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Adaptation of SWAT hydrological model to study runoff processes in the mountainous Baksan river basin (the North Caucasus, Russia)

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In past years, there has been an intensive deglaciation in the North Caucasus. Glacier area has decreased by almost 27%, since 1960. This is reflected in the decrease of August and July monthly runoff by 2–20%. To study the processes of river runoff in mountainous areas, the SWAT hydrological model was adapted for the Baksan River. Baksan is a mountain river, located in North Caucasus. It originates from the glaciers of Mount Elbrus and flows in a foothills to Malka River (Caspian sea basin).

As input parameters we used meteorological data from ERA5 reanalysis and data from 4 meteorological stations with period of observations 1977-2019. Also soil database, glacier data and DTEM were used. For model calibration we used SWAT-CUP tool with daily river runoff data from 2 gauges in Baksan basin. Results of modelling were compared with ECOMAG hydrological model, which used similar input parameters. Advantages and disadvantages of each model were analyzed in conditions of mountain river runoff.

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