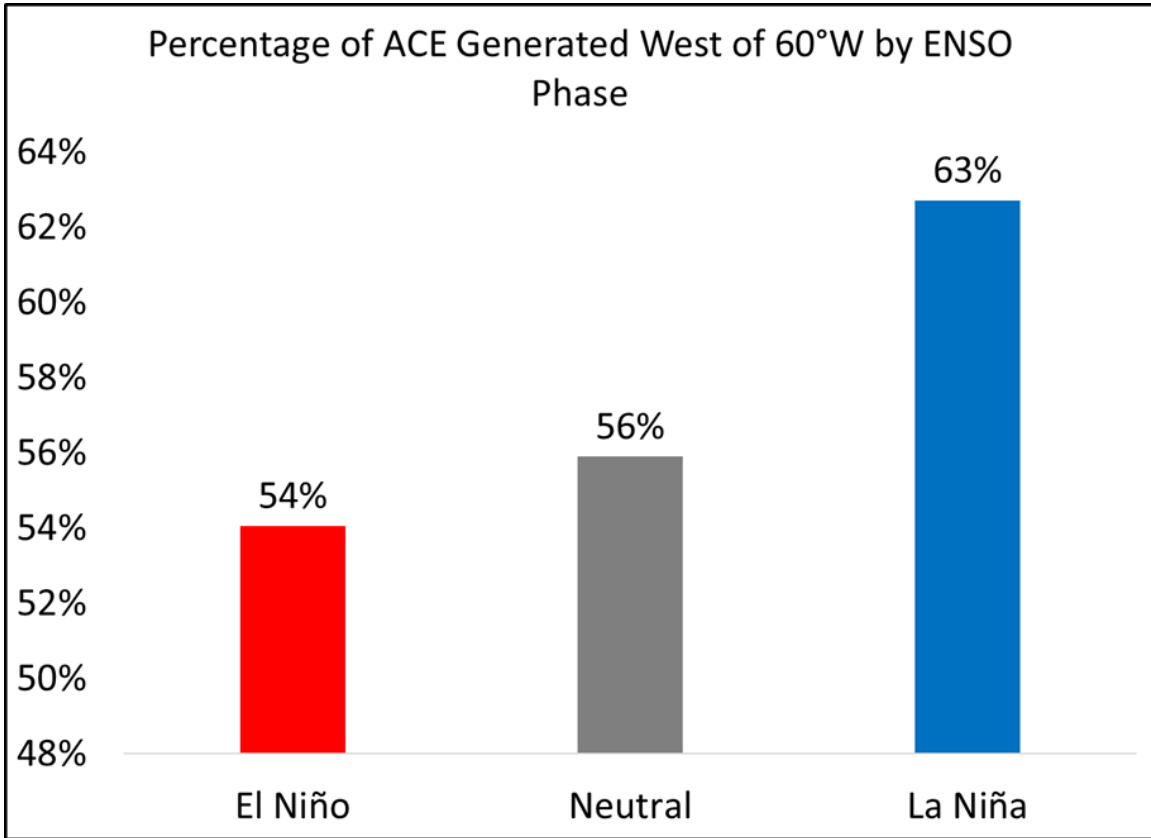


Figure 18: Percentage of ACE generated west of 60°W by ENSO phase.

2.5 June Forecast Summary and Final Adjusted Forecast

Table 7 shows our final adjusted early June forecast for the 2026 season which is a combination of our statistical scheme, statistical/dynamical schemes, and analog scheme as well as qualitative adjustments for other factors not explicitly contained in any of these schemes. We favor our lower analog guidance over some of our more aggressive statistical and statistical/dynamical model guidance due to recent robust anomalous cooling across the Atlantic MDR as well as the continued rapid transition towards El Niño. Despite the high certainty that El Niño develops, there remains considerable uncertainty with this outlook given uncertainty in how strong the El Niño will be and how warm the MDR becomes for the peak of the upcoming season (August–October).

Table 7: Summary of our early June statistical forecast, our statistical/dynamical forecasts, our analog forecast, the average of these six schemes and our adjusted final forecast for the 2026 hurricane season.

Forecast Parameter and 1991–2020 Average (in parentheses)	Statistical Scheme	ECMWF Scheme	Met Office Scheme	JMA Scheme	CMCC Scheme	Analog Scheme	6-Scheme Average	Adjusted Final Forecast
Named Storms (14.4)	13.9	14.3	15.8	14.8	10.0	8.8	12.9	11
Named Storm Days (69.4)	57.0	59.5	69.1	62.4	30.6	38.4	52.8	45
Hurricanes (7.2)	5.9	6.1	7.1	6.4	3.1	3.3	5.3	5
Hurricane Days (27.0)	20.2	21.6	26.9	23.2	5.8	13.2	18.5	15
Major Hurricanes (3.2)	2.4	2.6	3.2	2.8	0.8	1.5	2.2	2
Major Hurricane Days (7.4)	4.9	5.4	7.3	6.0	1.0	3.4	4.7	4
Accumulated Cyclone Energy Index (123)	93	99	122	106	30	59	85	70
Net Tropical Cyclone Activity (135%)	109	114	137	121	45	69	99	80

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 19 and 20), 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.

