Anonymous Referee #2

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The manuscript entitled “Using isotopes to understand evaporation, moisture stress and re-wetting in catchment forest and grassland soils of the summer drought of 2018.” by Lukas Kleine, Dörthe Tetzlaff, Aaron Smith, Hailong Wang, and Chris Soulsby presents an interesting contribution to our understanding of ecohydrological processes in a mixed land cover catchment (forest and agricultural), especially under the influence of climate anomalies. The authors conducted a case study in North-East Germany in the Demnitzer Millcreek catchment. They highlight the use of isotopic tracers together with conventional hydrology to understand the effect of drought progress, the recovery of soil water storage and the memory effect of drought evaporation when the catchment could no longer hold streamflow and crop production and further mixing with fresh precipitation.

The study shows an important work with a logical structure and is clearly written, in my opinion, it deserves to be considered for publication in the HESS after some minimal revisions. Most of my editing comments match those of Referee 1 and have already been addressed by the authors.

We are grateful for the constructive comments of reviewer 2 on the manuscript. We appreciate this thoughtful and stimulating review of our work. Throughout the revision of the manuscript, the authors have adapted the terminology used to improve clarity for the discussion and key messages. For the specific comments, we have addressed them accordingly. Responses are given below and will be incorporated in the revised manuscript.

I recommend the authors to be careful when using the terms "blue and green water", as it is broad and varied in the literature, so I suggest that they highlight in the introduction section what they specifically refer in this study.

We clarified the use of terms “blue” (as groundwater recharge and stream discharge) and “green” (evapotranspiration) water fluxes in the introduction section. (L. 8). We would like – respectfully – keep these terms as they are important and widely used terms in the literature.

I’m a little concerned about the limited availability of soil water isotope samples (monthly basis) used to drive such a conclusion based on tentative MTTs. The manuscript would benefit for a wider discussion and to clearly state this limitation. In order to reaffirm the credibility of these results, I suggest widening the context of the study by comparing it with similar drought cases in nearby sites or with comparable geographical regions.

We agree, and recognise of the limitations of monthly destructive samples and we are careful to be circumspect about the inferences. Still, as the work getting such samples is so labour intensive, not many such data sets exist. To assess spatial variability (replicates) and enable ongoing sampling in the limited site area beyond the study period, we had to limit the temporal resolution of the sampling. Nevertheless, the insight in subsurface processes was invaluable and demonstrated the efficiency of this method for a first approximation. We will expand the critical discussion but cannot widen the context of the actual study (obviously) as this would be a different paper. To our knowledge, no other bulk water isotope samples exist from nearby sites (or at least are not published yet). Though we make comparison to chloride related water ages from lysimeters for another site in Brandenburg.

Further, an extended amount of literature pointed out that MTT (based is a gamma distribution with two parameters and derived MTTs concept) is only a qualitative indicator of catchments for a first screen and basic comparison, however a bit critical when the evolution of water ages is involved. With the available information, I firmly believe that it would be possible to obtain better and accurate results by including more elaborate and non-stationary criteria in the analysis.

We agree with your concern and are well aware of the limitations of this method. We tried to emphasise the tentative nature of these results. Further this concern lead to the additional

consideration of Young water fractions as an unbiased indictor of water ages. This largely supported the MTT results and helped underpin our conclusions. The basic nature of this analysis is further highlighted in the manuscript (L. 401-405)
Also, we added a reference to a process-based ecohydrological modelling approach (considering isotopes) at these two plot sites which also estimated the water ages in the conclusion (recently published by Smith et al.; L. 413-414).This is also broadly consistent with the more basic approximations reported here. However, conducting such complex non-stationary analysis would be beyond the scope of the paper.

Finally, please improve figure 4, the size of the symbols and the colours used make it difficult to identify isotopic signatures.

We adapted color-codes and sizes to make it easier to identify.