

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

C. Ebert<sup>1</sup>, M. Knoche<sup>1</sup>, E. Pohl<sup>2</sup>, T. Rödiger<sup>1</sup>, S. Geyer<sup>1</sup>, R. Gloaguen<sup>2</sup>, K. Osenbrück<sup>3</sup>, S. M. Weise<sup>1</sup>

<sup>1</sup> Helmholtz-Centre for Environmental Research – UFZ, Department Catchment Hydrology, <sup>2</sup> TU Bergakademie Freiberg, Remote Sensing Group, <sup>3</sup> University Tübingen, Water & Earth Sciences Research Center

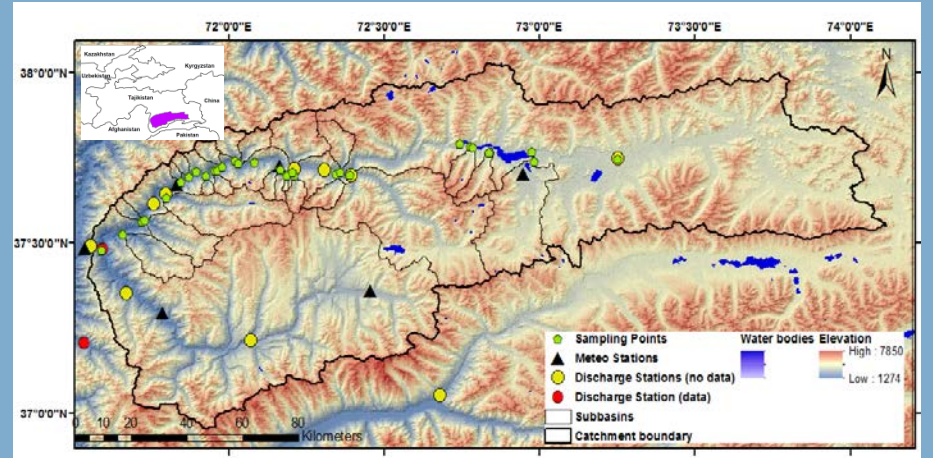
## 1. Introduction

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.



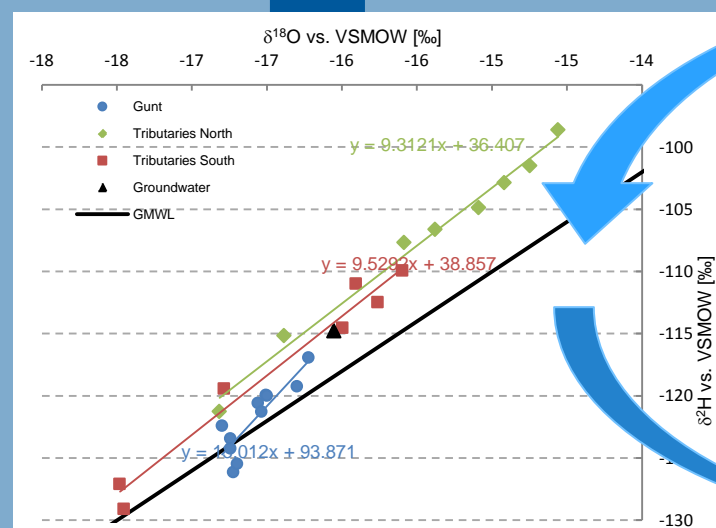
## 2. Objectives

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.

