

## **Effects of grade-control structures on channel evolution in sandy torrent beds: a laboratory study**

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The role of large engineering control works, such as dam construction and river channel adjustments, is well recognized in many areas of the world. Their downstream impacts on river dynamics, geomorphic processes, and riparian vegetation changes, have been documented in several contributions. However, interactions between small grade-control structures and erosion and deposition processes are less well known. These small structures play a key role in stabilizing natural rivers through a general reduction of the bed slope upstream. This new longitudinal profile, better known as 'slope of siltation' or 'equilibrium bed slope', depends on the height and distance between structures and on the particle size of the bed. Consequently, a better understanding of the selective sediment transport related to their construction can be useful in predicting the channel evolution of natural rivers. The contribution reported here is based on an experimental laboratory channel, characterized by a sandy bed, where some small control structures have been placed. The experimental runs are aimed at analyzing the variations in terms of channel evolution and sediment particle size before and after their installation. Experiments were carried out in steady sheet flow conditions, varying the slope of the channel from 0 to 0.02 m/m in each run. The particle size distribution of the bed near the structures has been studied using a digital analysis. The overall results indicate an armour coat formation that depends on the bed slope and on the initial grain size distribution. However, further work is required to extrapolate these preliminary results to a field scale.