Reviewer 2

General Comments:

"Xylem water in riparian Willow trees (Salix alba) reveals shallow sources of root water uptake by in situ monitoring of stable water isotopes" This manuscript describes an intensive experiment that monitored the isotopic composition of xylem water in two willow trees and compared it to the available water sources in the soil system. The xylem water most resembled the water in the surface soil, which suggests that most of the water transpired by these trees was from that source. This inference is supported by the drawdown of water content in the surface soil. The paper is one of the first to use the in-situ borehole method to monitor rapid changes in xylem water. It was particularly interesting that the traditional cryogenic sampling of xylem water, which has been in serious question for a year or more, yielded isotopic values that neither made sense nor matched the in situ samples. Figure 5 can be beautiful--with some modifications.

Response to General Comments

The authors thank Prof Marshall for his positive comments and acknowledging the intensity of our experiment, but also the novelty of this paper using the in-situ bore hole method (developed by himself).

We will emphasize the usage of the borehole method as being one of the first. Further, we will discuss the cryogenic results of xylem water in more detail in the revision. Figure 5 will be modified to be more readable.

Additional literature:

Two papers describing similar conclusions, but in other species, have appeared in recent months. The first is different because it uses the Volkmann probes, but the second uses boreholes. I am not sure the second can be cited yet, but the first certainly can. These papers are:

Gessler, A., Bächli, L., Rouholahnejad Freund, E., Treydte, K., Schaub, M., Haeni, M., Weiler, M., Seeger, S., Marshall, J., Hug, C., Zweifel, R., Hagedorn, F., Rigling, A., Saurer, M., & Meusburger, K. (2021). Drought reduces water uptake in beech from the drying topsoil, but no compensatory uptake occurs from deeper soil layers. New Phytologist, 233:194-206.

and

Kathrin Kühnhammer,Adrian Dahlmann,Alberto Iraheta,Malkin Gerchow,Christian Birkel,John D. Marshall,Matthias Beyer. Accepted. Continuous in situ measurements of water stable isotopes in soils, tree trunk and root xylem: field approval. Rapid Comm. Mass Spectrom.

Response to additional literature: The authors thank the reviewer for their suggestion. We will add the papers to our discussion and firmly compare our results with the recent findings. The second paper is now published, so both studies will be referred to and discussed in our revision.

Method:

The authors have modified the earlier borehole method by inserting a porous sleeve into the borehole. It is almost certainly not true that fungal infections were prevented by the sleeve (line 224) unless the entire procedure of boring and tube insertion was carried out under sterile conditions. Perhaps it is enough to say that fungal infections were reduced, although even this would seem to require some attempt to examine fungal density on the borehole wall. Second, I am curious about the concern over liquid water (line 222) in the boreholes. As the xylem is under tension, it would seem that this could not occur except perhaps when

tension is released as the vessels were first cut. I doubt that the sleeve caused any harm apart from a minor slowing of response, but I am skeptical that it caused any improvement. Questions about artifacts caused by cryogenic distillation (Chen et al., 2020, cited) are worrying much of the ecohydrology community. As this study has compared this technique to the borehole technique, confirming that the worries are valid, I think that the comparison should be emphasized. I suggest presenting it in the abstract (not corroboration, line 9) and the conclusions, for example. It is relevant as it helps justify preference for some version of the borehole technique in future work. In the methods, you should probably add measurements of height and diameter of the trees.

Response to Method: The authors thank the reviewer for their constructive comments. We agree with the reviewer, that an active prevention of fungal infection by the polypropylene membranes inside the boreholes will require further investigation. Due to the small pores of the membrane, which are impermeable to fungal spores, we think that a "reduced risk of fungal infection" can be assumed without testing. We will clarify this in the revision. Since the membrane usage was new, we wanted to emphasize every possible improvement of the setup. We did not expect the willows to have liquid water inside the borehole, but as the reviewer knows, there are (tropical) tree species, that use water inside wounds as a defense mechanism. Under such circumstances the membranes would only allow vapor to enter the system. However, since this is not the case in our study, we will remove this section in the revision. It might not be a direct improvement of the borehole method, but we think it's still an advantage that the same method (membranes inserted inside a matrix) can be used inside soil and xylem to collect the sample improving comparability of the two measurements.

We thank the reviewer for their suggestion and will compare in-situ and cryogenic extraction of xylem water in more detail also emphasizing the results in the abstract.

Further, estimations of tree height and measurements of diameter of the trees will be stated in the revision.

Order of figures:

I found the order of the figures confusing. Fig. 7 should be presented after Fig. 3 as these are similar in structure and both present something like raw data. Fig. 4 can be moved to the supplement as it is not really used or discussed here. Fig. 5 could then come next, after being modified somewhat. In Fig 5, the polygons obscure the color of the points, making it difficult to distinguish which points are which. Especially difficult is to see the surface soil data in the green and blue polygons. I suggest colored outlines rather than filled polygons. Also, there is a series of precip data in the middle of the plot that almost look too perfect. Perhaps those could be checked and commented on in the text? This figure is otherwise compelling. I look forward to seeing its final version.

Response to order of figures: These are good suggestions. We will reorder the figures to better match the processing of the data. Further, we will update Figure 5 to improve its readability by using unfilled polygons. We double checked the precipitation data points matching the local meteoric waterline and didn't find any anomalies (sample amount between 10 and 500 ml, results are from June or July, sometimes due to the 4h interval several measurements were aggregated with weighted mean to get daily results). Precipitation events were also compared with data from the German weather service (DWD). We assume the data match the local meteoric waterline since the line is calculated from those data (from May 2020 – January 2021).

Fig. 6:

Fig. 6 would come next in logical order as lc-excess is derived from the raw isotopes, but the caption should include a brief description of what lc excess is and the labels on the axes

should be improved (lc ex. is not OK). Finally I am curious about why the precip lc excess in fig. 6c is so far above zero. It should be zero by definition, should it not?

Response to Fig. 6: Yes, good suggestion. Since this was also suggested by reviewer 1, we will add a section in the methods part about lc-excess, explaining the value and giving the calculated function we used. Further, we will add a short description in the figure description of figure 6. The positive lc-excess was produced by a typo reversing + and - in the calculation of precip, groundwater, lake and stream water lc-excess. We will correct this in the revision.

Fig. 9:

Finally, two comments on Fig. 9. There is no dashed blue line in the legend. In addition, much of the soil data is cut off at the top and bottom of the plots. This would be more compelling if they were included.

Response to Fig. 9: Thanks for pointing this out. We will update figure 9 to include the description of the dashed lines and the cut off parts of the soil data at the top and base of the plots.

Discussion:

In the discussion before line 381, probably at the end of the previous paragraph, I would note that the dynamics of vwc are also consistent with the conclusion that most water uptake is from the upper layer. I presume that there are few data points above field capacity, so the seasonal pattern of vwc should be driven primarily by root uptake. By the way, this raises the question of what you have actually gained by the isotopic measurements if vwc shows the same thing. I think there are good answers, but it would be worthwhile to spend a few lines on this question near the end of the discussion.

Response to Discussion: Good point! It's true that vwc of the top soil is probably mainly driven by root water uptake, but it's also important to consider the other soil layers. The first Reviewer mentioned that from a quantitative perspective the willows could easily have used mainly the water from 40 cm instead of the water at 10 cm. Hence, we see here the importance of the stable water isotope analysis linking the root water uptake mainly to the top soil. In general, we think that's a very interesting point to discuss and we will emphasize this in more detail in our revision.