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Changes in the Seasonality of North Atlantic Tropical Cyclones

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The North Atlantic hurricane season is officially recognized to start on June 1st and end on November 30th. The awareness of this time window is crucial both for federal, state and local agencies as well as the general public to put in place preparation and mitigation efforts to mitigate the impacts of this natural hazard. However, there is an underlying assumption of stationarity in the seasonality of these storms, implying a lack of narrowing or expanding of the hurricane season over the years. Here, we consider the days when tropical cyclones happen (TC_{days}) to model their seasonality using circular statistics, which is the appropriate modeling framework due to the nature of this quantity. By using mixtures of distributions to model the inter-annual variability of the TC_{days} , we find an expansion of the tails of the distributions over the period 1966 – 2020 for the North Atlantic basin, leading to a more prolonged hurricane season over the recent decades. These results will be explained in terms of physical drivers, providing insights into the mechanisms that could be responsible for the observed lengthening of the hurricane season.