

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC2
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Reply on RC2

Nadav Peleg et al.

Author 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-AC2>, 2022

We appreciate the reviewer's time and effort as well as their constructive and positive feedback.

In the reviewer's opinion, the study's evaluation analysis and data description are lacking in detail, and the discussion of the advantages and limitations of using acoustic sensors in flood early warning systems remains rather general. We completely agree with the reviewer on this evaluation, but we have to point out that this article is submitted as a "brief communication".

Our goal here is not to discuss the capabilities of a specific type of acoustic sensor, but rather to highlight to the natural hazard community the potential of using acoustic sensors in general to aid existing or planned urban flood warning systems. We complement our commentary with a short quantitative demonstration of the capabilities and current limitations of one type of acoustic sensor.

We specifically chose the "brief communication" format to provide our "personal" commentary on this specific Special Issue. In fact, as per NHES criteria, "Brief communications are timely, peer-reviewed, and short (2–4 journal pages). These may be used to [...] (b) report/discuss significant matters of policy and perspective related to the science of the journal, including "personal" commentary", https://www.natural-hazards-and-earth-system-sciences.net/about/manuscript_types.html. We believe this description well fits our goal and our manuscript type.

The referee raises several relevant suggestions that could help us improve our manuscript. In our revisions, we will address many of the points raised by the reviewer while preserving the intended commentary angle and keeping the manuscript concise and within a "brief communication" format:

- We agree that the discussion on acoustic sensors' potential for flood early warning can be more meaningful by demonstrating how well the acoustic sensors record the rainfall spatial structure, which will be included in the revised version of the manuscript.
- We will briefly discuss possible approaches to convert drop counts to rainfall intensity. Apart from discussing the effect of drop size distribution (as suggested), we will discuss the possibility of segmenting rainfall events into rain types (e.g., convective/stratiform) and assigning individual drop-intensity relationships for each type.
- It is noteworthy to point out, however, that part of our message is that such a

conversion is not necessarily needed to aid rainfall nowcasting algorithms for early flood predictions.

- The reviewer noted that there is insufficient detail provided about data and monitoring devices to ensure reproducibility and allow comparison with other studies. We will share the data collected by the acoustic sensors in an open repository accessible to all. We will also add additional information on the reference rain gauges ("meteo-blue data"), for example, distances to the acoustic sensors and on the type of data recorded.
- We will elaborate on the advantages and limitations of using acoustic sensors, especially on the potential to use these sensors over a longer period (maintenance, energy consumption), as well as sensors available already on the market (such as by Vaisala), as suggested by the reviewer.
- We will revise the title and abstract to more accurately reflect the content of the manuscript.

We are confident that our revisions will strengthen the content of the short communication and deliver our key message, namely that acoustic sensors in general (and not just the specific type we are using) should be further developed as a viable alternative to e.g., expensive rainfall gauges to be used in rainfall nowcasting for flood warning systems.

Thank you again and best regards,

Nadav Peleg, on behalf of the co-authors