COLORADO STATE UNIVERSITY FORECAST OF ATLANTIC HURRICANE ACTIVITY FROM OCTOBER 15–28, 2024

We believe that the most likely category for Atlantic hurricane activity in the next two weeks is above-normal (50%), with near-normal (40%) and below-normal (10%) being less likely.

(as of 15 October 2024)

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In Memory of William M. Gray[6]

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

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1 Introduction

This is the 16th year that we have issued shorter-term forecasts of tropical cyclone activity starting in early August. These two-week forecasts are based on a combination of observational and modeling tools. The primary tools that are used for this forecast are as follows: 1) current storm activity, 2) National Hurricane Center Tropical Weather Outlooks, 3) forecast output from global models, and 4) the current and projected state of the Madden-Julian oscillation (MJO).

Our forecast definition of above-normal, normal, and below-normal Accumulated Cyclone Energy (ACE) periods is defined by ranking observed activity in the satellite era from 1966–2023 and defining above-normal, normal and below-normal two-week periods based on terciles. Since there are 58 years from 1966–2023, we include the 19 years with the most ACE from October 15–28 as the upper tercile, the 19 years with the least ACE as the bottom tercile, while the remaining 20 years are counted as the middle tercile.

Table 1: ACE forecast definition and probabilistic forecast for tropical cyclone activity for October 15–28, 2024.

Parameter	Definition	Probability in Each Category
Above-Normal	Upper Tercile (>7 ACE)	50%
Normal	Middle Tercile (1–7 ACE)	40%
Below-Normal	Lower Tercile (<1 ACE)	10%

2 Forecast

We give a 50% chance of above-normal activity (>7 ACE) during the next two weeks. Invest 94L currently has a 60% chance of tropical cyclone development in the next seven days per the National Hurricane Center. Some global models as well as their individual ensemble members also develop this system and maintain the storm for several days, potentially getting ACE near the above-normal threshold. The National Hurricane Center is also monitoring an area in the western Caribbean with a 30% chance of tropical cyclone development in the next seven days. If this system does form, it would likely only generate small levels of ACE given that it looks to track over land relatively quickly. Global models do not show much additional signal for development in the next 10 days, although there are some signs of potential western Caribbean development later in week two. The MJO is forecast to predominately be over the Maritime Continent and western Pacific over the next two weeks. These phases generally disfavor Atlantic hurricane activity, which is likely one reason why there is not much global model signal for tropical cyclones beyond what is currently in National Hurricane Center's Tropical Weather Outlook.

Figure 1 displays the formation locations of tropical cyclones from October 15–28 for the years from 1966–2023, along with the maximum intensities that these storms

reached. Figure 2 displays the October 15–28 forecast period with respect to climatology. The primary threat area for major hurricane formations during mid- to late October is in the western Caribbean.

