Hydrol. Earth Syst. Sci. Discuss., 10, C1048–C1050, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C1048/2013/

Hydrology and Earth System Sciences Discussions

Interactive comment on "The effect of watershed scale on HEC-HMS calibrated parameters: a case study in the Clear Creek watershed in Iowa, USA" *by* H. L. Zhang et al.

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Received and published: 23 April 2013

1. Comment: Page 10, Line 16-17: "Fig.4 illustrates that the mean of drainage density tends to decrease as the mean of sub-watershed area increases, while the average longest flow length increases." This statement is inconsistent with Fig.3 in which it showed that the flow length increases while the sub-watershed area decreases. And the Fig. 4(b) may be wrong, please check carefully.

Authors' reply: Thanks very much for the question. "the average longest flow" here means to be the average value of all of the longest rivers within each sub-basin, that

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the value indeed decreases as the sub-watershed area decreases. We guess it might lead to a misunderstanding that "the average longest flow" stands for a total river length within the whole watershed. To avoid potential misunderstanding from other readers, we changed the sentence as follows:" Fig.4 illustrates that the mean of drainage density tends to decrease as the mean of sub-watershed area increases, while the average of longest flow length within each sub-watershed increases".

2. Comment: It is not clear how the author calibrated the model parameters. Was the value of model parameter for each sub-catchment the same or different?

Authors' reply: Parameter values for each sub-basin are different, that's why we used "boxes" for all charts, of which the 30th and 70th percentiles demonstrate the spectrum of watershed areas and calibrated parameters. A number of parameters have to be calibrated in HEC-HMS, and the procedure is stated in the manuscript (Page 10, Line 11-15):" The initial step in model calibration is a manual adjustment of model parameters using the trial and error method, which enables the modeler to make a subjective adjustment of parameters that gives an appropriate fit between observed and simulated hydro-graphs (Oleyible and Li, 2010). An automatic optimization algorithm built into the HEC-HMS 3.4 implementation follows this step."

3. Comment: If the model used the same parameter value for all sub-catchments, it is not super-size that the model performances at the Coralville and Oxford gauge were different. This difference might be caused by the differences in the landscape conditions, e.g., the land uses.

Authors' reply: As answered in comment 2, parameter values are different for every sub-basin. The difference of model performances between the gauges of Coralville and Oxford are not very significant, and the main reasons could be due to many reasons, e.g. the landscape conditions, the heterogeneity of hydro- meteorological inputs, and the initial assigned values of the parameters, etc. The simulated outflow at the interior point illustrate that the HEC-HMS model's ability to simulate internal dynamics

(Page.13 Line 21-22), which also further indicate that model performance at the outlet does not translate to the ability of the HEC-HMS to describe the interior dynamics of water in the basin (Page .14, Line 9-10). With the above in considerations, the roughly approach between simulations and observations at Oxford, as well as the differences between simulated outflow at Oxford and at the outlet are not critical for the argument of watershed scale effect.

4. Comment: If the model used the same parameter value for all sub-catchments, is the scaling property of model parameter meaningful?

Authors' reply: Thanks very much for the question, and as stated in comment 2 and 3, parameter values for each sub-basin are different. It true that the significance of this manuscript is based on the variation of parameters values between different sub-basins and different configurations.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 965, 2013.