



Relations between bed forms and bed load transport rate on steep slopes

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For gentle slopes, Simons and Richardson (1966) proposed a classification of flow conditions based on bedload layer continuity. They defined the lower regime as a discontinuous bedload layer alternating grain rest and movement and a low transport rate. They distinguished this from the upper regime, with a continuous bedload layer over a flat bed and intense bedload. Similar regimes were identified on steep slopes ($1\% < S < 9\%$) using image analysis (Recking 2006): in the low regime, flows appeared to be associated with low-relief bed waves, grains seemed to shift alternatively between rest and movement, and the stationary bed was not clearly delimited, whereas the high regime was characterized by a perfectly flat water surface, a clearly delimited and flat stationary bed, and a continuous and uniform bedload layer of rolling and saltating grains, whose thickness was several times the grain diameter. Substantial changes in flow resistance, bedload discharge, and transport rate efficiency were consistent with these experimental observations of a change in grain motion. In future research, this classification should help to derive an asymptotic function for high bedload transport.

Recking, A., An experimental Study of Grain Sorting Effects on Bedload. PhD Thesis Cemagref www.lyon.cemagref.fr/doc/these/recking/index.shtml, Lyon, pp 261, 2006

Simons, D. B. and E. V. Richardson, Resistance to flow in alluvial channels, Geological Survey Professional Paper 462-J, Washington, 96 pp, 1966