Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2018-63-RC2, 2018

Atmospheric Measurement Techniques Discussions

Interactive comment on "Characteristics of vertical velocities estimated from drop size and fall velocity spectra of a Parsivel disdrometer" *by* Dong-Kyun Kim and Chang-Keun Song

Anonymous Referee #2

Received and published: 10 April 2018

The paper "Characteristics of vertical velocities estimated from drop size and fall velocity spectra of a Parsivel disdrometer" by Kim and Song presents the results of an experimental study aimed to develop a technique to estimate the vertical velocity of raindrops in natural rain, and to apply the technique to convective precipitation around mount Jiri, in South Korea. The data from three measuring stations, equipped with a Parsival disdrometer and an ultrasonic anemometer, are used to study the relation between the velocities measured by the two instruments in leeward and windward side of the mt. Jiri for convective and stratiform rain.

The paper is interesting, fairly well written and the topic is comprised among the subject

areas of AMT. I therefore suggest the publication of the paper, after a few modifications I suggest below.

Lines 154-160. The correction proposed by Authors to take into account the reduction of air density with altitude is around 1% for D4, and this error is largely negligible if compared to other experimental errors, so I suggest to cancel this discussion and to use the Atlas et al. (1973) relation. For example, ultrasonic anemometers show that the air velocity varies greatly (much more than 1%) at sub-minute scale, while the Authors assume the speed of air is constant (Vf) during one minute and different drops fall with different instantaneous velocity.

Figure 4. This is a 2-panel figure. On the left there is accumulated precipitation (color shades) but also isolines of altitude, I guess. Altitude is also reported on the right figure, enlarged, but the meaning of the color is not given. I suggest to simplify this figure, avoiding to repeat the same information twice, and better describing in the caption what is shown in the figure.

Figure 5 (a, b, c). The "composite reflectivity (dBZ) from the dual radar…" is never mentioned in the text and these data never used in the discussion: I suggest to remove the blue dots, and the sentence on lines 186-188.

Figure 5 (d, e, f). I suggest to expand the y-axis scale, say between -0.5 to 1 m s-1, in order to better appreciate the differences between the two vertical velocities.

Figure 5. Since it is discussed the coincidence of rainshowers and differences between the two w, it would probably better to put R/Z/Dm and w plots one above the other.

Lines 220-223. This sentence is not convincing and too speculative. The causes of increase or decrease of rainrate are very complex and cannot be understood by simply measure the point-like vertical velocity few tens of centimeters above the ground. What is measured here is not the updraft/downdraft of convective development (that cannot last for many hours), but probably the weak component of the wind speed due to the uphill/downhill flux.

Lines 233-235. It is true that higher b indicates steeper relation between R and Z, bus does not tell anything about the “strength” of rainfall occurred, it is a measure of the relative occurrence of smaller and larger drops.

Line 242. It should be noted here that there are a plenty of algorithms based on DSD to discriminate convective and stratiform precipitation based on DSD and not only on rainrate (Tokay and Short, 1996, Caracciolo et al., 2006, Thomson et al., 2015, Thurai et al., 2016).

Figure 7. Please keep wpar and wUVW names as in the text and other figures. How are the histograms normalized? They are percent of what?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-63, 2018.