Hydrol. Earth Syst. Sci. Discuss., 11, C2244–C2249, 2014
www.hydrol-earth-syst-sci-discuss.net/11/C2244/2014/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "On the sensitivity of urban hydrodynamic modelling to rainfall spatial and temporal resolution" *by* G. Bruni et al.

Anonymous Referee #3

Received and published: 7 July 2014

The paper addresses the question of the impact of rainfall variability in urban areas which is a topic highly relevant to urban water management. Papers on this issue are welcomed. However I believe that some aspects should be significantly improved before publication and that the modifications needed require a major revision.

General comments

The following general points need to be addressed by the authors in the revised version:

- More explanations on why these indicators were chosen should be given.

- A pedagogical and presentation effort should be made with regards to all the param-

eters presented. Their significant number makes the paper quite hard to read. A first idea could be to move the presentation of "scale lengths" in data presentation (a way to characterize catchment and rainfall) and only keep the ratios in the methodological section (the purpose of the paper).

- Results are potentially strongly biased by the fact that rainfall events were centred on the studied catchment. See detailed comments below. A possibility could be to carry out simulations with other storm locations.

- The conclusions drawn from the curves are not always obvious and the threshold values for the dimensionless numbers seem rather arbitrary.

- I think it would be interesting to show not only relative results (%) but also absolute ones (ex: superposition of hydrographs)

- The use of fully distributed model, which could possibly be more suited for such study, should at least be mentioned.

- Given that rainfall is intrinsically a space-time process it would interesting to change both the spatial and temporal resolution at once.

- Although I am not a native English speaker I noticed some errors (p 5997 l 20 : "madre"; p -6006 l17: "to" should be "of"). Please carefully check.

Detailed comments

1) Introduction

- p. 5993 l.27: "rain gauges" , I would rather mention "rain gauges networks".

- p. 5994 l.5-6: "these radars ... C-band radars." ; they do not measures intrinsically closer to the ground, it is simply that since the data is usable only with a smaller range than the other radars, indeed the beam is pointing at locations closer to the ground (but the same ones as for the other radars within this range).

2)

2.1)

- 1st paragraph : may be a figure would be helpful to illustrate the local settings

- For pedagogical purpose, I would include here the definitions of runoff length to characterize the model resolution. The parameter for sewer system should also be mentioned here I think, if discussed (see comments below).

- More details about the rainfall-runoff generation should be added.

2.2)

- Why these events were selected ?

- The temporal evolution of the average rain rate over the studied area should be displayed.

- The radar did not measured rainfall over the Rotterdam catchment. It should be discussed the orientation of the storm with regards to the catchment that was chosen.

3)

3.1.1)

- More details or additional references should be added with regards to how variograms are practically computed, and also with regards to anisotropic ones.

3.1.3)

I do not understand how the sub-catchments are delineated. Could authors try to reformulate or add more details. Why are they denoted “independent” in Fig. 2?

3.2)

- May be one paragraph per parameter would be help the reader in its reading. Adding the equations and not only sentence would also be a good thing.

-p.6000 l.20 – p.6001 l.2 : more discussion on this parameter is needed. “Reduction of gradient” : what is meant? At what scale ?

- Is the sewer sampling number really needed? Indeed from my understanding the relevant feature to characterize is the size of areas for which rainfall is considered as homogeneous, which is done by the “runoff sampling number”. I do not really get the added value of “sewer sampling number”, while it adds some complexity for the reader.

- p.6001 l.17: from my understanding the “lower” should be “greater”. Please check.

4)

4.1.1)

- Figure 3 and comments : The mean and standard deviations are computed over what? Why standard deviation =1 for the highest resolution?

- As said in the text the “smoothing effect” (Figure 3 and fig 4) is due to the fact that a portion of rainfall is removed from the catchment boundaries because of the averaging. I have the feeling that the conclusions are strongly biased by the fact the storms are artificially “centred” on the catchment, which would not necessarily be the case in reality. For example if the heaviest portion of the storm is nearby the boundary, coarser resolution would “bring” water to the catchment, the decrease observed in the mean would be an increase... More comments/tests/simulations are needed on this point.

- The threshold of 0.2 seems rather arbitrary and if it really exists (see previous comment) it should be justified more in depth.

- The title of Figure 3 should be removed or changed

4.1.2)

-p.6004 l.10 : “at every node of the model”. If the nodes are not evenly distributed, it may introduce a bias by giving more weight to a portion of the catchment than the others. Furthermore since all the nodes are taken into account, some water “is counted”

more than once...

- p.6004 l.12-13: it does not seem obvious from the curves..., for instance for event 2 it seems to be the contrary.

- p.6004 l 14-15: “the largest effect... event 4”: again (see comments in 4.1.1) it could simply be due to the “artificial” location of the heaviest portion of the rainfall. Simulations putting heavy rainfall at the highest resolution on the hedge of the catchment could be an easy way to test this.

- p.6005 l2-5 : “furthermore . . . depths”: it seems quite hard to conclude this from the data (ex event 2 seems to exhibit the contrary)

4.1.3)

- Personally for clarity I would include this section in the data presentation section because it is just a way to describe more precisely the rainfall data

- More details or additional references on the method implemented should be added.

- for Evt 3 and 4, it should be computed also for distance greater than 2 km, since the plateau is not reached for some angles

4.1.4)

- p.6006 l23 -24 : “for all events . . . and 1” it is not obvious from the curves and should be discussed more precisely

- Again the 0.9 threshold seems very arbitrary and should be justified.

4.1.5)

- The title of Figure 3 should be removed or changed

- p.6007 l.26-27 : the average is taken over what?

- p.6008 l.1 : the equal sign should be >? please check.

- Same comments as before with regards to the threshold value...

- The widening of the scattering of points with increasing RR/RRL should be discussed

4.1.6)

- p.6008 l.11 : may be 100m2 should be 100 m x 100 m, please check

- p.6008 1.2-13 : “the idea . . . resolution”; this is not completely accurate since the effect mentioned strongly depends on the size of the runoff areas..., which is why I do not fully understand the relevance of this indicator (both runoff and sewer ones are strongly linked)

- p.6008 l.17-18 : two regimes are mentioned, which is in contradiction with the linear trend showed on Fig 9. Please clarify

4.2)

4.2.1)

- I believe that much more comments are needed (the loss of concavity for event 3 . . . among other)

4.2.2)

- the duration of the intense period of the rainfall should be added to the discussion of the observed time shift.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 5991, 2014.