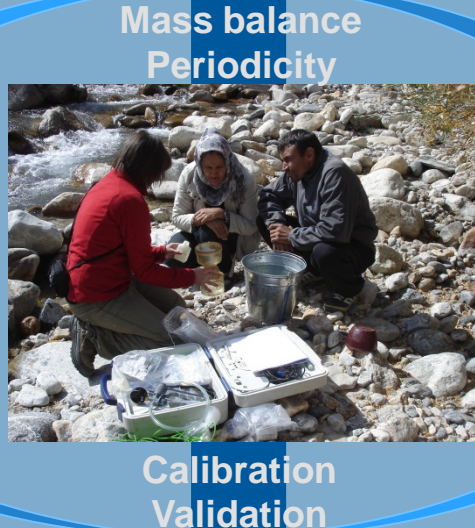


## 3. Methods:

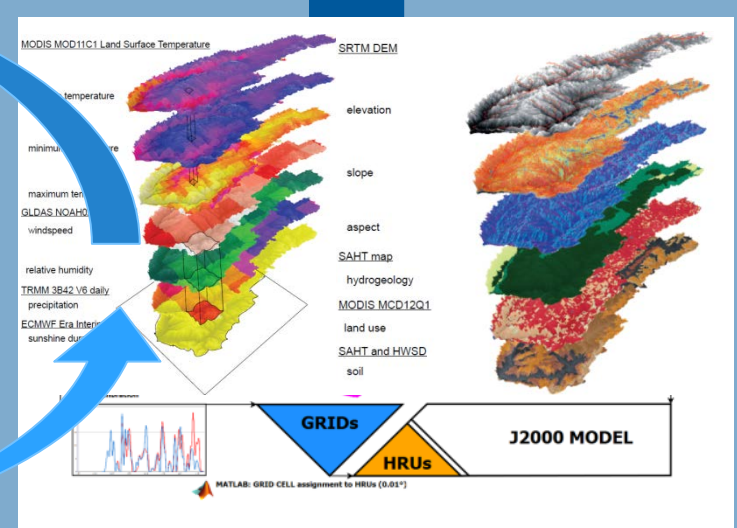
### Environmental isotopes



### Hydrochemistry



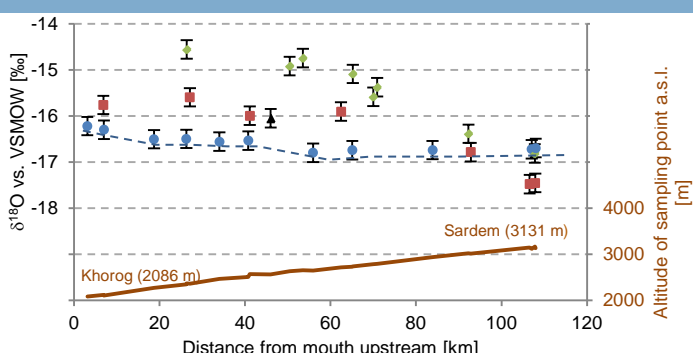
### Remote sensing & hydrological modeling



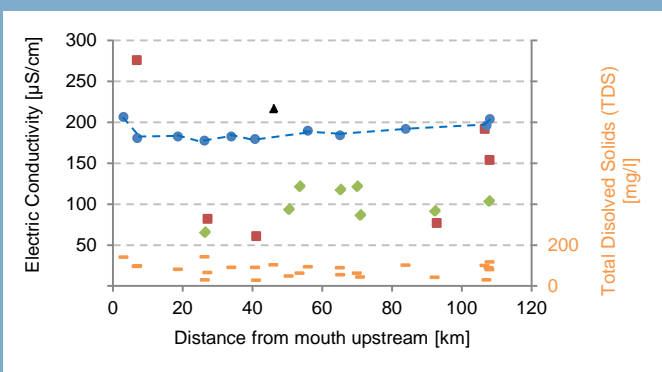
## 4. Preliminary results:

### 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)



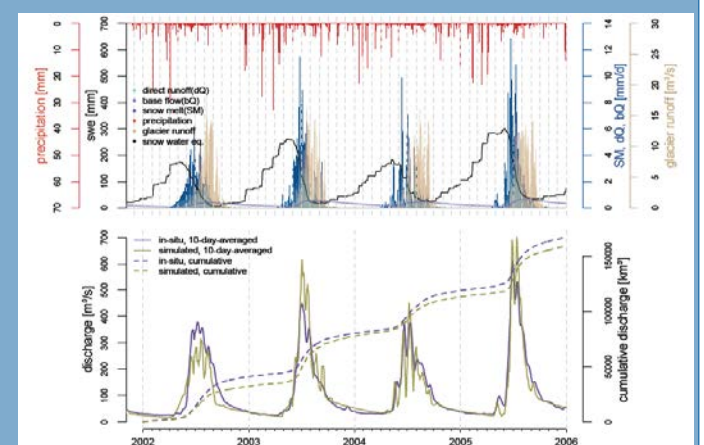
### Hydrochemistry:



- Concentrations of (major) anions and cations are generally very low (TDS < 200 mg/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



**HELMHOLTZ**  
CENTRE FOR  
ENVIRONMENTAL  
RESEARCH – UFZ

Contact:

Christiane.Ebert@ufz.de  
Helmholtz-Centre for Environmental Research – UFZ  
Department Catchment Hydrology  
Theodor-Lieser-Str. 4  
06120 Halle, Germany

