

Interactive comment on “Developing an effective 2-D urban flood inundation model for city emergency management based on cellular automata” by L. Liu et al.

Anonymous Referee #2

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General comment

In this work the Authors present a new cellular automata (CA) model to simulate inundation dynamics in urban areas in case of extreme storm events. The Authors present the model calibration and validation and compare the model performances with those obtained by using a 2-D physically-based hydraulic model. The analysis matches the journal scope, the paper is well organized and, in my opinion, it is suitable for the publication even though there are some issues that need to be addressed.

Comments:

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- Abstract-L10: When you say 3x3 cell I suppose it refers to meters. I think it is better to explicitly define the unit of measure.
- P6177-L3: Please correct Zanobetti.
- P6178-L21: Please notes that T, here indicated to represent the transition rules, may be confused with T adopted in Table 1 as the time step of the model. I would suggest to use “t” for the CA time step as adopted in other parts of the manuscript (see e.g. P6179-L15).
- P6179-L7: “urban object” sounds not very appropriate in this case; may be land-cover or land-use should be more adequate.
- P6179-L8: Please reword this sentences, it’s a little bit confusing: 16,57% seems to be the infiltration rate, not the pervious area.
- P6179 Eq. (2): at line 4 Authors say that the infiltration process is represented by a temporally-varying infiltration rate for each pixel but in the eq. (2) Ra is not represented as a function of t. Furthermore, looking at Table 2 Ra seems to be constant during the simulation. If I am not wrong it should be stated that the infiltration process is only a “spatially-varying” process, whereas the only temporal limit is due to the presence of the infiltration threshold. Finally, since I suppose Ra is defined at each computational cell, it would be more clear refer to “cell a” instead of “object a” at Line 15.
- Eq. 6: What does the term A refer to?
- P6181-L7: Are you sure that the total number of cell involved in water re-distribution are 6? Looking at figure 1 and P6181-L2 I would say they are 5.
- Eq. 7: Please take care of the consistency of the variable names in the overall manuscript. Here n and S are used to indicate the roughness coefficient and the surface slope, respectively, while Table 1 reports a different meaning for S and a different name for the roughness coefficient.

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- Table 1: infiltration rate is indicated as “Ir” while in the text is used “Ra”.
- Figure 1: It will be more clear if you add the cell numbers.
- Figure 2: The width of the study area is very small. Are there some reasons for that? How did you define the catchment contours? Since the slope of the area seems not trivial I wonder if and how the water run-off over the roads are considered. In other terms, does the model consider eventual lateral water inflows coming into the study area through the streets? Which hydraulic conditions did you define at the catchment outlet? Can the water flow outside the system? I think a deeper description of these aspects should be provided.
- P6185-L3: How do you define the outlet capability? It influences the water depth into the study area and need to be clearly described.
- P6182-L22: Usually Figures are reported in the order they are referred to into the manuscript (Figure 5 should become Figure 3; please consider the possibility to reorder the positions). In any case, in Figure 5 it is not clear what are the points to which observed and simulated water depths refer to. Please correct the caption adding also the simulated water depth.
- P6182-L25: The first time an acronym is used is better to fully describe it.
- Chapter 4: Considering the discussion reported into this chapter I would suggest to rename it as “Results and Discussion”, while chapter 5 may simply be renamed as “Conclusions”.
- Figure 3: as for Figure 5 there are no indications about the point of interest for the simulated and observed water depth (see e.g. points in Figure 6a).
- P6183-L14: Are there some references concerning those typical infiltration values?
- Table 2: Are those simulations enough to evaluate the sensitivity of the model? Impermeable land and road always adopt the same Manning's coefficient, is it necessary

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to distinguish those elements? What is the difference? Please, add also the variable names to the table.

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