

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

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We thank the Anonymous Referee #2 for her/his valuable comments and suggestions. We will address all the comments and suggestions in the reviewed manuscript.

In the following we answer to the general comments provided by the Referee.

Comment 1): - Quality of Figures must be improved - Scores Tables are missing and should be added

Reply 1) We will improve the quality of the Figures and we will add the Tables with the obtained scores in the reviewed manuscript.

Comment 2) : Some datasets are used for validation but one of them (GPCC) had

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previously been used for calibration. This is confusing. The authors have to make a clear difference between what can be considered as a simple quality check of the calibration (using GPCC) and indirect validation using pre-existing datasets (other than GPCP).

Reply 2) We will clarify this aspect underlining the use of GPCC for calibration and quality check.

Specific comments:

Comment 3): L. 47 (10.34 mm): please clarify units (mm per month ?)

Reply 3) We will add the units, in this case is 10.34 mm/5day

Comment 4): L. 47: BIAS should be lower case

Reply 4) Thank you, we will remove the capital letters

Comment 5): I would delete "very" as these in situ observations have their own instrumental issues

Reply 5) Thank you for the suggestion, we will delete the word very

Comment 6): L. 120 ("GPCC ... used for calibrating SM2RAIN"): should then not be used for validation in Section 3 (?) Please clarify.

Reply 6) Please refer to Reply 2

Comment 7): L. 160: Please write here that 3 regional datasets are used for validation in Section 3.2 (E-OBS, etc.).

Reply 7): OK, we will add the regional datasets here

Comment 8): - L. 173: frequencies

Reply 8) Thank you

Comment 9): - L. 186 (deserts): do you mean "arid areas" ?

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Reply 9) No, here we meant desert itself. The issue in SM retrieval is related to the presence of sand. The retrieval over an arid area with different soil characteristics is not problematic.

Comment 10): - L. 202 (Eq. (1)): insert space between "a" and "s"

Reply 10) Thank you

Comment 11): - L. 227 (Eq. (3)): delete "\*\*\*"

Reply 11) We use "\*\*\*" to distinguish  $Z^*$  (soil depth times soil porosity) from  $Z$  (soil depth) used in the original formulation of the algorithm.

Comment 12): - L. 249 ("in order to perform a fair comparison with the benchmark"): please clarify. These are scores corresponding to the "learning phase" of the algorithm (based on GPCC-FDD). Obtaining good score values in such conditions is not surprising. What is the purpose of Figure 4 ? Validation or evaluation of the quality of the calibration ?

Reply 12) GPCC-FDD has a native resolution of  $1^\circ$  while the calibration has been carried out at  $0.25^\circ$  of spatial resolution. The calibration check has been carried out here at  $1^\circ$  in order to consider the native resolution of the benchmark, as performing the check at  $0.25^\circ$  could introduce errors in GPCC-FDD. As stated above, we will underline the fact that GPCC is used for check the calibration results

Comment 13): - L. 262 (Figure 5): Please indicate which period is considered here. A table giving min-max-mean-std of scores is needed.

Reply 13) We will add the tables with the different scores, thank you.

Comment 14): - L. 273 (Figure 6): A table giving min-max-mean-std of scores is needed. Again, this is not validation (GPCC was used for calibration). Please clarify.

Reply 14) Please refer to the previous replies

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Comment 15): - L. 298: please explain why you use E-OBS here, and not GPCC.

Reply 15) We used EOBS here for validating the rainfall dataset over Europe. We will better clarify this aspect in the reviewed manuscript.

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