

# ***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***

## **Anonymous Referee #3**

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This paper presents a study of an orographic precipitation event focusing in particular on the performance of a hydrometeor classification scheme based on polarimetric observations. The whole paper is aimed at justifying the correctness of the hydrometeor classification scheme implemented at DWD. However, from the discussion of the paper I cannot really find out whether the classification scheme is working properly. The microphysical interpretation made by the authors is very subjective at best. Overall the paper needs a major revision before it can be considered for publication.

General comments: 1. The discussion about the use of the vertical scan for Zdr monitoring (introduction) is irrelevant in this context. 2. The discussion of the data pro-

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cessing (section 2) needs further clarification. In concrete: How do the authors justify the use of membership functions designed for S-band in a C-band network? Is there a rationale behind the thresholds on class probability? Have the authors created a membership function for HZEROCL, SNOWLMT and the ML history? Which one? The polarimetric variables of some classes (notably rain) have a dependency on reflectivity intensity. Do the authors use a single membership function for all reflectivity values?

3. Section 3. I have seen nothing that justifies that the so called event is in the melting layer. Looking at the evolution of the radar reflectivity it seems clear that the iso-0° is below the radar observations. Moreover, in the melting layer one would expect a much lower rho<sub>hv</sub>. The increase in velocity could be simply due to a strong downdraft. I find it very hard to believe that melting snow can be present up to 4000 m above ground level when the iso-0° altitude is no more than 500 m above ground level.

Specific comments: Title: given that during the event there was a mix of rain and snow on the ground it would be more appropriate to call it precipitation event not rain event. Page 8847-line 13: no comma between reason and why Page 8847-line 21: The later Page 8848-line 24: the hydrometeor Page 8850-line 10: differential phase (Phidp not KDP). Page 8853-line 2: Doppler Page 8853-line 5: Reformulate this sentence Page 8853-line 21: “As soon as all snow is melted, ...” this sentence is confusing since after the event the observations are in snow. Page 8853-line 22: This is inexact. The increase in reflectivity in snow is not due to coating in the early stages but to the increase in dielectric constant. Page 8853-line 27: Where do the authors see the thickness of the melting layer? The melting layer is well below the radar observations at this point. Page 8854-line 5: Small rho<sub>hv</sub> values may be simply due to the influence of thermal noise on the measurements. Page 8857-line 11: “The begin...” This sentence is not understandable.

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