Hydrol. Earth Syst. Sci. Discuss., 10, C2902–C2904, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C2902/2013/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Contribution of directly connected and isolated impervious areas to urban drainage network hydrographs" *by* Y. Seo et al.

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Received and published: 1 July 2013

Referee #2

In this paper, the authors suggest a hydrologic approach, in which, they claim, the suggested model addresses the mass balance error observed in hydrographs in urban catchments. The suggested approach also incorporates the concept of connected and disconnected impervious areas where the connected impervious areas were referred to as effective impervious area(EIA) or directly connected impervious area(DCIA) and the disconnected areas were referred to as isolated impervious area(IIA). The approach is interesting in that few models have an ability to evaluate the contribution of each area, especially DCIA and IIA separately. However, in terms of the slow response in urban

catchment, the authors should know that SWMM has a similar function and need to mention it and discuss the difference between the suggested approach and SWMM in the manuscript.

Answer: The authors thank the reviewer for the comments.

The results of this study indicate that the performance of the conventional approach utilizing a width function is comparable with the IUHM and does not show great difference with the detailed SWMM results. Therefore, it implies that the performances of other hydraulic and hydrologic models (SWMM and IUHM) considered in this study can be greatly improved and possibly show better performances compared with the proposed approach in this study by considering the effect of infiltrated amount of rainfall in pervious areas. Moreover, this study incorporates the concept of directly connected impervious area and isolated impervious area to capture the flow characteristics in urban catchments and the proposed approach enables us to evaluate the contribution from each area.

In general, urban drainage systems consist of three parts: the overland surface flow system, the sewer network, and the underground porous media drainage system. Traditionally, no design is considered for the urban porous media drainage part (Yen and Akan, 1999). It is known that the groundwater discharge accounts for the time-delayed recession curve that is prevalent in certain watersheds (Fetter, 1980). This process has not, however, been account for satisfactorily modeled by surface runoff models alone (Huber and Dickinson, 1992). As the reviewer commented, SWMM has a subsurface flow routing subroutine called GROUND in Runoff Block based on physical processes of groundwater with a number of parameters. In contrast, this study suggest a relatively simple approach, which enables us to assess the fate of the infiltrated water that eventually reaches to the main drainage network and contribute to the direct runoff hydrograph by a parameter rb.

References

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 5605, 2013.