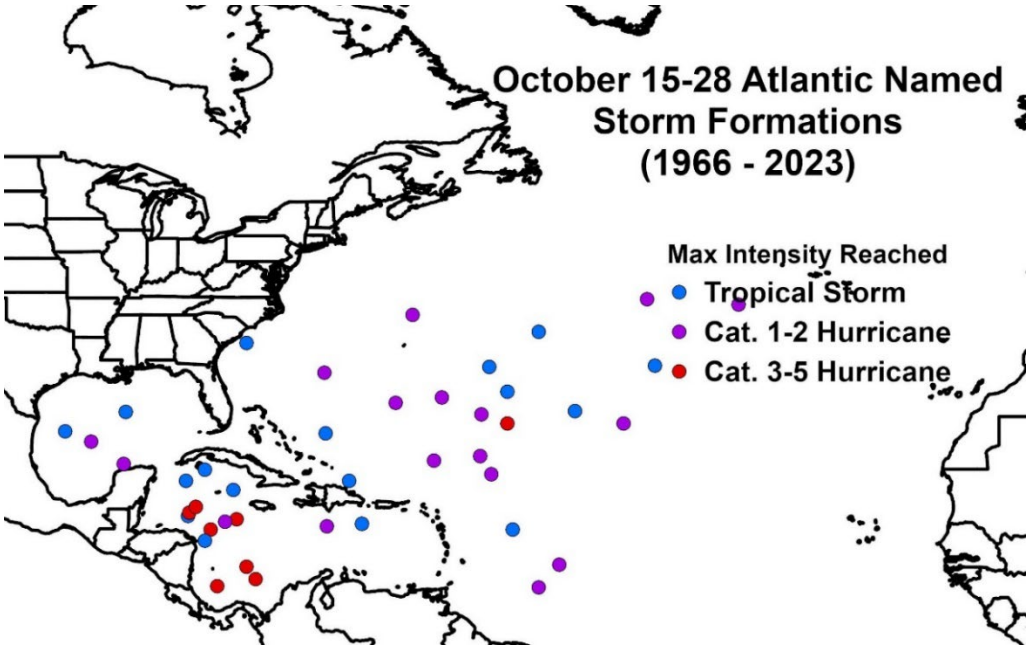

Figure 1: Atlantic named storm formations from October 15–28 from 1966–2023 and the maximum intensity that these named storms reached.

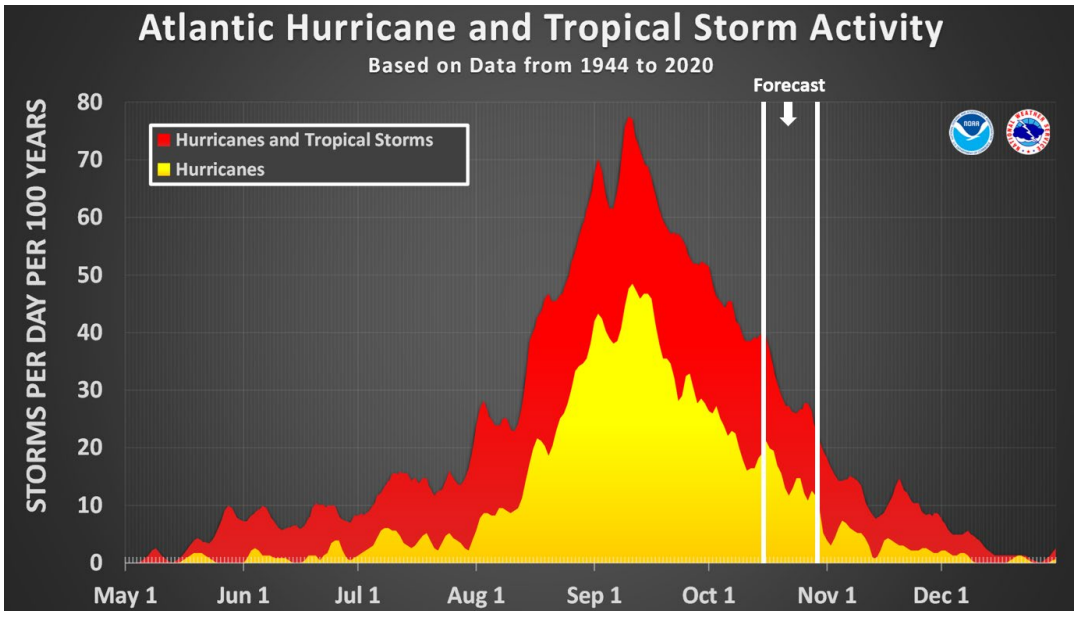

Figure 2: The current forecast period (October 15–28) with respect to climatology, delimited with white lines. Figure courtesy of NOAA.

We now examine how we believe each of the four factors discussed in the introduction will impact Atlantic tropical cyclone activity for the period from October 15–28.

1) Current Storm Activity

There are currently no active tropical cyclones in the Atlantic.

2) National Hurricane Center Tropical Weather Outlook

The latest National Hurricane Center Tropical Weather Outlook is monitoring two areas for potential tropical cyclone formation in the next seven days (Figure 3). Invest 94L in the central tropical Atlantic has a 60% chance of formation in the next seven days and could generate medium levels of ACE given it looks to track through a reasonably tropical cyclone-favorable environment. The low probability area in the western Caribbean (30% chance) would likely track over land fairly quickly if it does form, consequently generating only minimal ACE.

