



Contemporary suspended sediment yield of a partly glaciated catchment, Riffler Bach (Tyrol, Austria)

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Due to glacier retreat since the LIA (Little Ice Age) proglacial areas in high mountain landscapes are growing. These systems are characterized by a high geomorphological activity, especially in the fluvial subsystem. Despite the long tradition of geomorphological research in the European Alps there is still a lack of understanding in the interactions between hydrology, sediment sources, sediment sinks and suspended sediment transport. As emphasized by ORWIN ET AL. (2010) those problems can be solved by gathering data in a higher frequency and/or in a higher spatial resolution or density - both leading to a big amount of data.

In 2012 a gauging station was installed at the outlet of the partly glaciated catchment of the Riffler Bach (Kaunertal valley, Tyrol). During the ablation seasons in 2012 and 2013 water stage was logged automatically every 15 minutes. In both seasons discharge was measured at different water levels to calculate a stage-discharge relation. Additionally, water samples were taken by an automatic water sampler. Within 16 sampling cycles with sampling frequencies ranging from 1 to 24 hours 389 water samples have been collected. The samples were filtered to calculate the suspended sediment concentration (SSC) of each sample. Furthermore, the climate station Weißsee provided meteorological data at a 15 minute interval.

Due to the high variability in suspended sediment transport in proglacial rivers it is impossible to compute a robust annual Q-SSC-relation. Hence, two other approaches were used to calculate the suspended sediment load (SSL) and the suspended sediment yield (SSY):

A) Q-SSC-relations for every single sampling cycle (e.g. GEILHAUSEN ET AL. 2013)

B) Q-SSC-relations based on classification of dominant runoff-generating processes (e.g. ORWIN AND SMART 2004).

The first approach uses commonly operated analysis methods that are well understood. While the hydro-climatic approach is more feasible to explain discharge generation and to locate sediment sources both approaches underline the fact that SSC does not always depends on discharge but also on sediment availability. The comparison of both approaches shows that in well investigated areas the results are strongly determined by the choice of the analysis method.

References

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