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Flood risk assessment in a poorly gauged basin

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An approach for flood risk assessment in a poorly gauged basin has been proposed and tested for the Sosna River basin in the European Russia. The approach involves searching a data-rich small proxy-basin which is hydrologically similar to the poorly gauged study basin, developing a physically based model of flood generation in the proxy-basin, and transfering the developed model to the study basin. Parameters of the hydrological model determined from the available observations in the proxy-basin have been transposed, with the adjustment, to the study basin. The adjustment has been carried out through the model calibration against snow and soil freezing survey data in the study basin; streamflow data have not been used for the calibration. Long-term artificial time-series of daily weather variables have been Monte Carlo simulated and converted by the hydrological model to the corresponding series of snowmelt flood hydrographs in the study basin. Frequency distributions of flood characteristics (volume and peak discharge) have been derived from the long-term series of the modeled hydrographs. It has been shown, that the developed approach allows deriving frequency distribution of flood volume without utilization of any streamflow observations in the study basin. However, in order to obtain reliable frequency distribution of flood peak discharge, several years of streamflow observations should be used for the additional calibration of the model. The proposed approach is considered as a suitable alternative to the traditional methods of flood risk assessment in the ungauged or poorly gauged basins.