Dear Schumann,

Thank you for all your helpful comments. I am sorry being late to finalize the evaluation report for testing the algorithm in a Java platform. We summarize our major changes as following.

First of all, we revised all the inappropriate words or sentences corresponding to your suggestions.

Secondly, we carefully address each comment and reply them in detail.

Thank you for your referee service with our manuscript.

Sincerely yours,

Yong Liu, Lin Liu

This paper describes the use of a cellular automata (CA) modeling approach to simulate urban area flood inundation in an efficient way for emergency response management and compares results to another model as well as field data.

The paper is very well written and falls well within scope of the journal. I think this paper deserves publication after some moderate revision.

Comments:

1. L19P3: Please delete 'of '

Re: corrected as suggested.

2. L23P3: I would reword this sentence to: "especially in the context of ancient and emergent urban areas as a result of rapid urbanization of China"

Re: corrected as suggested.

3. L24P3: Please replace 'hard' with 'difficult'

Re: corrected as suggested.

4. L25P3: Time scales may be larger, so I would rephrase this to: "at time scales as small as tens of minutes."

Re: corrected as suggested.

5. L26P3: Please replace 'complicated' with 'complex'

Re: corrected as suggested.

6. L27P3: "immense amount of time." What time? I assume here you mean "computation time"? Please clarify

Re: Yes, calculation of the differential equations in physics-based models requires immense amount of computation time, especially in a large natural catchment. We have replaced "time" with "computation time".

7. L27P3: I would rephrase this to: "In contrast, floodplain inundation is most often characterized by a much slower varying phenomenon"

Re: corrected as suggested.

8. L8P4: '... often leads to a less accurate result.'

Re: Added "to" after "lead".

9. L20P4: When you say final, I assume you mean 'maximum'? To me the word 'final' in a process means in the case of inundation, all water would be drained. Please revise this word

Re: Yes, replaced "final" with "maximum".

10. L27P4: I think here it is important to note that the main reason these methods are so speed-efficient is precisely because they ignore important flow governing terms and really only use the gravitational term of the 2-D shallow water equations, as mentioned in the text. This is not

to say that I don't agree with the CA method; in fact as proposed here for urban emergency management I think it is a very sensible choice. However I think the reader should know that the CA method does not solve all terms in the equation necessary to replicate the full dynamics

Re: Agreed, and added two sentences at the end of the paragraph. "While it is a sensible choice to only use the gravitational term of the 2-D shallow water equations for urban emergency management, it should be noted that the algorithms in CA models not solve all terms in the equation necessary to replicate the full dynamics."

11. L10P5: Please correct spelling mistake in 'LISFLOOD-FP' here

Re: Corrected to "LISFLOOD-FP"

12. L10-L20P5: Please revise this paragraph of LISFLOOD-FP. As it reads at the moment it seems the newer version of the model after Bates et al. (2010) is similar to your CA method described. This may be somewhat true for the floodplain solution used in the Bates and De Roo 2000 version of LISFLOOD-FP; however the newer version is much different and solves for all the shallow water terms except for advection

Re: Yes, the newer version of LISFLOOD-FP solves for all shallow water terms except for advection. We have downloaded the 5.9.6 version (Bates et al., 2013) on the website, and tried to test in our study site, however the input data it required such as the boundary conditions, channel geometry are difficult to obtain.

These sentences "Although these work have been done to predict flood inundation, the data requirements in LISFLOOD-FP model setup (5.9.6 version), such as the boundary conditions, channel geometry and friction (Bates et al., 2013), are difficult to obtain particularly in an urban area. The detailed urban features that affect the storm water drainage, including buildings, roads, curbs, inlets, and so on, are not 20 explicitly prescribed in the model." are revised to:

"However, a non-linear model including both friction and wave propagation behavior will be complex, Bates and Horritt et al.(2010) presented a reasonable approach which considered only inertial term for low computational cost. Thus, in some circumstances such as urban emergency management, it is pragmatic to simplify the flow governing terms."

13. L10P6: Please give a reference to the Von Neumann neighborhood

Re: Add a reference here: Theory of Self-Reproducing Automata (Von Neumann 1966).

