Reply to comments of Anomynous Referee #3 on Close-range radar rainfall estimation and error analysis

This manuscript is an excellent overview of the most important error sources affecting radar-based QPE, with a focus on observations collected at short distances from the radar. This overview is well presented and the reader is guided step-by-step through the case study of August 2010. The manuscript reads well, it is well suited for AMT and it should be published after very minor corrections.

The authors would like to thank the referee for these comments. Below we will give a reaction to each separate comment.

General comment: It would be interesting to have the confirmation that similar outcomes can be expected for other rainfall events, and thus that the results are general (for the given set-up). The manuscript should still be based on the current precipitation event (as it reads very well this way), but could anything be added in the appendix?

Testing other events is unfortunately beyond the scope of this study. Because of the different types of precipitation that were observed in this event, we think that it is reasonable to assume that the results presented here hold for more than just this event, and that they are quite general, We will make a remark about this in the paper.

Short comments:
1) Clearly the manuscript focuses on non-polarimetric radars. Could the author define in the text (briefly) the concept of polarimetric radar?

We will add a very brief description of polarimetric radar.

2) Page 2, Lines 20-25. Here it may be interesting to talk about some polarimetric methods for attenuation correction

We will mention polarimetric attenuation correction in the paper.

3) Page 2, Line 32. It could be stated that above the melting layer precipitation is usually under-estimated given the dielectric properties of ice (snow).

For this study we stay well below the melting layer, but we will change the text to reflect both the uncertainties within and above the melting layer.

4) Page 4, Line 5. For expert readers, it may be useful to mention the "generation" of Parsivel used.

The Parsivel data we used was from a 1^{st} generation Parsivel. We will add this information to the paper.

5) Page 5, Line 1. Could you give an order of magnitude of how similar those measurements are? Are they another order of magnitude with respect to the corrections proposed later on?

The differences between the two disdrometers in terms of rainfall accumulations can be seen in the bottom panel of Fig. 3. For the largest part of the event, the rainfall intensities from both disdrometers are approximately equal. For the most intense part of the event, the LPM seems to record more than the Parsivel and the rain gauge. For clarity and conciseness, we will remove all references to the LPM from the paper, as it does not add much.

6) Page 8, Line 1. How often is operationally re-calibrated the radar, by means of this procedure?

The radar receiver calibration is monitored daily using the sun. We only recalibrate the radar if we see very large deviations or discontinuities. In practice, we have never needed to recalibrate the radar beside that which is carried out as part of annual maintenance. We do, however, spot radar system part malfunctioning through this method of monitoring, which helps us to keep a stable radar. With respect to the transmitter calibration, we monitor the transmitted power as well as the returns of stable clutter targets on a daily basis. Again, we do not operationally adjust the transmitter calibration based on this outside of the annual calibration, but we do find system faults

7) Page 8: Clutter correction. Could you give the filter width of the notch filter operationally implemented?

The width of the employed Doppler notch filter is approximately 1 m/s (we use dual-PRF, and have a Doppler notch width of 0.84 m/s for the lower PRF and 1.13 m/s for the higher PRF).

8) Figures 6 and 7: i would prefer a lot to see the 3 panels vertically aligned, with the same width.

The upper left panels are time series for a much longer period than the other two. The reason why the upper-left panels of these figures have a longer time span is that we want to show what happens in dry weather preceding and following the event. The reason for plotting the intensity graph across the entire width of the figure is that it contains much more detail than the accumulation graph. So we will keep these figures as they are.

9) Page 9, Line 3. If not dBZ, please give the units here (units are given only later on in section 4.4.2)

We will add the units of Z [mm^6 m^{-3}].

10) Page 11, Z - R relations. Among the different corrections, this one seems more difficult to implement real-time. It is not the main focus of the manuscript, but could you spend some words about the potential rea-time implementation of those corrections?

Our purpose was mainly to quantify the magnitude of the errors when using non-optimal Z-R relations. Having said this, one could of course think of an application where data from a limited network of disdrometers could be used to derive event type-specific Z-R relations (for e.g. convective, stratiform, etc. rain) that could then be operationally applied (reverting back to climatological relations if no rain occurs over any of the disdrometers). See also our reply to the comment made by Neil Fox about this.

11) Page 12, Lines 5-10. Could you define also D as the equivalent volume diameter?

Yes, D could be defined as the equivalent spherical volume diameter.