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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Using unmanned aerial vehicle and volunteered geographic information to sophisticate urban flood modelling" *by* Yuan-Fong Su et al.

Anonymous Referee #1

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General comments: The authors attempt to combine (1) UAV aerial surveying data with, (2) volunteered geographic information (VGI) and (3) computational flood simulation (CFS). Combining all three approaches is a useful topic and the authors are encouraged to pursue further fieldwork and research in this area. However, the paper skims the surface of each topic, has poor quality input data, buries the details of data analysis, incorporates a number of poor/dubious practices, and hides the quality of output data inside lumped categories. The conclusion of the paper that a higher resolution DEM produces better CFS results is common sense and hardly new. Other factors that are arguably more important are resolving critical sub grid scale features such as walls, and how these can be incorporated into a coarser (or variable resolu-

tion computation grid). The factors above and comments below make it impossible to recommend publication.

Specific comments: âĂć The paper covers a small spatial area and the limitations of UAV's in this regard is not discussed. âĂć Boundary conditions are the edge of the spatial domain are not considered/discussed. âĂć A freeway/motorway takes up a substantial proportion of the study domain, but is removed from the DEM without sufficient information on how the DEM was estimated where this was removed, or how roughness/friction parameters were estimated. âĂć Vegetation takes up a substantial proportion of the study domain, but is removed from the DEM without sufficient information on how the DEM was estimated where this was removed, or how roughness/friction parameters were estimated. âĂć The study only uses 3 ground control points for UAV surveys which is not enough. At least 8 required, with many studies recommending 16+. âĂć There is no discussion of flight regulations limiting UAV operations in urban areas and other similar considerations. âĂć The study talks about a computational sewer model being used, but provides no details of this and where sewers were or how flow was accounted for. âĂć The study provides very limited details of the CFS model. Other papers are referenced, but no local information is provided on roughness of different terrain types etc that must be used inside the CFS but are local to the study area. âĂć The paper provides irrelevant equations and information about DEM reconstruction and camera lens distortion (section 2.1). These are a red herring and completely irrelevant. The authors used Pix4D to do their aerial image processing and have not implemented the equations themselves. Pix4D or Agisoft Metashape are the appropriate software packages for this type of work, but the authors should spend more time discussing the appropriate workflow for data processing. It is likely that they did not follow a recommended workflow since they only used 3 ground control points. âĂć The timestamp of the photos from 'picture posting time' is not at all defensible. The authors should extract the EXIF information from the photos and look at image capture time. If images were captured with a cell phone then the timestamps should be accurate. âĂć The authors did not adequately survey flood depth at locations from

the VGI images. They should have gone out with an RTK GPS survey system and a ruler after the flood and measured the spatial location of depth reference points and the associated depth. Not doing this ("flood depth estimated from photos") is very poor practice. âĂć Other errors throughout the paper from lack of attention to detail (see technical comments below) also call the accuracy and research quality of the paper into question. âĂć Scaling of figures 7 and 8 is poorly selected and shows nothing of the fine scale DEM at ground level which is critical for the flood modelling. The selection of this scaling raises questions as to whether it was selected on prpose to hide a poor quality DEM at ground level. âĂć Data in table 4 have been thresholded by the arbitrary category of water depth over 5 cm deep. This simple thresholding makes it far easier for data to appear correct (i.e. assigned to binary over/under categories). The data should compare actually flood depth (from ground truth measurements at VGI photo locations compared to observed water levels in photos) with flood simulation depth and quantify the error (discrepancy between the two). âĂć The paper is well written in some sections, and poorly in others. Many sections would benefit from a rewrite, information being removed, information being added, or information being moved to other sections. This is beyond the scope of what is expected from a reviewer, hence I have only listed some of the obvious errors, suggestions, and grammatical corrections in the technical corrections below. Hopefully these will help the authors to rework the paper to become a high-quality conference paper, or with very thorough reworking and further analysis it may possible for it to be eventually published as a journal article. However, it may be faster for the authors to record another more thorough dataset (in a more suitable location) to analyse for a future journal paper.

See the attached file for the full review that includes technical corrections.

Feel free to pass on the attached review file to the authors. The review is detailed, tough, but hopefully fair and should improve the manuscript or a future repeat of the study. The authors should continue work in this area as it is important, however the quality of this publication is not quite up to international journal standards.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2020-59/hess-2020-59-RC1-supplement.pdf

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