

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

Anonymous Referee #2

Received and published: 20 December 2018

General comments

The paper presents an evaluation of precipitation estimates by the DPR onboard the GPM Core Satellite by using a very dense gauge network located in Austria. The study can be of interest for the GPM DPR user community, because it aims at providing an independent validation of DPR precipitation estimates. Anyway many issues are present in the manuscript, that are worthwhile of further investigation. First of all the 22 selected case studies include many very light precipitation events, or no precipitation at all. The high number of correct negatives has a strong impact on the statistics and should be not included in the analysis. Moreover I do not see an evaluation of the rainfall variability in the DPR footprint, thanks to the very dense gauge network. Thus the usefulness of such a density seems to be not fully exploited. English can be

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improved. Many typos are present and terminology used is often quite approximative and needs to be checked. Moreover the statistical analysis is not well designed in my opinion. At the end my feeling is that the paper does not add enough relevant and new knowledge on the topic stated in the title. Thus I think the paper could be considered for publication in AMT, provided that a careful effort of major revision is undertaken.

Specific comments

Page 2 Line 18: If by “The microwave imagers” you mean the GMI, please reword “The microwave imagers augment the core satellite and enable a high temporal resolution for global precipitation maps.” to “The GMI completes the core satellite, enables a high temporal resolution for global precipitation maps and is used as a calibrator for the other radiometers in the constellation.” If you are referring to the other radiometers of the GPM constellation, please use the words “microwave radiometers”, not “microwave imagers”, because not all of the constellation instruments are imagers (e.g. MHS is a sounder).

Page 3 line 2: “only measurements at points in time” means “instantaneous precipitation rate”

Page 3 lines 4-5: more and better with respect to?

Page 4 line 12: what do you mean by “up to 0.1 mm”?

Page 4 lines 19-28: I do not agree with the authors about this paragraph. Why do they say that the WegenerNet is twice as good as the DPR? The availability of about 1 gauge per 2 km², while the DPR resolution is roughly 5x5 km², makes the difference in resolution much higher. Moreover they say “there is no other precision (quality) information for the GPM-DPR estimates”: what do they exactly mean?

The sentence “the WegenerNet provides accurate information, not only whether precipitation occurred but also on the amount of rain.” seems to say: the DPR only provides where precipitation occurred. Please clarify better.

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Finally: I do not think that the gridded gauge data are actually characterized by a higher resolution, with respect to the station data. I think that the inverse distance method used to regrid data cannot really "increase" the resolution from 2 km² to 200m x 200 m. Please explain better this issue.

Page 5 lines 5-10. The concept is often right, but this paragraph should be written in a more precise way. The DPR swath includes 49 beams (or rays), not bins. The KaPR includes 49 beams in total, but only 25 are overlapped to the KuPR ones, the other 24 are interlaced. The sentence "The KaPR on the other hand, has half of the swath size of KuPR with 120 km and 49 bins" seems to mean that KaPR has roughly twice the KuPR resolution. The sentence "KaPR shall provide better information on light rainfall and snow." is not completely correct. This was the aim, in some sense, of the availability of Ka-band in the DPR, with respect to TRMM PR I mean. Anyway there is a relevant bibliography dealing with the problem of detecting light rainfall and especially snow by means of KaPR, because of its low sensitivity (e.g. Casella et al, that is the list of references, but is not cited in the manuscript).

Pag 5 line 14-15: DPR does not measure cumulated rainfall, but instantaneous one. So here you should write 0.2 mm/h and 0.5 mm/h.

Page 9 lines 23-24: because the authors are aware that correct negatives take an effect on the results, why do they include them in the statistical analysis. I should suggest to avoid them and to use other scores (e.g. ETS, HSS) to evaluate the performances. In which way you carefully choose the events?

Page 11 lines 6-12: This paragraph is not clear. I do not understand how you round to zero. The analysis of the subpixel-scale variability is cited, but non investigated in details throughout the manuscript.

Pages 12-14: all this part is not clear and in general shoul be rethought. Moreover the last analysis, with the constraint on GPM-DPR estimates and standard deviation, could be completely avoided.

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Section 4.2 The analysis of case studies is misleading. How can it happen that for some footprint stations do not measure precipitation and gridded data show a (relevant) amount of rainfall? It often happens and the authors shoul explain if the inverse distance used to regrid data is responsible for this strange behaviour. If so, I do not think that the gridded data have to be used, also because of the artificial higher resolution.

Page 16 lines 1-6. Light rain are of convective nature? I cannot understand how you discriminate between convective and startiform events.

Page 19 Lines 6-8: the analysis of the lag effect is correct in principle, but I do not understand the use of such a large time interval (+ 30 minutes).

Page 20 Line 6: what does "although the grid changed obviously" mean?

Page 21 Lines 12-14: I do not understand what are the authors' plans as far as HS scan is concerned.

References

Many items present in the list of references (e.g. Casella et al., Petracca et al., Seto et al., Speirs et al., Szeberényi et al.) are actually not cited in the manuscript. Please check carefully.

In the list of references please write the author names in the right way and put them in the right alphabetical order (e.g. Jackson is actually Skofronick-Jackson)

Technical corrections

There are many typos brought the manuscript. Just some of them are listed below. The authors have to check very carefully all of them.

Page 2 Line 8: is the reference to JAXA in the correct AMT style?

Page 3 line 8: fly-overs are generally called overpasses.

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Page 4 line 19: “each footprint” → “each DPR footprint”

Page 5 line 1: “frequency” here is really misleading. Maybe you mean “number, concentration”?

Page 6 line 5: the most rainiest → the rainiest.

Page 10 line 1: occurs→occur

Page 10 line 25: any→no?

Page 13 line 16: “delivers”→ “deliver”

Page 13 line 17: “low”→ “light”

Page 16 line 3: phenomena is plural

Page 16 line 1: “where”→ “were”

Page 17 line 1: Fig A6 is actually Fig A5.

Page 18 line 3: Fig A7 is actually Fig A6.

Page 19 line 17: Fig A5is actually Fig A4.

Figures

Figure 1: Place the label somewhere else.

Figure 3: Does min resolution Ka (that is 0.2 mm/h non t mm) need to be shown?

Figure 4 caption: what is resp.? “The diagonal denotes the line where the satellite measures the same as the terrestrial network.” is obvious.

Figure 5 top panel is the same as Figure 3. Please avoid to show the same data twice.

Figure 6-9. The DPR data superimposed to the Wegener gridded ones in the bottom panel should be removed, because already shown in the top panel.

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