



Particle tracking via RFID technology to monitor bedload sediment dynamics in mountain streams

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In this contribution we present preliminary results on the monitoring of bedload entrainment and transport in two mountain streams, the Grigno Creek (90 km²) and its tributary, the Tolvà Creek (14 km²), located in Valsugana, Autonomous Province of Trento. In particular, we monitor bedload by means of Radio Frequency Identification (RFID) technology in conjunction with Passive Integrated Transponders (PIT) (e.g., Lamarre et al., 2005) injected into pebble-to-cobble sized tracer stones (b-axis ranging from 30 to 130 mm). In the Grigno Creek 120 PITs were released in December 2013 along a 100-m channel reach and have been surveyed 10 times. In the Tolvà Creek 100 PITs were released in July 2013 along a 100-m channel reach, and the site has been surveyed 4 times.

Particle tracking is conducted by integrating two complementary antenna types: (i) a portable one, which enables to estimate travel distances of tagged clasts; and (ii) a set of four fixed antennas (25m apart from each other), which allows detecting motion/rest periods of particles, entrainment thresholds and transport velocities.

Particle tracking is combined with on-site high-frequency (i.e. 10 minutes) water stage monitoring. Salt dilution method is monthly applied to relate flow discharge to water stage. The analyzed river reaches extend over different morphologic units (steps, pools, glides and boulder-cascades). We are looking to estimate (i) the channel forming discharge; (ii) a quantitative evaluation of specific bedload transport. These information will be associated to the surficial bed texture and bed morphology. Data collected from fixed and mobile antennas will enable to infer statistical information of the trajectories run by tracer ensemble, in particular the step lengths, the total travel distances and the rest periods.

Lamarre H., MacVicar B., Roy A.G. 2005 Using Passive Integrated Transponder (PIT) tags to investigate sediment transport in gravel-bed rivers. *Journal of Sedimentary Research*, 75, 736-741.