Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-286-RC1, 2017

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.

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Received and published: 16 June 2017

General Comment The effect of grid size (referred to as scale) in the hydrology modeling of urban sites is investigated. Two scenarios and 17 grid sizes are considered and the model results are compared to observed flows. The model itself is explained very well with enough supporting materials. The results are statistically analyzed and the performance of the model for each scenario in large, medium, and small scale is obtained based on different factors as well as agreement likelihood and runtime.

The paper is well written with an interesting topic. The paper was successful to discuss its title. It means that a reader can get an actual sense of the scale's effect on the urban hydrology model after reading this paper. Results are presented in informative graphs,

however, in poor quality. Results are also discussed with different parameters that affect the model performance with a clear conclusion.

I just added some minor comments when I was reading the manuscript. These are more in suggestion format. Therefore, it's up to the author to accept, reject, or modify the comments especially those referring to rephrasing.

I vote for a minor revision.

Specific Comments

The abstract is a bit long and it usually should be a single paragraph. I suggest to move the first paragraph to introduction section (if it suits) and merge the second and third paragraphs to a single paragraph.

In Abstract, line 11, don't cite a reference in the abstract section.

Page 2:

Line 15: calibration step should force the model to represent the observed data points not to represent the needed performance. On the general picture, a well-calibrated model can have a low performance depending on the definition.

Line 24: "The choice of an appropriate spatial resolution is always a crucial problem and the obtained model performance depends highly on the chosen implementation scale." -> reference is needed.

Page 3:

Line 2: "they found that grid size effects influence physically based models" -> I would rephrase to: they found that the effect of grid size on the model performance is not linear where . . .

Line 5: give a sentence about their result or remove this line.

Line 12: before dive into the model description, explain a few lies about fully distributed

and physically based models in hydrology. Or do it in the introduction section.

Fig 1: The size and quality of figure 1 are low. It's not readable.

Line 18: what do you mean by "physical equations"

Page 4:

Line 5: Saint-Venant equations -> reference is needed

Page 5:

Fig 2: why in "with majority rule" matrix (in lower right), the pixels in (row:3, col:3) and (row:4, col:4) are red. Shouldn't be gray or yellow, depends on their covered area?

Line 1: "Multi-Hydro core ensures the connection, interaction, including a retro-action, and data exchange between these four modules after each time loop of 5 min." ensures what? Not clear, please rephrase.

First paragraph: The whole paragraph can be reorganized. This is a very messy explanation of a model.

Page 6:

Fig 3: the resolution of the legend is low.

Page 7:

Fig 4: The size and quality are poor.

Line 1: "the literature" -> which literature? Add reference or use another notation

Page 8:

Paragraph 1: move the whole paragraph to the introduction.

Page 9:

Fig 5: The numbers in y and x-axis are hard to read. Generally, the quality of graphs

presented in this manuscript is low. When your paper is published, researchers first look at your graphs to see if that paper worth to download or not. So, I suggest using HD quality graphs always. Merge the second paragraph to the previous one.

Page 10:

Parag 1: No need to explain correlation coefficient and to introduce its equation. It can be found in any statistical textbook.

Page 11:

Line 1: "value of β = 1 indicates a perfect match between the observed and simulated" -> not true. The β = 1 can show an ideal match, but still, we can have leads square error greater than one.

Page 12:

Line 12: "suggesting that the pluvial network structure occupies almost the whole 2D space" -> why?

Page 15:

Comparing Fig 11 and 12, why the difference between the yellow and gray portion of each bar are significantly different? On the other hand, how come that switch between scenarios can substantially change the portion? It shouldn't be that different.

Page 16:

Line 4: 20% and 80% quantiles -> why not 95% confidence interval (2.5% to 97.5%)

Line 6: R2 isn't a better indicator for model accuracy evaluation?

Page 20:

Line 1: some fluctuations of these performances are noticed -> how can performance fluctuate? It's not clear. Maybe oscillation is a better word here!

Conclusion:

Please first explain about the goal of the study. The conclusion section should be a summary of your study plus the result. You just dived in the results section.

Technical Correction

title:

I think scale's effect is a better word. But I'm not sure if you want to change that entire the manuscript. "Scale's effect on the urban hydrology . . ."

Page 2:

Line 2-4: break down the sentence to two.

Line 7: Move the (Salvadore et al. (2015)) to the end of the sentence.

Line 11: Please add at least one reference for each type: (lumped models, semi-distributed and fully distributed)

22: change "much more important" to "more important"

Line 25: "The appropriate spatial resolution is obviously linked to the quality of data available, its spatial resolution and the modeling goal", the "its spatial resolution" is redundant.

27: "is obtained" -> can be obtained.

30: been investigated by . . . -> been investigated by researchers, for example . . .

Page 3:

Line 2: DEM -> Use full form before first application of any abbreviation

Line 3: effects -> affects

Page 4:

Line 12: Environmental Agency -> Environmental Protection Agency

Line 20: demanding -> demanded

Line 27: unique land use class -> unique class of land use

Line 29: majority rule -> rule of majority

Page 6:

Line 2: imperiousness or impervious?

Line 3: is a separate one and storm water -> is a separate from storm water

Line 14: very good -> high

Page 7:

Line 3: a separate one -> a separate distribution system from storm runoff system

Line 3: use "system" instead of "one"

Page 9:

Line 9: is represented -> as represented

Page 19:

Line 13: the model shows its better performances -> the model shows a better performance OR the model shows its best performance

Line 14: values between 0.54 and 1.25, its mean is around 0.89 -> values between 0.54 and 1.25 with a mean around 0.89

Line 17: the model performance remains good -> the model performance remains high

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