Geophysical Research Abstracts
Vol. 20, EGU2018-15399, 2018
EGU General Assembly 2018

Combining isotopic and hydrochemical approach in a mixing model to define how rain and meltwater components contribute to overland and subsurface runoff generation in alpine catchments

Ekaterina Rets (1), Nadezhda Loshakova (2), Julia Chizhova (2), Igor Tokarev (3), Nadine Budantseva (2), Maria Kireeva (2), Andrew Smirnov (2), Yurij K. Vasil'chuk (2), Natalia Frolova (2), and Viktor Popovnin (2)

(1) Water Problems Institute Russian Academy of Sciences, Moscow, Russian Federation (retska@mail.ru), (2) Department of Geography, Lomonosov Moscow State University, Moscow, Russian Federation, (3) Center for Geo-Environmental Research and Modelling (GEOMODEL) at St. Petersburg University, St. Petersburg, Russian Federation

Due to extreme complexity of flow-forming processes in alpine watersheds any schematization of river runoff generation becomes a challenging task. Input nourishment components such as rain, snowmelt, and glacier icemelt contribute to river discharge running off the watershed in a form of overland and subsurface flow in different proportions. These proportions and resulting time lags can vary greatly and change during the season. The study is based on field observations conducted in 2013-2016 in high-altitude river basins representative for the Northern Caucasus (Djankuat river basin) and the Central Tian Shan. Water conductivity was used in a mixing model as an indicator of how the water ran off the watershed: in a form of overland flow - not enriched by dissolved salts, or in a subsurface form, significantly more enriched by dissolved salts. The excess of concentration of 18 and D in summer precipitation provides possibility to use this marker in a mixing model to separate rain component from the meltwater. Combining this to approaches in one equation system provided possibility to estimate the proportion of subsurface flow formed by rain and meltwater in study areas for the days without rain precipitation events. Comparison with the field meteorological observations on the sites with the calculated dynamics of rain runoff component reveals geomorphological limitations of rain water storage drainage rate for the studied watersheds.
This work was supported by the Russian Foundation for Basic Research (project No. 16-35-60042).