



Rock fragment movement in shallow rill flow – A laboratory study

Kerstin Becker, Stefan Wirtz, Manuel Seeger, Oliver Gronz, Alexander Remke, Thomas Iserloh, Christine Brings, Markus Casper, and Johannes B. Ries

Trier University, Physical Geography, Germany (s4kebeck@uni-trier.de)

Studies concerning rill erosion mainly deal with the erosion and transport of fine material. The transport of rock fragments is examined mostly for mountain rivers. But there are important differences between the conditions and processes in rivers and in rills: (1) In most cases, the river cuts into a coarse substrate, where fine material is sparse, whereas rill erosion occurs on arable land. So the main part of the substrate is fine material and only single rock fragments influence the processes. (2) In rivers, the water depth is relatively high. There are a lot of studies about hydraulic parameters in such flows, but there is almost nothing known about hydraulic conditions in surface runoff events of a few centimeters.

Additionally, little information exists about the rock fragment movement as a part of rill erosion processes on arable land. This knowledge should be increased because rock fragments cause non-stationary water turbulences in rills, which enhance the erosive force of flowing water.

Field experiments can only show the fact that a certain rock fragment has moved: The starting point and the final position can be estimated. But the moving path and especially the initiation of the movement is not detectable under field conditions.

Hence, we developed a laboratory setup to analyze the movement of rock fragments depending on rock fragment properties (size, form), slope gradient, flow velocity and surface roughness. By observing the rock fragments with cameras from two different angles we are able (1) to measure the rotation angles of a rock fragment during the experiment and (2) to deduce different rock fragment movement patterns.

On this poster we want to present the experimental setup, developed within the scope of a master thesis, and the results of these experiments.