

Forecast of the 2022 Hurricane Activities over the North Atlantic

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Following another active year in 2021, we provide our view of the 2022 season, which runs from June 1 to November 30. The prediction includes total numbers of named storms, hurricanes, major hurricanes, and accumulated cyclone energy (ACE, defined as the sum of the squares of the 6-hourly windspeeds in knots above tropical storm strength). Our forecast combines dynamic forecasts with machine learning as informed by our physical understanding of hurricane activities.

Specifically we utilize a Random Forest approach based on seasonal forecast data from the European Centre for Medium-Range Weather Forecasts (ECMWF). We utilize the forecast July/August/September tropical Atlantic area-averaged sea surface temperatures (SSTs) in the same region used in our June predictions (Davis, Zeng, and Ritchie 2015; Davis and Zeng 2019) as well as August/September area-averaged SSTs in the Nino 3.4 region. Our method uses 25 ensemble members from 1981-2016 and 51 members from 2017-2022.

We calibrate the model using data from 1981 to 2007: we first train the model on the first ensemble member (from the model control run) on all data from 1981 to 2007, use it to predict for the other members over the same time period, and average predictions from all members for a year as our prediction for that year. Then we validate the model using data from 2008 to 2021 in “real time” (for example, for 2015, we would train the model using data from 1981 to 2014 and use the 2015 data to make a prediction for 2015).

Table 1 compares our model’s performance during the calibration and validation periods against the 5-year running average, or a no-skill metric. The model outperforms the no-skill category in all variables.

For our April forecast, we expect slightly above-average hurricane activities over the North Atlantic. Tropical Atlantic SSTs are forecast to be higher than about 70% of hindcast years, and for the Nino 3.4 region, forecast SSTs are lower than about 70% of years.

	2022 Prediction	Probability Range	Median Since 1980
Hurricanes	7	5-9 (66%)	7
Major Hurricanes	3	2-4 (68%)	2
Named Storms	14	11-17 (66%)	13
ACE	129	89-169 (59%)	107

We will update our prediction in early June 2022.

Reference:

Davis, K., X. Zeng, and E. A. Ritchie, 2015: A New Statistical Model for Predicting Seasonal North Atlantic Hurricane Activity. *Wea. Forecasting*, 30, 730–741, doi: 10.1175/WAF-D-14-00156.1

Davis, K. and X. Zeng, 2019: Seasonal Prediction of North Atlantic Accumulated Cyclone Energy and Major Hurricane Activity. *Wea. Forecasting*, 34, 221–232, doi: 10.1175/WAF-D-18-0125.1

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Category	Calibration	Validation	5-yr Average
Named Storms	2.6	3.9	4.6
Hurricane	1.9	2.5	2.9
Major Hurricane	1.2	0.9	1.6
ACE	44.1	35.2	46.1

Table 1. Mean absolute errors of our forecasts and those using the 5-year average as the prediction.