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Spring freshet on East European plain: changes in drivers and conditions during last three decades

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Over the past 20 years, the climate on the East European plain tends to be significantly warmer and drier. Winters became shorter and spring freshet's conditions have been changed significantly. Maximum snow depth was the most important factor of spring freshet formation 30 years ago, but nowadays it has no significance at all and main factor today is melt water losses on infiltration and evaporation.

We registered a decrease in the period of stable snow accumulation (on average by 20% in the southern and southwestern parts of the East European Plain) because of the increase in winter temperatures. More often during first part of winter snow cover disappeared totally. The number of thaws and their duration at the end of the winter also increase and this leads to earlier and more prolonged melting of the snow pack. In these conditions, an extremely low spring freshet is formed. Our studies show that with the condition of an equal maximum snow depth the slow snowmelt forms the spring freshet up to 4 times less in volume than the fast melting.

Soil moisture also plays an important role in the melt water losses. The most part of the East European Plain is characterized by a decrease in soil moisture in late autumn, which indicates increased losses during snow melting period.

Still, the most significant changes in the structure of the factors of spring freshet formation are common to the southern and southwestern parts of the East European Plain. In the northern part, conservative factors still dominate, although this area is characterized by the significant increase in winter temperatures.

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