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Single or multiple source(s) of precipitation in the Western Pamirs, Tajikistan?

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A three years lasting isotope hydrological study has been performed in the 14,000 km2 catchment of River Gunt in the western Pamir in Tajikistan. The main goals were to identify the origins of precipitation in the Tajik Pamir and to resolve the contributions of different components to the total run-off out of the catchment. In a monthly interval precipitation samples have been taken from six meteorological stations in this high-alpine and partly glaciated region. Additionally, each month, river water was sampled at more than 30 sampling points of the main stream and its tributaries to get a time-integrated record of the isotopic signal in precipitation.
The continental location of the catchment as well as its strong altitudinal variations between 2,000 and 6,700 m a.s.l. lead to isotope values that are rich in contrast.
Precipitation as important initial parameter was shown to originate from different wind systems (Westerlies, Monsoon, Southern Cyclones) tracing regionally the isotopic composition in time. Deuterium excess values in precipitation higher than 10‰ indicate precipitation through re-evaporation and therefore an origin in the Caspian and/or Mediterranean Sea. Within the catchment, the surface water samples of the subcatchments group with respect to deuterium excess of their waters. This strengthens the assumption of the varying influence of different wind systems.