Atmos. Meas. Tech. Discuss., 6, C1076–C1077, 2013
www.atmos-meas-tech-discuss.net/6/C1076/2013/

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 #1

Received and published: 25 May 2013

This paper presents the analysis of C-band polarimetric radar data taken during the evolution of convective rain cells. Two cases are presented, one which led to heavy rainfall while the other did not. The data analysis clearly shows the advantage of polarimetric information in identifying potentially hazardous rain events. The paper is well organized, and well written, and contains very useful data and analysis. It is very suitable for publication in AMTD. Only minor changes are suggested, plus a few queries.

1. In Eq. 2, shouldn't 'f' be the reflectivity-weighted ice fraction?

2. Eq. 4: what are errors in this equation? Also, this depends on the accuracy of the attenuation correction schemes, so this should me mentioned too.

3. Section 2.2, page 3683: one needs to be somewhat careful when Kdp from Phi_dp

range profiles at C-band, since backscatter differential phase may become significant (in the presence of large drops). Ideally, and FIR-based method needs to be employed, e.g. that described by Hubbert and Bringi, JAOT, 1995).

4. In eq. (8), shouldn't \zeta be \zeta_sub_H ..?

5. Fig. 3: Here, can the authors include the 'ice fraction' determined from the radar measurements (as time series)?

6. Page 3687, line 19, sentence beginning 'The horizontal distance. . .', is not at all clear. Please rewrite. (The next sentence is understandable).

7. Page 3688, line 11, sentence beginning 'A detailed error analysis. . .' Authors can note or refer to the article 'Estimating the Accuracy of Polarimetric Radar–Based Retrievals of Drop-Size Distribution Parameters and Rain Rate: An Application of Error Variance Separation Using Radar-Derived Spatial Correlations' by Thurai et al., Volume 13, Issue 3 (June 2012) pp. 1066-1079.

8. Page 3689, line 23, sentence beginning 'Because the number of . . .' – it is not clear why cell B should develop in a very short time. The sentence needs to be rewritten.

9. Fig. 10: are the numbers in this figure in minutes? If so, this should be included in the figure caption.

General: Since the manuscript contains significant discussion on ice fraction, in the analysis of the two cases, it might be helpful to include these values, perhaps as a set of panels corresponding to Fig. 7. This may help identify regions with significant fraction of non-(fully) melted hydrometeors so that further contrast between the cells A and B can be made.

Related to the above point, a brief discussion can be included in the Appendix on how Parsivel performs for events with such partially melted hydrometeors.

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