HESSD

Interactive
comment

Interactive comment on "A bootstrap method to estimate the influence of rainfall spatial uncertainty in hydrological simulations" *by* Ang Zhang et al.

Anonymous Referee #1

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GENERAL COMMENTS The authors set out to establish a simple method for estimating the uncertainty of areal rainfall estimates on hydrologic simulations. While such approaches have been broadly considered (and are well cited in the introduction), the authors suggest that existing approaches lack an ability to be extrapolated to other places. Presumably the authors believe their approach addresses this, though that is not explicitly clear to the reviewer. Even if this were the case, unfortunately the modeling study suffers from fatal flaws that prohibit further interpretation of the results. Namely, the authors rely on running a 6-min simulation model with 2-hour forcings (precipitation). This causes multiple problems with model behavior (see specific comments). Additionally, the model clearly suffers from misspecification as a result of over-

fitting – demonstrating that the curve can be matched but at the expense of process fidelity.

SPECIFIC COMMENTS P3.L14-16: Is the argument for this study that a more straightforward methodology is needed? Or simply that this type of study needs to be performed at more sites than it has been to date?

P3.L24-25: In L12-14 on this page, you argue that results are not reliably extrapolated to other locations, so can your study really accomplish this, as stated?

P4.L30-31: Why use Thiessen? Why not use something more sophisticated?

P6.L1-3: Why are you using 6-min time steps here, when DYRIM performance above (P5.L26-29) is noted as satisfactory for daily to monthly time steps?

P6.L6-8: How many parameters are in DYRIM, how many need to be calibrated?

P6.L28-29: Why would you use this rather than something like SCE-UA or DDS, which are recognized to be the "best" global optimization algorithms for hydrological applications?

P9.L3-4: But, if you don't have 6-min forcing data, what does the 6-min runoff simulation get you? I am also concerned by the number of ad hoc adjustments being made in the model implementation (disaggregating rainfall data to smaller time steps, selecting the nearest observed runoff time for NSE evaluation, etc).

P9.L13-14: Exactly, you can't really simulated 6-min runoff with 2-hour rainfall. My question, then, is what value do these results have? The study would be stronger if the data fit the desired framework. . .

P9.L14-16: So why use Thiessen method?!

P9.L16-19: This is a clear flaw in the study design. Any interpretation of these results will naturally be influenced by this.

P9.L21-22: Why should the vertical saturated conductivity of the topsoil change so much? Shouldn't this value theoretically be constant? Aren't these changes representative of compensation of other errors in the modeling?

P9.L25-26: But it doesn't prove that it achieves this performance for an appropriate reason. This is just curve fitting, isn't it?

P10.L6: How would you utilize these results to improve rainfall gauging density or placement? Can you predict these locations without already having measured rainfall? If not, then what is the benefit?

TECHNICAL CORRECTIONS P2.1-2: "more" reliable. . .

P3.3: Change "good fit" to "goodness of fit"