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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Scale effect challenges in urban hydrology highlighted with a distributed hydrological model" *by* Abdellah Ichiba et al.

Anonymous Referee #2

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General Comments

It is disappointing that this seven author paper has not been better prepared for peer review. A simple comparison with the related excellent paper by Gires et al. (2017) in HESS, applying similar fractal analyses to semi-distributed models for a variety of catchments, illustrates what might have been achieved if the seven authors had combined their respective strengths to prepare the paper thoroughly for peer review. This takes time and requires attention to the detail of presentation. I would encourage the authors to do just that in a resubmission.

Some pointers are:

1. Introduce equations as part of a sentence and define symbols as they are intro-

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duced.

2. Comply with the preparation guidelines of HESS: Table caption at top etc.

3. The English should be improved to the standard of Gires et al. (2017). The abstract provides a good example of where improvement is needed. Punctuation, plurality (data are) and use (omission) of the definite article requires attention, for example.

4. Be considerate of the peer reviewers' task. Prepare a paper fit for external review through a process of thorough internal review. It should be a delight to read like Gires et al. (2017).

Now turning to the science contribution of the paper.

The paper complements and goes beyond that by Gires et al. (2017) by focussing on a single urban catchment (Sucy-en-Brie) and using a model (Multi-Hydro) that is distributed.

A key feature investigated through fractal analysis is how different spatial properties (land use, impervious cover, sewer structure) are introduced into a distributed hydrological model configuration at different scales (model resolutions) and how this impacts performance. Priority and Majority rules are compared: obviously this can make a big difference to model response as a function of scale (model resolution) and this is demonstrated for impervious cover. The authors do not consider alternatives to these rules to make the formulation more scale invariant such as a fractional approach. This deserves some comment.

The paper seems more motivated by creating and observing multifractal behaviour than addressing the modelling problem it presents: some more discussion of the latter would be good. Also, more detail needs to be given on how these properties function within the model to gain clearer insight and understanding (for example, the precise meaning of imperviousness coefficient needs to be understood in terms of model function).

The science of the paper, and the practical application addressed, is of interest and

deserving of publication in HESS. However, the paper presentation requires thorough revision followed by re-review.

Some more detailed comments follow.

Detailed Comments

P1 Very brief guidance on improving the abstract follows (as an example). "Hydrological models are. . .activities. There is a growing interest in the development..such model implementation. . . .crucial problem, and model performance. . .Both the structure. . .modeling investigation is. . .17 spatial resolutions. Results demonstrate scale. The fractal concept. . .with the Multi-Hydro model. . .and confirmed through modelling. This work also discussed. . .requirements. The principal findings. . ."

P2 huge amounts of data. . .hydrological models becomes relevant..aggregation and disaggregation. . .is obtained using a high-resolution grid. . .

P3 . . .representation. They found. . . physically-based models: a 10 m . . .used to configure urban storm models. . ...the multi-Hydro. . .assigned to each pixel

P5, 6 imperviousness coefficient

P7 . . .sensitivity of the Multi-model to land use. . .(should this be the Multi-Hydro model???)

P10, 11 These equations need to be introduced properly as part of a sentence and terms defined as they are introduced.

P10, 11 and elsewhere. More care needs to be taken with the word "parameter". NSE is Nash-Sutcliffe Efficiency (a performance metric or statistic, not a parameter).

P11 The inequality is wrong.

P12 The purpose of this selection. . .

P14 imperviousness coefficient ???

P14 Section 5.1.3 heading – remove : (and elsewhere)

P14 which assigns a unique land cover

P14 land use classes (not soil)

P17 . . .spatial variability among these properties. (not parameters)

P17 In fact all indicators reveal a similar trend of higher performance at smaller scales. (Not parameters.)

P19 Improve style of “We found it important here. . .”

P23 Dehotin et al. is no longer in HESS Discuss.

P23 Gires et al. now published in HESS 2017.

P24 Rafieeinasab et al. (2015) – correct reference to Journal of Hydrology

P24 Thibault and Crews (1995) – correct reference to “Flux, 19, 17-30, 1995.”

P25 Yanshi and Kaixuan – Change title to mixed case.

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