

Identifying flood processes in pre-alpine catchments with river signatures

Problem Overview:

In natural catchments, floods are induced either by extreme rainfall, rapid snowmelt, or rainfall on snow events¹. These different flood types exhibit various behaviours, observed as the flood development over time. This advantage has been recently incorporated into flood-type classification² which uses flood properties of observed events to determine flood dominant processes. Independently, flood regime classes (river signatures) have been developed for rivers in Switzerland³, using mostly physiographic properties. It is unclear, however, how these two classifications correspond to each other and whether one can be translated into another. Such knowledge could greatly support flood predictions at ungauged sites by using such pre-defined river signatures.

Contents of the Master's thesis:

The aim of this thesis is exploring these two classifications, i.e., based on the flood-type scheme and on the river regime scheme, and to propose a method for transferring regime classes into flood types. As a result, this thesis should answer the following questions:

- What are the similarities and the differences between those two classifications and their classes assigned?
- How can the flood type classes be explained with the river regime classes?
- Which catchment factors (e.g., climate, geology, or altitude) can be helpful in determining the flood types from river regimes?

Supervisors:

Dr. Anna Sikorska (anna.sikorska@geo.uzh.ch)

Prof. Jan Seibert (jan.seibert@geo.uzh.ch)

Key references:

- ¹Merz, R., and G. Blöschl (2003), A process typology of regional floods, *Water Resour. Res.*, 39(12), 1340, doi:10.1029/2002WR001952
- ²Sikorska, A. E., D. Viviroli, and J. Seibert (2015), Flood-type classification in mountainous catchments using crisp and fuzzy decision trees, *Water Resour. Res.*, 51, doi:10.1002/2015WR017326.
- ³Weingartner, R., and H. Aschwanden (1992), Abflussregimes als Grundlage zur Abschätzung von Mittelwerten des Abflusses, in *Hydrologischer Atlas der Schweiz, Tafel 5.2*, Bern, Bundesamt für Umwelt BAFU.