REVIEW OF THE PAPER "Improved rain event detection in Commercial Microwave Link time series via combination with MSG SEVIRI data", AMT 2023-175 (round II)

General comment

The authors did a huge effort in editing the manuscript according to reviewers comments. I think that this new version has improved a lot and it is much clearer than the original one. I also would like to thank the authors for their detailed replies to my questions. There are still a few points, which, in my opinion, are due a **minor revision**.

- Sampling and resampling of SEVIRI and CML data: for wet /dry classification (ADB methods), SEVIRI has been resampled to 1-min, i.e. the same as CML data. However, comparison against radar data is carried out resorting CML to 15-min sampling. Why you did not use 15-min all the way, just resampling CML data?
- About my comment on performance indicators in the first round of review. Specifically about MCC. It is not a matter of being familiar or not with it. I think that several readers would not be able to rate the statement in the abstract "Compared to basic and advanced TSB methods, these combinations improved the Matthews Correlation Coefficient of the rain event detection from 0.49 (0.51 resp.) to 0.59 during the day and from 0.41 (0.50 resp.) to 0.55 during the night". Is it a significant/huge improvement or not? Are 0.49 or 0.41 acceptable values for the MCC? To help understanding MCC, if we compare (6) and (1), we get that MCC is basically PCC for binary data. That would be a synthetic and easy explanation of MCC. When I see it from the reader's perspective, it would be more effective to summarize in the abstract the improvement brought by combinations using TPR and FPR, or just writing a simple statement as the one on p. 19 lines 420-21.
- About my general comment on wet/dry rationales for radar data: the authors explain how radar pixels are combined (p. 5, line 125) to overlap a CML as the comparison with SEVIRI is done over CML paths. The radar-based precipitation value is derived by a weighted average in space (according to the fraction of the path overlapping the radar pixel) and an arithmetic average in time (from 1 to 15-min). However, it is not well explained how radar time series (i.e. rainfall rate estimates) were reduced to wet/dry time series for the validation of SEVIRI products in Fig. 4. It is stated that wet/dry threshold on radar data is 0.1 mm/h (p. 4 line 130). Hence, I guess the authors first calculated the radar-based rainfall estimate over the CML path and then they thresholded it at 0.1 mm/h. I think that this procedure should be explained in the text for instance on p.5 after line 125.
- Threshold on SEVIRI probability of rain. As the authors said in Sec. 5.1, it is surprising that PC and PC-Ph work at their best with such a low probability of rain. This looks even more surprising considering that it is calculated over a rather large pixel (table 1). Can the author provide any information about how these precipitation products were extracted from SEVIRI measurements to justify these outcomes?
- Figure 7: I cannot get why the relative bias of each class is normalized to the average rainfall intensity over all classes (denominator of Eqn. 2) if I got it, which I am not sure. If we assume an order of magnitude 1000 mm of rainfall per year, the average rainfall intensity would be around 0.12 mm/h. Is it correct? In my view, for class, say, light 2, the denominator should be the average of the occurrences of radar-based rainfall rates between 1 and 2.5 mm/h. The important information I retain from Fig. 3c is the sign of the relative bias. The height of bars is about the balance between negative and positive errors. In the evaluation of CML rain estimates time vs radar, using different wet/dry classifiers, I think a useful indicator is missing, that is the RMSE, which would help in assessing also the performance over individual classes.

- One thing I guess remains without an explanation is why all methods underestimate precipitation with respect to the radar reference whatever the rainfall intensity class, while they overestimate dry periods (relative bias in Fig.7). I think a comment in the manuscript is due. Even if this fact is explained somewhere else, please not only add only the reference, but at least one explanatory statement.

Specific comments

- P.4, line 144: "it is calculated by a regression of IR and Water Vapour channels (WV)." What you mean by WV channel? Channels are identified by a frequency.
- P. 7, line 171: "We computed RS and CNN on a 1-minute basis". Do you mean in previous paper?
- P. 7, line 175 what you mean by "we forward filled?" You just classified all minutes within a 15-min SEVIRI wet slot as wet? It could be a problem when it starts/stops raining or during intermittent rain. This point has to with the first bullet in my general comments.
- P. 10 Eqn. (2) I think the terms on the numerator should be switched, as all methods underestimate rain intensity as the authors state several times, it means that RB<0
- P. 12 lines 299-301 and P. 19 line 406-408: the authors do not bring a physical evidence that dew formation is the responsible for such a drop of the MCC for RS from day to night. They just say that the difference between RS and CNN performance suggests this conclusion. I suggest to smooth the statement on p. 19 which sounds like an harsh statement. (also I think the word "assumption" is not correct in this context)
- P. 13 Figure 4 caption: better to add that TPR, FPR, MCC refer to wet/dry classification performance while PCC is for rainfall intensity estimate.
  P. 13 line 316-319: from Figs. 5 and 7, as far as I see it, the three combined methods shown perform the same except for the bias. Moreover, the 10.8% bias is attributed to PC1 combined, while from Fig. 7 it seems the one of CNN-combined.

Technical corrections

- p. 6 line 163, "adapted"
- p. 7, line 185: I guess it is "Fig. 2"
- p. 10, line 219 "For comparison against the benchmark" sounds better
- P. 12, line 2929: "one" instead of "on"
- P. 14, line 326-27: I guess you are referring to Fig 7 c) and d)