Geophysical Research Abstracts
Vol. 20, EGU2018-13104, 2018
EGU General Assembly 2018

Solutes concentrations and C-Q relations across Swiss rivers: natural and anthropogenic drivers of solute export at the catchment scale

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River hydrological and biogeochemical response carries information about solute pathways, solute sources and transformations in the catchment. We investigate long-term (1975-2015) water quality data across 11 Swiss catchments aiming at understanding the solute characteristics and the influence of anthropogenic activities on solute concentration in stream water. Magnitude, trends and seasonality of water quality samples are evaluated and compared across different solutes and catchments. Subsequently, we evaluate the empirical power-law between solute concentration C and discharge Q, C = aQb, with the ultimate goal of classifying different solute behaviors (chemostatic behavior, dilution, enrichment) depending on the value of the b coefficient.
Although the influence of catchments geology, morphology and size is sometime discernible on in-stream solute concentrations, anthropogenic impacts are the most visible. The majority of solutes shows dilution with increasing discharge, especially geogenic species, while sediment-related solutes (i.e. Total Phosphorous and Organic Carbon species) show an enrichment with increasing Q.
Both natural and anthropogenic factors impact the streams biogeochemical response and while the majority of solutes show identifiable behaviors in single catchments, only a minority of them can be generalized across catchments using geological, climatic and anthropogenic features.