



Investigating the dynamics of the bed load transport with a hydro-acoustic measuring system

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The contribution deals with the question, if acoustic measurements in running waters are appropriate for a highly resolved investigation of the bed load transport with regard to time. In addition, it was investigated which characterizations of the bed load regarding mass and shapes are possible via the acoustic signals. The signals were recorded by data recorders, which were connected to hydrophones by cables. These underwater microphones were mounted onto the bottom side of stainless steel plates, serving as a contact surface for the bed load moving above them. After series of 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. By analysing several artificially produced flood waves in a small brook 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. 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 effluence of groundwater from the interstitials back to the channel and the decreasing pressure of the flowing water on the sediment body can explain the increase in the bed load transport behind the maximum discharge. At that time material from the channel bed is loosened and mobilised. 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, however, 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.