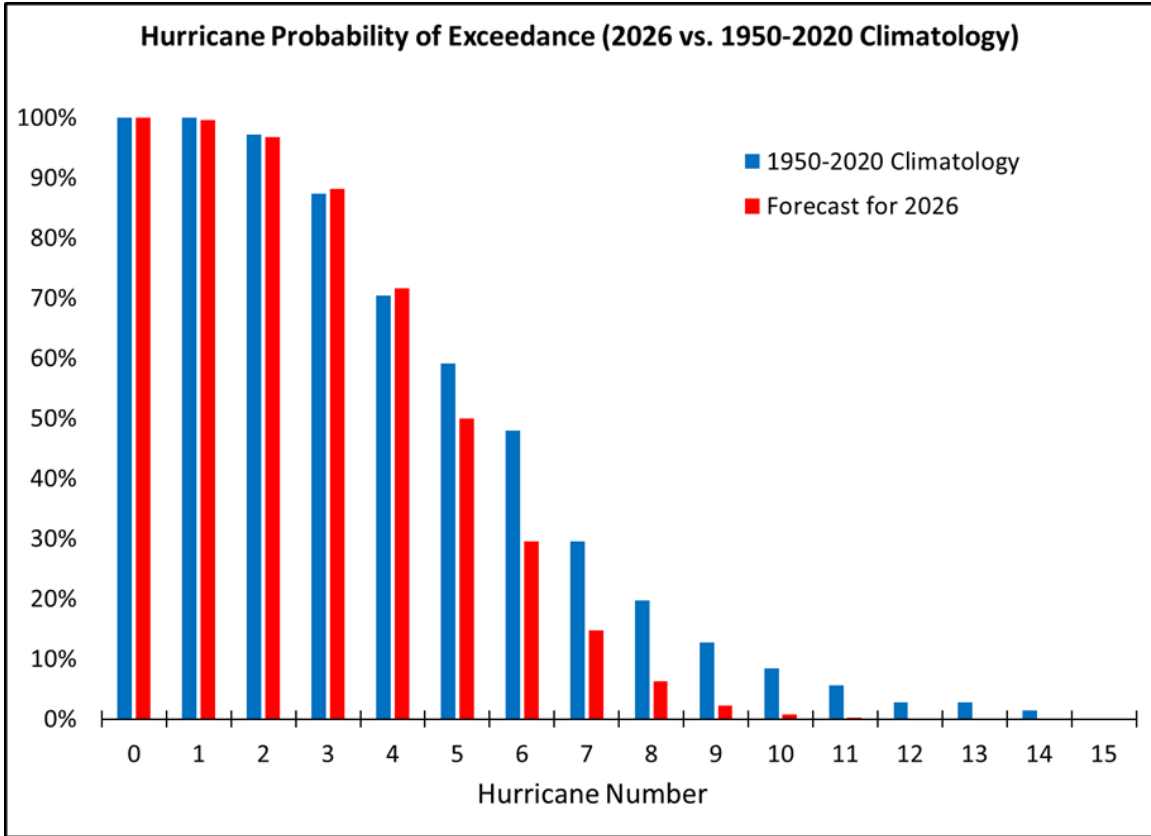


Figure 19: Probability of exceedance plot for hurricane numbers for the 2026 Atlantic hurricane season. The values on the x-axis indicate that the number of hurricanes exceeds that specific number. For example, 97% of Atlantic hurricane seasons from 1950–2020 have had more than two hurricanes.

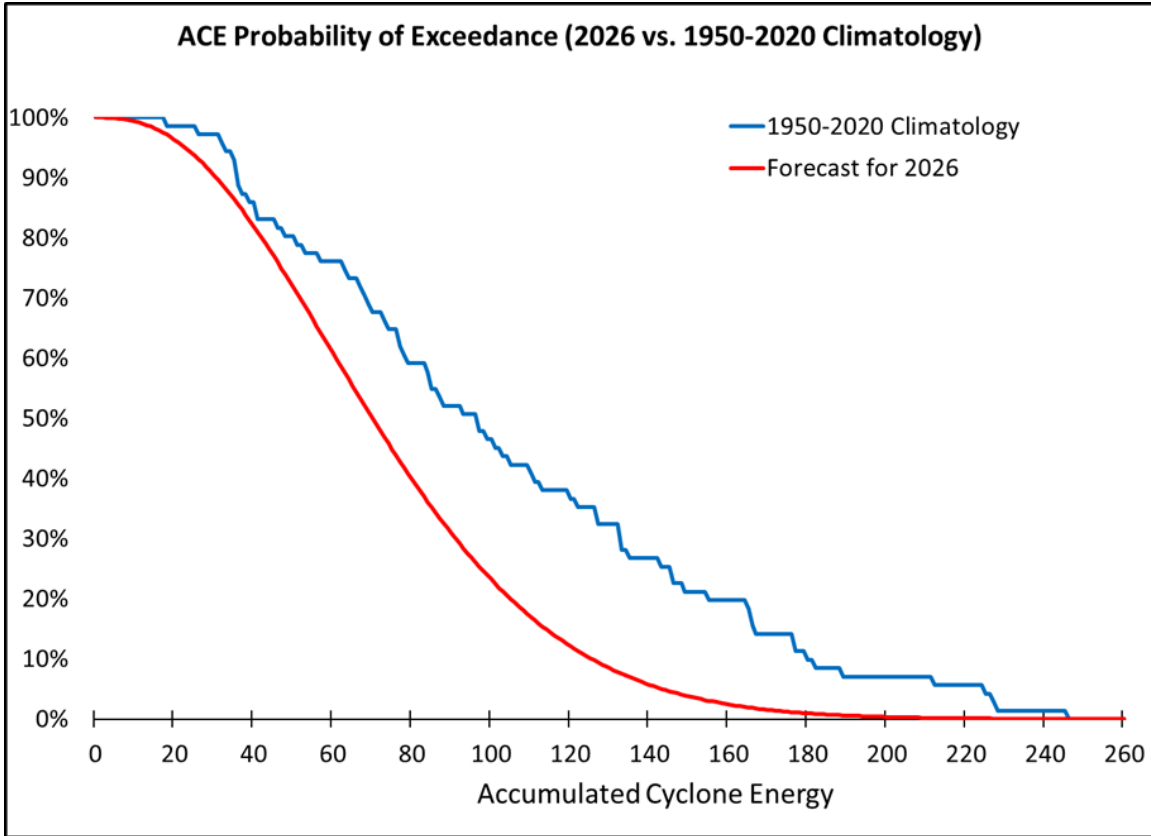


Figure 20: As in Figure 19 but for ACE.

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	2026 Forecast	Uncertainty Range (68% of Forecasts Likely to Fall in This Range)
Named Storms (NS)	11	8 – 14
Named Storm Days (NSD)	45	27 – 65
Hurricanes (H)	5	3 – 7
Hurricane Days (HD)	15	7 – 26
Major Hurricanes (MH)	2	1 – 3
Major Hurricane Days (MHD)	4	0 – 8
Accumulated Cyclone Energy (ACE)	70	37 – 114
ACE West of 60°W	35	16 – 63
Net Tropical Cyclone (NTC) Activity	80	45 – 124

4 ENSO

Over the past several weeks, warm ENSO neutral conditions have prevailed across the tropical Pacific (Figure 21). SST anomalies have increased across the central and eastern tropical Pacific since the end of March and are now exceeding the El Niño threshold of 0.5°C. Figure 22 displays the locations of the various Nino regions displayed

in Figure 21. Please note that all SST anomalies in the various Nino regions now are calculated as relative SST anomalies, that is, all SST anomalies are calculated relative to the tropical average SST (20°S–20°N, 0–360°). These relative SST anomalies have been adopted as part of NOAA’s shift in February 2026 to the RONI.

