



EGUsphere, referee comment RC2
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Comment on egusphere-2022-274

Anonymous Referee #2

Referee comment on "Assessment of the ISBA Land Surface Model soil hydrology using several lysimeters and four pairs of soil water retention and hydraulic conductivity functions" by Antoine Sobaga et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-274-RC2>, 2022

This manuscript presents the results of an LSM application using two different approaches according to BC and VG to reproduce soil water mass, volumetric water content, and drainage water flux volume observed in seven lysimeters over a period of more than five years. Furthermore, approaches by Braud et al. (1995) and Valiantzas (2011) are tested to simulate the soil hydrology of these lysimeters. They derived hydrodynamic parameters directly from the observation and compare them with several pedotransfer functions commonly used by LSMs. The LSM used has a multilayer diffusion approach of the Interaction-Soil-Biosphere-Atmosphere (ISBA) model, which solves a variant of the Richards equation.

- The term "drainage" in this context means the transit of a liquid through a porous medium. In the present case, it is water through the upper soil layers. It is neither a quantity nor a volume. Therefore, if the amount of water is to be addressed this must be explicitly stated as drainage water.
- For the lysimeters, the experimental setup is sufficiently described, but the lower boundary condition is not mentioned in detail as a special feature of the lysimeter. Since drainage in particular is considered as a special aspect, this has to be described in detail for the lysimeters. Especially the consequences/impacts of the chosen design on the drainage amount of water must be discussed. Otherwise, it is assumed here that the lower boundary layer of the lysimeter corresponds to a naturally layered soil, and this is de facto not the case.
- The methods section on the comparison between the model predictions and the lysimeter observations is very unclearly written and needs a more comprehensible description.
- Why these applied models were selected is not convincingly presented, especially since there are more current modeling approaches that promise better simulation of processes and results.
- Lysimeters provide "point" information compared to LSM. Here, indications are missing how this discrepancy is addressed or how lysimeter results could be scaled.

Line 107: A specification of the measurement resolution is missing here.

Line 181 ff: Is this the case? It is often stated that in zero-tension lysimeters, the seepage water formation takes place under water-saturated conditions. I am not aware of any study that has decisively investigated this. Of course, small-scale saturated structures are also conceivable with corresponding fingering. Is this the case? It is often stated that in zero-tension lysimeters, leachate formation takes place under water-saturated conditions. I am not aware of any study that has decisively investigated this. Of course, small-scale saturated structures are also conceivable with corresponding fingering. Especially before the background of a very heterogeneous material of a former industrial site, which was filled manually into lysimeters. Hydrophobic structures are also conceivable.

Line 200 ff: Should be discussed later, because it is manual filling with disturbed profiles. This has an impact on the parameter estimation.

Line 233 ff: "At the bottom of the soil" What do you mean by this? This wording is very unclear or does not make sense.

Line 242: Masses of what? Water?

Line 266f: I do not understand this argumentation. The temporal resolution is criticized as limiting and therefore I reduce the temporal resolution even more or aggregate the data?

Line 265ff: In order to be able to classify the different seepage water quantities, a distinction must be made between vegetated and unvegetated lysimeters. This has been done. But to be able to investigate or classify the differences between the vegetated lysimeters, measurements of the crop development (LAI) or the crop yield (harvest amount), etc. are absolutely needed. Only with this information different ETp results can be classified.

Line 289 ff: Also, non rainfall water like dew, hoar frost, etc.

Table 1: Regarding the contents of the table: am I correct in assuming that the remainder is 100% silt? If not, what then? But should still be presented in more detail for clarity. To standardize the presentation, the number of decimal places should be the same for all data.

Figure 3, 5-7: Measurement units of the Y-axes are missing

Furthermore, I share the remarks of the reviewer 1.