

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-376

Anonymous Referee #1

Referee comment on "Evaporation, infiltration and storage of soil water in different vegetation zones in the Qilian Mountains: a stable isotope perspective" by Guofeng Zhu et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-376-RC1>, 2021

Review of the manuscript 'Evaporation, infiltration and storage of soil water in different vegetation zones in Qilian mountains: From a perspective of stable isotopes' (HESS-2021-376)

General comment

This is an interesting study conducted in a mountain region in China. The research is based on the use of stable isotope in water to understand the main mixing processes and hydrological processes. The manuscript is logically organized and clearly illustrated. However, there are serious issues that in my opinion should prevent the publication of this manuscript in the present form. First of all, the English language is very poor, and sometimes (especially in the Introduction) it's hard to follow the reading. Secondly, there are serious flaws in the Abstract and mostly in the Introduction that fails to reach the focal point of this work (see specific comments below). Third, the discussion is well complemented with literature references but is quite often vague and appears to be not well supported by the observations. No reference to figures and tables are reported in the Discussion and it seems that the processes explained by the Authors are based on a previous knowledge of the area and by results taken from the literature than supported by their own results. I suggest to more strictly base the inference on hydrological processes on the observed results.

In the end I suggest to resubmit this manuscript after fixing all these major issues.

Specific comments

L1-3. The title does not read well. I suggest changing into "Evaporation, infiltration and soil storage in different mountain zones" or "Evaporation, infiltration and soil storage in different vegetation zones in a mountain catchment". Perhaps also "Evaporation, infiltration and soil storage in different mountain zones: an isotope perspective". But there is no strict need to stress the isotopic perspective, in my opinion.

- The abstract lacks to report the main objective, or the research questions.

- The introduction suffers from different weak points and needs a severe restructuring.

1) It is not clear what different vegetation zones are, and what role they play in water exchange in the environment, and why they are important in this research.

2) The text focuses too much on the variability of the isotopic composition in vegetated environments without going deeper into the main physical processes that still need to be understood. Isotopes are just a tool, and the goal here is to understand hydrological processes with the help of isotopes, not which are the factors affecting isotopic variability.

3) Very importantly, no research gaps is put forward. We understand that studying and understanding hydrological processes in different vegetated areas is important but what is the real problem here? As a result, the specific objectives are disconnected from the rest of the Introduction and fluctuate in their own space. Moreover, what is the memory effect? Why is it important? What is not known about it? How does it fit the general story behind this paper?

L349-354. This paragraph and the related Fig. 7 fit much better in the Results than in the

Discussion. I suggest restructuring this part.

L365-366. Which are the results that lead the Authors to believe this? Please, explain.

L422-424. Again, here we need some experimental evidence about this process.

Section 5.3. All this is interesting but it sounds a bit general and vague, these statements look not so related to the results, there are no references to the figures, and the reader has the impression that the Authors present their own preliminary idea that does not reflect the data. I'm happy to be mistaken here but we need to have evidence of all the described processes. Moreover, the title does not reflect the content of the section.

Minor comments and technical corrections

L58-59. D-excess is introduced here without any explanation on its formulation and physical meaning.

L96. Is this the long-term average runoff? Please, specify.

Table 1. Are the meteorological parameters averages? Over which period of time? Please, specify.

Section 3 (Methods). No explanations about the determination of the gravimetric water content are given. Please fix this issue.

L140-142. I suggest including a reference to the correction of the memory effect (e.g., Penna et al., 2012 and/or Qu et al., 2019).

Penna, D., Stenni, B., Šanda, M., Wrede, S., Bogaard, T. A., Michelini, M., Fischer, B. M. C., Gobbi, A., Mantese, N., Zuecco, G., Borga, M., Bonazza, M., Sobotková, M., Āejková, B., and Wassenaar, L. I.: Technical Note: Evaluation of between-sample memory effects in the analysis of $\delta^2\text{H}$ and $\delta^{18}\text{O}$ of water samples measured by laser spectrometers, *Hydrol. Earth Syst. Sci.*, 16, 3925–3933, <https://doi.org/10.5194/hess-16-3925-2012>, 2012.

Qu, D, Tian, L, Zhao, H, Yao, P, Xu, B, Cui, J. Demonstration of a memory calibration method in water isotope measurement by laser spectroscopy. *Rapid Commun Mass Spectrom.* 2020; 34:e8689. <https://doi.org/10.1002/rcm.8689>

L169. Please explain the role of 10 in the equation.

L176. Add "2017".

L194: Precipitation events?

L213-220. This part can be reported in a Table or in a boxplot.

Fig. 3. Use different colours to distinguish between the different variables. Particularly, I suggest using different closures for the two isotopes and then keep them in all the other graphs.

L263? Does "deep" mean "grey"? In that case use the correct term.

L266. The diagram is normally called "dual isotope space".

L272-274. This part can/could be moved to the Discussion.

L311. As far as I understand the plot does not show the “differences” but the raw values. Please, correct.

L385-386. Add a reference to a figure to corroborate the statement.

L409. I think the correct citation is Amin et al., 2020.

L463. Typo.