

Background

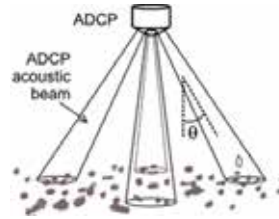
The quantification of the sediment transport in fluvial environments is a notoriously difficult and labor-intensive task.

Statistically valid measurements are extremely important for the evaluation of the sediment transport masses, especially for big hydropower projects and for large navigable or heavily exploited rivers. Widespread implementation of the hydro-acoustic techniques would reduce the scarcity and statistical uncertainty of sediment data.

The main objective of this work is to develop a methodology for evaluating the bed load transport using commercial acoustic Doppler current profilers (ADCP).

The hydro acoustic measurements are relatively well explored by the scientists and engineers. The suspended load estimation has been successfully adopted by analyzing

the backscattering echo and the attenuation of the acoustic signal. The bedload transport has been estimated by using the apparent velocity ($v_{GPS} - v_{BottomTrack}$), or the exploiting the bias that appears in the Bottom Tracking signal of the ADCPs. The signal reflected from the riverbed assumes complex two-phase scattering happening in the active layer of the bedload and the irregular immobile surface. It additionally complicates the results and increases the uncertainty in the sediment velocity calculation. The main focus of this study is to explore this phenomena in details and use this information for calculating the total sediment masses by developing specific methodology and models (e.g. kinematic transport model). Three laboratory experiments are performed using different ADCs and different sediments. Based on this information several field studies are planned to be conducted. The future goal is to identify the source of uncertainty and suggest new instrument parameters.



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Operation of
hydropower plants
exposed on high
sediment yield.
Non-intrusive bedload
measurements

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