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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Prediction of direct runoff hydrographs utilizing stochastic network models: a case study in South Korea" *by* Y. Seo and S.-Y. Park

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The authors thank Prof. Kirkby very much for his valuable comments on the manuscript entitled "Prediction of Direct Runoff Hydrographs Utilizing Stochastic Network Models: A Case Study in South Korea", which was submitted to Hydrology and Earth System Sciences. To reply Prof. Kirkby's comments, explaining the basin idea of this study would be a good point to start with.

The idea of this study is started from previous studies by the authors; Seo and Schmidt (2012) realized that drainage network should be categorized in order to evaluate the

sensitivity of hydrograph to storm movement. They utilized Gibbs' model proposed by Troutman and Karlinger (1992) and the corresponding parameter value (beta) in grouping the network. The term 'synthetic' might be confusing, because it does not mean 'arbitrary' but it just means 'not real.' Seo and Schmidt (2013) developed the original idea of the study again and they used the term 'synthetic' in their article. Gibbs' model (or the Gibbsian model) is used to generate networks. However, it does not generates arbitrary network but a network, which can be highly sinuous or less sinuous depending on the parameter (beta) value. As the vale of beta increases, the generated network tends to be less sinuous (highly effective in drainage time) and vice versa. One of the things that Seo and Schmidt (2012) found was that the Gibbsian model with certain value of beta generates networks and width functions which is close to the existing actual width function. Therefore, the idea of this manuscript came out that the Gibbsian model can be used to reproduce the runoff hydrographs even we do not have detail of the drainage network and potentially it would be beneficial especially for ungaged basins. We applied evaluated the possibility of the idea to a test catchment in South Korea. For the purpose of transforming a width function to a hydrograph, the WFIUH (Naden, 1992; Franchini and O'Connell, 1996; Seo et al., 2013) was utilized.

In terms of contribution of hillslope hydrographs at this scale of a test catchment, the authors agree with Prof. Kirkby, but please be understood that the original intend of this study is to demonstrate the possibility of a stochastic network model replacing an actual drainage network. Therefore, the focus of this study is on that. The further analysis will be presented in the future works considering hillslope processes and resulting hydrographs.

Beta should be defined as it first shows up in Equation 1. The authors will include the definitionof beta with Equation 1 in page 7. To reply the comments on the presentation of the results, please refer to Fig. 4b-e in that how different values of beta result in different network configuration (page 12, lines 11-18). Figure 2a shows the reconstructed network of the test catchment and the grid size is 4 km. The authors will notify the

grid size, which was not given when Figure 2 first comes out in the manuscript. Lastly, modified Figure 11 is attached that the legend can be easily identified for refrees.

The authors thank again Prof. Kirkby for his comments to improve this manuscript.

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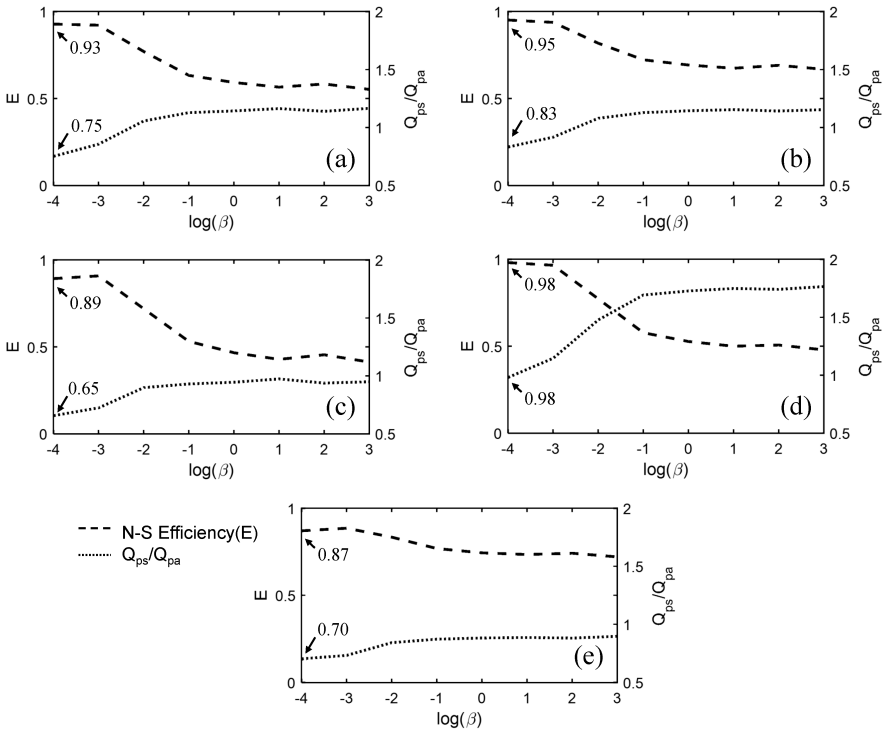

Fig. 1.