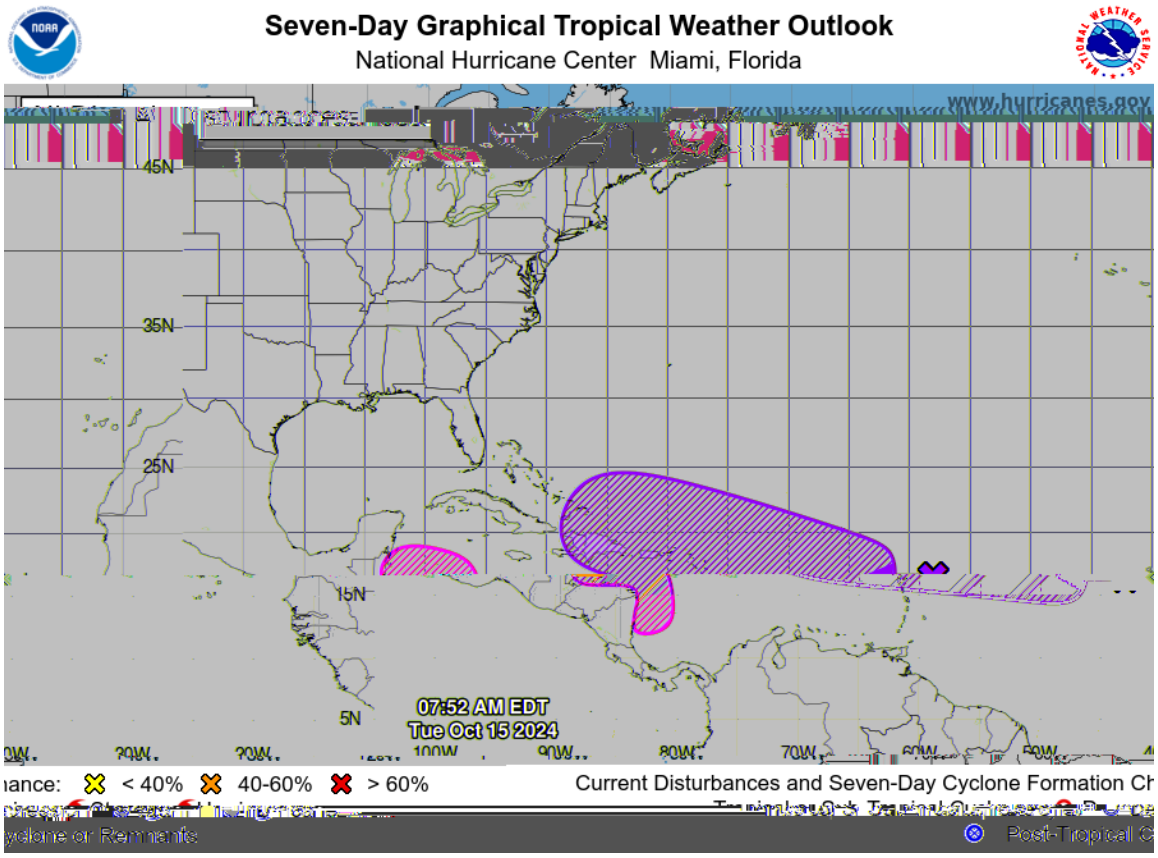

Figure 3: Current National Hurricane Center Atlantic Tropical Weather Outlook.

3) Global Model Analysis

The ECMWF EPS ensemble (Figure 4) and the GEFS ensemble (Figure 5) both have members that develop 94L, potentially intensifying it into a hurricane. The GEFS is much more aggressive than the ECMWF with the development of the western Caribbean system. There are hints of potential additional development in the western Caribbean late in the forecast period, but these signals are fairly weak.

