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Flume experiments on the dynamics of a braided river transect

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River braiding occurs in streams with high sediment load and slope. Braided rivers are characterized by multiple channels which undergo a continuous spatiotemporal evolution, and they have a high environmental value. Their fragile dynamics are sensitive to hydrological alterations, and are prone to induce transition to meandering or pseudo-meandering rivers.
Complex phenomena drive the braiding process, and new research is required. In this framework, flume experiments are a key tool, as they can reproduce the fundamental mechanisms occurring in rivers.
In this work the focus is on the dynamics of a braided river transect. In particular, the temporal evolution of the river bed position η, and of the free surface position H at any point x of the transect are considered.
In order to record $\eta(x)$ and $H(x)$ a new experimental facility has been developed. The key feature is a coupled laser-ultrasonic sensor. This sensor can measure η and H in a fixed point with flowing water and without disturbing the stream. This sensor is mounted in a CNC frame so that η and H can be surveyed along the transect (x values).
Braiding channels are generated in a flume 18 m long and 4 m wide, filled with 0.5 mm mean diameter sand. Slopes and flow discharges are the ranges [0.5%-1.5%] and [0.5 l/s -1.5 l/s], respectively.
The runs are as follows: water flows in a straight channel that evolves into a braided network. Topography and bathymetry along a transect are recorder. Measures are repeated with a temporal resolution of 2 minutes. The scanning of the transect allows to describe the temporal evolution of the transect (in terms of η and H). These analysis help to characterize the temporal dynamics of a braided river transect and can be an important benchmark for future numerical simulations of braided channels.