Atmos. Meas. Tech. Discuss., 8, C260–C262, 2015
www.atmos-meas-tech-discuss.net/8/C260/2015/

Atmospheric Measurement Techniques
Discussions
Open Access

Interactive comment on "A novel approach for absolute radar calibration" *by* C. Merker et al.

Anonymous Referee #4

Received and published: 6 March 2015

The paper addresses the question of absolute radar calibration, which is a topic highly relevant to hydro-meteorology. Paper on this issue are welcomed. Some innovative methodological developments are introduced which is a good point and validated by synthetic rainfall fields. The manuscript is interesting and deserves to be published. However I believe that some aspects should be improved before publication and that the modifications needed require a minor revision.

General comments:

- There is a need to emphasize more explicitly and discuss the validity of the various assumptions made in the development of the method. See detailed comments below. - I did not understand very well what was done in section 4. Real data ? Synthetic ? - It would be very interesting to actually test the developed method on a real case (not clear to me whether it is possible with the data in section 4, its seems the radar

configuration is OK). - If possible, I would suggest to slightly reorganize the manuscript with section a "proof of concept" that would include tests with homogeneous rainfall, very regular pattern, and more realistic one (current section 4) and a new section with actual implementation.

Detailed comments:

1) Introduction - p. 1673 l.28 – p. 1674 l. 1 : "this implies . . . heigth" : some references that quantify this effect should be added (ex : in a radar context Jaffrain and Berne 2012, or more generally Gires et al. 2014, or Moreau et al. 2009) - p. 1674 l.1-2 : disdrometers could also be mentioned

2) Theoretical framework - p. 1675 l. 5 : "a strongly attenuated frequency", some quantitative elements should be given (what wave length are needed) - p. 1676 Eq. 4 : may be more explanations for eq. 4 would be needed - p. 1677, Eq 7 : there is a strong assumption that DSD is constant in the vertical profile above the MRR. It should at least be explicitly mentioned. What is the typical height where the three beams cross (for example in the configuration of section 4) ? - p. 1677 l.5-6 : "specific attenuation.... particular section", again this is a strong assumption, especially given that n=8 is advocated after which corresponds to a section of more than 3 km, over which rainfall is highly variable moreover during one 10s time step (see examples in Jaffrain and Berne 2012 and Gires et al. 2014, or Mandapaka et al. 2009) of small scale rainfall variability. The limitations of this assumption should be discussed more explicitly. - The differences in the volumes scanned by the MRR and the radars should be mentioned and discussed.

3) Proof of concept - p. 1679 l.28 – p. 1680 l.1 : Ok according to the graph but for large n, the homogeneity assumption is much less valid... - p.1680 l.4-5 : "possible . . . results", it remains a very regular patterns with regards to actual ones! - Fig. 4 and 5 : could you explicitly mention in the text that colour scales for the mean are not the same on both figures (it would help the reader, at least me :-)). It enables to see that

with homogeneous rainfall the influence of n and R is actually quite limited.

4) Test on synthetic data with realistic precipitation partner - I do not really understand what is done in the section ? Real data just to obtain rainfall (aand only rainfall) patterns over the section ? Then why adding a random noise ? Could you clarify.

References:

- Gires, A. et al., 2014. Influence of small scale rainfall variability on standard comparison tools between radar and rain gauge data. Atmospheric Research, 138(0): 125-138.

- Jaffrain, J. and Berne, A., 2012. Influence of the Subgrid Variability of the Raindrop Size Distribution on Radar Rainfall Estimators. Journal of Applied Meteorology and Climatology, 51(4), 780-785.

- Mandapaka, P.V., Lewandowski, P., Eichinger, W.E. and Krajewski, W.F., 2009. Multiscaling analysis of high resolution space-time lidar-rainfall. Nonlinear Processes in Geophysics 16 (5) 579-586.

- Moreau, E., Testud, J. and Le Bouar, E., 2009. Rainfall spatial variability observed by X-band weather radar and its implication for the accuracy of rainfall estimates. Advances in Water Resources 32 (7), 1011-1019.

- Jaffrain, J. and A. Berne, 2012. Quantification of the Small-Scale Spatial Structure of the Raindrop Size Distribution from a Network of Disdrometers. Journal of Applied Meteorology and Climatology 51 (5), 941-953.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 1671, 2015.