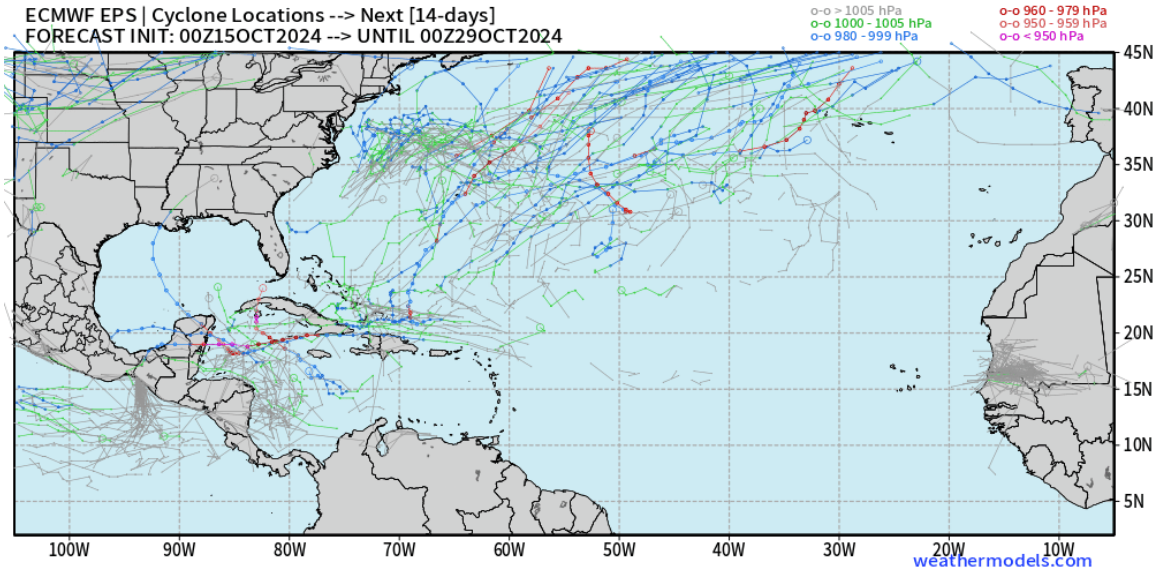

Figure 4: Cyclone locations from the ECMWF EPS ensemble for the next 14 days. Figure courtesy of weathermodels.com

