

Change of Climate-related Extremes in North Eurasia under contemporary Warming

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The daily meteorological data obtained at regular observational network of the former USSR are analyzed from the viewpoint of extreme values and their combinations. For the analysis, the following characteristics of meteorological extremes are used: - monthly number of days with rainfall sum greater than 30 mm; - monthly number of days with snowfall sum greater than 10 mm; - the biggest pentad sum of precipitation in each month; - number of days in a month, corresponding to the atmospheric drought criteria by precipitation and maximum air temperature (not counting its continuous length); - number of days in a month with minimum air temperature below the 10% probability limit; - number of days in a month with maximum air temperature above the 10% probability limit; - number of days with wind velocity stronger than 20 m/s; - length of frost-free season. The listed characteristics are calculated as average for the reference period of 1951-1980, as well as for the period of contemporary global warming (1989-2005). The periods were chosen according to the variations of annual air temperature, averaged over Russia, which increased by about 1DaC, and its rise is statistically significant. The 10% probability limit for minimum and maximum air temperature for the reference period was used also for the global warming period. The spatial fields of the extreme characteristics for the mentioned time periods are plotted. Regions with different trends of the characteristics during the contemporary warming are revealed. In general, the winter weather has become less extreme in the end of 20th and beginning of 21st centuries. The number of days with extremely strong frosts in winter decreases significantly in a large part of Eurasia. The frequency of the strongest winter precipitation doesn't change so much, except for few regions in Western Siberia and in the Far East. Under the climate warming, the number of summer drought days increases in Western Siberia, in Aral region and in Kazakhstan, and decreases in some parts of Eastern Siberia and Ukraine. The most intensive precipitation in July has become heavier on the Black Sea coast of Caucasus and in the south of Far East, while decreasing in a small part of Ural mountains. The frost-free season increases in some parts of Siberia and near Baltic Sea, but in spite of the warming, decreases in the north and east of European Russia. On general sub-continental scale, the changes in weather-related extremes frequency in North Eurasia are not very significant up to date. The study is supported by the Russian Foundation for Basic Research (grant No. 06-05-64349).