



Monitoring of sediment transport processes using tracer stones

Matthias Redtenbacher, Gabriele Harb, Teresa Barbas, and Josef Schneider

Graz University of Technology, Institute of Hydraulic Engineering and Water Resources Management, Graz, Austria
(gabriele.harb@tugraz.at)

In the last decades the vulnerability of our civilization to geomorphological damaging events like debris flows and exceptional floods increased. The reasons are, on one side, that the global hydrological cycle became more intense during the recent past and on the other side that the material assets of the population increased. Risk prevention, risk analysis and forecast methods thus became more important. Geomorphological processes are often not easy to analyse. To get information about the probability and the consequences of these increasing events, it is necessary to analyse the availability of sediments in the catchment area, the erosion processes of the sediment and the transport of the sediments along torrents.

The project ClimCatch, which started in April 2012, investigates the torrential sediment transport processes in a non-glaciated Alpine valley in Austria and the related natural hazards under the viewpoint of the on-going climate change. Due to an extreme precipitation event in 2011 debris flow-similar discharges occurred in this catchment and since that the sediment sources are highly erodible there. The aims of the project are to derive a quantitative sediment budget model, including geomorphic process domains, determining sediment transport in the river system and the measurement of bed load output, besides others.

To quantify river sediment dynamics several different methodologies are applied within the project. Discharge and sediment transport measurement as well as hydrological stations are installed in the catchment area. Aggradation and erosion are analysed by means of laser scanning technology in the sediment storage basin which is located at the outlet of the catchment. The observation and measurement of the sediment transport is performed by the application of radio telemetry stones and colour tracer stones. Line pebble counting, automated grain size determination using photographs and sieving on-site is performed to get qualitative sediment information.

This contribution focuses on the application of the radio telemetry and colour tracer stones. More than 100 tracer stones have been released in two tributaries of the catchment. Tracer stones up to a grain diameter of 28 cm have been moved due to higher discharges at rainfall events. Their movement has been monitored and related to the measured discharge data.