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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Estimating field scale root zone soil moisture using the cosmic-ray neutron probe" *by* A. M. Peterson et al.

Anonymous Referee #2

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Estimating field scale root zone soil moisture using the cosmic-ray neutron probe Authors: A. M. Peterson, W. D. Helgason , and A. M. Ireson

General Comments This paper describes approaches for estimating soil moisture through the entire root zone at a field scale using surface soil moisture measurements from a cosmic-ray probe and 3 different depth scaling approaches. This subject will be of great interest to many researchers working on similar problems and has applications further than the cosmic-ray probe to other near surface measurements. The exponential approach clearly has advantages in terms of required instrumentation and the ability to make root zone soil moisture estimates at the same time resolution as the cosmic-ray probe estimates. The paper is well written and I recommend only minor changes before I believe it is ready for publication in HESS.

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Specific Comments

1. Fig 1a and b need labels

2. Section 2.2.1 – there seems to be no adjustment for soil organic matter or lattice water which represent an additional pool of hydrogen. Depending on the size of these pools they can have an effect on the fit of the universal curve (see Hawdon et al. 2014 and Zreda et al 2012) and hence impact upon derived soil moisture estimates.

3. Section 2.3.2 – how do you deal with varying measurement depth of the CRP in such a scheme?

4. Section 3.1 – While agreement between validation and CRP estimates is good not including lattice water or soil organic matter could also account for the differences you see. Similar underestimation at low soil moisture and over estimation in wetter conditions is shown in Hawdon et al 2014 when these hydrogen pools are ignored (see fig 9).

5. Fig2 – samples are said to be gravimetric yet the axis is volumetric?

Hawdon, A., D. McJannet, and J. Wallace (2014), Calibration and correction procedures for cosmic-ray neutron soil moisture probes located across Australia, Water Resour. Res., 50(6), 5029-5043, doi: 10.1002/2013wr015138.

Zreda, M., W. J. Shuttleworth, X. Zeng, C. Zweck, D. Desilets, T. Franz, and R. Rosolem (2012), COSMOS: the COsmic-ray Soil Moisture Observing System, Hydrol. Earth Syst. Sci., 16(11), 4079-4099, doi: 10.5194/hess-16-4079-2012.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 12789, 2015.