

Longterm Measurements of Bedload-Transport in alpine Catchments

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In recent years the necessity of predicting the long-term behavior of sediment transport has increased. On the one hand, the effects of technical measures (e.g. retaining measures, hydropower, etc.) in the natural system are to be evaluated. On the other hand long term ecological studies that are strongly linked to the sediment budgets and its variation are more and more evolving.

The ACRP Project DevoBeta-CC addresses the dynamics of long term sediment transport dynamics and its temporal altering. The focus is put on smaller tributary catchments enabling the model development. In total the data from ten catchments connected to the hydropower station Kaunertal (Tyrol/Austria) and eleven catchments linked to the power plant group Sellrain-Silz (Tyrol/Austria) are available. The considered catchments vary regarding their characteristics such as size (3 km³ to 27 km²), glaciation (0 % to 53 %), mean catchment slope (53 % to 92 %) and mean channel gradient (4 % to 49 %). The main data basis are records from the water intake structures operated (partly since 1965) by the TIWAG (Tiroler Wasserkraft AG). The sedimentation dynamics and operational flushings of the connected settling basins are used to measure the transported sediments. Since 1985 even high resolution data (15min intervals) are available. At selected catchments, the operationally recorded data (flushings, load membrane measurements,...) are verified within measuring campaigns using bed load traps upstream. Further, the sedimentation dynamics and grain size distributions in the settling basins are evaluated. Therefor two water intakes were put temporally out of operation, allowing an improved measurement of settled volumes by means of terrestrial surveying. Uncertainty assessments reveal an overall accuracy of estimated annual bed load volumes lower than a factor of two. Additionally, the data set enables to address sediment transport at a sub-annual basis, hence, the presented data set is unique regarding the long-term bed load budget of small mountain creeks.

First analyses are presented to link catchment descriptors to transport efficiencies. Both, between-sites and within-site (temporal) variability of transport efficiency is determined.