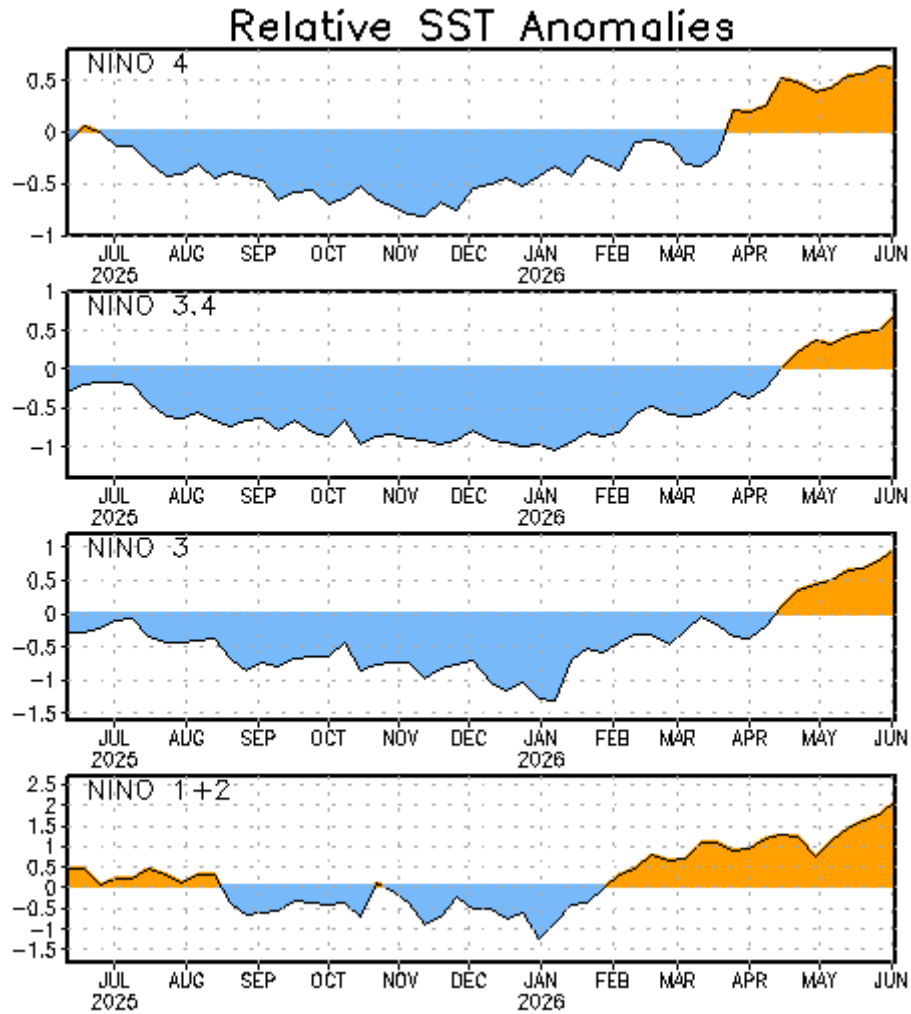


Figure 21: SST anomalies for several ENSO regions over the past year. Figure courtesy of the Climate Prediction Center.

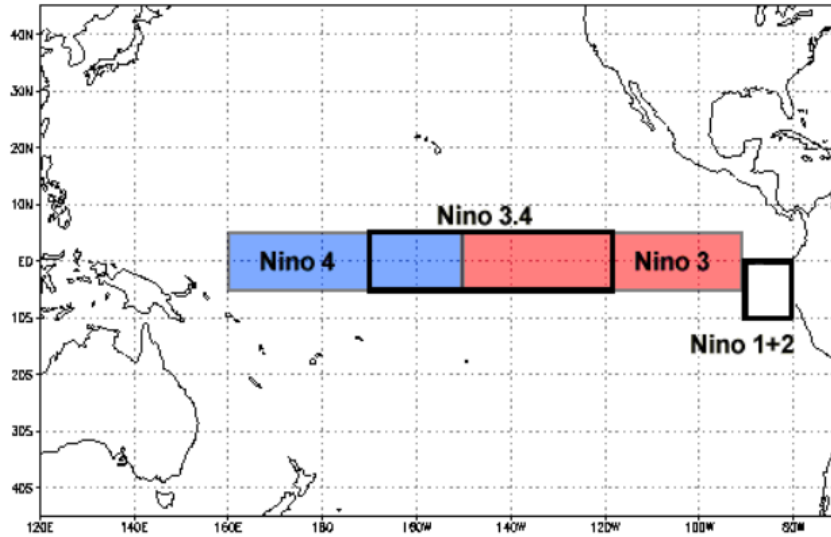


Figure 22: Location of ENSO SST regions used in Figure 21. Figure courtesy of the National Centers for Environmental Information.

Equatorial upper-ocean heat content anomalies in the eastern and central tropical Pacific rapidly increased from December through mid-April and have since decreased slightly (Figure 23). Current SST anomalies are above their long-term averages across the entire equatorial eastern and central Pacific (Figure 24).

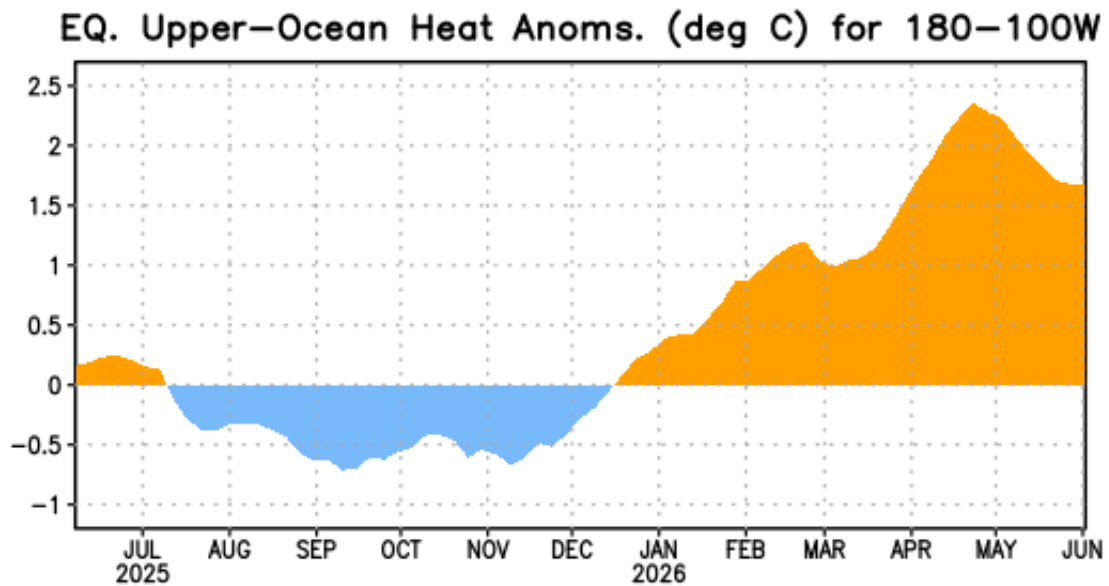


Figure 23: Central and eastern equatorial Pacific upper ocean (0–300 meters) heat content anomalies over the past year. Figure courtesy of Climate Prediction Center.

