

Interactive comment on “Identifying runoff processes on the plot and catchment scale” by P. Schmocker-Fackel et al.

Anonymous Referee #1

Received and published: 1 September 2006

GENERAL COMMENTS

This is a very interesting paper, building on previous published work by Naef and Scherrer. This uses an empirical soils-based approach to mapping Dominant Runoff Processes (DRP) in catchments. In this paper, the approach is upscaled from the plot to the small (ca 1km²) catchment, using empirical soils data and a GIS.

The methods are well established and used nicely in this paper to gain a more comprehensive understanding of small catchment hydrology. The paper is well-written, well-structured and makes a useful contribution. My main criticism is that the paper is - in places - not well contextualized to the wider literature. I would recommend that some more theoretical and empirical papers be cited as background and discussion points

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to the m/s. This will help increase the impact of the work and help emphasise generic points rather than more site specific details.

DETAILED COMMENTS

1. Introduction

p2065 Line 10: explicit reference to the IAHS PUB agenda could be made - (cf Sivapalan M, Takeuchi K, Franks SW, Gupta VK, Karambiri H, Lakshmi V, Liang X, McDonnell JJ, Mendiondo EM, O'Connell PE, Oki T, Pomeroy JW, Schertzer D, Uhlenbrook S, Zehe E., 2003. IAHS decade on Predictions in Ungauged Basins (PUB), 2003-2012: Shaping an exciting future for the hydrological sciences. *Hydrol. Sc. J.* 48: 857-880.)

p2065 Lines 13-17: the paragraph on runoff processes is quite weak, and could be expanded and more detailed. Reference could be made to recent general papers (eg McDonnell JJ. 2003. Where does water go when it rains? Moving beyond the variable source area concept of rainfall-runoff response. *Hydrological Processes* 17: 1869-1875) and specific papers (eg Weiler M, Naef F. 2003. Simulating surface and subsurface initiation of macropore flow. *Journal of Hydrology* 273: 139-154.)

p2065 Line 25: Regarding HOST, some interesting recent work - relevant to this paper - has shown how this can be used to predict catchment response as the small to mesoscale (Soulsby, C., Tetzlaff, D., Dunn, S.M., and Waldron, S.(2006) Scaling up and out in runoff process understanding - insights from nested experimental catchment studies. *Hydrological Processes*. 20, 2461-65.)

p2066 Line 10: on the general links between plot and catchment response in hydrological classification, recent debate (eg Sivapalan M. 2003. Process complexity at hillslope scale, process simplicity at the watershed scale: Is there a connection? *Hydrological Processes* 17: 1037-1041.) could be referred to

p2067 Line 10: The focus of the paper is very much on soil-based approaches to runoff process conceptualization. Recent work (eg Haria AH, Shand P. 2004. Evidence for

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deep sub-surface flow routing in forested upland Wales: implications for contaminant transport and stream flow generation. *Hydrology and Earth Systems Science* 8: 334-344.) has shown the important of groundwater contributions to rapid runoff, such work should be referred to.

2. Study site

p2067 Line21. What is the relevance of the 46km² Aabach catchment. An interesting (yet undeveloped) implication of the paper is the upscaling issue. Is this possible with respect to the Aabach?

5 DRP maps

The results are very interesting, though I was hoping for some reference to upscaling in relation to what extent the small catchments investigated are Representative Elementary Areas (REAs) (see Wood EF, Sivapalan, M., Beven, K. and Band, L. 1988. Effects of spatial variability and scale with implications to hydrologic modelling. *Journal of Hydrology*, 102, 29-47.) that can be used at larger scales where flood management issues are more important.

6. Summary and conclusion

This lacks an element of synthesis/generic comment about larger issues in using field studies to identify hydrological controls on runoff generation (eg Sidle, RC, 2006. Field observations and process understanding in hydrology: essential components in scaling. *Hydrological Processes* 20: 1439-1445.) Some studies have, like this one emphasised the importance of soil-based scale-independent controls at larger scales (eg Soulsby, C., Tetzlaff, D., Rodgers, P. Dunn, S. and Waldron, S, (2006) Runoff processes, streamwater residence times and controlling landscape characteristics in a mesoscale catchment: an initial assessment. *Journal of Hydrology*. 325, 197-221.. Others emphasise the effects of topography as a scale independent control (McGuire KJ, McDonnell JJ, Weiler M, Kendall C, McGlynn BL, Welker JM, Seibert J. 2005. The

role of topography on catchment-scale water residence time. Water Resources Research 41: W05002.). Some enrichment of the discussion of the paper would link it to wider debates in the hydrological literature and emphasise generic issues. At what scales do the authors think the SN scheme can be used? Just in 1km² catchments? or 10km² or 100km²?

In summary, a very good paper, but one that needs strengthening by linking it into the wider literature.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 2063, 2006.

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