

Interactive comment on “Disdrometer measurements under Sense-City rainfall simulator” by Auguste Gires et al.

Anonymous Referee #2

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Authors would like to thank the reviewer for its feedback that helped improving the paper. Hopefully, the modifications implemented will satisfy her/him.

Data presented here are in principle a relevant contribution to the field of hydrometeorology. To my knowledge, databases of disdrometer measurements in a simulated rainfall environment are not yet available to the scientific community and thus such datasets would be a relevant contribution. In my opinion, the authors must address a few important and major concerns / clarifications about the rainfall simulator itself before to consider the manuscript for further review.

Thank you for your overall positive feedback.

Disdrometer data of simulated rainfall, as said, are extremely interesting. What I could not find in the manuscript is convincing explanation that the rainfall simulator is actually able to “manufacture” rain with a believable microstructure (i.e., DSD).

1) Section 2.1 and 2.2: while browsing the citations and websites mentioned in those two sections, I could find plenty of information about the disdrometers, while no information about the rainfall simulator design and performance. If such information is available, I recommend to improve those sections and to include as much information as needed. If such information instead is not available, the authors should maybe reconsider whether this manuscript should be re-submitted (and data made available) only after that an evaluation of the plausibility of the simulator measurements is conducted.

The purpose of this data paper is actually to make the data collected under this rainfall simulator available. Authors believe that it would be the purpose of another dedicated paper, not a data paper, to address the question of how realistic the simulated rainfall is ? As you pointed out in your comment, we included in section 4.2 some preliminary comments to help the reader understand the potential and limits of this data set. We are working on future scientific paper including more in-depth analysis of the simulated rainfall and comparison with actual rainfall.

2) Page 4, lines 21 -26: this is the type of information that should be expanded or should at least be available in a separate paper. The reader must be convinced about the plausibility of the simulator. Questions that naturally come to mind, and that need a convincing answer, are for example: a) Is it 8 m enough to reach the terminal fall speed and equilibrium conditions of drops? While reading i.e. (Beard, 1976) it seems that the answer is no. Also Fig. 4 in the manuscript shows drop spectra shifted towards lower fall velocity than expected. b) Why is this inclination of the nozzles used?, c) How do the DSD spectra collected compare to the ones observed in “natural” outdoor environments for similar rainfall rates? d) What is the expected use of the data presented in this manuscript, for an interested researcher who access them?

As said in the previous comment, the purpose of the paper is not to convince the reader that the rainfall simulator is realistic but to make the data available so that the reader can directly check. We agree that the questions raised by the reviewer are indeed interesting and should be addressed in-depth in future scientific paper using this data. However some comments were added. a) Indeed 8m

is not enough and this was actually already mentioned in section 4.1. The reference to Beard (1976) was added. b) The inclination is actually in the design of the nozzle provided by the manufacturer for the two level of rain rates. It was clarified in section 2.2. c) Some preliminary comments, with the introduction of the mass-weighted diameter  $D_m$  are actually in section 4.2. d) An example of use is to understand, depending on the application, how the variations with regards to actual rainfall should be accounted for in the interpretation of the reproducible experiments carried out with this simulator.

### Comments

1) Page 2, line 5: Are the two devices here the two disdrometers or the disdrometers and the rainfall simulator?

It is a reference to the disdrometers only. This was clarified and the title of section 2.1 also updated by replacing “devices” by “disdrometers”.

2) Page 2, lines 6-8: I find it a bit confusing. It seems to imply that information about this set-up is available in other manuscripts, while I could only find information about disdrometer measurements and not about the most important item, i.e. the rainfall simulator.

It was clarified that it is a reference to an outdoor measurement campaign involving only the disdrometers.

3) Page2, Line 18: I suggest also (Löffler-Mang & Joss, 2000)

Indeed this initial paper on the Parsivel is relevant to be cited here. This was done.

4) Page 2, line 22: please mention what happens when two or more drops cross the measurement area simultaneously.

It is for rainfall an very rare event. It will basically be seen as a larger drop. Following the reviewer’s comment, this was clarified in section 2.1.

5) Page 4, line 24: add schematics of the system.

The nozzles are distributed for the heavy rain over two separate lines of length 8.03 m split by 1.44 m. The nozzles are distributed for the light rain over two other separate lines of length 8.03 m split by 1.56 m. As suggestion by the reviewer as well as the reviewer #1, the positions of nozzles and line of nozzles are now displayed in Fig. 2 and 3.

6) Table 2: add information about rainfall intensity.

This was done.

7) Section 3: I suggest to provide also NetCDF data files.

What would be the benefit for such indoor measurement campaign ? Authors believe that the provided format is sufficient for the data this measurement campaign.

Beard, K. V. (1976). Terminal velocity and shape of cloud and precipitation drops aloft. #JAS#, 33, 851-864.

Löffler-Mang, M., & Joss, J. (2000). An optical disdrometer for measuring size and velocity of hydrometeors. #JAOT#, 17, 130-139.

These references were added.