

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
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## **Comment on hess-2022-18**

Anonymous Referee #1

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Referee comment on "Sources and mean transit times of stream water in an intermittent river system: the upper Wimmera River, southeast Australia" by Zibo Zhou et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-18-RC1>, 2022

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### General comment

The topic presented in the manuscript is relevant to HESS. The manuscript does not present novel approaches or ideas. However, it contributes to knowledge on intermittent streams by documenting sources and mean transit times of one such stream in southeastern Australia and highlighting the role of the near-river store.

### Specific comments

1. A methodological flaw is related to the fact that the near-river samples were collected two years after the streamflow samples (April 2021 and March-November 2019).
2. The approach and data are well described and the interpretation of results is included in the Discussion. I would prefer if the word "likely" is less frequent there; perhaps it could sometimes be substituted by a more appropriate "we think" or "we assume".
3. It is not clear if the average annual rainfall (lines 235-238) used in calculation of runoff coefficients for the three river gauges was estimated specifically for the upstream area of each river gauge (and how) or if the same value was used for all river gauges. Since the annual precipitation varies from 505 to 709 mm, catchment precipitation should be calculated for each gauge specifically.
4. It is interesting to me that MTTs during the high flow period were generally higher (older water?) than during the low flow period (younger water?) – lines 458-461. I would

assume the opposite, is it possible to comment on it briefly in the Discussion?

#### Other comments

1. Title - I propose to change the title and omit the general term "geochemistry" there. Geochemistry of major ions is not used in the interpretation of data presented in the Discussion, because "...the major ion and stable isotope geochemistry of regional groundwater and near-river water are similar ...and the geochemistry of the stream does not vary with flow" (lines 440-443). Perhaps the reason of using "geochemistry" in the title was to say that it used the tools and principles of chemistry (a general definition of the sciences of geochemistry). However, then the application of isotopes on which is the work heavily based, is not clear from the title. "Sources and mean transit times of stream water in an intermittent river system: the upper Wimmera River, southeast Australia" or "Using isotopes to understand sources and mean transit times..." could be better titles.

2. I do not think that it is necessary to mention climate change and global water stress in second half of the first sentence of the Abstract. The manuscript does not deal with these topics. Furthermore, presented results are not interesting only in relation to climate change or water scarcity.

3. Line 60 - please check the formulation of the sentence - the water that range from days to centuries "old" - is it a correct English?.

4. Line 86 "This approach requires sub-weekly measurements of tracer concentrations in rainfall and stream water...". Since most earlier studies used monthly data with LPMs, I would not say that subweekly data are required when using attenuation of the stable isotope signal. Please think about the reformulation of the sentence.

5. Line 107 please check the sentence "...in a similar way to other radioisotopes such as  $^{14}\text{C}$  and  $^{36}\text{Cl}$  THAT are used to determine residence times...".

**6. lines 133-134** - I do not understand the explanation of an inverse relationship between MTT and runoff coefficient that is linked to high evaporation rates. In my understanding, a higher runoff coefficient means that more precipitation goes to runoff relatively quickly, i.e. the MTT would be shorter (as the inverse relationship suggests). Where is the influence of high evaporation rate there? If the evaporation is high, the runoff coefficient should be smaller.

7. line 144 "higher" (salinity) instead of "high"?

8. It would be useful to supplement Fig. 2 by one more panel with graphs showing the variability of air temperature and precipitation in 2019

**9. line 391** - I wonder if there is an interpretation of the good correlation between  $^3\text{H}$  activity and deuterium content presented in Fig. 6a; is anything indicated by the fact that the oldest water (the one with the lowest tritium activity that is well below that of current precipitation, i.e. 0.1-1 TU) has low deuterium content while the samples representing modern precipitation (tritium activity around 3 TU) is evaporated (deuterium as high as +25 per mil)? Lines 415-417 mention that the variations "most likely" reflect mixing. I agree that is the samples plots along a line with low slope it indicates the mixing line, but could the good correlation provide any other information

**10. Fig. 9** shows runoff coefficients for the pools. How can be runoff coefficient of a pool which is in my understanding a stagnant water body calculated?