Geosci. Instrum. Method. Data Syst. Discuss., 4, C251–C253, 2014
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Geoscientific Instrumentation Methods and Data Systems Discussions
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Interactive comment on "A new instrument to measure plot-scale runoff" *by* R. D. Stewart et al.

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Received and published: 8 December 2014

Review of gid-4-589-2014, December 2014: A new instrument to measure plot-scale runoff, by R. D. Stewart, Z. Liu, D. E. Rupp, C. W. Higgins, and J. S. Selker

Evaluation Scientific Significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Geoscientific Instrumentation, Methods and Data Systems (substantial new concepts, ideas, methods, or data)? The paper presents a welcome and necessary innovation (good to excellent)

Scientific Quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? Yes, well considered with theoretical derivation of expected h/Q relation and sensible empirical correction. References: see remarks

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Discussion Paper

below.

Presentation Quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)? Very well presented, sound structure, English excellent.

Review The paper presents an interesting addition to the set of discharge measurement devices available for the study of surface runoff. Its main features are its low costs and the very large dynamic range (0.05 l / min to 300 l / min). The presentation is clear and complete, with a good structure. All claims are supported by measurements and due attention has been paid to consideration needed to apply the device in the field. I have no detailed comments and would recommend publication.

I do have some points of discussion, that cluster around one issue and that is timing. The first line of the abstract mentions the importance of timing, although this does not come back later in the manuscript. For proper understanding of runoff processes and associated scale issues, timing is crucial. The authors reference our paper (Stomph et al. 2002) but do not point to the extensive studies for which that device was needed. This is ok but also bit awkward given that a dozen or so references are mentioned some of which, at first glance, have less to do with the present study (Stewart et al, 2014?). The reason I put this forward is not so much that we are in desperate need for further quotations but that, based on these studies, my interest in this device is that it does open the possibility for very small delays between runoff occurring and runoff being measured, and reduction of associated smoothing of runoff peaks. The reason is that, just as with Stomph et al. (2002), the backwater curve would seem to be simple and knowable. For operational reasons, the installations to date arranged for inflow at the bottom of the UbeTube through an underground pipe, which would introduce a complicated backwater curve and loss of details in the shape of the runoff hydrograph. However, when timing of runoff is important, one would prefer to forsake these operational advantages and let the water simply run in from the top. The authors do not report on the storage within the device as a function of water depth but this

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should be easy to determine. With this additional information available, one would have a-near-instant runoff measurement device. This would also be ideal for use at the bottom of gutters and rain pipes to study urban runoff. The only real remaining problem would be the occurrence of momentum effects on the pressure measurements but these should be reducible through a careful design of the stilling well. So if some information on the h/V relation could be provided, even when only qualitatively, this would increase the value of the device/paper.

A final small remark concerns inflow of sediments. Is there any reason why these would not increase the density of the fluid in the stilling well? This may be another source of error.

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., 4, 589, 2014.