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# ***Interactive comment on “Detecting groundwater discharge dynamics from point to catchment scale in a lowland stream: combining hydraulic and tracer methods” by J. B. Poulsen et al.***

**Anonymous Referee #2**

Received and published: 7 February 2015

## General Comments

This paper aims to combine point, reach, and catchment scale measurements of groundwater-surface water interactions to assess the temporal and spatial variability of groundwater discharge in a lowland catchment setting by combining both hydraulic and tracer methods. This is an important step in how we study surface water-groundwater interactions, and fills a current gap in our knowledge, as many have indicated the need to quantify the impact of study scale on surface water-groundwater interaction results. The paper is technically sound, and, with a few minor edits in its presentation, would be a strong addition to HESS, as it contains significant scientific progress.

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My main overall issue with this paper is that the information about piezometer sampling and the spatial variability in head gradient are unnecessary to answer the authors' questions and could be removed from the manuscript, including figure 3. While interesting, they do not seem to fit in with the aim of the paper given in the abstract and introduction, which is to compare VTP, DTS, differential gauging, and hydrograph separation. If the authors wish to keep the groundwater head information, they should incorporate it into the abstract and introduction. As the paper currently reads, the head measurements seem to come out of nowhere.

### Specific Comments

The authors cite Sophocleous 2002 multiple times, and given the information about plagiarism in that paper (<http://link.springer.com/article/10.1007/s10040-014-1215-0/fulltext.html>) I would recommend removing all of those citations.

Page 13115, lines 28-29 and page 13116, lines 1-2: Are these correlations statistically significant? Please note their p-values.

Page 13116, line 24: How are the authors defining 'recovery time'? Is it 90% of pre-event water? 95%? This information should be added, and perhaps indicated on the graphs in Figure 7 c-f.

Page 13119, lines 7-10: Layout C is 1/3rd of the study, so I believe the authors need to more fully address why there is the discrepancy between signal strength and estimated fluxes in this location. After all, a third of the study does not show that these two methods show a correlation between DTS and VTP flux estimates.

Page 13120, line 1: this is exactly why you need to add error bars to figure 4 (see note below on figure 4)

Page 13120, lines 23-27: I would also cite Vidon and Cuadra, 2010, Impact of precipitation characteristics on soil hydrology in tile-drained landscapes, *Hydrologic Processes* 24

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Figure 2: The authors should combine these two graphs into one and help the reader to better visually assess the stream response to rainfall events.

Figure 4: The caption does not tell the reader where the vertical flux measurements are coming from. I'm assuming they are from VTP measurements, but that information should be added.

Figure 4: Error bars should be added to part b, or if they are too small to see because of the symbol size, that should be indicated in the caption.

Figure 4: The authors should indicate in part a and b of this figure where the tributary joins the main channel.

Figure 5. Error bars should be added.

Figure 8: The authors should show the uncertainties in the figure.

#### Technical Corrections

Page 13105, line 14: I would change 'wrong' to 'incorrect'

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 13101, 2014.

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