Water and ice regime of the rivers of European Russia under climate change

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Specific features of water and ice regime of the rivers of European Russia as well as their spatial and temporal variability were studied using the up-to-date hydrometeorological data. Variations in the characteristics of water and ice river regime over the last 125 years are analyzed. For the some rivers potential changes in the dates of the appearance of floating ice and the breakup due to expected changes in the air temperature and the rate of streamflow in rivers are assessed. Special attention is paid to the factors that affect the formation of ice jams and their spatial and temporal variability for the northern rivers. Trends of ice regime changes within the territory under study during recent decades have been revealed. It is shown that changes of ice regime are mainly defined by features of water regime. The basic feature of modern changes of rivers’ water regime on a prevailing part of the country is significant increase of low flow, especially in winter. Within the European territory of Russia for the majority of considered rivers significant positive trends of winter and summer-autumn low flow are marked. There is an increase of natural regulation of rivers’ drainage. Noted changes of rivers’ water regime in many aspects define development of dangerous ice processes. Winter break-ups are accompanied with ice jams and flooding. High water level during further freezing-up and the large amount of slashed ice within the river channel increase the risk of catastrophic ice jams during the break-up.