Review of the manuscript "Uncovering Inundation Hotspots through a Normalized Flood Severity Index: Urban Flood Modelling Based on Open-Access Data in Ho Chi Minh City, Vietnam" by M. H. Jalloul, L. Scheiber, C. Jordan, J. Visscher, H. Q. Nguyen & T. Schlurmann submitted for publication in "Natural Hazards & Earth System Sciences"

General comments

The authors present some kind of methodology to build a 2D hydraulic model based on freely available data. The objective is praiseworthy but since these data appears to be of relatively low quality and having in mind the sensitivity of a hydraulic model to the DEM for flood simulation, it seems pointless, even dangerous. Indeed, an urban flood model have to be of high quality (DEM, hydraulic calibration and validation) having in mind the repercussion of modelling results. The authors presents an interesting discussion on the DEM uncertainties based on freely available data. They should try to propagate these uncertainties using the numerical model; it could lead to any kind of results. Most institutions or insurance companies will use flood maps provided by scientists as a truth. If the model is not properly calibrated nor validated, it may lead to very problematic situation for people living in these areas. Clearly here, for the case of the River Sai Gon next to Ho-Chi-Minh-City (very flat system largely influenced by tide, complex system of canals, heavy rains, etc.), a numerical model of the city needs data of much better quality for the construction and validation of the model. Is it reasonable to have a DEM resolution of 30 m or more with a vertical uncertainty up to 1 m to build a 2D numerical model? Eventually, the proposed model is not really calibrated nor validated. Results in Fig. 5 are correct but there are many unclear assumptions behind. And main results presented in Fig. 7 are quite poor. In general, although the manuscript is well written, many technical details are missing. It is often difficult to understand how the bathymetry and boundary conditions are built.

The authors introduce a new index to evaluate the flood risk (normalized flood severity index), which can be interesting. However, they should verify if the normalization with a maximum value cannot bias the result in case of numerical divergence. Also, since the results of the model are quite poor, it appears difficult to validate the use of the index here. This index should be discussed for a case, which is much better described and a numerical model that is of higher quality. Flood hazard assessment for pedestrian often combine water depth and flow velocity (Musolino et al., 2020). Since this criteria is based on results from a 2D model, it could be interesting to introduce a second index based on velocity and duration. Anyway, this part of the paper appears a little bit off-topic.

Minor comments

- L32: For a list of reference, use the chronological order
- L34: next decade**s**
- L40 skip "C.R."
- L75 (Figure 1): I do not see any step of calibration and validation of the model
- L79: What do you mean by "similar sources"?
- L137: Please detail the characteristics of the Lidar data
- Tab. 2: An error of one meter for a DEM is huge! How accurate can you be for hydrodynamic calculations?
- Fig. 2: use (a), (b) etc. Instead of (A) (B); 3×3 instead of 3x3 (times and not x-letter)
- L157: In many countries such as in Vietnam, bathymetric data exist and could be obtained through collaborations or by paying for it.
- L158: Again, such data base provides very rough estimations of the bathymetry. How accurate will be the model using such data?
- L172: What is the reference here? How do you set the bed level of the canal? Is this averaged depth a tidal-averaged depth?
- L180: "expedient" is maybe a little bit strong. For the moment, the model construction seems very crude, especially for a complex and very flat system such as the Ho-Chi-Minh-City area.

- Fig. 3: Please provide a proper figure caption and not a discussion of the figure. Also, most of the legend has no clear meaning (i.e. difference, exemplary colours, etc. ?). What do A, B, and C red squares mean? I guess they correspond to the Lidar samples.
- L190: I'm not sure I understood. Are building represented as non flowing area? Or is an equivalent Manning friction coefficient used to represent building effects on the averaged flow velocity?
- L195: The Manning coefficient has a unit; don't use the term "roughness coefficient" while talking about the Manning friction coefficient
- L197: Is a unique roughness coefficient used for the whole model ($n=0.1$ s/m$^{1/3}$)? What about canals and main channels (Sai Gon and Dong Nai Rivers)?
- L222: The Sai Gon water discharge is mostly influenced by the tide (Camenen et al., 2021). They provide some estimation of the net discharge for the years 2017-2018.
- L238: So, as far as I understood, you had access to Nha Be data.
- L239: It would be interesting to present a plot showing these results
- L255: variables in italic: $n=28$
- Eq. 1: functions in roman: $n=28$; define all variables introduced in this equation
- L260: α ?
- L263: The variable n is already introduced for a number of years
- Eq. 2: This is not an equation; to be written within the text
- L269: Do you mean $\beta=0.854$ for the Ho-Chi-Minh-City area?
- L294: Arguable
- L304: This is not a proper argument. If there is some protection measure, there won't be any flow toward some of the lowest elevations. These zones may be eventually flooded but for other reasons (rain, groundwater, etc.) and so with a different dynamics.
- L308: It would be interesting to present this reference. And this methodology is also arguable. If this reference is not realistic compared to observed flooded zones, how can we trust simulations with more extreme conditions?
- L321: Flow depth is often not sufficient to evaluate the risk for people. One also needs the flow velocity (which can be provided by a 2D model of properly calibrated)
- L334: This sentence should appear after the introduction of Eq. 3
- Eq. 3: Even if this error is very common, it is not correct to introduce a variable made of multiple letters, i.e. $NFSI=N\times F\times S\times I$. I would suggest to write:
  $$I_{NFS}(x,y)=\frac{z_{max}(x,y)\times D_o(x,y)}{\max(z_{max}(x,y))\times\max(D_o(x,y))}$$
  Isn't it a problem to use the maximal flood depth and duration as a reference. If the model provides some local unrealistic values for z_{max} and or D_o, it would significantly affect the results.
- L346: This is a significant issue. In many cases, institutions or insurance companies will use such flood maps as a truth. If the model is not properly calibrated nor validated, it may lead to very problematic situation for people living in these areas…
- L352: What about calibration?!
- L354: What about discharge and water level (tidal) conditions on the River Sai Gon?
- L357: Is this specific event representative of all events occurring on the HCMC area? Are there some cases with high discharges for the River Sai Gon and/or strong tidal effects for which the model could also be validated?
- Fig. 5: Do not add a linear regression when comparing simulation to observation; I see only 14 points on the plot whereas 25 are shown on the map. As far as I understood, the simulated water depths correspond to a difference between simulation results and results of the simulation for the 3h1y rain event with mean tide and mean river discharge. How sensitive are the results to this choice?
- L363: Just tot be sure I understood, you increased the Sai Gon bed level from +8.4 m (above see level?!) to 14.8 m (Fig. 6). Is it realistic? Anyway, I'm amazed that such variations don't

