Hydrology and
Earth System
Sciences

Discussions

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**Interactive
comment**

Interactive comment on "Multiscale soil moisture estimates using static and roving cosmic-ray soil moisture sensors" *by* David McJannet et al.

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General Comments:

The manuscript nicely describes a blueprint for a roving cosmic ray neutron sensor application (CNRS) for remote sensing validations, land surface model validation, and field scale soil moisture retrieval over adequately large farmlands. Conditions for application, and guidelines are outlined in sufficient technical depth. The novelty of this manuscript is the clear presentation of the technical methodology, focus on the purpose, conclusiveness of the experiment and validation of the derived data by static and additional roving CRNS experiments. Hence, the manuscript deserves to be published in HESS subject to revisions which can be easily handled by the authors.

Discussion paper

Specific and technical comments:

There are few points which will improve the quality of the paper mostly regarding restructuring of the text and improving clarity of the figures. Although methods and results are mixed at several instances, the manuscript was written fluently and well readable, containing the necessary technical details and contents for reproducible. Along with restructuring, novelties might be marked more strikingly by additional sub headings.

l 42: scale hectometers - rephrase

l 46: remove "better" otherwise better than what?

l 48: I'd suggest to treat land surface modeling separate to remote sensing, and include parameter estimation studies which actually use CRNS already (and are potential cases for rover application at horizontal scale) such as Baatz et al. 2017 "improved land surface model prediction" and Villarreyes et al. 2014 "Inverse modelling of cosmic-ray..." .

l 83: indicate time over which is averaged (monthly average or daily average)

l 86: Stick to one terminology. The authors switch repeatedly between CRNS (this one should be preferred), "cosmic ray soil moisture sensor" and many others throughout the manuscript and headings.

l 93: add citation (e.g. Hawdon et al.)

l 131: isn't air pressure (fp) used to scale to sea level (1013 hPa) instead of an additional scaling factor (fs)? This would avoid using a redundant scaling factor fs.

l 152: This sub-chapter can be restructured mostly to include sections from "Results" but which actually are "Methods". Here, the novelties and blueprint character could be more concise.

l 187: This is not an "additional" part. Now, it is part of this study.

l 197: This is very likely the approach taken by Baatz et al. "An empirical veg.." Eq. 2.

l 209-210: Move to methods

l 214-217: What is remarkable similar? Just the results should be clear enough. Here, the curve-average resulting difference in soil moisture should be also noted, since this is the variable of interest for hydrologists. As it reads now: The interpretation would be that biomass pools are equal. Perhaps, knowing the site conditions, biomass "is basically non-existent".

l219-221: Move to methods. Paragraph reads like the approach described in Baatz et al. 2015.

l 228-232: Move to methods.

l 232-233: This is a result.

l 233-235: Move to methods.

l 249-251: Move to methods or rephrase.

l 259: Please investigate.

l264: "farm property" seems a key words and should be introduced earlier.

l 267-272: Move to methods.

l 275-277: Move to after-results e.g. conclusion or outlook.

l 290ff: to methods.

l 295-299: Link/relate results to driving speed and counting rates.

l 320: replace will with with

Fig. 1: Insert Map of Australia and consider landscape format of the figure.

Fig. 2 and others: Add axis title (Lat/Lon).

Fig. 3: Consider using color bars with 2 colors for b, c, and d. "m ASL" was used in the text, so please use it in the figure as well. Now it is "m AHD".

Fig. 7 and 11: Consider dark Brown- light Yellow or other color bars with 2 colors for neutron counts. Is this already corrected neutron counts? This would be desirable, please indicate. Soil moisture is preferably shown with red-green-blue color bar throughout all plots. The counts shown should be corrected neutron counts. Otherwise, the additional value is not clear. Why are the interpolation patterns for neutron counts not visible in the soil moisture interpolations? I suggest to coarsen the visual representation.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-358, 2017.