Review of the paper:

“Multiscale soil moisture estimates using static and roving cosmic-ray soil moisture sensors”

by: David McJannet

GENERAL COMMENTS

The paper describes a research project aimed at producing soil moisture estimates at a range of scales that are commensurate with model and satellite retrievals. The study involved static cosmic ray neutron sensors and rover surveys across both broad (36 km at 9 km resolution) and intensive (10 x 10 km at 1 km resolution) scales in a cropping district in the Mallee region of Victoria, Australia.

Given the ever increasing lack of ground measurements, having medium-to-high resolution observations of soil moisture against which validating satellite soil moisture products is extremely important. With the advent of Sentinel 1 satellite sensor we will have soon soil moisture estimates at 1 km of resolution or even lower. Hence, studies involving any technique for retrieving or expand the availability of these information are very welcome in literature. For this reason, I think the topic is of interest for the journal readership and worth the consideration for the publishing in HESS journal. The paper is also well written and structured and concise at point.

My main recommendation for the authors is to put more effort to underline the real merit of the paper by trying to underline the differences with respect to previous studies and add material that makes the study more close to a scientific paper than a technical report. Indeed, I struggled a bit to grasp the novelty and potentiality of the study – “The paper describes a research project” as written by the authors in the abstract – and this does not do justice to the merit of the study. My suggestion is to provide a comparison of the rover estimates with a model or other types of observations (like the gravimetric measurements the authors have collected) demonstrating the reliability of the rover estimates in terms of reproducing spatial pattern of soil moisture which can be extremely useful for validating high-resolution satellite soil moisture products.

I also have other comments the authors can be considered to improve the manuscript. I report below my comments in order of appearance indicating also their relevance.

PAGE	LINES or Section	RELEVANCE	COMMENT
3	102	MINOR	Define fp here. Cosmic-ray neutron intensity, fp, is part….
5	155	MINOR	18 time.. faster?
7	Section 3.2 and 3.3.	MODERATE	Figures 4 and 5 seem not cited in the text.

7-8	Section 3.5 Intensive scale rover survey	MAJOR	I think it is too much optimistic to say that the agreement is excellent based on only on two points and three times. Why not comparing spatially with model estimates?
8	264-277	MODERATE/ MAJOR	Provide more details about the point-area regression analysis. It is not completely clear from the text.
16	Figure 1	MINOR	Provide scale of the figure and indication of the size of the box.

Based on the comments above I recommend the publication after **MODERATE/MAJOR REVISIONS**.