

Interactive comment on “Performance of high-resolution X-band radar for rainfall measurement in The Netherlands” by C. Z. van de Beek et al.

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General comments

The discussed paper titled “Performance of high-resolution X-band radar for rainfall measurement in The Netherlands” by C. Z. van de Beek et al. presents a very detailed analysis of the X-band, non-polarimetric radar SOLIDAR, located in Delft, The Netherlands. Radar’s precipitation estimation performance is assessed based on simultaneous rainfall measurements by a network of rain gauges. The paper is well written and has a very good, logical structure. Analyzed rainfall events are well documented

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and represent a variety of rainfall conditions from a very light precipitation to a strongly precipitating squall line. The authors do a very good job presenting every aspect of the analysis in a clear manner.

Lack of polarimetric capabilities in radars operated at X-band frequencies limits performance of attenuation correction algorithms. The SOLIDAR, being a non-polarimetric, X-band radar is affected by attenuation, ground clutter, calibration errors and other factors that make rainfall estimates subject to high uncertainty. The analysis presented in this paper can be seen as one of possible approaches to assessing this uncertainty. Although the overall quality of the paper is good, I do have some specific question I will present below.

Individual questions:

PAGE 6039, LINE 20: The authors write about major upgrades to the SOLIDAR radar. Is there any information on the character of those updates? What is the possible effect on the quality of data presented in this study?

PAGE 6044, SECTION 3.2: a) Is the ground clutter correction performed on a polar grid, or is the data converted to some kind of a Cartesian grid?

b) For the nearest neighbor method, the authors average surrounding non-clutter pixels to obtain the value for the cluttered pixel. Which quantity is averaged and in what units?

PAGE 6051, LINE 6: The authors claim that only forward method is used to correct for attenuation in all precipitation events. Is this statement relevant to Z-R parameter estimation section (3.3) only? I am asking because later in the document results from both forward and backward methods are compared.

PAGE 6055, LINE 8: The paper reads: “The significant overestimation is not trivial to explain, but a reason could be found in the fact that in this special case no wet-radome attenuation occurs, as well as highly localized convective cells that might have been present at the gauge but not completely within the radar bin associated with the

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gauge.”

I am not sure if the later can be used as explanation to an overestimation problem. Partial beam filling can lead to underestimation, rather than overestimation. Is it possible that in this case overestimation is due to the bright band phenomenon?

My last question is related to the analysis method used in all of the case studies (Section 4). The authors are using mean rain rate [mm/h] as a way of comparing radar performance with rain gauges performance. Why mean rain rate? It is the best? Have you considered rainfall totals [mm]?

Technical corrections

Would it be possible to have Figures 6, 11, 12, 14, 15 and 16 in color for the on-line version of the paper?

Instead of time evolution type, the Figure 2 could be better represented as simple radar vs. rain gauge scatter plot.

Figure 4: In the description, words ‘rows’ and ‘columns’ should be switched with each other.

PAGE 6047, LINE 20. “. . .carried outperformed. . .”. I am not sure if this is an intended expression.

PAGE 6049, LINE 11. The statement of the Hitschfeld and Bordan method being the most common is unfortunate. It is common for non-polarimetric radars only.

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