

## ***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.***

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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:

L19P3: Please delete 'of'

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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"

L24P3: Please replace 'hard' with 'difficult'

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

L26P3: Please replace 'complicated' with 'complex'

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

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

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

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

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

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

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

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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

L10P6: Please give a reference to the Von Neumann neighbourhood

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

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

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

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

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

L23P14: Please replace 'Nevertheless' with 'Although'

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

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