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Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of GPM-DPR precipitation estimates with WegenerNet gauge data" *by* Martin Lasser et al.

Anonymous Referee #3

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Review of AMT-2018-395 By Martin Lasser, Sungmin O and Ulrich Foelsche. Manuscript title: Evaluation of GPM-DPR precipitation estimates with WegenerNet gauge data.

The manuscript presents a validation of the DPR rain rate products by using as a reference the rain gauge data collected by the WegenerNet network in the South-East Austria. Four years of data have been considered, but due to the small spatial extension of the network only 22 case studies have been selected. Both dichotomous (i.e. POD, FAR) and continuous (i.e. Bias, Correlation coefficient) scores have been calculate in order to quantify the agreement between satellite and ground-based data. The GPM community encourages validation studies and in this sense the paper is of absolute interest. However, in the current shape it presents some confusing parts and,

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even if it is easy to read and to be followed, the English can be improved. As a general comment, the paper presents a lack of the GPM validation works which have already been carried out (i.e. Watters et al., 2018, D'Adderio et al., 2018., Biswas and Chandrasekar, 2018 among the other). Some of them are reported in the references list but are never cited within the text (Petracca et al., Speirs et al. – also other papers are not cited within the text). The review of the works on the same topic is useful to understand the novelty of the present work. In this regard, in my opinion, the authors do not take advantage of a such dense gauges network. There is not any analysis relating the agreement between DPR products and the rain gauges measurements to the intra-footprint variability. This would considerably increase the quality of the paper. Following these general comments and the more specific ones reported below, the manuscript has to be deeply revised before to be considered suitable for publication on the Atmospheric Measurement Technique journal.

- Page 2, lines 13-15 and lines 22-23: these information should be moved in the Section 2.

- Page 4, line 30: "The DPR radar instrument. . ." should be "The DPR instrument. . ."

- Page 4 ,lines 30-32: the heavy and light precipitation can occur also at mid- and tropical latitudes.

- Page 5, lines 7-10: I see what the authors mean saying that the KaPR has 49 bins (25 of MS + 24 of HS), but I think this is misleading for a user which does not have a deep knowledge of DPR data structure. I suggest to rewrite the period also considering that the Ka HS data are not used in this study.

- Page 7, lines 1-3: I do not agree with the choice of the authors to include the three events where the DPR products did not reported rain. This is in contrast with what they state at lines 25-27 pf Page 5.

- Page 7, lines 3-6: what is the reason to report an event in Table 1 and then state that

the same event had to be omitted?

- Page 7, lines 13-14: not all the plots of Figure 2 report the WegenerNet rain rate map, so you should specify which panels you refer. In general, it would be very useful to label each panel with a), b), c) and so on. Furthermore, the bottom panels of Figure 2 are useless, the panel titles “WegenerNet grid” is enough.

- Page 9, line 2: has the event N. 21 of Table 1 been omitted or not?

- Page 9, lines 12-17: all the data available are included in the calculation of both correlation coefficient and bias. This means to include also the DPR-gauge couple both reporting no rain. Consequently, this has an effect (as also the authors state) on the scores. You should to consider only the data where the truth (gauges) reports rain rate above the minimum detectable threshold (1 mmh-1) for the calculation of correlation coefficient and bias.

- Page 10, line 25 to Page 11, line 2 and Figure 3 and Figure A3: this is totally confusing to me. What is the difference between the blue line of Figure 3 and Figure A3? If the Figure A3 reports the range it should have a minimum and a maximum value for each footprint, but I see only one value. Furthermore, the standard deviation reported as it is in Figure A3 is completely useless. You should plot the average value plus/minus one standard deviation represented by a shadowed area.

- Table 3 should be placed before than Table 4.

- Discussion about contingency table (Table 3) and derived statistics (Table 4): in my opinion, it is hard to say that KaPR provides the best results since it reports a lot of misses (the double of KuPR and DPR) which are not take into account considering only POD, FAR and POFD. Consequently, I suggest to include additional statistical scores (as for example, the Critical Success Index – CSI) to evaluate the impact of the misses.

- Figure 5: the top panel is repeating the information given in Figure 3. It could substitute the Figure 3 or it should be deleted. Where is the CC for the event N. 8, 10 and

13? Furthermore, some events do not show the CC for all three DPR products. Can you explain the reason?

- Page 15, lines 9-10: instead of the mean of CC, you could consider to calculate the CC by combining all the data available.

- Page 15, line 11: it does not make any sense to calculate the bias for the events without precipitation.

- Page 16, line 2: substitute “where” with “were”.

- Page 16, lines 18-20: which constraint?

- Within the text, the values of statistical scores are reported sometimes as absolute values and sometimes as percent values, while they are reported in absolute values in the corresponding tables. Please, uniform the text reporting either absolute or percent values.

- Page 18, line 8: I do think that rain rate lower than 7 mmh-1 can be considered heavy precipitation.

- Page 19, line 1: substitute “events” with “event”.

- Page 19, line 6-8: a time lag of $\pm$30 minutes is too large. The DPR precipitation estimation at surface that you used is an extrapolation of the precipitation rate estimated at Near Surface level, which is the level closest to the surface where the data are available. Considering the distance between this level and the surface you can estimate the time needed to the precipitation to reach the ground and consider a reasonable time lag.

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2018-395/amt-2018-395-RC3-supplement.pdf

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