Geophysical Research Abstracts
Vol. 19, EGU2017-2436, 2017
EGU General Assembly 2017

Continuous monitoring of the bedload transport rate and the bed topography in a flume with alternate bars

Blaise Dhont and Christophe Ancey

Laboratory of Environmental Hydraulics, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland (blaise.dhont@epfl.ch)

The development, destruction and migration of bedforms in gravel-bed rivers can cause large fluctuations in bedload transport rates. Measuring bed topography and bedload transport rates at high frequency and over long periods of time (e.g., more than hundreds of hours) is still a challenge.
In this experimental study, a combination of several continuous monitoring techniques is used to investigate the effect of bar dynamics on the bedload transport rate over long periods of time under steady state conditions. The flume is 16-m long and 60-cm wide. The bed is made of moderately sorted natural gravel, with a median diameter of 6 mm. The bed surface consists of a series of alternate, and the water depth ranges from 0 to 15 cm. The flow conditions are turbulent.
The bedload transport rate is measured at the flume outlet using vertical impact plates. These devices were developped to be operated continuously over several hours. The water elevation is measured using ultrasonic probes mounted on a moving trolley. Simultaneously, a camera takes top-view images of a laser sheet projected from the trolley on the bed surface, through the water. The bed elevation is subsequently computed using an image-processing algorithm robust to a pertubated water surface. The trolley scans the bed surface every 10 minutes.
Experimental runs can last up to 24 hours without interrupting the flow. They can be repeated indefinitely. The output data include the bedload transport rate averaged over one minute and the bed topography every 10 minutes. The accuracy is good enough for the study of mesoscale bedforms. This dataset makes it possible to better understand the dynamics of alternate bars and their relation with the bedload transport.