

## ***Interactive comment on “Mean Transit Times in Headwater Catchments: Insights from the Otway Ranges, Australia” by William Howcroft et al.***

### **Anonymous Referee #2**

Received and published: 30 August 2017

The paper estimates mean transit times in 6 headwater catchments in southeast Australia using two methods and radioactive  $^3\text{H}$  tracers. The study is very interesting and provides with an initial overview that stable isotope tracers cannot provide. However, I think the discussion could be more thorough and the structure of the paper be reorganized. Following I write my suggestions to improve this paper and hopefully the authors take them in the best way possible.

General comments:

1. My first comment is a general concern since it was not mentioned anywhere in the document. Are all  $^3\text{H}$  activities used on the study normalized? If it was mentioned I missed it.

C1

2. I mentioned that the results from this study are a good initial overview because the authors are ignoring the seasonal variation of tritium concentration in precipitation. In Varlam et al. (2016) and Tadros et al. (2014) is shown that seasonal variation is noticeable where autumn-winter precipitation has activities half or lower than spring season precipitation. From Tadros et al. (2014): "Within the annual cycle, a clear maximum is observed in early spring between August and September and extends into summer, with the minimum concentration occurring in March/April." The values ranging between 2.4 and 3.2 TU are the annual average activities, but if the actual precipitation in March/April was at least half of the measured during those 78 days in July-September, the MTT would increase so much as it did. I understand that resources are not raining and analyzing samples for  $^3\text{H}$  are expensive, but this should be acknowledged as a flaw of the study and probably causing overestimation of MTT in March 2015.

3. The document lacks structure. Even when there are subtitles stating "Methodology", "Study Area", "Results" and "Discussion" there are results and methods in the discussion section, as well as study area information in the results section. I will point out in more detail in the specific comments.

4. There are a lot of regressions were the only measurement for curve fit is the  $r^2$ , using the p-value would also add information on the data that is correlated.

Specific comments:

1. P1 L18: 2.4 to 3.2 TU is the annual average value, not the real range of activities, big difference, which might explain partially the low values obtained on the stream water.

2. Page 6 Line 148: "agricultural" I think the authors meant "agriculture" or rephrase.

3. P7 L169: Is the forest cover in Table 1 only eucalyptus? If so, reference table 1.

4. P15 L390 to P16 L410: should be in "Study Area" section.

5. P16 L411-412: What about the correlation with geology? As well as a multiple regression or a PCA?

C2

6. P16 L413-Fig7: This is a good example where the p-value could give more information, it's easy to see there are two extreme points with higher runoff coefficient that create that "correlation", but if those two would not be there the slope of the correlation would be negative instead of positive.
7. P17 L433-P18 L475: This should be in Results, not Discussion (with few exceptions of a couple of sentences that were discussion).
8. P18 L 476: The authors could make a section called uncertainties in the "Methodology" section with a description of each of them so there is no need to explain them in the "Discussion" section.
9. P19 Eq 2: this equation goes in the "Methodology" section, not discussion. Additionally, the "d" is missing in the equation, which is correctly mentioned in the text afterwards.
10. P20 L515-520: As mentioned before, 2.45 TU is probably the high end of activity on the annual precipitation.
11. P20 L523: If 2.45 TU is on the high end, for the March calculations the precipitation should be more on the 1-1.3 TU (being conservative).
12. P20 L530-531: Yes unimportant for the surveys taken in September, partially for those in November and July, I don't think it was unimportant in March.
13. P21 L539-L544: This should be in the Results section.
14. P21 L547-549: I agree that the intermediate flow rates are important, maybe even the
15. P21 Eq 3: This equation belongs to "Methodology", not discussion.
16. P22 Eq 4 and 5: These should be in results.
17. P22 L569-582: This belongs to results.

C3

18. P22 L588-P23 L592: Discuss why is no increase on the sulphate concentration in the Ten Mile Creek, are the anthropogenic activities different in this catchment than in the others?

Reference:

Carmen Varlam, Octavian G. Dului, Ionut Faurescu, Irina Vagner Denisa Faurescu (2016) Tritium time series in precipitation of Rm. Valcea, Romania, *Isotopes in Environmental and Health Studies*, 52:4-5, 363-369, DOI: 10.1080/10256016.2015.1114932

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