Determining the water budget of the Gunt (semi-arid Tajik Pamir) using environmental isotopes, hydrochemical and remote sensing data

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1. Introduction
In the arid Central Asian lowlands water scarcity is a well known problem. Large rivers such as the Panj and Amu-Darya, whose water is excessively exploited for irrigation purposes, are mainly fed from snow- and glacial melt occurring in the Pamir and Tien Shan mountains.

2. Objectives
The objectives are to understand the current and future key hydrological processes, such as streamflow generation and groundwater recharge in an exemplary drainage system in the Tajik Pamir.

3. Methods:

- Environmental isotopes
- Hydrochemistry
- Remote sensing & hydrological modeling

3.1 Environmental isotopes

3.2 Hydrochemistry

3.3 Remote sensing & hydrological modeling

4. Preliminary results:

**Environmental isotopes:**
- With increasing flow length of the Gunt: enrichment of heavier stable water isotopes (altitude effect)
- Differences in isotopic signature between northern and southern tributaries (probably reflecting input of different climate situations)
- Altitudinal information about the catchment (see also fig. below)

**Hydrochemistry:**
- Concentrations of (major) anions and cations are generally very low (TDS<200mg/l)
- Tributaries are less mineralized than the Gunt and thin out the concentrations of anions and cations of the Gunt (see fig. above)
- Quantification of runoff components

**Remote Sensing & Modeling:**
- Hydrograph separation on the basis of remote sensing driven hydrological modeling (first approach see fig. below)
- Validation by environmental isotopes and hydrochemical data

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