

Analysing bedload transport in small rivers of the low mountain range with seismological and hydroacoustic measurements

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Hydroacoustic signals were recorded by data recorders, which were connected to hydrophones. These underwater microphones were mounted onto the bottom side of stainless steel plates (40 cm x 40 cm x 3 mm), serving as a contact surface for the bed load moving above them. After tests in the laboratory, which indicated the basic relations between the dimension, shape and weight of the bed load and the resulting signal, field tests of the measuring system were conducted. Acoustic measurements in running waters are appropriate for a highly resolved investigation of the bed load transport. By analysing several flood waves in small brooks and by investigating a winter flood wave in the river Moselle near the border between Germany and Luxembourg, it is possible to elaborate similar structures of the signal course of the bed load movement. The highest transport rates can be observed at the beginning of the increasing limb and behind the peak of the waves. In the rising limb at the beginning of the flood events, the increasing transport power of the water and the loose material can be considered as the cause for this result. The characterisation of the bed load regarding the shape and mass is still limited regarding the field measurements and could only be solved for homogenous grain sizes and single stones under laboratory conditions. The field tests highlight that in the increasing branch mostly coarse and angular material will be moved in reptation. Behind the wave peaks, mainly small and round components in saltation can be observed. In the next step of the BEDLOAD project the parallel recording of hydrophone noise and seismometer vibration (seismometers installed next to the brooks) with a trapping and analysis of selected bedload material will describe the highly time-resolved kinetics of transported material.

Acknowledgements

This study is supported by the National Research Fund, Luxembourg (BEDLOAD C11/SR/1158445) and could not have been conducted without the help of Jean François IFFLY to who we would like to express our gratitude.