

Recent research

Bed load transport in the Gurgler Ache

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Mountain streams like the Gurgler Ache river build the upper part of the fluvial network and are important regarding the transfer of sediments from headwaters to lower basins. Typically, the river bed of mountain streams represents the habitat for several species, while intense relocations of sediment during flood events pose a severe hazard for human settlement areas.

Regarding both, knowledge on bed load transport processes is essential in order to make morphologic responses to human actions (e.g. restoration measures, hazard mitigation) predictable. To make a contribution on this issue, a reach of the Gurgler Ache River was built to a scale of 1:20 in the hydraulic laboratory of the University of Innsbruck. At varying discharge conditions (2.5 – 15 l/s) relatively fine sediment (diameter of 0.5 – 5.6 mm) was supplied at the upper end of the model. Since the supplied sediment was coloured beforehand, transport processes and morphologic responses could be assessed in detail, giving evidence that supply conditions affect bed load transport in a major extent. Especially at low discharges, it is rather the supply of moveable sediment than the power of the flowing water which regulates bed load transport.

As part of this project Dipl.-Ing. Daniel Kößler wrote his master thesis, entitled „Physikalische Untersuchungen zum Geschiebetransport über die Deckschicht eines alpinen Gebirgsflusses“, further scientific publications are in preparation and another master thesis just started. Furthermore the results of this project will benefit the new project “Development of Bedload Transport in Alpine Catchments under Climate Change” which is financed by the Austrian Climate Fund (ACRP – 5th Call).



Figure 1: Overview of the prototype reach (left) and the physical scale model (right)



Figure 2: Evolution of the bed surface during an experimental run with a water discharge of 4 litres per second and blue coloured, added sediment: a) initial condition, b) during and c) at the end of the experiment