Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-358-SC1, 2017

Hydrology and Earth System Sciences
Discussions

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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Received and published: 15 September 2017

Dear David McJannet,

thank you for the interesting study using CRNS roving across scales. As an external observer of the interactive discussion, I would like to comment shortly on the discussion about potential road effects. This topic has been the focus in one of our recent research projects in Europe. Our work is currently under review in another journal, but it is already publicly accessible on the arxiv.org pre-print server: https://arxiv.org/abs/1709.04756

Neutron simulations and dedicated experiments indeed show that roads introduce a bias to the neutron counts if the roads are dryer than the surrounding. But as the

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climatic conditions at your sites are rather dry and most of your surveys were off-road, I guess the overall impact to your specific case are minor.

The overestimation of field neutrons ranges between factors of 1 to 1.4, depending on field and road moisture content and road width. Just as an example, if your road is of 3 m width and contains approximittely 6% water equivalent (account for lattice, hydrogen fractions, etc.), then your neutron counts are probably biased by factors of 1.03 to 1.13 for field soil moisture conditions of 10% to 30%, respectively. The effect is probably not significant for your April'16 and March'17 surveys, but could have an influence on your wetter campaign days, e.g., June'16.

The good news is that the effect almost vanishes beyond a few meters away from the road. You mentioned in your manuscript that most of your surveys went along paths at the field borders next to the road. Our results suggest that road effects along these off-road tracks are likely to be insignificant compared to the overall heterogeneity of hydrogen pools in the environment.

I hope you find this comment useful and that those recent results could help to support your argumentation in the manuscript.

Regards, Martin Schrön

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