Influence of ice regime on hydroecological safety under climate change: case study in the north of the European part of Russia

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Abstract Various features of the river ice regime in the north of the European part of Russia are of critical importance for hydroecological safety. Spatial and temporal variability of these characteristics was analysed using the most up-to-date hydrometeorological data from 146 gauging stations in the study region. Trends of ice regime changes during recent decades were identified and interpreted in the context of the changing climate. It was found that under low flow conditions, autumn ice and slashed ice drifts became longer, ice jams more frequent, and freeze-up periods shorter. More frequent thawing spells resulted in decreasing ice thickness and snow storage in river basins. Winter break-ups were accompanied by ice jams and floods. High water levels during further freezing-up, as well as large amounts of slashed ice in river channels increased the risk of catastrophic ice jams.

Key words hydroecological safety; ice regime; climate change