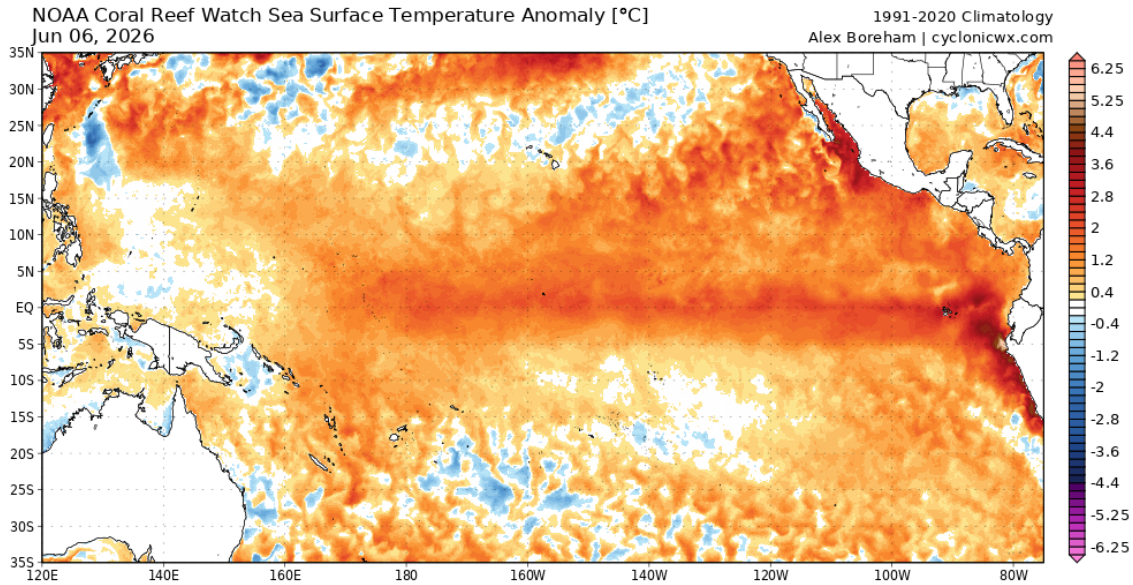


Figure 24: Current SST anomalies across the tropical and subtropical Pacific.

Table 9 displays March and May relative SST anomalies for several Nino regions. As noted earlier, over the past two months, relative SST anomalies have increased across the eastern and central tropical Pacific.

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

Region	March Relative SST Anomaly (°C)	May Relative SST Anomaly (°C)	May – March Relative SST Anomaly (°C)
Nino 1+2	+0.9	+1.4	+0.5
Nino 3	-0.2	+0.7	+0.9
Nino 3.4	-0.5	+0.5	+1.0
Nino 4	-0.1	+0.6	+0.7

Several robust upwelling (cooling) oceanic Kelvin waves occurred in the central and eastern tropical Pacific late last year (Figure 25). Since that time, three pronounced downwelling (warming) oceanic Kelvin waves have traversed the tropical Pacific, leading to anomalous warming. While there has been some slight anomalous cooling in recent weeks west of the International Date Line, we anticipate additional anomalous warming with a pronounced westerly wind burst now underway and likely to continue for the next several weeks per the latest forecast from ECMWF (Figure 26).

