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Atmospheric Measurement Techniques Discussions

Interactive comment on "Effect of sampling variation on error of rainfall variables measured by optical disdrometer" *by* X. C. Liu et al.

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General Comments: The paper presents a study on sampling errors of optical disdrometer via MonteCarlo simulations. While the approach has a good potential there are some garish errors in the paper, that makes the paper not publishable. I do recommend rejecting the paper. Also the English is in general poor and needs certainly to be revisited (if the authors intend to re-submit the paper). Some of the major problems I spotted: 1) All computed Z values are above 81 dBZ, i.e. in a totally unrealistic range; 2) Some of the W computed values are also in unphysical region (above 10 g/mËĘ3); 3) The terminology is sometimes incorrect (e.g. N_0 is not the total drop concentration, what is the water concentration?). 4) Eq (7): I do not know where this parameteriza-

tion is coming from (add a reference), but it seems to have unphysical discontinuity at D=0.1 and 1 mm. 5) I simply do not believe Fig2: it seems that actually lowest samples. number produce better results. The same applies to Fig.4. We would dream to have such small errors from disdrometer measurements!!!! The paper would also benefit from: a) Simulation based on different DSD shapes (e.g. changing the mu parameter) b) An in-depth comparison with error assessment coming from real measurements.

Response: Thanks for your comments of our work. We have modified the above errors in our revised manuscript according to your suggestions. Besides, we have invited professional English native speaker to check for the spelling and grammatical errors to make this manuscript publishable.

1) We are sorry for the obvious error of reflectivity values; the reason is that the radar reflectivity values were calculated by logarithm base e instead of base 10 mistakenly, it has be corrected in the revised manuscript.

2) Because the calculation of this paper is based on the ideal assumption, it might be possible that W is greater than 10 g/mËĘ3 when the rain rate is larger than 50mm/h, which is unphysical for the normal rainfall.

3) We have corrected the terminology, N0 is an "intercept" parameter, μ is not the order of the gamma distribution but a shape parameter. We also replaced the 'water concentration' by 'water content', which denotes the water content in the unit volume.

4) Eq (7) is come from a book published in china, but due to its error, we have used the velocity model of raindrops by Atlas and Ulbrich in the revised manuscript.

5) Fig.2 and Fig.4 show that lowest samples number produce better results; the possible reason is that fewer samples have a higer random probability and therefore a lower representation, which denotes that too fewer samples can not represent overall rainfall. Therefore we repeated the simulations, and found that larger samples number produce better results, the results are shown in Fig.2 and Fig.4 in the revised manuscript.

This paper studies the sampling variation with different DSDs, sample areas, and samples number, we only focus on the effect of sampling variation on the error of different disdrometers under the ideal conditions, while take no account of many sources of error in reality. Therefore the small errors from disdrometer measurements of theoretical analysis couldn't represent the actual performance of disdrometers. And thank you for your advices; we will discuss this problem by numerical simulation based on different DSD shapes, and compare the error coming from real measurements in next paper.

Please also note the supplement to this comment:
http://www.atmos-meas-tech-discuss.net/5/C4025/2013/amtd-5-C4025-2013-supplement.pdf

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Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8895, 2012.