Hydrol. Earth Syst. Sci. Discuss., 11, C4481–C4484, 2014
www.hydrol-earth-syst-sci-discuss.net/11/C4481/2014/

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Polarimetric radar observations during an orographic rain event and the performance of a hydrometeor classification scheme" *by* M. Frech and J. Steinert

M. Frech and J. Steinert

Michael.Frech@dwd.de

Received and published: 15 October 2014

First we thank for the helpful and constructive comments by the reviewers. We first of all have a general statement, as this seemed to be an issue for all of the reviewers. This indicates to us the necessity to sharpen the manuscript so the main points become clearer.

Since the birdbath scan is part of the operational scanning this scan opens the opportunity to provide high-resolution information on the precipitation process to the (end-) user that has not been available before. Furthermore the combination of operational

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

high resolution profile measurements (birdbath scan), surface measurements and visual observations is in our opinion a unique combination to investigate radar products based on volume scans. To our knowledge there aren't that many studies published where this operational set-up is available. So in the first part we demonstrate what can be seen in birdbath scan, focusing on an observation above the melting layer that is not often revealed, but which has a direct link to surface rain rate, especially if the orography plays a crucial role.

Response to reviewer 2:

A radar - radar comparison is possible but has its limitations as further assumptions need to made: a meaningful comparison must make sure that the same sensing volumes are considered for each radar. In this case this could be approximately achieved as for example the height of the radar is at about 600 m, and the Hohenpeissenberg radar is at 1000 m. Furthermore the important link to ground truth measuresurements and observations is missing. And latter is an important aspect and the focus of this study.

We will include a more detailed discussion on the synoptics using sounding in order add explanations about the observations (see response to reviewer 1)

Response to the specific comments. (ok means we will work on the text to make the paper more concise).

1. (P.8847 L.17) a thorough description of the scan definition is not relevant here as we use only the lowest elevation. We refer to the reference in the manuscript

2. (P.8848 L.1006) ok, we can detail the orography (include a plot).

3. (P.8848 L.27) ok?

4. (P.8849 L.2) Straka et al. (2000) summarise in their paper the different polarimetric measurement variables as base for a hydrometeor classification. So, the hydrometeor types give more or less unique signatures in the radar data and the inclusion of

HESSD

11, C4481–C4484, 2014

polarimetric measurements results in a higher degree of freedom for the hydrometeor classification.

5. (P.8850 L.13) The attenuation path correction is applied all along the ray of clutter-free segments with constant hydrometeor class. Furthermore all hydrometeor types and not only the liquid ones are considered. More information can be found in the response to comment 8 of the first reviewer.

6. () Details of the membership functions are beyond the scope of the paper. A complete description of the hydrometeor classification algorithm including the membership functions will be published later after the completion of verification and testing.

7. (P.8852 L.17) see line 16: no clutter filter applied.

8. (P.8853) will be stated.

Memmingen radar:

the focus of this study is to compare a high resolution column (birdbath + surface observations) against classication results obtained from an operational radar.

in the revised version we will consider the suggestions with respect to the figures.

References:

[Bringi et al. (2001)] Bringi, V. N., Chandrasekar, V.: Polarimetric Doppler Weather Radar. Cambridge University Press, 2001.

[Park et al. (2009)] Park, Hyang Suk, et al. "The hydrometeor classification algorithm for the polarimetric WSR-88D: Description and application to an MCS." Weather and Forecasting 24.3 (2009): 730-748.

[Straka et al. (2000)] Straka, Jerry M., Dusan S. Zrnic, and Alexander V. Ryzhkov. "Bulk hydrometeor classification and quantification using polarimetric radar data: Synthesis of relations." Journal of Applied Meteorology 39.8 (2000): 1341-1372.

[Testud et al. (2000)] Testud, J., Bouar E. L., Obligis, E., and Ali-Mehenni, M.: The rain profiling algorithm applied to polarimetric weather radar. J. Atmos. Oceanic, Vol. 17., pp. 322–356, 2000.

Houze and Medina (2005), Turbulence as a Mechanism for Orographic Precipitation Enhancement. Journal of Atmospheric Sciences Vol. 62., pp. 3599–3623.

Terry Schuur, Alexander V. Ryzhkov, Heather D. Reeves, John Krause, Kimberly L. Elmore, Kiel L. Ortega, 2014: Recent Modifications to a new Surface-based Polarimetric Hydrometeor Classification Algorithm for the WSR-88D Network. ERAD 2014, Garmisch-Partenkirchen, extended abstract, 7p. http://www.pa.op.dlr.de/erad2014/programme/ExtendedAbstracts/134_Schuur.pdf

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 8845, 2014.