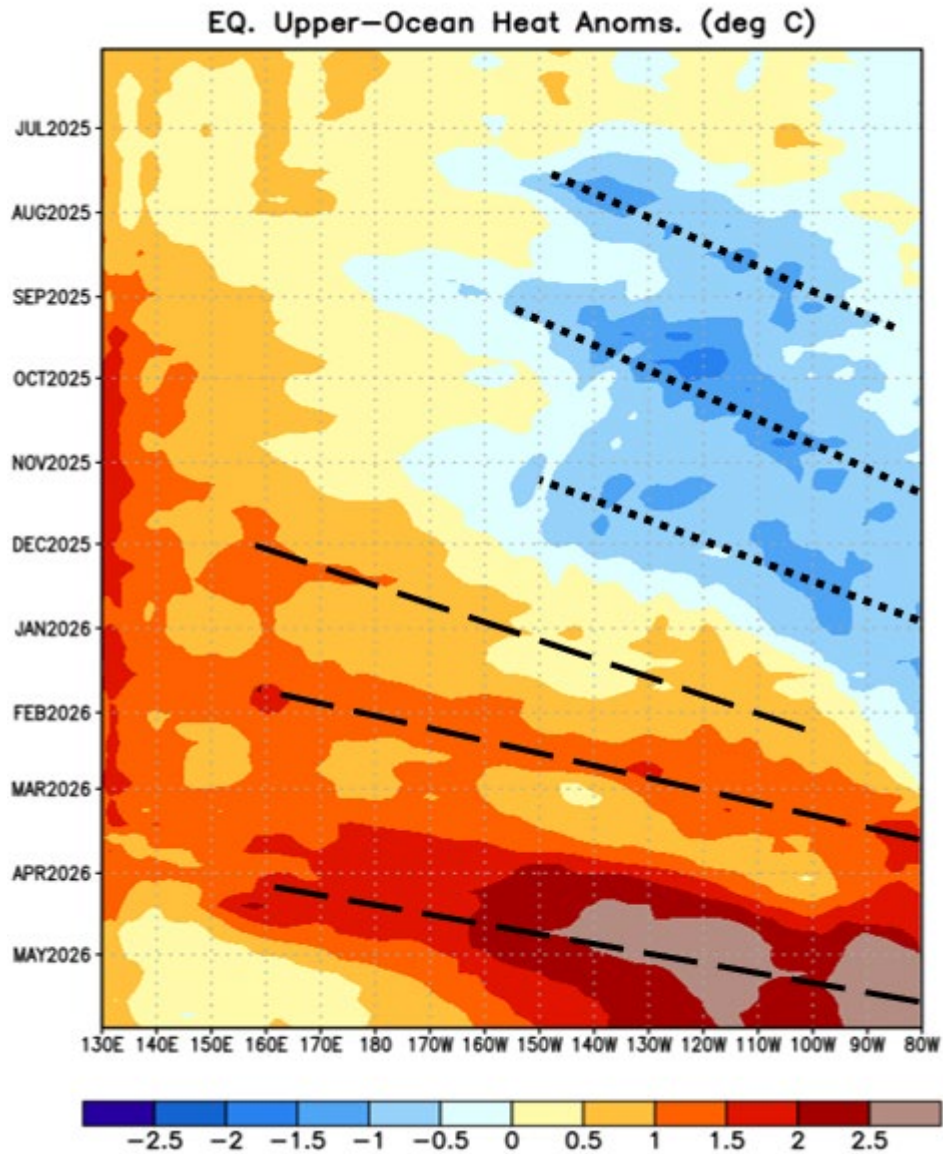


Figure 25: Upper-ocean (0–300 meter) heat content anomalies in the tropical Pacific since June 2025. Long dashed lines indicate downwelling Kelvin waves, while short dashed lines indicate upwelling Kelvin waves. Downwelling Kelvin waves result in upper-ocean heat content increases, while upwelling Kelvin waves result in upper-ocean heat content decreases. Over the past several months, several robust downwelling Kelvin waves have resulted in significant anomalous warming. Figure courtesy of NOAA/Climate Prediction Center.

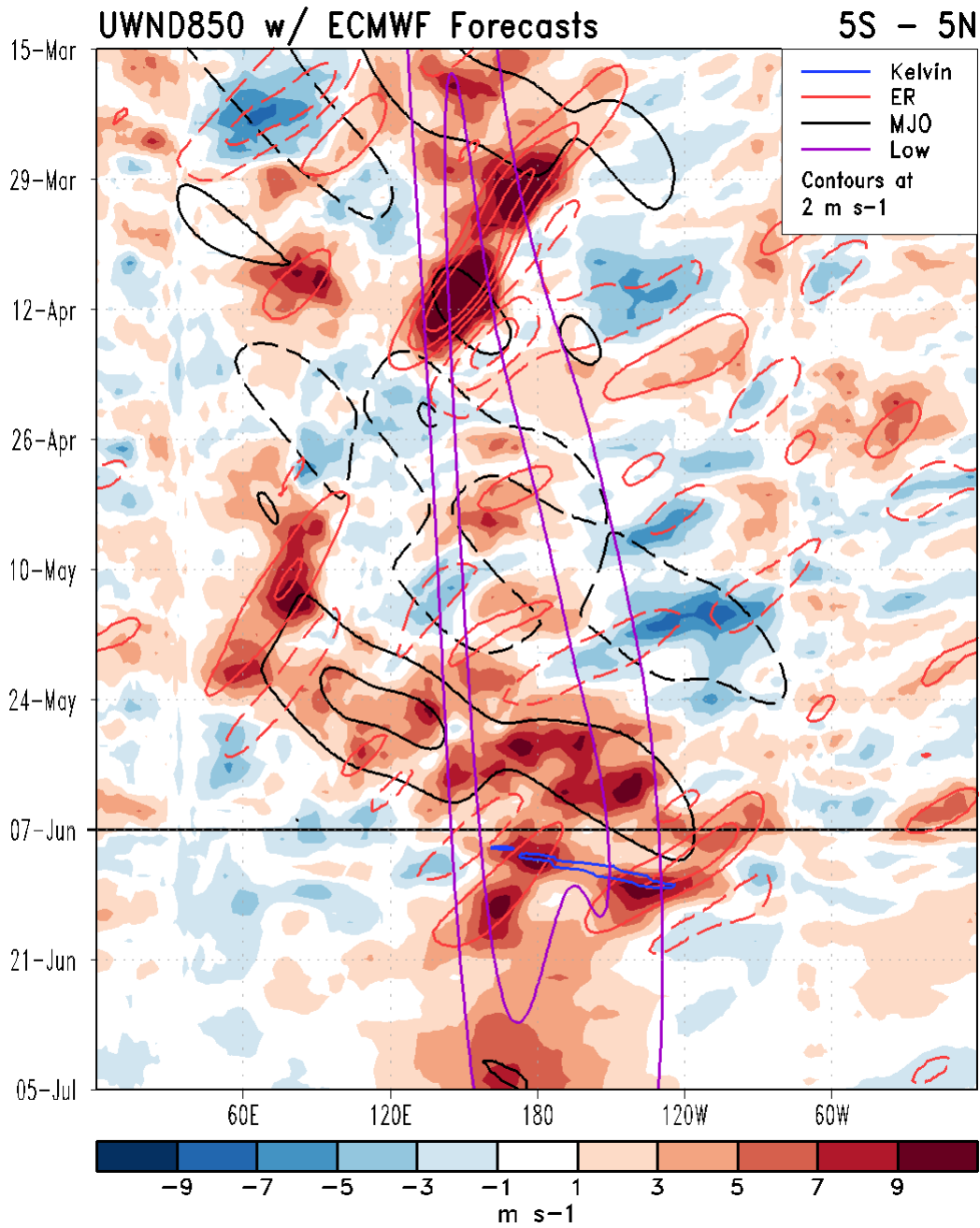


Figure 26: ECMWF observed and forecast 850-hPa zonal equatorial winds for the next 46 days. Figure courtesy of Nick Novella (NOAA/Climate Prediction Center).

While El Niño for the 2026 Atlantic hurricane season is effectively a forgone conclusion, there remains uncertainty as to how strong the El Niño will be. The latest plume of ENSO predictions from the North American Multi-Model Ensemble shows considerable spread by the peak of the Atlantic hurricane season in August–October

(Figure 27). However, all model ensemble averages (dark lines) and model ensemble members (thin lines) are forecasting El Niño for the peak of the Atlantic hurricane season, with ~60% of ensemble members calling for a strong El Niño by August–October.

