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First feedbacks on a new method using active transponders (a-UHF tags) for tracking pebbles in rivers

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In the last decade, low frequency (134.2 kHz) passive integrated transponders (PIT-tags) have become widespread and popular technique for tracking pebbles. It is used for the locating individual particles after flow events, estimating critical discharge and critical shear stress above which tagged particles are entrained. However, the low tracer recovery rates when deployed in active bedload transport conditions or large rivers, present a significant drawback (Table 2 in Chapuis et al., 2015). These are mainly due to detection range of in-field maneuverable RFID reading systems (typically < 1m; Chapuis et al., 2014; Arnaud et al., 2015; Cassel et al., 2016) leading to long, exhausting and not systematically successful surveys.
In order to increase tracer recovery rates and reduce in-field time prospection, we developed new coarse sediment tracers combining synthetic pebbles equipped with Ultra High Frequency active transponders (a-UHF tags). We characterized distances of detection in water and saturated sediment layer and proposed in-field protocol to determine tracer position with good accuracy (Cassel et al., 2017). First deployments of these tracers have been done in two rivers reaches characterized by challenging conditions: the Miribel Canal, a channelized stream with significant water depths (< 2.5 m) and alternated gravel bars and the Buëch river within a braided reach exhibiting large areas of emerged gravel bars. First surveys, conducted in 2017, show very encouraging results: rates are beyond 70%, mean and maximum distances of travel are of 323 and 1060 and of 982 and 3240 meters respectively for Miribel Canal and Le Buëch, obtained from very short in-field prospection time (< 8 day/operator per site). These first results confirm the interest of this new method for in-river pebble tracking. New methods of prospection are currently tested and articulated to optimize in-field prospection efforts according to study purpose, from sediment transfer continuity (only downstream distance needed) to macro form dynamics (2D accuracy needed).

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