Cyclone and anticyclone activity over the Lake Baikal basin

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Variations of the hydrological cycle in the Lake Baikal basin are associated with its special geographical location. The catchment basin of Lake Baikal is located in the center of Asia between 46°N and 57°N and between 97°E and 114°E. In recent years, anomalously high values of surface air temperature have been noted with a strong deficit of precipitation in the Lake Baikal basin (Mokhov, Timazhev, 2016b). These extreme climatic phenomena are manifested against the background of the corresponding long-term positive temperature trends and negative precipitation trends for the last decades (http://meteorf.ru/), see also (Climate Change 2014; Obyazov, 2015). The Lake Baikal basin is one of the Russian regions with the strongest warming in summer during the last decades (Groisman et al., 2012). Significant weather-climate anomalies in the Northern Eurasia regions are associated with the El-Nino phenomena (Mokhov, Timazhev, 2016a,b). One of the key factors that play a crucial role in the formation of significant weather and climate anomalies is associated with changes of cyclone and anticyclone activity.

We analyzed seasonal cyclone and anticyclone activities over the Lake Baikal basin (98-112°E) for the two periods (1980-1994 - I and 2002-2016 - II). Cyclone and anticyclone characteristics were calculated from the 6-hourly mean data for sea level pressure from NCEP/NCAR reanalysis. Figure 1 shows the latitudinal distribution of cyclone and anticyclone frequencies (per season) in summer for the different periods.

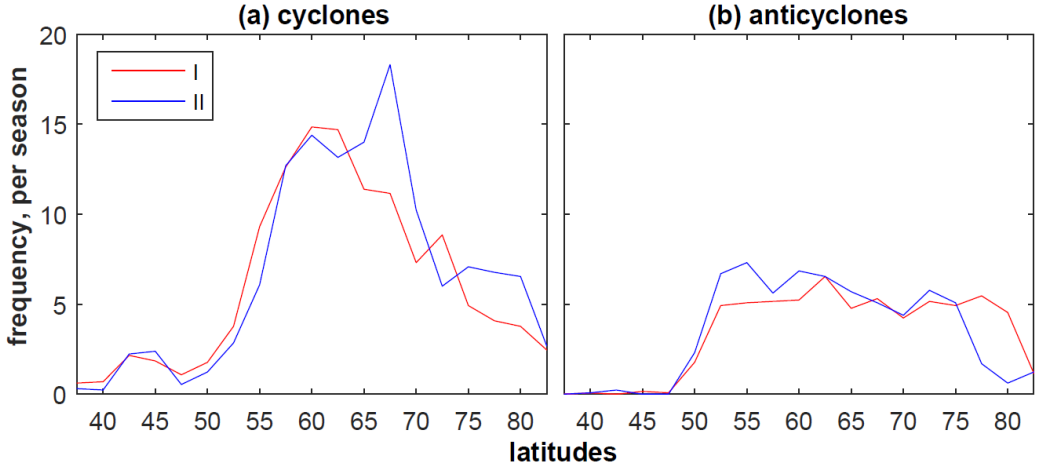

Fig. 1. Latitudinal distribution of cyclone and anticyclone frequencies (per season) in summer for two periods: I – 1980-1994, II – 2002-2016.

The meridional distributions of cyclone and anticyclone frequencies in Figs. 1a,b are very different. The frequency of cyclones in summer shows significant maxima near 60°N for period I and near 70°N for period II. The frequency of summer anticyclones does not show any significant maxima. On the whole, a general decrease in cyclone frequency at lower latitudes (40-60°N) and its general increase at high latitudes (higher than 65 °N) are found for summer. The changes of opposite sign are noted for the summer anticyclone frequency. Figure 1 shows a general tendency of decreasing the cyclone frequency and increasing the anticyclone frequency over the Lake Baikal basin in summer.

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