



Bedload transport rates by grain-size fraction determined from Swiss plate geophone signal

Carlos Rodrigo Wyss (1,3), Dieter Rickenmann (1), Bruno Fritschi (1), Jens Martin Turowski (2), Volker Weitbrecht (3), and Robert Michael Boes (3)

(1) Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Mountain Hydrology and Mass Movements, Switzerland (carlos.wyss@wsl.ch), (2) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Potsdam, Germany, (3) Laboratory of Hydraulics, Hydrology and Glaciology VAW, ETH Zürich, Switzerland

The Swiss plate geophone is a device that measures bedload transport indirectly. At the Erlenbach stream in Central Switzerland, the Swiss plate geophone system has been calibrated for total transported bedload mass sampled with automatically activated basket samplers. In this study we show that the amplitude of the signal registered by the Swiss plate geophones at the Erlenbach contains information about the transported grain-size distribution. The method to extract grain-size information is based on summary values describing the statistical distribution of the signal's amplitude: the so-called amplitude histograms. The amplitude histograms are computed by summing up the number of impulses and packets (representing a single impact) registered for different amplitude ranges. The presented method is further based on the number of transported particles which, together with the amplitude histograms, are used to compute bedload mass for different grain-size fractions. The results show that for particles larger than 9.5 mm, the grain size distribution of the transported material at the Erlenbach can be continuously monitored with the Swiss plate geophone system.

Keywords: Swiss plate geophone, grain-size distribution, amplitude histograms, bedload transport, indirect measurement.