Using the radar- and ground-based measurements for rainfall floods modeling in small catchments (the Polomet' river, Russia)

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The previous research had shown that change of rainfall structure is taking place over Russia which increases the probability of occurrence of hazardous hydrological phenomena such as flash rainfall floods. Thus, the relevance and significance of the study is determined by the necessity of taking into account the structural changes of precipitation for reliable estimates of rainfall runoff characteristics in terms of climate change. The data of this study are comprehensive and consist of various sources of hydrometeorological information, including ground-based observations of precipitation and runoff, radar data. The assessment of the changes occurred in the maximum rainfall runoff and daily rainfall depth within the Russian part of the Baltic Sea basin was carried out in this study. The majority of the basins in our study showed positive trends in maximum discharge. The results of the work describe the experience of using different types of meteorological information of precipitation for rainfall floods modeling. The open-source SWAT (Soil and Water Assessment Tool) hydrological model was utilized. Small catchment (631 km²) situated in the Polomet' River basin were chosen as the object of test modeling. The simulation efficiency is assessed using the coefficient of determination R², Nash-Sutcliffe model efficiency coefficient (NSE), by comparing the mean values to standard deviations for the calculated and measured values of water discharge. This study was supported by RFBR, grant 19-35-90123 “Rain floods in the North-West Russia: assessment of variability and development of new forecasting methods”.