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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.

Anonymous Referee #2

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The authors are requested to make corrections, or provide more explanation / data in the following sections:

Study site and data:

1 "CCW receives an average annual precipitation of 889 mm, and the average annual runoff is 68$\times$106m^3", $here 106 should be 10^6$.

2 In an area with "an average annual precipitation of 889 mm", the use of "Hourly precipitation Stage IV products for this region" may be a key weakness of the model, because rainfall intensity for 30 min varies greatly for the same hourly intensity. Some analysis should be made concerning the climate and rainfall pattern of this area and its

impact of the model performance when hourly precipitation data is used in the model.

Fig 5 and Fig 6 comparisons of "April flood, June flood, April flood with June parameters, and June flood with April parameters" is very interesting and more analysis should be made based on these two figures, e.g. to reveal the implication of some parameters related to pre-event conditions (why the model performance in April and June differ despite the specifically calibrated parameters?)

Fig.7

It maybe difficult to compare initial abstraction in April and June without referring to the rainfall pattern, i.e., do they have the same 30 min rainfall intensity (mm per 30 min) in April and June? Is it possible that the larger abstraction in April was a result of smaller but persistent rainfall intensity (resulting in runoff after saturation) than June? And smaller abstraction in June maybe caused by larger rainfall intensity that did not last for a long time (resulting in runoff when rainfall intensity is greater than infiltration rate)? These are more related the physical process considered in the HEC-HMS model than the effect of watershed scale on HEC-HMS calibrated parameters.

About Fig.10:

1 "proportions of surface flow and initial abstraction follow a relation that decreases approximately monotonically with watershed size" - is this related to the fact that the model is constructed in such a way that the total length of channels increases with the watershed size (or the number of partitions)? So that it will take longer for the runoff to reach the outlet if the watershed is larger with more partitions, and therefore more water will be infiltrated on the way and deduced from surface flow. Please explain more.

2 "the configuration with 1 sub-basin .... is regarded as one whole unit. ... there is no channel within the watershed, and all of the water mass has to be lost at the hillslope " - this is obviously something in the model to be improved; the original developers of such a model did not expect that users shall use a "configuration with 1 sub-basin".