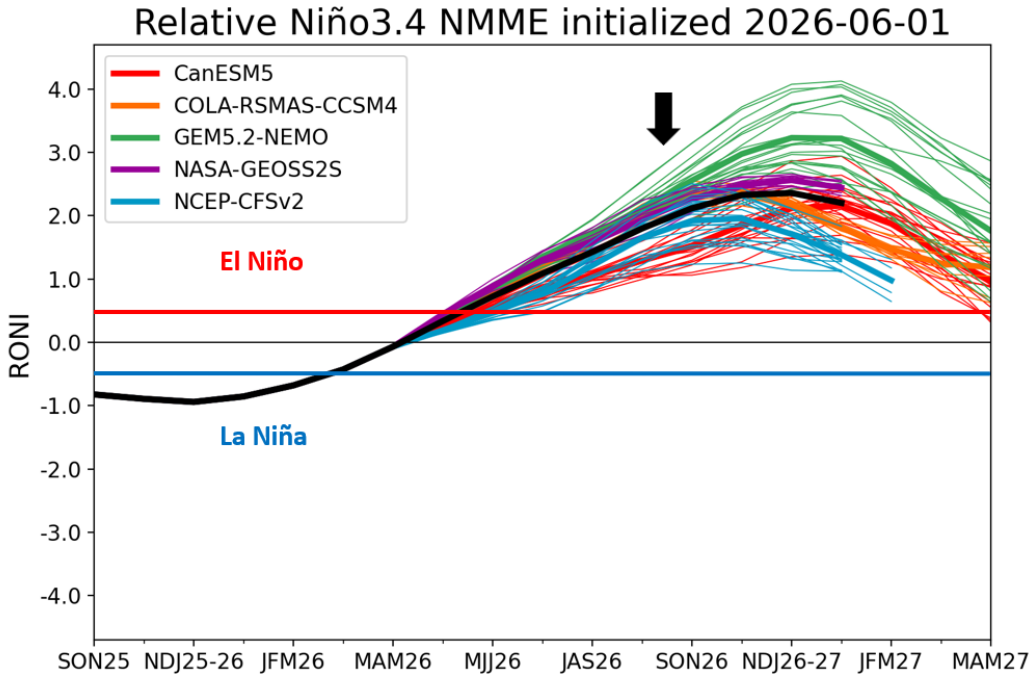


Figure 27: ENSO forecasts from the North American Multi-Model Ensemble for the RONI based on a 1 May initialization. The black arrow delineates the peak of the Atlantic hurricane season (August–October). Figure courtesy of the University of Miami.

The latest official forecast from NOAA strongly favors El Niño for August–October. NOAA is currently predicting a 98% chance of El Niño, a 2% chance of ENSO neutral, and ~0% chance of La Niña (Figure 28). NOAA currently gives a 40% chance for a strong El Niño for August–October (RONI $\geq 1.5^{\circ}\text{C}$).

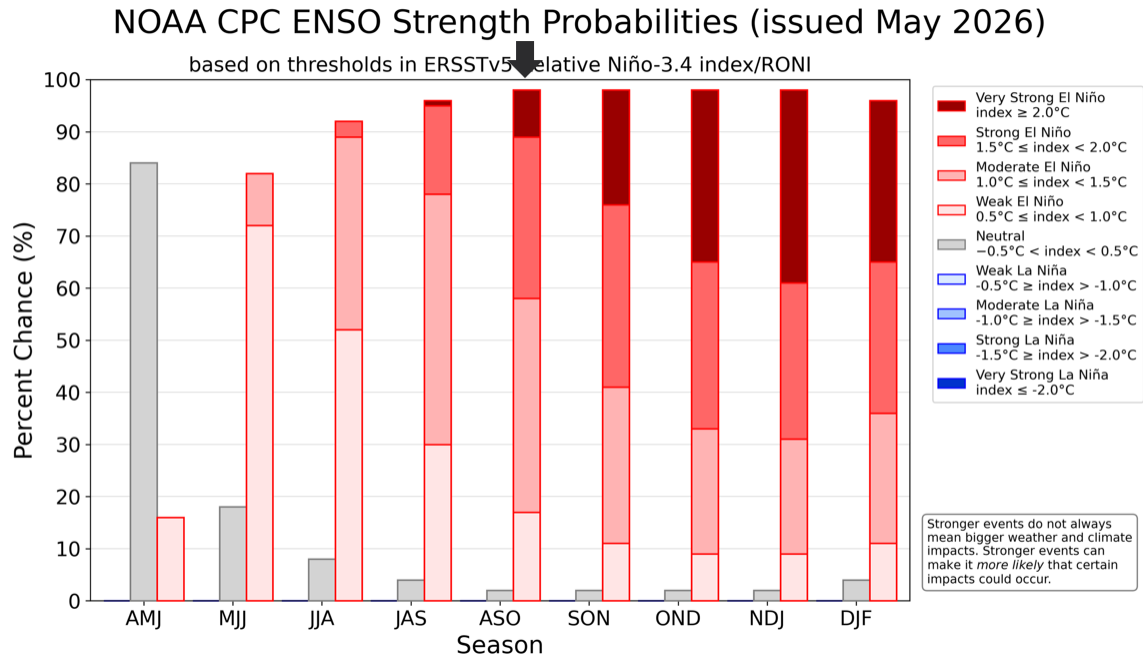


Figure 28: Official probabilistic ENSO forecast from NOAA. The black arrow delineates the peak of the Atlantic hurricane season (August–October).

Based on the above information, our best estimate is that we will have a moderate to strong El Niño this summer and fall. We believe that the odds of a strong El Niño have increased over the past few weeks, likely significantly increasing MDR vertical wind shear and reducing Atlantic hurricane activity. We will have more to say about El Niño and its potential magnitude with our next update on 8 July.

5 Current Atlantic Basin Conditions

Currently, SSTs are near average across the western tropical Atlantic and are somewhat cooler than normal in the central and eastern tropical Atlantic (Figure 29). Over the past several weeks, trade winds across the Caribbean have been stronger than normal (Figure 30), consequently eroding most of the warm anomalies that formerly prevailed in this region, due to the enhanced evaporation and mixing that occurs with strong trade winds.

Overall, the current SST anomaly pattern across the North Atlantic presents mixed signals relative to Atlantic hurricane activity. While the warmth near the Iberian Peninsula and in the Gulf is typically associated with busier Atlantic hurricane seasons, the relative coolness across the MDR is typically associated with quieter hurricane seasons (Figure 31).

