



Tools and cover effects in bedload transport observations in the Pitzbach, Austria

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We report bedload data and acoustic impulse measurements due to particle impact from the Pitzbach in Austria. Impulse counts can be viewed as a measure of the energy delivered to the bed by moving particles. Impulse counts show a large scatter even for the same discharge and bedload supply. This scatter is due to varying grain size distribution, grain shape, mode of transport of the sediment particles, and spatial and temporal distribution of the sediment load. Both tools and cover effect are active on the channel bed. Dependent on the local balance between sediment supply and transport capacity, either effect may be dominant at different locations along the cross section at the same time. Furthermore, the same bed location may respond to increasing sediment supply tools-dominated at some discharges and cover-dominated at other discharges. Our observations may have implications for modelling of bedrock erosion in landscape evolution models and of bedrock channel morphology. Erosion models that do not incorporate both tools- and cover-effect are not sufficient to describe observations. Furthermore, a local erosion law cannot in general be used to describe erosion averaged over the channel cross section. The changing balance between sediment supply and transport capacity with increasing discharge highlights that a single representative discharge is not sufficient to capture the full erosion dynamics.