

## ***Interactive comment on “Contrasting transit times of water from peatlands and eucalypt forests in the Australian Alps determined by tritium: implications for vulnerability and the source of water in upland catchments” by I. Cartwright and U. Morgenstern***

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### General Comment

The manuscript HESSD “Contrasting transit times of water from peatlands and eucalypt forests in the Australian Alps determined by tritium: implications for vulnerability and the source of water in upland catchments” by Cartwright and Morgenstern, 2016, assesses, in terms of mean transit times, the hydrological differences between wet-

C1

lands (peatlands) and eucalypt forest ecosystems. Although this study is mainly based on lumped parameter models for which uncertainties are commonly large, the inclusion in the analysis of diverse datasets like major chemical elements, stable and radioactive isotope data, allows the authors to crosscheck findings from different perspectives. The authors perform an appropriate analysis of the contrasting mean transit times found between both analyzed ecosystems, allowing to hypothesize about the hydrological functioning of the related aquifers and flow paths. Considering the scarce studies dealing with wetlands and more specifically, peatlands (e.g., as compared to mountain forest head water catchments), this study is very timely and therefore I recommend it for publication after some minor revisions which I detail below.

### Specific questions/issues

Page 2, line 8. Define the acronym TU when first used, e.g., Tritium Units (TU). Besides, consider using an acronym for  $^3\text{H}$  activity/activities, this term is widely used along the manuscript (around 100 times). Please avoid beginning a sentence or a paragraph with an acronym or an abbreviation, this basic grammar rule is circumvented throughout the manuscript. Just to mention some few paragraphs starting with acronyms: pag. 8, line 17; pag. 11, lines 16 and 25, pag. 12, lines 10 and 19. Furthermore, three from four paragraphs of the Section 4.3 begin with “ $^3\text{H}$  activities of...”

Page 4, lines 20 to 22. There are very few studies dealing with the appropriate tracer data resolutions to obtain reliable transit time estimations through lumped parameter models. Please consider mentioning the study by Timbe et al., 2015, who investigated this topic using stable isotopes of water.

Page 5, lines 17 to 19. Consider adding another citation, there is a more recent study for a similar ecosystem (peatlands), located in the tropics by Mosquera et al., 2016, in which mean transit times of less than one year have been also found (it uses Oxigen-18 and Deuterium as tracers).

Page 9, lines 12 to 15. Is it really possible to outline small catchment, like 0.5 km<sup>2</sup>,

C2

from the mentioned coarse google resolution?

#### Technical Corrections

Page 2, line 6. Please write out the full name when the acronyms are first mentioned. E.g., define acronym 3H: "This study uses Tritium (3H) to estimate..."

Page 2, line 13. Should say: "... are higher in the eucalypt forest stream than in the peatland..."

Page 6, line 2. Rephrase: "This study is based in the upland areas of the Victorian Alps, southeast Australia and was designed to..." to something like: "This study, located in the upland areas of the Victorian Alps (southeast Australia), was designed to..."

Page 7, line 17. Please check this "the soils alci include..."?

Page 8, line 15. Please check, sentence is currently written in present tense: "Observations indicate that this is at or close..."

Page 8, line 16. Correct: "At least three bore volumes of water WERE extracted prior to sampling"

Page 8, lines 20 to 22. Rephrase the complete sentence written in these lines.

Page 9, line 3. This device is more commonly known as Thermo-Finningan Delta plus.

Page 10, line 9. Delete "transit times" once, it is repeated.

Page 11, lines 16. Please rephrase the description of the stable isotope values, it is a bit confusing in its current state. I would first describe the range for O-18 and then for Deuterium (e.g., from -8.3 to -5.0 per mil for O-18 and from -43 to -23 per mil for Deuterium).

Page 12, line 1. Rephrase "Three 2 week to 3 months aggregated samples...".

Page 12, line 4. Correct "activities in rainfall FOR this region".

#### C3

Page 12, line 14. Delete the word "and" at the end of the sentence.

Page 15, line 14. Define acronym "Eqs" when first used.

Page 15, line 19. "Given that the water WAS sampled..." or "Given that waters WERE sampled"?

Page 16, lines 3 to 5. Rephrase the sentence contained in these lines.

Page 16, line 8. "yields mean transit times of up to 3.9 years..." Do you mean 4.0 years (Table 2, last column)?.

Page 17, line 1. Insert a comma after the word "increase".

Page 20, line 15. Delete the word "at" after "mean transit times".

Page 21, lines 25 – 26. Rephrase: "... comparable studies such as this will become possible there which will allow ...."

Figure 1. Units are missing in the legend for elevation.

Figures 4 and 6a: Correct the axes labeling.

#### References

Mosquera, G. M., Segura, C., Vaché, K. B., Windhorst, D., Breuer, L. and Crespo, P.: Insights on the water mean transit time in a high-elevation tropical ecosystem, *Hydrol Earth Syst Sci.*, 20, 2987-3004, doi:10.5194/hess-20-2987-2016, 2016.

Timbe, E., Windhorst, D., Celleri, R., Timbe, L., Crespo, P., Frede, H.-G., Feyen, J. and Breuer, L.: Sampling frequency trade-offs in the assessment of mean transit times of tropical montane catchment waters under semi-steady-state conditions, *Hydrol. Earth Syst. Sci.*, 19(3), 1153–1168, doi:10.5194/hess-19-1153-2015, 2015.