Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., author comment AC1
https://doi.org/10.5194/amt-2022-209-AC1, 2022

Reply on RC1

Basivi Radhakrishna

Author comment on "Raindrop size distribution (DSD) during the passage of tropical cyclone Nivar: effect of measuring principle and wind on DSDs and retrieved rain integral and polarimetric parameters from impact and laser disdrometers" by Basivi Radhakrishna, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-209-AC1, 2022

At the outset, the author wants to thank the reviewer for his patience in reading and suggesting improvements to the manuscript.

Reviewer#1

Comment: This manuscript describes the observations collected by three surface disdrometers (i.e., JWD, LM, and PARSIVEL) during the passage of a Tropical Cyclone. There are a few confusing sentences that need to be clarified before publishing.

Reply: *The confusing statements are rewritten with better clarity in the revised manuscript.*

Comment: 1. Abstract. Lines 10-12 state, "Raindrops greater than 3 mm in size are infrequent in the JWD recordings while frequent in the LPM an PARSIVEL indicating JWD underestimates the size of the raindrops than LPM and PARSIVEL due to canting of raindrops in the presence of wind." This sentence suggests the JWD underestimates raindrops greater than 3 mm diameter because the raindrops are canted in the presence of wind. This is inconsistent with conclusion #1 (lines 345-348) that states "The canting of raindrops in the presence of large horizontal winds results in more residing time in the laser beam resulting in an additional reduction in the beam intensity at the receiver. Thus, the conclusion suggests the laser disdrometers overestimate the size of the raindrops in the presence of horizontal winds." I believe the abstract needs to be corrected to match the conclusion.

Reply: *Compared to JWD, LPM and PARSIVEL disdrometers record raindrop with size greater than 3 mm. To avoid confusion, the sentence is modified as follows in the revised manuscript. LPM and PARSIVEL overestimates the raindrop size when the fall path deviates from nadir due to horizontal wind.*

Comment: 2. Lines 10-12 (abstract), 233-236 (body) and 345-348 (conclusion). The word "canting" only occurs in the abstract and conclusion. The body (lines 233-236) discusses why the laser disdrometers observe larger raindrops in high wind cases because the raindrops have a longer path through the laser beam. This longer path is not a raindrop canting. The three disdrometers cannot measure canting angle (the JWD measures momentum, and the two laser disdrometers only have one imaging dimension).

Please clarify the manuscript and be consistent between abstract, body, and conclusions.

Reply: *I completely agree with the reviewer that canting of raindrops cannot be measured by the disdrometers used in the study. The context is to portray the deviation of raindrop fall path from nadir. Hence, in the revised manuscript the canting of raindrops is replaced with deviation of fall path from nadir.*

Comment: 3. Equations (1) to (6). I am confused by what processing was performed by the disdrometer and what processing was performed by the author. Please clarify in the text which processing steps described in equations (1) to (6) produced N(D) as an output from the disdrometers and which processing steps were needed to calculate N(D) off-line.

Reply: *The processing performed by the manufacturer of disdrometer indicates the converting of electrical signals into number of drops in each drop diameter interval.*

After obtaining the number of drops information in each diameter interval, equations (1) to (6) are used to estimated N(D).

Please also note the supplement to this comment:
https://amt.copernicus.org/preprints/amt-2022-209/amt-2022-209-AC1-supplement.pdf