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Atmospheric Measurement Techniques Discussions

Interactive comment on "Detection of potentially hazardous convective clouds with a dual-polarized C-band radar" *by* A. Adachi et al.

Anonymous Referee #2

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General Comments

The subject of this paper is the short term forecast of high surface rainfall using the occurrence of high ZDR columns. High resolution (spatial and temporal) C-band radar measurements from two convective rain cells with different evolution are presented for this purpose. The paper is well written and merits publication in AMT after minor revision, even though the method needs more elaboration and verification which probably will be made by the authors in future work.

Specific Comments

lines 227-227: The definition for VMI (vertical maximum intensity) is not given in the paper. It could be defined at these lines.

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line 245: It should be mentioned that the differential phase ΦDP unlike measured ΨDP does not include the backscatter phase shift and the method to remove it.

lines 276-277: ZDP in insensitive to ice particles not because they are more spherically symmetrical but due to their isotropic orientation (Bringi and Chandrasekar 2001).

line 290: What is the standard error around this rain line? For an ice fraction of 0.1, which is used by the authors as a threshold for "pure" rain for the application of Eq. (7), corresponds to a rather small ΔZ=0.5 dB. Probably a figure with an example of measurements for the estimation of the rain line Eq. (4) should be given.

lines 303-305: Have you used a more accurate attenuation correction algorithm with variable instead of fixed coefficients of the dependence on differential phase like in Kalogiros et al. (2013) , http://dx.doi.org/10.1109/TGRS.2013.2250979. There should also be a dependence on elevation angle.

line 307-309: Have you calculated a simple parametric dependence of ZDR (as well as the rest polarimetric measurements like KDP) on the elevation angle using T-matrix simulations (e.g. a cosine squared dependence). This would be of practical usage.

line 321: How was Eq. (8) estimated ? or give a reference.

Section 2.3: The data length in the comparison with the disdrometer is too short (1.5 hour). Probably you should include data from more rain events.

line 453: What is the difference of the dashed blue-white line from the blue contour line? The height of VMI(R) is the freezing level (line 459)?

line 461: VMI(R) is estimated below freezing level but include the bright band. Does Zrain shows a bright band effect?

lines 491-498: The inclusion of Doppler information as additional information to estimate convergence areas and updrafts would be valuable in the proposed algorithm. The horizontal wind could also be used to estimate horizontal advection in addition to

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the time delay of heavy rain to reach ground. This could be future work for a more elaborate algorithm.

line 526: Do the authors have any indication from ground observations (like flood occurrence, damages) for the very high estimated rainfall (250 mm h-1)?

lines 532-534: Does this conclusion mean that he proposed algorithm failed in cell B2, which indicates that a more advanced algorithm should be used?

lines 596: Does “more extreme events” mean rainfall rate more than the already very high estimated value of 250 mm h-1.

line 632: Define “effective” area, i.e. what are the margins of it.

lines 634-644: In a recent paper (Tokay et al. 2013, JTECH, http://dx.doi.org/10.1175/JTECH-D-12-00163.1) attributed the overestimation of large drops number to the partially inhomogeneous laser beam in the first version of OTT Parsivel after communication with the company. This is a different explanation than the usage of De for Dp that the authors propose in the current paper. Have the authors contacted OTT for verification if the company uses indeed De?

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 3675, 2013.