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Discussions

Interactive comment on "Parameterizing complex root water uptake models – the arrangement of root hydraulic properties within the root architecture affects dynamics and efficiency of root water uptake" *by* M. Bechmann et al.

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Reply to reviewer #2, referee comment RC C270
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C633

Thank your for your comments on our manuscript.

The reviewer raises an important point with regard to the closeness between model simulations and reality.

Our model, similarly as other three-dimensional models, is to conceptualize the complex processes of root water uptake, which are difficult to measure (Dunbabin et al. 2013). One important but largely unknown set of input parameters to root water uptake models are the local root hydraulic properties, which alter depending on plant age and maturation. Our study aims at distinguishing likely root hydraulic parameterizations from unlikely ones (including homogeneous parameterizations) with the help of two efficiency criteria. As such, the scope of our model is in exploring complex interaction of the soil root system, not in reproducing actual root water uptake patterns, e.g. of a controlled experiment. This is similar to other applications of complex three-dimensional models (i.e. Couvreur et al. 2014) We understand that it is important to point this out clearly in the manuscript. We will emphasize in the revised manuscript that our study is more an exploratory approach, which serves to evaluate the principal influence of heterogeneity on root water uptake dynamics and its efficiency in a systematic manner. Thank you for pointing this out.

We created one specific root system geometry corresponding to a 28 d old sorghum plant (see also Sect. 2.3 of our manuscript). However, in order to investigate the influence of the arrangement of root properties, we varied the root hydraulic properties. We varied the fraction of young roots between 0 and 100 % systematically backward from the tip (see Sect. 2.3 of our manuscript), such to ensure that root tips always correspond to the youngest part of the root system.

We will change the wording and the notation from micro-meter to 10^{-6} m in table 2, as suggested.

References

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