



Stochasticity of bedload transport in the Erlenbach, Switzerland

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The Erlenbach in the Alptal (Canton Schwyz) is a small stream in the pre-Alps of central Switzerland, draining an area of ~ 0.7 km². There, the Swiss Federal Research Institute WSL has monitored the hydrology and sediment delivery for several decades. Bedload transport has been measured with piezoelectric bedload impact sensors (PBIS) in the period 1986-1999. The sensors count and store the number of peaks (known as impulses) due to impacts on steel plates mounted in the channel bed. It has previously been shown that the number of impulses is correlated with the bedload transport rate. For 349 bedload transport events during the survey period both discharge and impulses have been recorded at a 1-minute resolution. Furthermore, water temperature and chemistry are measured regularly and representative meteorological data is collected at a nearby station within the catchment.

For recorded events, we derive the conditions at the beginning of sediment transport, i.e. when the first signal is recorded by the sensors. The discharge at the begin of transport Q_c varies between 78 l/s and 1133 l/s, with an average of 488 l/s. We analyse the discharge at the start of sediment transport in the context of multiple environmental attributes (such as rainfall rate and water temperature), and hydraulic conditions (such as the gradient of the discharge curve). We advance several hypotheses to explain observed inter-dependencies and test them on the data as far as possible.