14. L9P7: How did you obtain this infiltration % (16.57)? This is a very precise number, please elaborate

Re: It (16.6%) is the percentage of pervious land in our study area, and is calculated from the land use map derived from high resolution airborne images.

15. L10P10: Why is the area chosen so small (about 400 m x 400 m)? Was rainfall concentrate only in this part of the urban area? Please elaborate

Re: Our study area is relatively small and is determined by the drainage area in the downtown area. Common flooding events in a natural watershed inundate large areas and last for hours and days. In contrast, urban flooding events usually occur in a small and even in a tiny sub-catchment

and on discrete sites with lower elevation due to natural topology or civil engineering projects. Most urban flooding events normally last for tens of minutes. The pourpoint of our study area is one of the frequently flooding spots. It is located at a low-cross section of the main avenue in the downtown area and often causes serious traffic jam. There is a CCTV camera 24-hour monitored on site and a rain gauge nearby, thus providing us good rainfall data and water inundation (depth and volume) data on the street.

16. L15P11: Is 9 simulations enough for a sensitivity analysis in this case? Did you examine this?

Re: Roughness values and infiltration rates are identified as the key parameters in the CA model. Referred to SWMM manual (5.0) and relevant literatures, we first set the parameters range (Manning's n for each land use: 0.01-0.04, infiltration rate of grassland: 2.4 - 22.5mm/h)，and then tested numerous combinations of the parameters in our experimental stage through over 500 simulation runs. The 9 combination runs presented in the text are the best calibration results.

17. L11P13: Part of the 5 cm error is attributable to the intrinsic error of the DEM as well. This should be noted

Re: We agree; this sentence has been reworded as "The model-predicted peak water depth was about 5 cm higher than the observed value in the first storm on 19 April, and was in agreement with the observed values in the second storm on 4 September. It is likely that part of the difference could be attributed to the intrinsic error of the DEM model"

18. L1P14: 'good agreement'. Please quantify with a measure of fit

Re: RMSDs between both model results within the three selected grids are 0.43cm, 0.1cm, and 0.02cm, respectively.

So the sentence in L1P14 "show very good agreement (Fig. 6)." revised to "show very good agreement (RMSDs = 0.43, 0.1, 0.02 cm) (Fig. 6)."

19. L23P14: Please replace 'Nevertheless' with 'Although'

Re: Replace 'Nevertheless' with 'Although'.

20. L6P15: With all recent advances in computer science and hydrodynamic modelling, '5 min' may not be regarded by some as speed efficient for 1.2 hours of a storm event in an area where the absolute maximum number of wet cells can only really be about 1600 (theoretically, I assume 1000 would be more realistic). For example the LISFLOOD-FP inertial version as presented by Bates et al. (2010) in one of their test cases at 5m resolution for a 3600 second (1 hour) event and wetting about 1000 cells (I guess this number), so essentially, similar numbers to your test case, takes about the same time but it accounts for more hydrodynamic terms. I think you should state which computer specs (cores, processors, memory, parallelization or not) were used in your case, so the reader can get a better idea how this speed compares to other models. I believe in your case, 5 min is speed-efficient but computer specs need to be provided.

Re: The "5 min" was the result of our initial CA model built on the Matlab platform. We have implemented the algorithm in a Java platform, and the same simulation now takes 35s (Intel i5 CPU 3.1GHz, 4GB of RAM, NO parallelization).

So this sentences in L5-9P15 “At such a small catchment, the computing time for simulating the 1.2 h storm event on 19 April 2012 is less than 5 min for both the CA model and FloodMap at similar environment and hard ware setting. . Although it is hard to tell the computing efficiency between both models, the computational efficiency of CA model can satisfy the demand of city emergency management.” are changed to:

“At such a small catchment, the computing time for simulating the 1.2 h storm event on 19 April 2012 is 35s (Intel i5 CPU 3.1GHz, 4GB of RAM, NO parallelization), this CA model is so speed-efficient is precisely because they ignore important flow governing terms, nonetheless, it is pragmatic to only use the gravitational term of the 2-D shallow water equations for urban emergency management.”

References:

Von Neumann, J. 1966. *Theory of Self-Reproducing Automata*.: University of Illinois Press.