

Hydrol. Earth Syst. Sci. Discuss., referee comment RC4  
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## Comment on hess-2022-173

Anonymous Referee #4

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Referee comment on "Technical note: A sigmoidal soil water retention curve without asymptote that is robust when dry-range data are unreliable" by Gerrit Huibert de Rooij, Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-173-RC4>, 2022

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This manuscript presents the improved parameterization of SWRC in the dry range based on the author's previously developed logarithmic-sigmoid SWRC model (published in HESS). Specifically, as formulated in the previous paper is expressed as a function of other parameters that were fitted, this may lead to the obtained not in the reasonable range. To solve this issue, the author focuses on regarding the shape parameter instead of as a derived parameter. By using the positive characteristic of and the minimum value of for any through the partial derivative of with respect to , the author quantified the corresponding upper and lower limits imposed on , then as a fitting parameter is eliminated and replaced by its upper limit that is determined by both and , given all fit points fell on the upper limit. As such, the obtained entire parameter space is valid, which is quite good. On the other hand, the author found that the sigmoid branch of the SWRC could be simplified to the commonly used power law as is very large. This further guarantees the rationality of emphasizing on fitting and the newly found parametric relationship.

The reviewer thinks that the SWRC formulated with the parameters that are suggested being better fitted or derived, are useful to be applied in soil moisture and temperature and land surface fluxes modeling especially for arid and semi-arid regions. On the other hand, the calculated fractions of capillary-bound water and adsorption water using functions in this paper may be useful in investigating microwave dielectric properties of dry soil and associated soil backscatter. The paper is well written and organized. The reviewer appreciates the author making the hand-on script and manual public, which is encouraging and makes readers and peers benefit. The reviewer suggests the acceptance of this paper with minor revisions, especially improving the resolutions of Figures 5-8. For other minor comments please see them in the .pdf.

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2022-173/hess-2022-173-RC4-supplement.pdf>