



## **Improving sediment transport measurements in the Erlenbach stream using a moving basket system**

Dieter Rickenmann, Jens Turowski, Ramon Heggin, and Bruno Fritschi

WSL Birmensdorf, Mountain Hydrology and Torrents, Birmensdorf, Switzerland (dieter.rickenmann@wsl.ch, +41 44 7392 215)

In the Erlenbach stream, a prealpine torrent in Switzerland, sediment transport has been monitored for more than 25 years. Sediment transporting flood events in the Erlenbach are typically of short duration with a rapid rise of discharge during summer thunderstorms, thus hampering on-site measurements. On average there are more than 20 bedload transport events per year. Near the confluence with the main valley river, there is a stream gauging station and a sediment retention basin with a capacity of about 2,000 m<sup>3</sup>. The basin is surveyed at regular intervals and after large flood events. In addition, sediment transport has been continuously monitored with a piezoelectric bedload impact sensor (PBIS) array since 1986. The sensor array is mounted flush with the surface of a check dam immediately upstream of the retention basin. The PBIS system was developed to continuously measure the intensity of bedload transport and its relation to stream discharge. To standardize the sensors, the piezoelectric crystals were replaced by geophones in 2000. The geophone measuring system has also been employed at a number of other streams.

In 2008, the measuring system in the Erlenbach stream has been enhanced with an automatic system to obtain bedload samples. Movable, slot-type cubic metal baskets are mounted on a rail at the downstream wall of the large check dam above the retention basin. The metal baskets can be moved automatically and individually into the flow according to flow and bedload transport conditions (i.e. geophone recordings). The basket is stopped at the centerline of the approach flow channel of the overflow section to obtain a sediment sample during a limited time interval. The wire mesh of the basket has a spacing of 10 mm to sample all sediment particles coarser than this size (which is about the limiting grain size detected by the geophones). The weight increase due to the collected sediment is measured by weighing cells located in the basket supporting structure, and this information is used in combination with the geophone recordings to determine when to move a basket laterally away from the flow. The upgraded measuring system allows: (i) to obtain bedload samples over short sampling periods; (ii) to measure the grain size distribution of the transported material and its variation over time and with discharge; (iii) to obtain direct bedload measurements that can be used to improve the understanding of the geophone signal; and (iv) to improve the geophone calibration for the Erlenbach stream. We introduce the new measuring installations, discuss our experience from the first successful automatic sampling operations in summer 2009, and we present first results.