



TLS - a tool for channel bed surface roughness determination?

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Channel bed surface roughness has a significant influence on flow characteristics of a stream. Since decades roughness coefficient determination is an integral part of fluvial geomorphological research. The methods used to directly measure channel bed roughness often require an exact knowledge of grain size distributions of a given stream reach. In some cases this method is impractical, especially for large catchments and systems involving a large degree of form roughness. In this context, the determination of bed surface roughness using Terrestrial Laser Scanning (TLS) provides new possibilities.

The application of laser scanning has been increasingly used recently for channel morphology research (Heritage & Hetherington 2007, Milan et al. 2007, Hodge et al. 2009). However, the use of TLS data to quantify bed surface roughness leads to new methodological problems. One of these problems is known as the 'Shading Effect'. Because of this, portions of the channel surface situated behind a large obstacle cannot be surveyed. Hence, the first goal of this study is to determine the minimum number of scanning positions to accurately characterize channel bed roughness. For roughness calculation, the investigation area is divided into an orthogonal grid. The question about this is: Which grid cell size should be chosen? In general, the cell size is defined by the largest particle in the test area. This requires sediment sampling and leads to additional field work. To avoid this, this study further assesses the importance of grid cell size on bed roughness calculation.

The ultimate goal of this study is to improve the application of TLS for roughness calculation in gravel-bed rivers. For this purpose several channel reaches in two different study sites were surveyed with an ILRIS 36D. One investigation area is situated in the Reintal valley located in the northern limestone Alps (Wettersteingebirge) Bavaria/Germany. The other one is situated in the proglacial area of the Gepatschferner, Kaunertal/Austria.

References:

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