

We thank the reviewer for reviewing the manuscript again and his helpful comments. We changed the manuscript accordingly.

Details about the changes are given below.

Line numbers refer to the plain text version of the revised manuscript.

Report #1 (Referee #2)

I thank the authors for their efforts to improve the manuscript. I am satisfied with the changes to the manuscript that tackled my suggestions/demands. Changing the order of the ideas in the discussion would eventually give the work a better readability and impact. I also have a few more minor comments. These changes can probably be made without an additional round of revisions.

Page 1

L26: “superior” may be too strong and start a debate with geochemists. Please consider another adjective. Also note that while isotopes are not affected by chemical reactions like solutes, stable isotopes nevertheless go through fractionation processes. These make it hard to link isotopic ratios to other processes (e.g. flows) in the absence of controlled conditions (e.g. temperature and humidity).

We changed “superior” to “advantageous”.

Page 2

L6: De Walle is not an appropriate citation, cite rather Liu et al. (2004),
<https://doi.org/10.1029/2004WR003076>.

Changed as suggested.

L7: I think it is “von Freyberg” et al.

Changed as suggested.

L14: “catchment residence times”

Changed as suggested.

L15-16: This sentence is really important. Splitting it and adding more details would give it more impact.

We splitted and rephrased the sentence. It now reads:

“Many studies have used the temporal dynamics in the isotopic composition of precipitation for estimating catchment residence times. Particularly, on forested sites where meteorological and isotopic reference stations are generally in the open interception losses and accompanying isotope effects must be considered as they have a significant impact on the input function (...).”

L27: I would replace “precipitation input” with “the water effectively recharging the catchment”

Changed as suggested.

L30: “decreasing TTDs” does not make much sense. Write “lower travel times” instead.

Changed as suggested.

L32: “data” -> “isotopes”

Discussion:

The discussion has almost all the ideas needed to give the work enough impact. However, these ideas are presented in a way that makes it challenging to follow and makes the reading a bit painful. I recommend that the authors really focus on their technological progress offering the benefits of continuous measurements against bulk samples at the start of the discussion. Then, they should move on to interpretations of their correlations and plots in terms of processes and applications to models/isotope hydrology applications, and then only technical aspects + limitations/way forward. Therefore, I suggest the following order (using the current section numbers) and advice for improvement:

(1) 4.1: Another title would describe the contents better.

Changed to “4.1 Continuous measurements”.

Paragraph II seems to fit better in 4.3.

Changed as suggested.

L25: You could mention that this finding about dTF too is possible only with continuous data and that further investigations about this will need such a measurement setup.

In section 4.7 we added

“For validation purposes, it would then require high resolution meteorological and isotope data as available from our setup in order to match the resolution of the envisioned modeling time steps.”

Further, in the Conclusion section we added

“The obtained data will be crucial for mechanistic modelling approaches which will yield more realistic isotope input functions and thereby improve water flow and solute transport estimations for vegetated catchments.”

L31: You could mention that this also dispenses the transport/storage of many samples.

In section 4.1 we inserted “Additionally, continuous measurements dispense the transport and storage of large quantities of samples.”

and also referred to it in the Conclusion section (p. 13, l.29) by inserting

“..., transporting and storing”

Also, avoid using “obviously” (found also in other sentences). What is obvious for someone may not be for someone else.

We rephrased to: "Generally, there was a tremendous loss of...".

(2) 4.6: the sentences lines 9-14 and the first sentence of paragraph IX seem to fit better in 4.5.

Changed as suggested.

Paragraph X would be better directly after VI.

Changed as suggested.

(3) 4.7: Make it clear here that only the continuous measurements in isotopes can validate such a mechanistic model. A word about the isotope applications in hydrology to echo the contents of the intro?

We added to section 4.7:

(l. 9) "...as well as intra- and inter-storm variabilities..." and

(l. 22) "Such a model would derive from P_g data a more realistic isotope input function of water effectively recharging forested catchments. For validation purposes, it would then require high resolution meteorological and isotope data as available from our setup in order to match the resolution of the envisioned modeling time steps."

To the Discussion section we added:

"The obtained data will be crucial for mechanistic modelling approaches which will yield more realistic isotope input functions and thereby improve water flow and solute transport estimations for vegetated catchments."

L14: Not clear what simulation is meant.

We inserted "envisioned" before "simulation".

"needed" -> "needs"?

Changed as suggested.

L14-16: Not clear, break down / reformulate.

We inserted "envisioned" before "simulation time step".

(4) 4.2

L15: "meteorological variable" seems unnecessary

Deleted as suggested.

(5) 4.4

L5: Similar but less distinct than what?

We rephrased the sentence to

"In the derived Δd values two clusters could be observed that were similar to but less distinct than the difference in $\delta^{18}\text{O}$ and $\delta^2\text{H}$ of the continuous measurements."

L8: But why would these uncertainties be higher for initially wet conditions?

We inserted

"In the case of initially wet canopies, mixing with pre-event water which was inconsistently subjected to evaporative enrichment of heavy isotopes may have contributed to the observed higher Δd variabilities."

L14-15: Really? For me this is not obvious. This needs further explanation (show the equations allowing this conclusion?)

We rephrased the sentence to

"Conceptually, positive Δd values could have resulted from evaporation lines with slopes higher than that of the meteoric water line, causing TF isotope values to plot above the meteoric water line in dual isotope space."

(6) 4.3

L24: The first sentence is repetitive w.r.t. the last sentence of 4.2. This may be irrelevant after rearranging the order of the paragraphs.

Yes, this is now irrelevant.

L27: Alterations in the isotopic signal evidenced by interception losses? That does not make sense. Please explain further.

We rephrased the sentence to

"Typically, air temperature as well as vapour pressure deficit being the main driver of evaporation slightly decreased over the course of an event. However, evaporation as evidenced by the observed interception losses still occurred and altered the isotopic signal."

(7) 4.5

Conclusion: Currently this section lacks enough detail about the impact/consequences for isotope hydrology. It is nice approach, but how will it impact the field. Does it really matter?

Page 14:

L8-10: More details about this and applications in isotope hydrology.

We rearranged the Conclusion section and inserted

"The obtained data will be crucial for mechanistic modelling approaches which will yield more realistic isotope input functions and thereby improve water flow and solute transport estimations for vegetated catchments."