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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Evaluating the suitability of the consumer low-cost Parrot Flower Power soil moisture sensor for scientific environmental applications" *by* Angelika Xaver et al.

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Reviewer 2

General comments

The manuscript is well written and scientifically solid. The research is of interest and highlights potential applications for both in situ soil monitoring and satellite validation for large scale analysis. To my view the manuscript can be accepted after minor revisions, here listed.

Response: We thank the reviewer for his/her positive feedback and the recommenda-

tion to publish the manuscript after minor revision.
We appreciate the constructive comments. Below we address the reviewer's comments point by point.

Specific comments

1) Page 2, line 37. Replace "Ochsner et al. (2013)" with "(Ochsner et al., 2013).
Response: We kindly thank the reviewer for pointing out this oversight. We modified the reference accordingly.

2) Page 7, Line 143. Maybe "where not considered" is "where considered "instead
Response: Thanks for thoroughly reading our manuscript and for identifying this slip of the pen. We modified the sentence as suggested.

3) Page 8, lines 188-189. The sentence is redundant as respect to line 138,page 6.
Response: While line 138 (page 6) focuses on the sensor set-up (and highlights the unconventional sensor position and its intended purpose), lines 188-189 (page 8) specify sensors that were used to investigate the temporal agreement between the low-cost and the professional sensors. Although we agree that the information provided is redundant, we decided to leave it as is for the benefit of the reader (to make the sensor easily recognizable).

4) Page 13, line 311. "Despite the much smaller range of incoming shortwave radiation observed by the FP sensors..." It seems that Figure 6 represents only the incoming shortwave radiation from CNR4, while light level is represented by the FP sensor.
Response: It is true that Figure 6 represents the incoming shortwave radiation from

the CNR4 and the light level observed by the FP sensor. While the CNR4 observes the incoming shortwave radiation within a spectral range from 300 to 2800 nm (see lines 106-107 on page 5), the FP sensor observes only a small part of it. Indeed, the FP sensor only observes the visible light within a spectral range from 400 to 700 nm (lines 75-76, page 3).

5) Page 14, Figure 7 and lines 313-314. The authors should avoid to calculate the bias or deviations of two different variables characterized by different measurement units. Remove the bias value from the Figure 7. Just a comment on the fact that the deviation cannot be calculated because of the different measurement units is fine.
Response: Thank you for this very valid remark. We have removed the bias from the figures 6 and 7 (see below). In lines 313-314 (page 14) we changed the sentence from "The high deviation in absolute values is a consequence of the different observation ranges and measurement units of both devices, which cannot be easily transformed into a common unit due to the difference in the observed spectral range." into "Computing the bias between the observations made by the devices is unfeasible because of the different wavelength ranges observed and the different measurement units.".

6) Pag 16, Figure 9. A bar plot of the rainfall in the same graph of the soil moisture measurements can be useful to see if the higher noise of FP sensor is related always to rainfall impulses. This can be also better justify the sentence in lines 339-341.
Response: Thank you for this suggestion. We included the rainfall observations in Figure 9 and in addition in Figure A2. While in Figure 9 the professional and the low-cost soil moisture sensor show a very similar reaction to rainfall events (p. 15, lines 335-337), Figure A2 shows an example where sensitivity to rainfall strongly deviates (p. 15, lines 339-343). This difference is most likely driven by the vertical position of the FP sensors, while the magnitude in general depends on local conditions (e.g., soil

texture, vegetation).
We could not identify a clear connection between the strength of noise and rainfall events.

7)Page 18, Lines 415-417. The author should test the significance of the correlation coefficients using the critical values related to the sample size or the p-value test. Same for table 4, on the validation of the ASCAT product.
Response: We included the significance information on basis of the p-value as suggested in Table 4 and in the lines 328 (page 15), 370 (page 17), 414 (page 18), and 419 (page 19).

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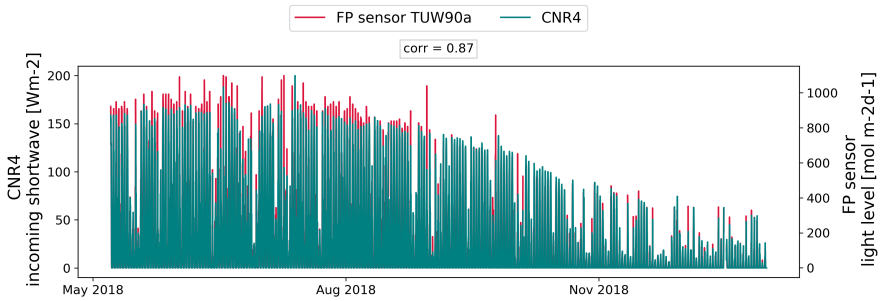

Fig. 1. Figure 6

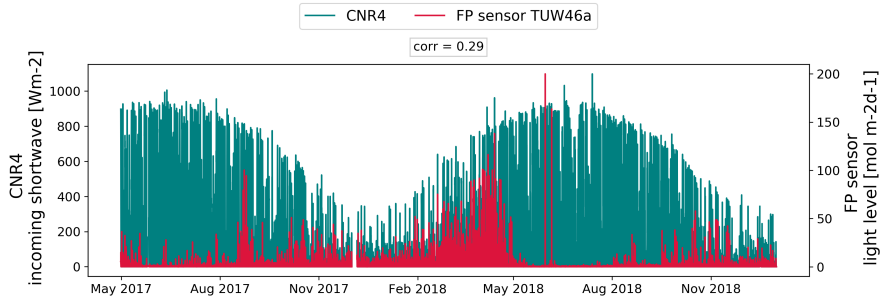

Fig. 2. Figure 7

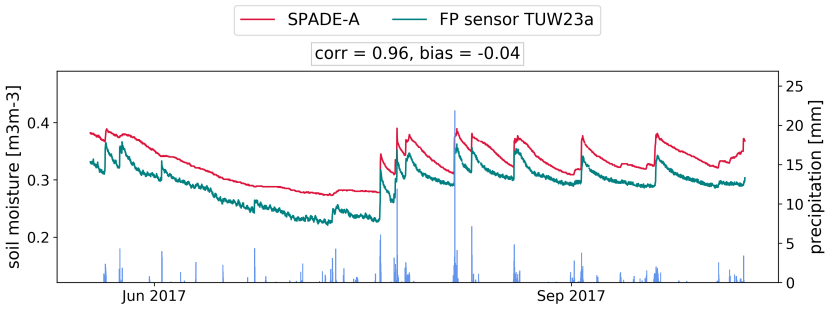

Fig. 3. Figure 9

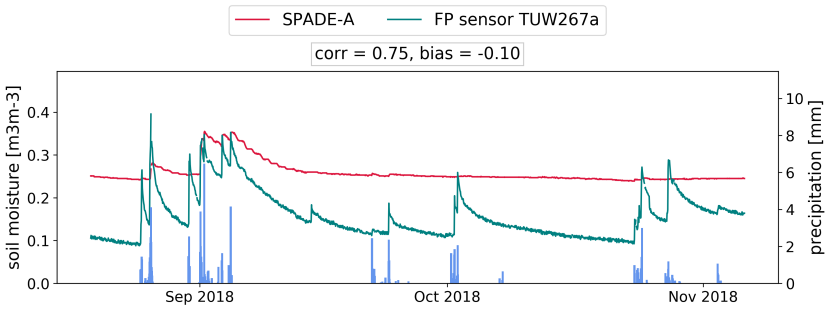

Fig. 4. Figure A2