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Separation of run-off components of a glacierized catchment in Kyrgyzstan, Central Asia, by tracer methods (mainly δ2H, δ18O) and meteorological data

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Since 2014 the glacierized Ala Archa catchment (ca. 230 km2) in the Kyrgyz Alatau mountains south of Bishkek is investigated for run-off contributions of precipitation, groundwater, snow-melt, and glacier melt by tracer methods (δ2H, δ18O, electrical conductivity) and hydro-meteorological data (run-off, precipitation, air temperature, albedo). The investigation period is characterized by a high inter-annual variability in precipitation amount and summer run-off. The isotopic composition of run-off water is found to be governed more by the interplay of air temperature, precipitation history, and snow coverage than by its origin from direct precipitation, snow- or glacial melt. The isotopic composition of base flow in winter and early spring time is found to vary probably not due to a reservoir (mixing) but due to a phase exchange process (fractionation). In the light of these results a separation of all run-off components in such an environment simply with isotope methods appears to be unrealistic.