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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Precipitation and Microphysical Processes Observed by Three Polarimetric X-Band Radars during HOPE" *by* X. Xie et al.

Anonymous Referee #1

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GENERAL COMMENT:

This paper is well organized, in a clear and simple manner, starting by the description of the HOPE experiment and associated instrumental set up, and ending by an analysis of the three case studies from three polarimetric X-band radar observations.

The interest of the paper lies in taking advantage of multi-parameter measurement capability to improve or assess microphysical phenomena knowledge. The data interpretation is quite consistent and well referenced, and recent and interesting approaches are used (e.g. QVP by Ryzhkov et al., 2016). However, even if the paper aims at presenting some preliminarily step to some more ambitious study (as stated in the conclusion), the analysis shown would be worth being completed by additional mea-

surements from the radars themselves. For instance, X-band Radar Doppler measurements in vertical pointing mode may alleviate some uncertainties about distinguishing between aggregation and riming above the melting layer (as mentioned in Case 3). At least, this could be mentioned or discussed in the paper.

Polarimetric measurements from the three radars are used in the microphysical analysis, as suggested by the title of the paper. Additionally, ground based instruments are used, not only to confirm, but also or to complete this analysis. The title should suggest the use of such complement.

SPECIFIC COMMENTS:

1°) Except for rain rate estimation, rain (or hail or melting snow) attenuation impacting X-band measurements is not mentioned at all in the paper. Indeed, the analyses use Z and ZDR, potentially biased by such attenuation. Are Z and ZDR corrected for attenuation?

2°) p7 lines7-9: Why are BoXPol disdrometer measurements not used, while MRR observations at the same site are?

3°) p9 lines 15-16: I do not understand how the distribution shown in Fig.4 results from individual measurements of disdrometers instead of averaging over disdrometer sites at a single time step. Does that mean, for instance, that 80 hours of [0,1] mm/h rain have been obtained by summing rainfall observation time over the N disdrometers (thus representing 80/N hours each)?

4°) p12 lines 16-17 and p13 line 13: the lack of consistency between rain rates also probably suffers from the representativeness error impacting BoXPol measurements (higher altitude of sampling volume).

5°) p14 Fig.7: When comparing KixPol and JuxPol rain accumulation, the south-west quarter of the panels shows significant differences. How could this be explained? Is this a problem of projection on ground?

6°) p25 line 3: About measurements indicative associate updraft, what about radar Doppler measurements at vertical incidence? (see general comment)

TECHNICAL CORRECTIONS:

1°) p1 line 21: replace “another three disdrometers” by “three other disdrometers”.

2°) p14 line 9: remove “s” in radars (replace “three radars estimates” by “three radar estimates”).

3°) p17 line 12: replace “30 dBz” by “30 dBZ”.

4°) p23 line 11: add “of” after “a region”.

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