

Interactive comment on “Isotopic approaches to quantifying root water uptake and redistribution: a review and comparison of methods” by Youri Rothfuss and Mathieu Javaux

Anonymous Referee #2

Received and published: 8 November 2016

General comments:

The manuscript aims to compare different methods to locate root water uptake depth. I understand that it is a review paper, however, it is rather long, way too complex, and unfortunately hard to follow (it even comes with an appendix). This is mainly due to the many formulas that are presented and which disturb the text flow. I agree that a method comparison is needed but the manuscript is blown up with a lot of “basic isotope knowledge” which for my feeling is not necessary in such extent. I would suggest to reduce the length of the whole manuscript and focus on what differentiates the three methods to be compared. Further, the authors should only present equations which are really needed to understand the method comparison. I believe that this would increase

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the readability. Concerning the presented figures, I would recommend to keep them simpler as they should generally be self-explaining and not as complex as they are now. I would consider the manuscript ready for publication after major revision.

Specific comments:

Title: “quantify” instead of “quantifying”

p. 3ff: Introduction needs a better/clearer structure

p. 3 l. 2-6: References are missing

p.3 l. 7: “driven by transpiration taking place...”

p. 3 l.11: “spatial distribution... is very variable in time and space”; spatial in space → avoid duplication

p. 3 l. 13-14: Reference missing; permanent wilting point concept; what is a dry soil in this context?

p. 5 l. 1: “each other” without hyphen

p. 5 l. 3-6: Repetition from abstract

p. 5 chp. 2.1: This chapter is too detailed; fundamentals of isotope hydrology do not have to be explained in such detail

p. 6 l. 20: Reference missing

p. 7 l. 8: “grey” instead of “gray”

p. 7 l. 12-14: Repetition

p. 7 l. 24: Mention this earlier in the manuscript

p. 9 l. 16: 21 studies: Based on which criteria have these studies been selected? Literature review using ISI web of knowledge? Please mention briefly.

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- p. 9 l. 20: “unambiguously identified” → What about issues with regard to water extraction techniques which might be a cause for this?
- p. 10 l. 7: grey → correct throughout the manuscript
- p. 11 l. 26: Table 1 should rather go into the Introduction section, also it is too detailed
- p. 12 l. 22: Replace www. by an abbreviation for example EPA, 2015; same for p. 13 l. 10
- p. 13 l. 20ff: Why did the authors not intercompare the methods based on a dual isotope approach? How reliable/meaningful is a single isotope approach?
- p. 14 l. 26: Is it necessary to mention the function?
- p. 18: Think about renaming the subsection e.g. method uncertainties and. . .
- p. 18 l. 1-20: This does not belong into the discussion section
- p. 18 l. 21: Reference missing
- p. 18 l. 21-24: Is this water plant available? Does it make sense to extract at such conditions if plant available soil water pools are of interest? Please discuss briefly.
- p. 18 l. 24ff: Methods are also not intercomparable and each method comes with a huge uncertainty (e.g. Sprenger et al., 2015; Orłowski et al., 2016). How reliable is such data in the end when utilized for RWU calculations? How would RWU depth vary if e.g. extraction method uncertainty is accounted for?
- p. 19 l. 3ff: Again, does this represent plant available water?
- p. 19 l. 15: Gaj et al. (2015) is not a method comparison paper. Pratt et al. (2015) is wrong → Orłowski et al. (2016) and please cite Sprenger et al. (2015) as review paper about extraction method comparisons.
- p. 19 l. 27: “generalization of coupled approaches” → What does that mean?

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Table 1: Too much information

Table 3: Not sure if all these numbers are necessary to understand the method comparison/virtual experiments

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-410, 2016.

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