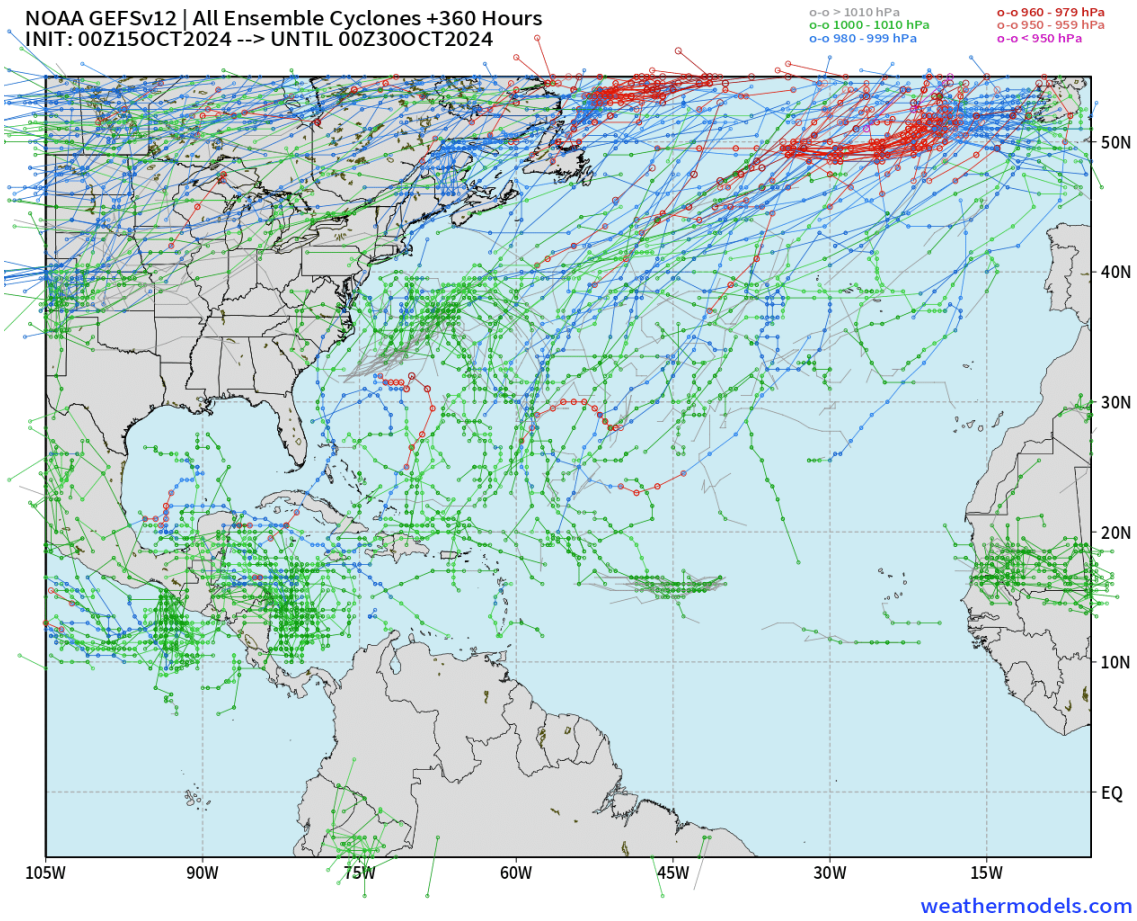

Figure 5: Cyclone locations from the GEFS ensemble for the next 14 days. Figure courtesy of weathermodels.com

4) Madden-Julian Oscillation

The MJO, as measured by the Wheeler-Hendon index, is currently located over the eastern Indian Ocean (Figure 6). The MJO is forecast by ECMWF to track eastward across the Maritime Continent and the western Pacific over the next two weeks. These phases typically are not conducive for Atlantic tropical cyclone formation, however, vertical wind shear anomalies are forecast to be somewhat below normal during the two-week period in the Caribbean, so we believe that there is additional potential for tropical cyclone formation in the Caribbean (Figure 7).

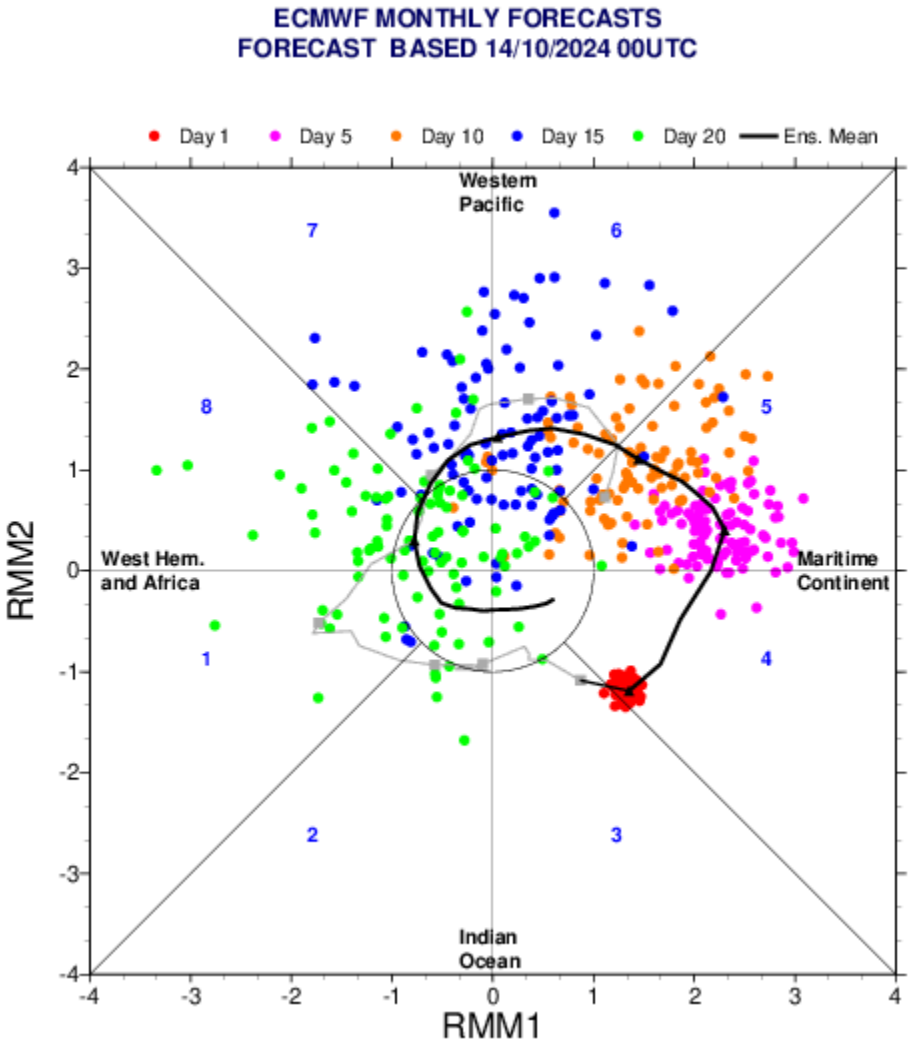

Figure 6: Observed and predicted propagation of the MJO by the EPS. Figure courtesy of ECMWF.