affect the results. How deep is the River Sai Gon for normal flows?

- L365: How were selected these three points?
- Fig. 6: Define the location of the points where sensitivity analysis is provided on the map Fig. 3 (use other letters since A, B, and C corresponds to other areas) and present plots only. Add a proper scale with axis legend for the three plots (or 4 if you include Nha Be water level time series)
- L375: There is no Fig. 6a and b. If you're talking about the plots in Fig. 6, it is not clear for me how you evaluate mFD and DoT from these plots.
- L377: How do you explain this behaviour? Is it based on observations from the field or from the numerical results?
- L380: What do you mean by "highlights previously hidden inundation hotspots"? Again, if the model is not really validated (at least not everywhere in the studied area), how sure are you about such results?
- L381: "considerable spatial overlapping"! I'm not that enthusiastic. Most of the reported inundation points do not overlap with the zones with a NFSI>0! What about all the zones with a high NFSI value? I can understand there is also a bias in the reported inundation points but you cannot say here that results are good.
- Fig. 7c: It is not very consistent to compare the flood severity index with reported inundation. A reported inundation corresponds to a water depth; so, these points should be compared to the modelled maximum flood depth (Fig. 7a). Again, do not provide comments of the figure in the figure caption (redundant with the text)
- L437: Due to the limitation of data to calibrate/validate the model, it is logical to use a single Manning friction coefficient for the whole domain. However, in reality, this coefficient should vary spatially depending on the city structure (presence of vegetation or not, porosity of the system, etc.)
- L474: True but the velocity is important in term of flood hazard for pedestrian (Musolino et al., 2020)
- L479: True but you need a robust and well calibrated model
- L491: I'm not sure such model can be used to simulate flood drivers, even partially.
- L528: Use European convention for dates: 12/06/2018
- L531: Use "doi:" instead of the full link "https/::doi.org/"
- L541: de Andrés, M.; be homogeneous with journal title (abbreviated or not)
- L546: Use capital letters for acronyms only, i.e. Bennghe Port Company Limited
- L554: Initials for first names after the name
- L557: Add all authors (instead of "et al."), initials of authors
- L567: reference?!
- L574: date, doi
- L595: Use capital letters for acronyms only, i.e. Go Fair
- L602: Skip "available at ..."
- L608: Skip "available at …"
- L614 NGO?!
- L615: journal?!
- L630: Explain the acronym JICA
- L638: de Moel, H.
- L672: Add all authors (instead of "et al."), initials of authors
- L685: Explain all acronyms
- L689: Don't use capital letters for the title and journal (International Journal of Geomate), some co-authors are missing
- L701: Skip "available at …"
- L716: Add all authors (instead of "et al."), initials of authors; Don't use capital letters for the journal name (?); Add (in Vietnamese)
- L726: Don't use capital letters for the author name

- L740: Skip references in review
- L776: Don't use capital letters for the author name

Additional references

Camenen, B., Gratiot, N, Cohard, J.-A., Gard, F., Tran, V.Q. , Nguyen, A.-T., Dramais, G., van Emmerik, T. & Némery, J. (2021). Monitoring discharge in a tidal river using water level observations: Application to the Saigon River, Vietnam. Science of The Total Environment, 761 (143195), doi: 10.1016/j.scitotenv.2020.143195.

G. Musolino, G., Ahmadian, R. & Falconer, R.A (2020). Comparison of flood hazard assessment criteria for pedestrians with a refined mechanics-based method, Journal of Hydrology X, 9(100067), doi: 10.1016/j.hydroa.2020.100067