

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2022-265

Anonymous Referee #2

Referee comment on "Predicting soil hydraulic properties for binary mixtures – concept and application for constructed Technosols" by Moreen Willaredt et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-265-RC2>, 2022

General comments:

The paper presents different ways to predict the water retention curve of binary mixtures (i.e., mixtures of two materials with different particle size distributions). The study was carried out within the context of the need to understand the hydraulic properties of constructed technosols that result from mixtures of geogenic materials of different particle size distributions. Willaredt et al. define two models and predict the water retention curves of different mixtures previously characterized in previous studies. The authors also fit the data to the bimodal water retention cure model, using an approach similar to Durner's (Durner, 1994).

The manuscript is clearly organized and relatively well-written. I reckon proofreading by a Native from English spoken countries. I have some concerns that should be addressed before potential publication:

- The topic of the paper lies partially in line with the area of hydrology. This study is clearly more geotechnical than hydrological. I join the feeling of the first reviewer concerning this aspect. I suggest strengthening the link with hydrological processes.
- In the end, the authors propose an application of their model that is more related to hydrological sciences. They show how their model may be used to predict water content in technosols for growing plants and trees. Using capillary models, they could increase the link with hydrology by predicting the unsaturated hydraulic conductivity from predicted water retention curves.
- I suggest moving the appendix to the main text since it presents important mathematical aspects. This move would ease reading the result section, in which links

to equations and models need to be more straightforward.

- Several variables and models are only sometimes clearly presented in the appendix and the main text. Please, define all the variables and their related units.
- Regarding the optimization process, when fitted data are compared to observed data, the equations should be reminded, and the optimized parameter should be listed and discussed. No discussion of parameters is proposed.
- The physics should also be discussed. In several mixtures, the fine components have bimodal pore size distributions. Theoretically, this could lead to three modes for the mixture pore size distribution, with two for the fine part and one for the coarsest part. This aspect should be discussed. The impact of the symmetrical and multimodal pore size distributions of components should be discussed concerning their impact on the bulk water retention of the mixture.

More detailed comments:

The authors will find a list of suggestions and comments in the enclosed pdf document.

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2022-265/hess-2022-265-RC2-supplement.pdf>