Interactive comment on "SM2RAIN-CCI: A new global long-term rainfall data set derived from ESA CCI soil moisture" by Luca Ciabatta et al.

Luca Ciabatta et al.

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We thank Dr. Beck for his valuable comments and suggestions. We will address all the minor comments in the reviewed manuscript. In the following we answer to the specific comments provided by the Referee.

Comment 1: Abstract: Capitalization of ACTIVE and PASSIVE is unnecessary? No mention of how well the other products perform. Maybe list median correlation coefficients for the other products.

Reply 1) Thank you. We will add the median values of correlation coefficients of the parent products. Regarding the capital letters, we think is better to clearly identify the products, as we have done for all the precipitation datasets we used, even if ACTIVE

and PASSIVE are not acronyms.

Comment 2: Line 94: Replace "etc..." with "etc.".

Reply 2) Thank you, will be replace it.

Comment 3: Line 96 – "With the aim of facing and monitoring climate change". Consider rewriting, reads a bit cumbersome.

Reply 3): Thank you for the suggestion. We will change the sentence with the following one "with the aim of providing valuable tools for climate change monitoring".

Comment 4: Line 109: Beck et al., 2016 -> Beck et al., 2017 (please fix throughout the manuscript). Reply 4) Thank you, will check the reference.

Comment 5: Which version of MSWEP did you use? MSWEP has a 3-hourly temporal resolution (not daily as stated).

Reply 5) We will change the temporal resolution and we will add the MSWEP version used in this work (1.2).

Comment 6: Line 139: MSWEP is a precipitation dataset (rather than a rainfall dataset).

Reply 6) Thank you, will we change this.

Comment 7: Line 159: I think ECMWF provides data through their API (not an FTP).

Reply 7) Thank you, we will change FTP with API.

Comment 8: Line 192: I don't understand what "interpolated to 00:00 UTC" means. Can you add an explanation?

Reply 8) The original CCI soil moisture products are provided as images with daily temporal resolution. Each image provides the soil moisture values on a global scale at the reference time of 00:00 UTC. In order to fill the data gaps created after the preprocessing steps, a temporal interpolation at 00:00 UTC has been performed. We will add more details in the reviewed manuscript.

Comment 9: Line 218: Why does the COMBINED dataset perform so poorly? Honestly curious. Consider adding a line discussing this.

Reply 9) The difference in performance should be related to the optimization strategy. The CCI COMBINED SSM dataset is created by merging the Active and Passive by estimating the Signal to Noise Ratio (SNR) of the parent products via a triple collocation analysis. The SM2RAIN-CCI dataset is created by merging the Active and Passive derived rainfall. The integration weights are estimated by maximizing the correlation between the new Combined rainfall dataset and the benchmark. We will add some lines in the manuscript showing this point and the performance of the parent products. However, the COMBINED product performances are not so poor, as you can see in the attached figure.

Comment 10: Line 244: Is it reasonable to assume that because of the separate calibrations the dataset is unsuitable for trend analysis? The presence of temporal discontinuities around 2007 in tropical areas seems to confirm this. Consider highlighting this in the manuscript.

Reply 10) Yes, correct. Due to the different algorithm calibration, the SM2RAIN-CCI dataset should not be used for trend analysis. We will underline this in the conclusions.

Comment 11: Line 261: New paragraph starting with "A cross-comparison ...".

Reply 11) Thank you, we will correct it.

Comment 12: Line 302: "due to the use of dense ...". I think a more likely reason for the good performance of ERA-Interim is the stratiform-dominated precipitation regime which tends to be well predicted by atmospheric models.

Reply 12) Thank you for the suggestion, we will add this to the reviewed manuscript.

Comment 13: Line 328: May be a bit unnecessary to repeat the entire methodology?

Reply 13) This part will be reduced, thank you.

Comment 14: Conclusions: Maybe state that the dataset should not be used for trend analyses.

Reply 14) Please refer to reply 10.

Comment 15: Figure 1: Delete the color bar.

Reply 15) Ok, we will remove the colorbar.

Comment 16: Figure 2: Is this figure really necessary? It doesn't really clarify anything in my opinion...

Reply 16) Thank you, we will improve the quality of the figure.

Comment 17: Figure 3 lower panel: What are the units?

Reply 17) The units are mm/d, we will add them in the figure and in the caption, thank you. Comment 18: Figure 4: List subfigure identifiers in subfigure titles (e.g., replace "Northern America" with "Northern America (A)")

Reply 18: Thank you, we will add the identifiers.
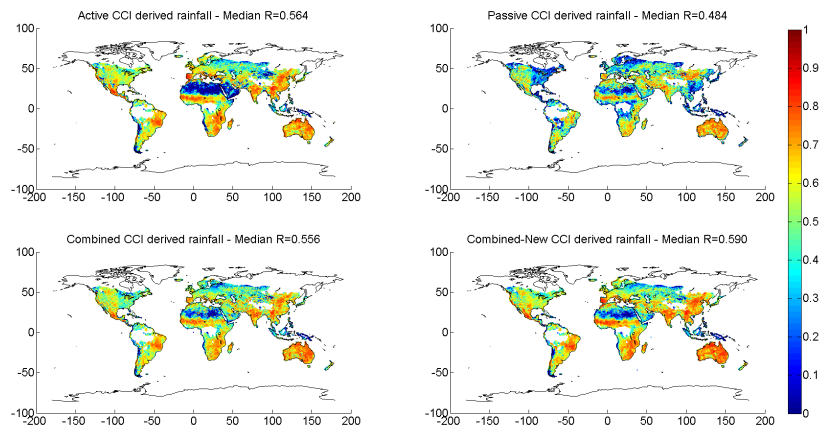
Fig. 1. Global correlation maps obtained during the period 2007-2013 for the ACTIVE (up-left), Passive (up-right), Combined (bottom-left) and the new Combined (bottom-right) rainfall datasets.