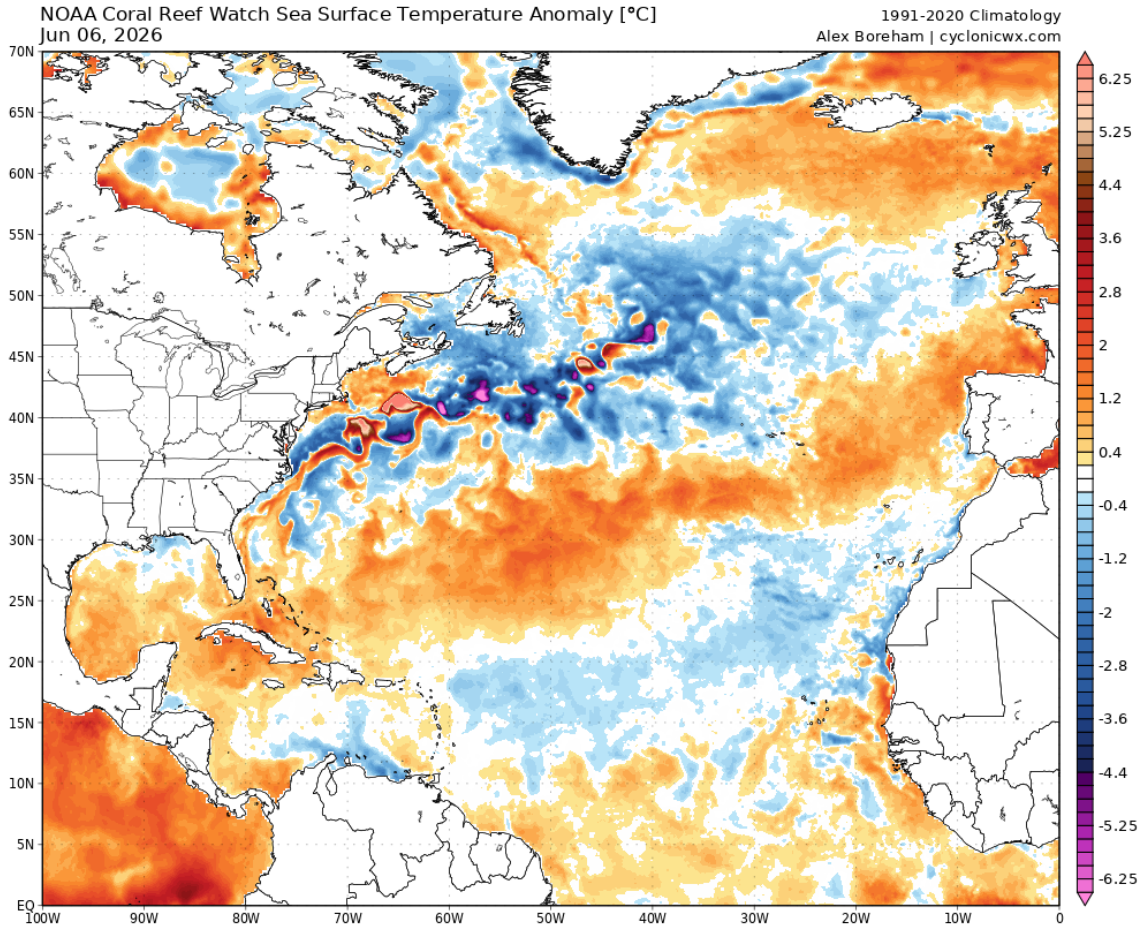


Figure 29: Early June 2026 North Atlantic SST anomalies.

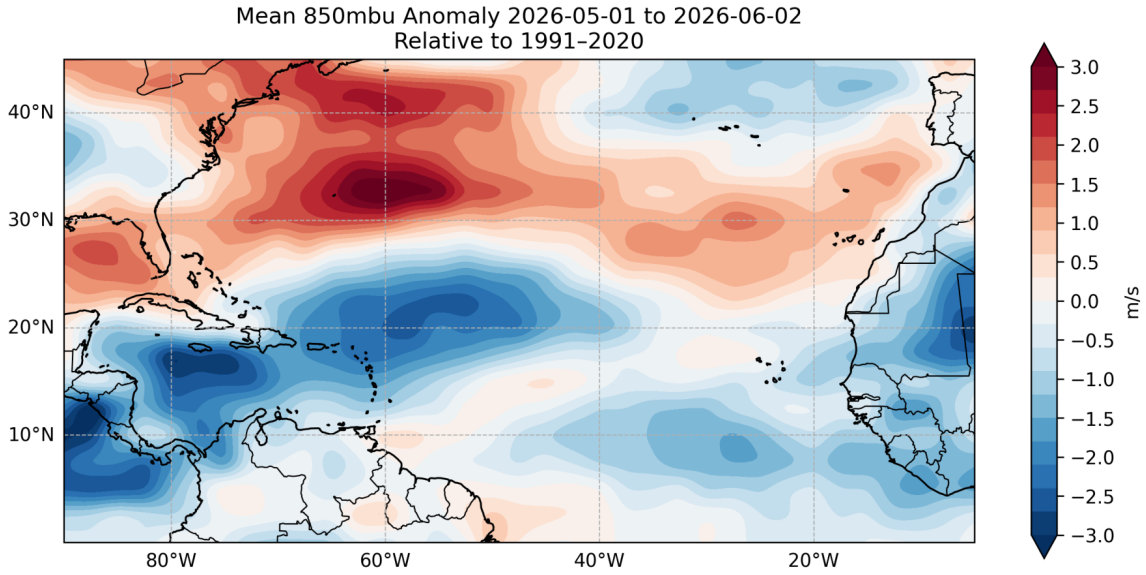


Figure 30: 850 hPa zonal wind anomalies across the North Atlantic Ocean from 1 May through 2 June 2026.

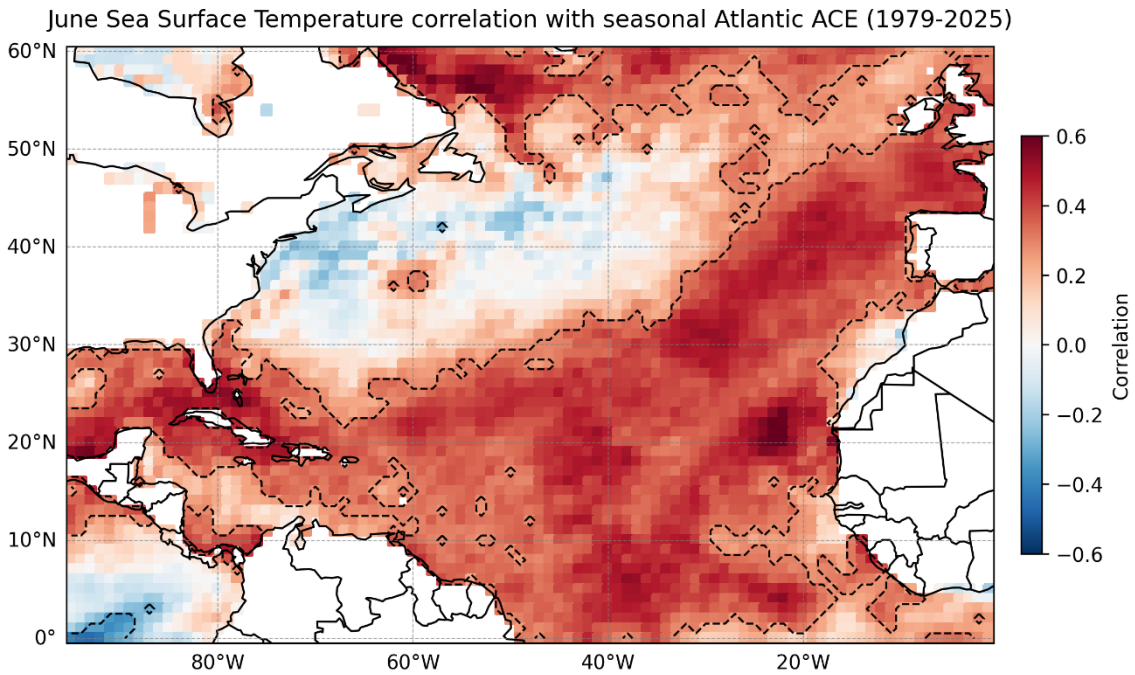


Figure 31: Correlations between June sea surface temperatures in the North Atlantic and annual Atlantic ACE from 1979–2025. Areas within a dashed contour are significant at the 5% level.

