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Interactive comment on "A Framework for Automatic Calibration of SWMM Considering Input Uncertainty" *by* Xichao Gao et al.

Anonymous Referee #2

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The study investigates the effects of rainfall errors and parameter uncertainty on SWMM rainfall-runoff simulation and calibration. It brings together existing methodologies (SWMM, DREAM, rainfall error model) and presents an application for a small urban catchment in China.

This is an interesting topic but I have several critical comments on the current manuscript.

-novelty: the presented methodology is not really new, but is mostly an application of existing methodologies to a SWMM modeling case study. The paper would be much more novel if the results would be used to gain new insights about the system's response and test additional model improvements. In other words, also bring in structural model errors, since they appear to be significant in the case study (see below).

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-the main conclusion of the paper is that accounting for rainfall errors improves simulation of rainfall-runoff response with SWMM. For example on line 295: "The results show that the runoff simulated with considering both parameter uncertainty and input uncertainty captures peak flows much better than that only considering parameter uncertainty, especially for the validation period." This conclusion is not supported by the results in fig. 5 and 11, which show mixed results, i.e. both better and worse performance after accounting for rainfall errors.

-several modeling assumptions are not met. For example, the residuals are assumed iid gaussian. This assumption is clearly violated in figs. 5 and 11, which show significant systematic deviations between simulated and observed discharge, that indicate one or more aspects of the system are not captured in the model. Another example relates to assumed unbiasedness of the rainfall measurements, (line 152). Results of the case study show that estimated rainfall multipliers are all greater than 1 (fig. 9). So at least for the case study, the unbiasedness assumption needs to be revised. Indeed, if, as suggested by the authors, rainfall errors are caused by wind-related undercatch, then one can expect systematic underestimation of rainfall.

-line 154: it sounds like the optimal value of sigma_m was obtained "manually", but such manual calibration was criticized earlier in the introduction. Why not automate the estimation of sigma_m? Either by jointly estimating sigma_m together with the other parameters, or if possible, integrating out sigma_m from the posterior before running MCMC.

-how was sigma_e (residual standard error) in eq.6 estimated?

-line 170: empty parentheses, missing equation?

-the case study considers a very small catchment, is spatial variability of rainfall an important source of rainfall error here (as suggested in the introduction)?

-line 191: why are these rainfall events selected and why so few? The small number of

events considered here limits robustness of any conclusions drawn from the analysis.

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