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Atmospheric Measurement Techniques Discussions

Interactive comment on "Raindrop Fall Velocities from an Optical Array Probe and 2D-video Disdrometer" *by* Viswanathan Bringi et al.

Anonymous Referee #5

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This manuscript is a summary of observations of the fall speeds of small raindrops near the ground, in a field setting. It is comforting to see that the observations are generally consistent with the familiar Gunn and Kinzer laboratory measurements in conditions not strongly affected by wind and turbulence. In the latter situation the measured fall speeds tended to be less, and therein lays a puzzle that warrants more discussion in the manuscript. Certainly turbulence in the low atmosphere could increase the spread of the drop fall speeds, but it does not produce a significant vertical mass flux. If the turbulence were isotropic (which may not be the case here) Stout et al. did find indications of reduced fall speeds. However, it's not clear why there would not be a similar neutral effect on the overall raindrop flux. If the drops are falling at normal terminal speeds in the free atmosphere and at reduced speeds near the surface there would

have to be an accumulation of rain at some level above the disdrometer. Of course there might be intermittent episodes of "super-" and "sub-terminal" fall speeds but the duration of the latter in the observations is a substantial fraction of an hour. I do not have an explanation but invite the authors to offer one, or at least discuss the subject. My other comments are relatively minor: There are instances of singular-plural subject-verb disagreement in the manuscript. L15ff: "micron" is not an SI unit (and compare with L57). L41: The authors might add the very useful fall speed relationship from Uplinger (Uplinger WG. 1989. A new formula for raindrop terminal velocity. Preprints, 20th Conference Radar Meteorology, 389–391). L81-103 (maybe 105-115 as well): What about possible edge effects on the measurements? Under the conditions listed in L199-207, a 1 mm drop at terminal fall speed would approach the instrument at an angle of <22 deg from horizontal. Viewing the measurement plane from that angle, there's a lot more edge than when the approach is vertical. L89: How does the "true air speed clock" work in this situation? L162: The expression in parentheses is not what is really meant. L230: ". . .panel 5 (b,d)." L251-252: If these (1 and 5) are fall speeds, include the units. Fig. 3a: Any clue what caused the MPS hiccup after 1.5 mm size?

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