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Comment on nhess-2022-257

Anonymous Referee #1

Referee comment on "Brief communication: the potential use of low-cost acoustic sensors to detect rainfall for short-term urban flood warnings" by Nadav Peleg et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-257-RC1, 2022

Review comment for „Brief communication: the potential use of low-cost acoustic sensors

in short-term urban flood warnings“ by Nadav Peleg and Herminia Torelló-Sentelles et al.

The authors present several experiments with low-cost acoustic sensors for urban rainfall monitoring and propose their use in short-term urban flood warning. The experiments consist of one lab and two outdoor experiments testing the accuracy and possible advantages and limitations of these sensors. Overall, these sensors do not yield exact rainfall amounts but rather can complement existing observations by giving begin and end of rainfall events as well as spatial rainfall distribution when a dense network is employed.

The topic of this brief communication suits well into NHESS’ scope and is presented in a good quality. Despite the fact that acoustic sensors were introduced for rainfall measurements earlier as referenced by the authors, here these sensors are brought into perspective with other sensors and the real-world application of urban flood warning. I found some issues in the manuscript which should be addressed by the authors prior to publication which I recommend.

Specific comments:

- Figure 2 - lack of time series

This are two issues which could potentially solved at once. First, Figure 2 is somewhat unintuitive because the same symbols are used to depict different things. Even with the figure caption being informative the Figure would benefit from a revision. Suggestions would be to remove the correlation and rain drop count to (a) new subplot(s) showing e.g. the correlation to rain gauges over distance. Also, the rain gauges from meteoblue could be shown in the map.

Second, I'd really like to see time series of acoustic sensors compared to reference rain gauges. Such time series could illustrate both the correlation presented in Fig. 2 and the text as well as some issues why these sensors cannot be used to derived rainfall amounts directly. Time series plots could be shown as supplementary material, while I would encourage the authors to add them to Figure 2.

- More specific information on deployment

While the whole process chain from the acoustic sensor to a warning system is depicted in the manuscript some description on the acoustic sensors regarding pricing compared to traditional sensors, setup and the setup in a real-time, operational way with many sensors (as envisioned in l. 165) would make this manuscript more inspirational for researchers and stakeholders playing with the thought of experimenting or deploying such systems.

- Questions raised in the manuscript

Two questions are raised at the end of the introduction and answered in the following chapters while a third one which is a mix of both is raised in l. 137. The easiest way to make this more consistent would be to add this third question to the intro, but there might be other ways to solve this inconsistency.

Technical issues

- 24 You could also list examples of ground observations
- 68 I assume you mean 30 acoustic sensors?
- 131 E-band CMLs are also in the magnitude of 10^0 km and can deliver data with sub-minute resolution

Further issues

The article type allows for 20 references while the authors cite 22 references. In my opinion 22 would be fine.

Data availability is not in agreement with NHESS data policy, e.g. "If the data are not publicly accessible, a detailed explanation of why this is the case is required." The FAIR way of course would be a publication of acoustic sensors data accompanied by reference rainfall data but I can understand if the latter one is not possible due to meteoblue's data policy.