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Video based bedload transport analysis in gravel bed rivers

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Image based analysis is increasingly used in river flow assessment and there are already promising attempts for analyzing sediment features with image techniques, such as the grain size composition of bed material. For the quantification of flow features, the Particle Image Velocimetry (PIV) and Particle Tracking Velocimetry (PTV) are widely applied. PIV provides 2D or even 3D distributions of the flow velocities in Eulerian approach, i.e. on a fixed grid. PTV, on the other hand, provides single trajectories and related flow velocities of tracers, released in the flow, in a Lagrangian way. Capturing videos of the river bed in gravel bed streams, the movement of the grains becomes detectable, providing suitable input for image analysis techniques.

In this study, an attempt will be made towards the coupling of PIV and PTV methods with complementary image based grain size analysis tools to estimate bedload transport. The test underwater videos are made in a large river, where the bedload transport is dominated by the movement of gravel. Local bedload transport rate will be determined as the product of the velocity of bedload particles and the thickness of the bedload layer, which is estimated based on the characteristic grain diameters.