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Atmospheric Measurement Techniques Discussions

Interactive comment on "Exploring the potential of utilizing high resolution X-band radar for urban rainfall estimation" *by* Wen-Yu Yang et al.

Anonymous Referee #3

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The work explores common corrections that have to be applied to single polarization X-band Doppler weather radar measurements in order to get quantitative precipitation estimations (QPE). The test site is locate on Beijing (China) and one single polarization X-band radar, one distrometer (OTT Parsivel) and eight raingauges are available. Rainfall events from July 2014 to September 2015 (43) are considered, with focus on 4th September 2015.

Although the topic is currently very interesting, the work has a traditional approach, already deeply analyzed in several works (see Nielsen et al. 2013; Scheebeli et al., 2012; Pedersen et el., 2010 and their references). The first doubt is about the shortness of the observations: some uncertainties, like anomalous propagation, are directly linked to climatological conditions of the site that can not be evaluated with one year observations. According to the Reviewer #1, the wind drift correction contains severe

theoretical issues: it is arguable to apply advection-derived wind instead of wind profile below precipitation, obtained from observations or NWP. The corresponding strong assumption is that the convective system displacement corresponds at least to the wind in the atmosphere from the cloud base to the ground!

Moreover, the derivation of Z-R relationships discriminating stratiform and convective shows unclear key points: how is the 39 dBZ threshold chosen? How many data are respectively used for stratiform and convective non-linear fittings? Is the decimal precision of "a" coefficient in Z-R relationships (in this study 426.5 or 499.3) really meaningful? Which are data quality checks applied on distrometer? The two derived equations are quite similar (i.e. similar DSD for stratiform and convective rainfall), and it is quite surprising: how can the authors explain it?

To reduce the bias in radar-gauges comparison, the authors consider 33 of 43 events. This choice need to be clarified: how are they chosen? Which are their characteristics?

Finally, the authors assert that anomalous propagation (AP) contributes a minimal improvement. The effect of AP on weather radar measurements should be evaluated more rigorously: - the authors consider only rainfall events, while AP has impact also during dry weather, carrying to false rainfall; - the overall effect depends on AP climatology of the considered site, that must evaluated on longer period (see Bech et al 2012, ; Fornasiero et al, 2006a, 2006b).

The exposition of the study is unclear and very hard to evaluate. The language is often poor with several spelling mistakes, even in physical units ("Ghz" or "kw" in Table 1).

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