

# ***Interactive comment on “Investigating temporal field sampling strategies for site-specific calibration of three soil moisture – neutron intensity parameterisation methods” by J. Iwema et al.***

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The authors present an interesting review of the three common calibration methods used for the cosmic-ray neutron sensor. The authors estimate statistically the required number of calibration datasets for the three different methods at three different study sites, providing some recommendations. The paper is well written but does contain several locations where grammar needs to be improved. Following fairly minor revisions (updating HMF coefficients, commenting on use for mobile applications), the

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paper would be suitable for publication and add to the growing CRNS literature.

Major comments:

1. As the main author of the HMF method, I would suggest a couple comments. First, the 4 derived coefficients were updated in the McJannet et al. 2014 WRR paper table 4. The updated coefficients should be used as they are more reflective of the 1 inch moderated tubes than a pure epithermal response (0.5 to 1000 eV). A weighted average of ~30% thermals (0-0.5 eV) and 70% epithermals (0.5 to 1000eV) should be used by MCNPx simulations to be more representative of the actual detector response. I don't think this will have a drastic affect on the overall results but may improve on any systematic bias that may exist with the HMF or COSMIC methods.

2. The HMF function contains only 1 free parameter as compared to 2 for COSMIC operator (2 here but 4 free parameters elsewhere) and 3 for modified N0. It seems that the performance of HMF given the less number of calibrated parameters should be taken into account for any cross comparisons of the methods. Did the authors consider any penalty factors for increased number of free parameters to calculate? Could this be considered with an AIC metric? The authors do point out the fewer number of parameters in several locations but I was just wondering if a penalty function was used.

3. Given the excitement for mobile CRNS surveys (Chrisman et al. 2013 and Dong et al. 2014), the authors may comment on the most appropriate method for use with mobile surveys. Perhaps in a few sentences in the discussion is all. Clearly calibrating each site 2-10 times is not a good option for mobile surveys.

Minor Comments:

A few examples of grammatical errors and needed sentence changes. Authors should check rest of manuscript for consistency.

Pg 2353 L18: "because year long daily time series of soil moisture is usually unavailable."

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Equation 3. Please update coefficients using McJannet 2014 WRR Table 4.

Pg 2366 L 22. :”understood by”

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