



Hydro-sedimentary event types and associated conditions and processes in an alpine catchment

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Under the influence of climate change, high mountain areas like the European Alps are in a transient state where catchment conditions and processes that determine sediment dynamics are changing. Hydro-sedimentary events can account for a substantial proportion the annual sediment yield in alpine catchments, and are often associated with heavy rainfall and rainfall-triggered mass-movements. It is therefore of interest to study the driving conditions and processes of these events, especially due to the potential downstream impacts they can have to eco- and human systems.

The dynamics, characteristics and, in particular, (suspended) sediment-discharge hysteresis are often used in conjunction with hydro-meteorological and catchment state variables to identify driving processes and conditions of events. However, is it possible to elucidate the determining conditions and processes or determine meaningful event classes based solely on metrics derived from the suspended sediment and discharge data of the event?

Using two catalogs of manually and automatically detected hydro-sedimentary events from Rofental, Austria, we attempt to answer this question. We perform a cluster analysis with various approaches on event metrics (e.g. hysteresis class, suspended sediment yield, peak discharge, time since last event). To avoid biasing the results towards a specific number of event types, we explicitly use clustering algorithms which do not require the number of clusters (i.e. event types) to be specified. We then look for commonalities within the identified event clusters in terms of catchment conditions and processes during the event (e.g. high temperatures, snowmelt, intense rainfall, wet antecedent conditions, mass movement occurrences). Finally, we discuss the advantages and disadvantages of grouping events on their characteristics alone.