

Interactive comment on “X Water Worlds and how to investigate them: A review and future perspective on *in situ* measurements of water stable isotopes in soils and plants” by Matthias Beyer and Maren Dubbert

Anonymous Referee #2

Received and published: 18 February 2020

The manuscript by Beyer & Dubbert reviews current methods of *in situ* measurements of soil and plant water isotopes. The methods are well described and an exhaustive review of past studies is given, before individual issues of current measurement techniques are discussed and finally suggestions for improvements are given. The manuscript is very well written and easy to read. The contents are valuable and worth publishing as the described methods are indeed still in development. Therefore, a comprehensive review such as this that collects the current knowledge is highly relevant. The title is slightly misleading however, as the manuscript barely deals with the “two or

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x water worlds” hypothesis. I suggest to remove all parts before and including the “:” from the title and just call it “A review and future perspective on *in situ* measurements of water stable isotopes in soils and plants”. I only have some minor comments for clarification or little bit more detail and suggestions for typos.

Specific comments L38: the more easily accessible water would be soil water that eventually becomes stream water, currently the sentence sounds like stream water is directly sampled L95: unclear if “leaf chamber” is a physical e.g. plastic chamber where leaves are studied or if stomatal openings, the sites of transpiration, are meant. L120: where’s the difference of fractionation factors and equilibrium fractionation factors? Be a bit more specific what is exactly meant with the first term L164: which other value was used to linearly correct the measured hydrogen isotope values in vapor in the study of Rothfuss et al. 2013? Further, how did Rothfuss et al (2015) proof that their isotope values were reliable? They must have compared it to something. L173: according to Line 128, the first *in-situ* study in semiarid areas was by Sodeberg et al (2012) and not Gaj et al. (2016). Please clarify. L183: incomplete soil water extraction by which system? L200: since this system is the most complete, I am lacking a bit of information of what this system consists of exactly. Especially since later the authors of this manuscript suggest a more general, expanded approach to the cited study. The other methods were well described but here the description is a bit lacking. It seems to be a vapor-permeable membrane technique, but the advantage or difference to previously described methods is unclear. L210: I would not call this “trueness” but “accuracy”. Since there is also a discussion ongoing of which water is exactly sampled by each method and which method can give “correct/true” values under which conditions. L408: method number 3 does not sound like a system to prevent condensation. The condensate between each flushing is just removed. Also for the example of Figure 5, where is the data coming from? Did you conduct this experiment or is it from another study? L445: the meaning of the sentence becomes unclear starting with “correction has mostly been applied [. . .]” L488: The description of carrier gas effects is very short compared to the rest L545: does the proposed method have to be repeated

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for each individual study? I think that the final multiple regression results should be general and applicable for many studies. Please elaborate on this. L579: I do not see how the example of mobile water is related to the sentence before, that in situ methods overcome current method limitations.

Technical comments L61: citation: Hendry et al. 2015. As changes in citation style appears again in the manuscript, please keep it uniform everywhere. L83: sentence “and this is where. . .” should be shifted, as it currently reads very confusing. For example, “The scientific community agrees that one of the most important steps to investigate, disentangle, quantify and incorporate. . .” L87: delete the one “a” before “the same” L91: “kil lthe plant” please correct L92: Sentence sounds like time and costs of destructibe sampling result in larger sample amounts. L94: delete “of” L169: “O” for oxygen missing at the end of the sentence with “delta 18”. Also unclear what combined measurement is referred to? I assume d18O in water and carbondioxide? L188: delete either “of” or “for” L200: “applied” please correct L213: write already “isotopes” in the heading for 2.2 L252: “Gordon” missing L304: delete “and” L375: delete one “now” L415: “disappears” spelling L454: use “positive correlation” instead of “positive effect”, as this sounds beneficial L465: “no” should be “not” L472: “A” should be “As [stated above]” L512: “is” should be “as” L514: do you mean “previous” instead of “succeeding”? L671: Fig 7 instead of Fig 6

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-600>, 2019.