

## Review of paper ESSD-2017-7

### **floodX: Urban flash flood experiments monitored with conventional and alternatives sensors by Moy de Vitry et al**

#### **General comments**

The paper describes experimental data sets of urban flooding experiments. The experimental set up covers a 500 m<sup>2</sup> area which provides data at almost a 1:1 scale. Such data sets are not very common and can be of high interest to test urban flood models in conditions close to field conditions. The authors should emphasize this point in their description of the data set. I agree with the authors that such a data set is very valuable to assess the validity of urban flood models.

If we refer to the scope of ESSD, it is stated that “Any interpretation of the data is outside the scope of a regular paper..... Any comparison to other methods is beyond the scope of regular data.” Therefore, it is not expected to see comparisons of the data with numerical models in the paper, nor any complete description or interpretation of the data. However, ESSD expects good quality data sets and the description should be clear and complete enough to provide the relevant information useful for potential users. I believe the authors did not really succeed to reach this last goal for the following reasons:

1/ the experimental set up description provided in the paper is not clear and complete enough to really understand the experimental set up and the various components of the experiment. The photo provided in Figure 1 does not provide the location of the sensors and does not allow understanding how the experiment was conducted and how water was flowing. Figure 2 provides a schematic transverse view of the experiment but it gives the impression that it is only a connection of pipes and valves, and does not inform on the lateral extension of the experiment. My point of view is that the authors should provide one or more plan view of their experiment showing the interconnections between the various elements, the 2D extension of their experiment and of water flow and also the locations of the various sensors (and possibly the view angles of the cameras). The authors make reference to the floodX documentation data set that provides plans of the experimental set up, but I believe this information should be provided in the main paper, in a schematic manner, but providing information on the main elements of the experiments (reservoirs, pipes, valves, manholes, etc.), of the location of the sensors and of the main directions of the flow.

2/ in the abstract the authors mention 37 experiments, but the paper does not provide an overview of the content of those experiments. The reader should refer to the data set documentation for that. I believe that a summary table, providing the main features of the experiments (duration, input discharge, specific configurations, etc.) should be provided in the paper, together with information on the data reliability of each data set (see next point). The potential user of the data should have guidelines to determine which experiment is reliable and which one is relevant for his/her specific needs.

3/ the authors also provide the codes used to pre-process the data. They provide the raw and pre-processed data which I find a good point, as the potential users have the possibility to take the raw data and make their own pre-processing if they do not agree with the authors' one. However, the pre-processing data presentation is somehow puzzling for the reader. As the authors are honest and do not hide the problems encountered with their data, the reader is left with the idea that none of the data set is of enough quality. I think the authors should provide clearer information on the data set quality, and if some experiments are not reliable enough, they should consider removing them from the data set.

4/ the authors explain with quite details, the problems they encountered with their experiments. This is a good point for the future users. However, the presentation is not balanced enough and the reader ends its reading with serious doubts about the interest of the data set. I believe the authors should also spend some times explaining what makes their data set valuable for other users, and what the strengths of their data sets are. Figure 3 is a nice summary of the collected data, but should be commented more in details to explain what can be seen in the figure. In particular the use of the temperature sensors is presented as new, but this would gain being illustrated with some examples. I also believe the OCR treatment of the data loggers is an original application that contributes to the originality of the data set.

5/ the authors should try to get a final version of the paper only focused on the data set description. So they may provide additional information (such as file naming, sensors drift, ..) in a supplementary material.

6/ at the very end of the paper, the authors mention water balance mass errors of about 20%. This is a big issue that may compromise the usefulness of the data set, and could require further analysis (in particular when putting doubts on the validity of the p6 discharge measurements). Shouldn't it be possible to make additional verifications to see if the proposed explanation may hold?

In conclusion, I believe that, provided the authors better document the quality of the various data sets and better describe the experiments, their experiments provide valuable data sets at a 1:1 scale that are of great interest for the science community, in particular for evaluating urban flood models. The data set has also some potential to develop LS-PIV technique. However, in its present state, the data set presentation suffers too many weaknesses for the paper to be published. I recommend major revision of the paper, following the suggestions provided above and below, before possible publication in ESSD.

### Specific comments

- 1/ Section 1.1. The authors may also consider the following references (Bazin et al., 2014; Mignot et al., 2013)
- 2/ P. 2, line 12 “that covers the majority of the components of the hydraulic system”: be more specific, which components?
- 3/ Figure 1, p.3 line 13: the figure is not clear enough and we do not see the elements mentioned by the authors. As mentioned before, one or several plan view of the experiment is necessary for the reader to understand how the experiment was working and the water flow paths. This is all the more necessary that Figure 2 gives the impression that the experiment is only a connection of reservoirs and pipes.
- 4/ P.5 put the section on files naming in a supplementary material, so that it is accessible to the reader without needing to download the whole data set.
- 5/ P. 6: section 4.3: I suggest that the authors provide a summary table with the various experiments that were conducted, their main characteristics and information about data quality.
- 6/ Section 5.1: you could illustrate what the images look like by providing some examples.
- 7/ Figure 3 is a nice example of the collected data but it is hardly described and analyzed in the paper. The figure should be enlarged so that the authors can highlight the part of the curves that are providing useful information. Such a description would strengthen the paper, by providing an insight on how the data can be interpreted and used to the readers. In addition, the authors mention the novelty of the temperature sensors data, but they do not demonstrate it. An explanation/discussion of the corresponding figure would provide elements to really appreciate the interest of such data.
- 8/ P.9 line 19 “... was unknowingly moved..” . What does unknowingly means?
- 9/ Figures 4 and 5: the points the authors want to highlight are not very clear
- 10/ Section 6.4: the authors should provide information on the experiments that were affected by this problem (in the summary table that would be added to the manuscript)
- 11/ Section 6.6: among the difficulties mentioned by the authors, the water balance closure problem is certainly the most critical one. The authors propose several explaining factors, but none of them is fully convincing. In particular, problems with discharge measurements at the outlet are one plausible explanation. But could the authors make additional analysis to see if this explanation really holds?
- 12/ Figure 7: I don't understand what the “trend” line in the figure is.
- 13/ P.13, line 1: I don't understand what the authors mean with this sentence.

### References

- Bazin, P.H., Nakagawa, H., Kawaike, K., Paquier, A., Mignot, E., 2014. Modeling Flow Exchanges between a Street and an Underground Drainage Pipe during Urban Floods. *Journal of Hydraulic Engineering*, 140(10). DOI:10.1061/(asce)hy.1943-7900.0000917
- Mignot, E., Zeng, C., Dominguez, G., Li, C.W., Riviere, N., Bazin, P.H., 2013. Impact of topographic obstacles on the discharge distribution in open-channel bifurcations. *Journal of Hydrology*, 494: 10-19. DOI:10.1016/j.jhydrol.2013.04.023