We appreciate the constructive comments from the reviewer #1 on the manuscript. The responses and proposed modifications are outlined below.

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.

Response: Geochemical techniques are well-established methods in understanding river processes and functioning globally. However, previous studies have mainly focused on perennial streams, and studies on intermittent streams are less common. Moreover, estimates of mean transit times in rivers (especially intermittent ones) are also not overly common. The application of geochemistry, together with tritium, in intermittent streams allows us holistically understand this type of riverine systems in general. We did note those facts in the study (Section 1) and will ensure that they are highlighted in the revised version.

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).

Response: We realise that the water from near-river corridors would be an important component when we measured the geochemistry of pool water, stream water, and regional groundwater in 2019. We had a plan to collect more river samples and near-river water samples in early 2020. Unfortunately, the Covid-19 pandemic forced Victoria into s strict lockdown for much of 2020 and 2021 and we were unable to undertake significant fieldwork at that time. There were a few short windows in 2021 when we could go in the field and luckily, we were able to take samples of near-river water in 2021 at similar flow conditions to 2019. Although not ideal, these are informative samples and we have explained the context in the text.

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".

Response: Agreed. We will reword sentences and reduce the frequency of 'likely'.

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.

Response: It is difficult to calculate the area weighted rainfall upstream of the individual gauges with the available rainfall data. Initially, we used a single average value of rainfall for all gauges. In the revised version we will calculate a range of runoff coefficients for the gauges based on the higher and lower rainfall values. The uncertainty on runoff coefficients estimated in this way is ~15%, which does not alter the conclusion of the study. We can add the error bars to Fig. 9a.

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?

Response: Yes, this is an important and interesting part of the study. High MTTs during the high flow probably reflects that older water from the catchment flushed into the river during the early stages of rainfall by hydraulic loading. This has been documented in other Australian catchments (e.g., Tambo River: Unland et al 2015, Hydrological Processes, 29, 4817-4829) and is a common feature in many river systems, sometimes referred to Old Water Paradox. The water that contributes to low flows probably includes a component of young water stored in the riverbank from the sustained winter streamflow that drains back into the river as flows subside. We will make sure that this is discussed clearly in the discussion section.

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 generals definicition 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.

Response: Agreed. We will change the title to "Sources and mean transit times of stream water in an intermittent river system: the upper Wimmera River, southeast Australia".

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. Furthrermore, presented results are not interesting only in relation to climate change or water scarcity.

Response: Yes, we agree. We will delete those sentences as it is not the main focus of the paper.

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

Response: The sentence could be clearer. We will change it to: 'the water that sustains river flow may have residence times ranging from a few days to several centuries'.

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.

Response: Yes, earlier studies used less frequent data but there is a tendency to use more frequent sampling where it is available (e.g., the intensively monitored catchments such as Plynlimon). We will amend it to 'high-frequency (generally at least monthly) and long-term tracer data'. Reviewer #2 also commented on this section and further modifications are discussed below.

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

Response: That is correct. We will add 'that' in the sentence.

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 undertanding, 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.

Response: The runoff coefficient refers to the fraction of rainfall that is exported annually by the stream in the catchment. Higher evapotranspiration leads to a lower runoff coefficient as more water is returned to the atmosphere. Catchments with high evapotranspiration will also have lower groundwater recharge rates, and consequently less rainfall will be exported through the catchments to the streams. The lower rate of recharge results in slower flow through the catchment and consequently longer MTTs. We will ensure that this is explained clearly in the paper.

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

Response: Yes, 'higher' is right and we will correct it.

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.

Response: That would be helpful and we will add those to Fig. 2.

9. line 391 - I wonder if there is an interpretation of the good correlation between 3H 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 (tritum 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 micxing line, but could the good correlation provide any other information.

Response: The mixing model does explain that correlation, and is consistent with other data. Firstly, TDS vs. ^{3}H implies mixing of young and old water. Secondly, the interpretation that the higher δ^2H values of pool water is caused by evaporation is consistent with the δ^{18}O in Fig. 4. Evaporation does produce a slightly increase in 3H activities (depicted in Fig. 6a) but not of the magnitude observed in the pool waters. The trend in Fig. 6a is strong but is based on relatively few samples and perhaps additional data would have shown a great scatter. Possibly the pool with higher groundwater inputs undergo less evaporation (conceivably they may be small through flow systems). We can discuss that briefly in the discussion.

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

Response: The runoff coefficient is a catchment attribute (it is the average discharge divided by the mean rainfall). There is only one runoff coefficient for each sampling point (i.e., it is not a function of flow at the time of sampling). It is valid to use this attribute for all flow conditions including the zero flow periods. We will ensure that the definition of the runoff coefficient (Section 3.1) explains this.