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Cyclone and windstorm activity changing over North Atlantic

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The goal of study is to show the cyclone activity variability over North Atlantic during winter (from October to March) and summer (from April to September) seasons from 1948 to present based on NCEP/NCAR reanalyses data set. The cyclone activity indices (cyclone tracks, cyclone frequency, the cyclone intensity, maximum storm wind) were calculated based on automated cyclone detection/tracking algorithm and the 6-hourly MSLP gridded data. Maximum storm wind was calculated as maximum surface wind near cyclone centers. The cyclone frequency and the integral season cyclone intensity are calculated by counting the cyclone occurrences and sum of cyclone centers MSLP anomalies at each grid point over North Atlantic during the season. Extreme cyclones were defined, as cyclones with an MSLP of 970 hPa or less. Extreme windstorm events were defined as cyclone with maximum storm wind that more 24 m/sec. The study of the cyclone and windstorm activity changing over time was made for high- and midlatitude zones of North Atlantic.

Analyses shows, that in high-latitude North Atlantic extratropical cyclone frequency for moderately strong cyclones (cyclone with an MSLP more 970 hPa) significantly decreased from 1948 to early 1990 as in winter, as in summer seasons. At that time, frequency of extreme cyclones significantly increased, especially last two decada. The most notable historical changes in cyclone activity, indicated by regional integral seasons cyclone intensity, in high-latitude are found to be associated with extreme cyclones. Baltic region is outstanding by most increasing of cyclone activity in North Atlantic. In midlatitude of North Atlantic cyclone activity is associated in main with moderately cyclones.

The most extreme windstorms are observed over high-latitude North Atlantic and Europe as in winter, as in summer seasons. Significant part of these extreme windstorms are accompanied by extreme sea level pressure over cyclone centers. The increase of the extreme windstorms frequency over North Atlantic related to increased track density and frequency of extreme cyclones.