6 Tropical Cyclone Impact Probabilities for 2026

In addition to our basin-wide forecast, we 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.

Net landfall probability is shown to be 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. 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 in 2026. Landfall probabilities are well below 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: 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 2026, based on the latest CSU seasonal hurricane forecast.

State	2026 Probability			Climatological		
	Probability ≥ 1 Named Storm	event within Hurricane	50 miles Major Hurricane	Probability ≥ 1 Named Storm	event within Hurricane	50 miles Major Hurricane
Alabama	34%	14%	4%	58%	28%	8%
Connecticut	11%	4%	1%	22%	8%	1%
Delaware	12%	3%	0%	23%	6%	1%
Florida	61%	32%	15%	86%	56%	29%
Georgia	38%	16%	3%	63%	30%	6%
Louisiana	40%	21%	7%	66%	38%	14%
Maine	11%	3%	1%	21%	7%	1%
Maryland	16%	5%	0%	31%	11%	1%
Massachusetts	17%	7%	1%	33%	14%	3%
Mississippi	30%	15%	4%	53%	28%	8%
New Hampshire	9%	3%	1%	18%	6%	1%
New Jersey	12%	3%	0%	23%	7%	1%
New York	14%	5%	1%	26%	9%	2%
North Carolina	42%	21%	4%	68%	38%	8%
Rhode Island	10%	4%	1%	20%	8%	1%
South Carolina	33%	15%	4%	57%	29%	8%
Texas	36%	20%	8%	61%	36%	16%
Virginia	25%	10%	1%	46%	20%	1%

7 Summary

An analysis of a variety of different atmosphere and ocean measurements (through May) 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 2026 will have below-average activity. The big question mark with this season's prediction remains how strong El Niño will be.

8 Forthcoming Updated Forecasts of 2026 Hurricane Activity

We will be issuing seasonal updates of our 2026 Atlantic basin hurricane forecasts on **Wednesday 8 July and Wednesday 5 August**. We will also be issuing two-week forecasts for Atlantic TC activity during the climatological peak of the season from August–October. A verification and discussion of all 2026 forecasts will be issued on **Tuesday, 24 November**. All of these forecasts will be available on our [website](#).

9 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 32 displays correlations between observed and predicted Atlantic hurricanes from 1984–2025, from 1984–2013 and from 2014–2025, respectively. Correlation skill has improved at all lead times in recent years, with the most noticeable improvements at longer lead times. While twelve 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>

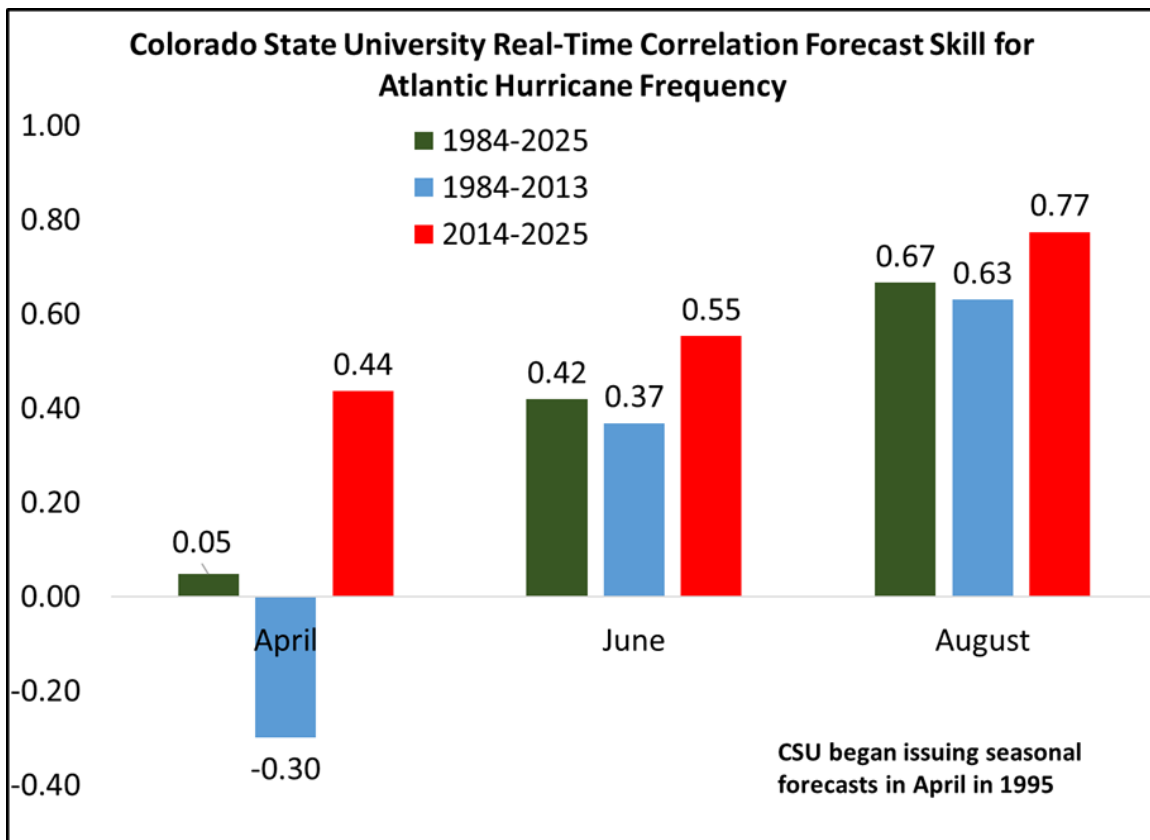


Figure 32: CSU’s real-time forecast skill for Atlantic hurricanes using correlation as the skill metric. Correlation skills are displayed for three separate time periods: 1984–2013, 2014–2025 and 1984–2025, respectively.