

## **Using isotope and hydrochemical methods to improve understanding of flow forming processes in alpine headwater regions of Northern Caucasus and Tian Shan.**

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High-elevation mountain catchments provide fresh water resources for biological communities and people living in mountain valleys. An ongoing active deglaciation results in great instability of mountainous headwater regions that can considerably affect water supply and cause intensification of dangerous hydrological processes. Due to complicated natural conditions, great spatial variation and lack of observations hydrological processes in mountains are still poorly known. There is an urgent need to obtain a more detailed understanding of flow forming processes in alpine areas in order to predict possible future trends in hydrological conditions and calculate river runoff characteristics. The goal of this study is to gain a better understanding of the runoff origin and of the hydrological interactions between different water sources in alpine areas by using isotopic methods. The study is based on field observations in representative alpine river basins in Northern Caucasus (Djankuat river basin) and Central Tian Shan (Chon-Kyzyl-Su river basin) during 2013-2016. Hydrograph separation using stable isotopes of water ( $\delta^{18}$ ,  $\delta^D$ ) and conductivity is applied to estimate contribution of different nourishment sources in total runoff and its regime. Two equations system for study objects were derived: in terms of water routing and runoff genesis. Djankuat and Chon-Kyzyl-Su river hydrographs were separated in 4 major source components: liquid precipitation/melt water, surface routed/subsurface routed water.