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Hydrology and Earth System Sciences Discussions

Interactive comment on "Fluorescent particle tracers for surface flow measurements: a proof of in a semi-natural hillslope" *by* F. Tauro et al.

Anonymous Referee #2

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The paper by Tauro et al is a laudable attempt to bring a new technology to rainfall-runoff studies. The work follows several other papers recently completed by the group that deal with the development of the technique (Tauro et al. 2010; 2011a,b). The set-up of the paper would be enhanced if the reader understood more fully how the present work relates to these other studies. To the casual reader, a 4th proof-of-concept study may suggest a tough concept to prove? This is especially confusing since in the Introduction, the authors state that "In addition, a proof of concept experiment of the potential of the fluorescent particle tracer methodology as an efficient flow measurement system for outdoor environments is performed in the Rio Cordon stream in the Italian Alps (Tauro et al., 2011a)". So, why is a separate proof-of-concept required for small streams (i.e. rills)? What differentiates such flow measurement challenges

from the stream-based work? What specifically cannot be quantified currently vis-à-vis overland flow currently and how does the fluorescent tracer approach overcomes these limitations? Better development of this line of questioning would help greatly in the Introduction of the paper. At present, there is a glaring absence of key papers from the overland flow literature that might help place this work in some process context. There appears to be no reference whatsoever in the Discussion section to any overland flow studies, leaving the reader questioning if in fact, in the end, there is any qualitative advancement from the work (that can be applied to overland understanding)? This is reinforced by statements made in the Results and Discussion section where: "Estimations of the travel time through visual inspection are generally possible for videos depicting transits of the 1000–1180 μm particles. In this case, the analysis gives an average velocity of 0.33ms-1 over the ten experimental repetitions with a standard deviation of 0.02ms-1. This value is in good agreement with velocity obtained by using the rhodamine dye, that is, 0.34ms-1 with standard deviation 0.01ms-1. Experiments with smaller particles do not lead to accurate estimations of travel time due to the poor visibility of first beads arrival and potential dispersion." It is not at all clear how what advance is made here beyond what one can do with Rhodamine? This is especially true given the all the caveats regarding light issues in mid-afternoon?

This is a paper I wanted to like upon receiving it to review. We are woefully lacking in new experimental approaches in hydrology. The introduction of new techniques, even if they represent only small incremental improvements, is a great thing. However, I simply cannot see, in the current version of this paper, how the fluorescent approach represents such an improvement. It may be there. However, the current manuscript does not communicate the work in such a way that would allow a reader to know this.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 4465, 2012.