

## ***Interactive comment on “Inter-calibrating SMMR brightness temperatures over continental surfaces” by Samuel Favrichon et al.***

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This paper presents the results of an inter-satellite radiometric calibration for SSMR over land using the GPM instrument. The authors' approach is novel in that they perform the inter-calibration of two satellite radiometers without near-simultaneous collocated observations. This method is justified because the SMMR was the first conical scanning radiometer in space, and therefore did not have the usual over-lapping period for comparisons with other space-borne instruments. Given this situation, I feel that the authors have made a reasonable case for their statistical method developed to compare the current GMI with the previous SSMR.

However, I have some comments, which I feel would strengthen their case if included

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in their paper.

1) Concerns the three available SMMR Tb datasets that exist. In section 2.1 the CM SAF FCDR was described but not the others? Were they available? It would have been better to compare the three different data sets in their statistical analysis or at the very least to discuss why they were not considered.

2) Concerns the oceans and/or Antarctic sea ice data sets. I suspect that a similar statistical comparison could have been made (as presented for land). I recognize that this expands the scope of the analysis, but it also makes the paper stronger. I suspect that similar results would have been found, which would provide confidence to the conclusions.

3) Concerns the selection of the two 2-month periods, namely: Jan/Feb and Jul/Aug. Some discussion was provided in section 2.2, but I recommend more information be provided to inform the reader specifically why these were selected (as opposed to monthly comparisons)?

4) The SMMR biases, relative to GMI (SSMI), are presented in Fig-1, -2 & -4, but I recommend that they also are included in a Table of results.

The following corrections are suggested:

P-2 Line-3 following Seasat insert “Nimbus-G”

P-2 same pp WindSat and TMI were not mentioned in the list of radiometers? Since only SSMI and GMI were involved in the direct comparisons, the others could have been omitted?

P-2 Line-12 . . . Fennig et al. 2019) than that . . .

P-2 Line-25 Insert “However”, this method is very

P-4 Line-5 . . . CM SAF FCDR insert “SMMR” . . .

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