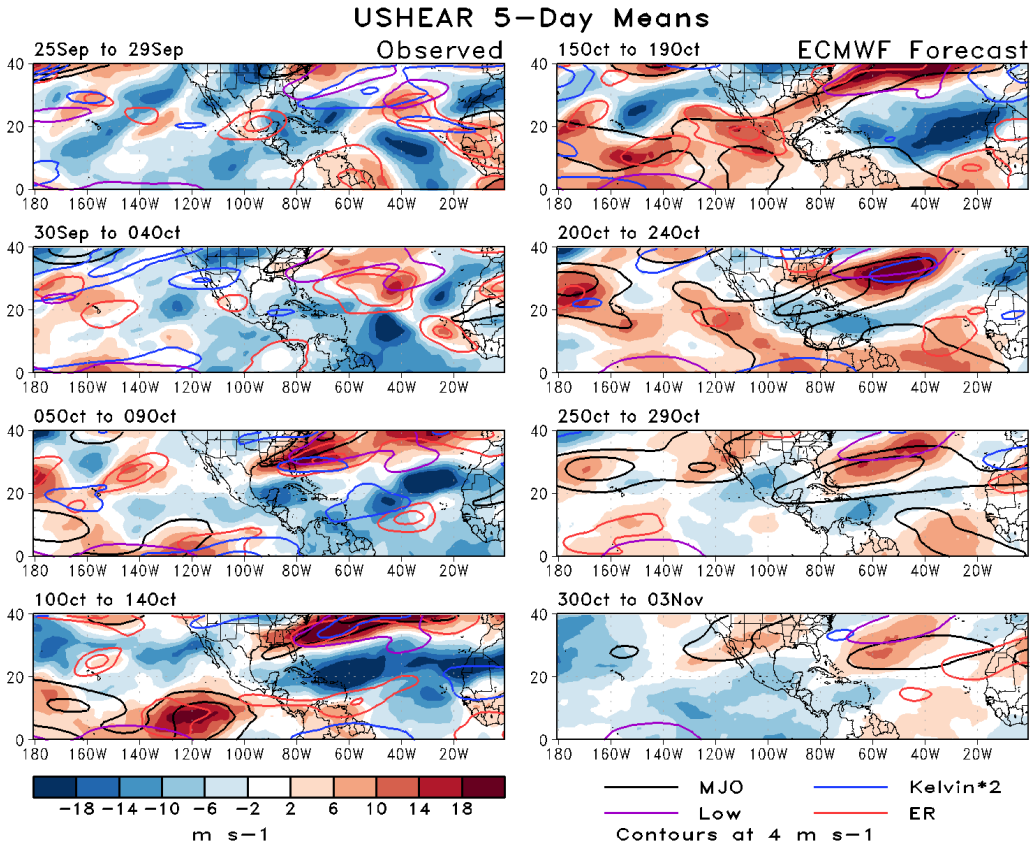

Figure 7: Observed and predicted zonal wind shear by the ECMWF ensemble for the next 20 days. Vertical wind shear is generally forecast to be below normal (e.g., easterly anomalies) across the Caribbean for the next 20 days. Figure courtesy of Nick Novella (NOAA/CPC).

VERIFICATION OF OCTOBER 1 – OCTOBER 14 FORECAST

62 ACE were generated during the two-week period, which is the 3rd most on record during the two-week period, trailing only 1893 (66 ACE) and 2016 (65 ACE). Milton and Kirk each produced 23 ACE, while Leslie generated the remaining 16 ACE. We had assigned a 99% probability of above-normal activity, with a nominal 1% chance of near-normal activity during the two-week period.

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

Table 3: ACE forecast for tropical cyclone activity for October 1–14, the probability assigned for each category being reached and observed ACE.

ACE Category	Definition	Probability in each Category	Observed ACE
Above Normal	Upper Tercile (>10 ACE)	99%	62
Normal	Middle Tercile (3–10 ACE)	1%	
Below Normal	Lower Tercile (<3 ACE)	~0%	