Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2022-18-RC2, 2022

Comment on hess-2022-18

Anonymous Referee #2

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-RC2, 2022

General comments

The work presented by *Zhou et al.,* is relevant to HESS. The contents are comprehensively described and provide very good insights into the rivers functioning, mean water transit times and water sources in intermittent streams in southeast Australia by using major ions and electrical conductivity. However, I suggest some minor revisions commented below.

Specific comments

- Watch out the grammar and the wording of sentences. For example, is it correct "contribute uncertainty to MTT" or should it be "contribute to uncertainty in MTT" (line 120)?
- The *Discussions* interpret the results very well. However, in my view, there may be a little more discussion in the subsection *Comparison with perennial streams* on how your findings are susceptible to changes in the climate (e.g., drought resilience of watersheds, limited streamflow generation processes, and changing status of the instream water quality) since you mention this important issue both in the *Abstract* and in the *Conclusions.*

Technical corrections

- Line 26: I would name the upper Wimmera River here since you are introducing the study site, rather than later on line 33, all of a sudden;
- Line 50: You could explain why TTDs provide better information than MTTs, since you

are mentioning this (e.g., TTDs describe all the transit times of the water parcels in the streamflow; however, MTT is a common metrics for TTDs, as it represents the mean transit time of the water leaving the catchment (McGuire and McDonnell, 2006)). Then keep going with explanations and implications of MTT, as you have already written;

- Line 60-64: what about mentioning the release of water of different ages also as a function of the catchment's wet/dry conditions?
- Line 86: following up the comment of Anonymous Referee #1, quoted below "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", I also suggest to reformulate the sentence, and stating why you say that sub-weekly or, more generally, high frequency tracer data are commonly needed. For example, it can be said that high-frequency and long-term tracer data are generally recommended to appropriately describe fast catchment-scale hydrological behaviors and the tail of the TTDs, respectively. See:
  1. Kirchner, J. W., Feng, X., Neal, C., and Robson, A. J.: The fine structure of water-quality dynamics: the (high-frequency) wave of the future, Hydrol. Process., 18, 1353–1359, https://doi.org/10.1002/hyp.5537, 2004,
  2. von Freyberg, J., Studer, B., and Kirchner, J. W.: A lab in the field: high-frequency analysis of water quality and stable isotopes in stream water and precipitation, Hydrol. Earth Syst. Sci., 21, 1721–1739, https://doi.org/10.5194/hess-21-1721-2017, 2017.
- Line 334-336: 'Overall, the major ion geochemistry of the groundwater, stream water from the different flow conditions, pool water and, NRW are similar'. What about EC? Differences in EC between stream water (2430-15,330 µS cm^{-1}) and near-river water (1035 to 6080 µS cm^{-1}) during zero-flow period are significant, and you could explain why.
- Line 416-418: 'The variation in ^{3}H activities with $\delta^{2}H$ (Fig. 6a) and TDS concentrations (Fig. 6b) most likely reflects the mixing between older regional groundwater and younger evaporated stream water'. It is not clear to me why you have drawn these conclusions. Could you explain better?