Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2022-93-RC2, 2022

Comment on hess-2022-93

Anonymous Referee #2

Referee comment on "Precipitation fate and transport in a Mediterranean catchment through models calibrated on plant and stream water isotope data" by Matthias Sprenger et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-93-RC2, 2022

General comments:

In this study the authors use precipitation, stream water and xylem water stable isotope measurements to constrain a hydrologic transport model that is based on water ages. They find that the evapotranspiration is determined to be too young when only precipitation and stream water are used for calibration. When xylem water isotopes are added to the calibration, the water age of evapotranspiration is found to increase considerably.

The topic is timely and it fits the scope of the journal perfectly. Language, style and structure throughout the manuscript are quite good and easy to follow.

It is a bit unfortunate that the sampling of the xylem water only took place during a relatively short period of time (8 months) at the beginning of the measurement period compared to the sampling of precipitation and stream flow (4 years). This causes some uncertainty with regard to the water that was already in storage before the sampling and modeling began. Fortunately, the authors discuss the potential implications of the bi-weekly sampling interval and note that this could also lead to a seemingly damped signal in the ET and thus to an overestimation of ET water ages.

Despite some of these drawbacks, in my opinion, the novelty of the work merits publication.

Specific comments:

Page 1, line 25: '…or TO BE discharged…'

Page 1, line 28: 'additionally' instead of 'simultaneously'?

Page 7, line 13: Delete 'a'.

Page 7, line 15: It would be nice to have a visual representation of how you convert xylem isotope ratios to ET isotope ratios. Just writing the equation in the text is not intuitive. Otherwise this important detail gets somewhat lost in the manuscript.

Page 9, line 9: See also Yang et al. (2018).

Page 17, line 7: '…high frequency xylem sampling…'.

Page 20, line 12: '…during THE largest rainfall-runoff events…'

Page 22, line 5-9: Could you please give some more details on what you mean when you state that the SAS approach does account for this heterogeneity – contrary to the traditional convolution transit time approaches?

Figures:

Figure 1: '…meteoric station…'?

Figure 8: diamonds = triangles; points = circles.

Supplements

Supp. Fig. 1: You are referring to Figure 6 in the main manuscript, not to Figure 5, are you? Maybe you could add Figure 6 to this Figure too, so that the comparison is easier (the scales are quite different and it's hard to see that you want to show that one is way less variable than the other).

Literature

Yang, J., Heidbüchel, I., Musolff, A., Reinstorf, F., and Fleckenstein, J. H.: Exploring the dynamics of transit times and subsurface mixing in a small agricultural catchment, Water Resour. Res., https://doi.org/10.1002/2017WR021896, 2018.