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# Fluvial response to climate change: a case study of northern Russian rivers

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**Abstract** The cold regions of North Eurasia include very sensitive fluvial systems. Rapid changes in climate are reported for these areas. The aim of this study is to propose a framework for fast climate-driven predictions of fluvial systems, and to apply it for rivers of the northern part of the East European Plain and West Siberian Plain. The general approach consists of integrating outputs from climate models into a hydrological model, and then driving a catchment and morphodynamic model using output from the hydrological model. Modelled by AOGCMs, future climate shifts are the drivers of significant changes in surface flow. Predictions of an up to 25% decrease in annual runoff by the middle of the 21st century enables us to forecast changes in sediment migration rates, stream energy and water-channel boundary interactions, changes in channel morphology and channel patterns shifts using corresponding physically-based equations. Whereas high dimensional models are still computationally too expensive for long-term morphological predictions, simple 1-D equations enable us to make assessments of channel system response. We tested a suit of 1-D models to estimate fluvial response to climate change for the middle of the 21st century of medium and large rivers draining the north of Russia. Comparison with regional predictions for other territories is the special task of the study.

**Key words** climate change; runoff calculations; fluvial systems; sediment load; channel patterns