



Experimental observations of bedload and slope fluctuations in a flume under constant feeding conditions

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Flume and field experiments have demonstrated that bedload is not a one-to-one response to shear stress but largely fluctuates with time, even under constant feeding conditions. This was largely investigated by Recking et al. 2007 through flume experiments.

Available results were obtained essentially for very steep slope experiments (5 to 12%) and with bimodal mixture. This is why new experiments have been performed under constant feeding rate conditions (flow discharge of 0.82 l/s and solid discharge of 5.4 g/s) and for long durations (48 h) in a 6 m long and 0.1 m wide flume for a mean slope of 0.028, using a bi-dispersed sand gravel mixture.

During experiments mean bed slope was measured regularly along the flume side wall using seven staff gauges, starting at the channel outlet. Continuous outlet solid discharge was calculated using WIMA software (Ducottet, 1994) by processing images taken at the flume outlet with a customized video system.

Large fluctuations for both the slope and the solid discharge were measured. We observe as found in other studies (Iseya et Ikeda, 1987), that fluctuations are always associated with a complex sediment behavior including various phenomena such as paving, smooth bed and sediment pulses. The periodical nature of the slope and the solid discharge were investigated through a spectral analysis obtained with a Fourier transform of temporal signal $Q_s(t)$ and $S(t)$. The analysis shows that three families of peaks can be identified corresponding to short, intermediate and long fluctuations. These periods are highly representative of the slope signal recorded during the run.