

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
<https://doi.org/10.5194/hess-2021-573-RC1>, 2022  
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## **Comment on hess-2021-573**

Anonymous Referee #1

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Referee comment on "Spatiotemporal variations in water sources and mixing spots in a riparian zone" by Guilherme E. H. Nogueira et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-573-RC1>, 2022

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Nogueira et al presented a modeling study for estimating the water sources and mixing spots in a riparian zone. The authors developed a SW-GW coupling model and applied it in a 4th-order stream, then compared against hydrochemical monitoring data. With the modeling quantification, the authors show that discharge events increase the mixing and present that their tool can serve as a complementary approach for hotspot identification. I feel this paper is novel and well-written so I encourage publications after some of my comments are resolved.

L92: The authors mentioned other options of models such as ParFlow, and others. To my knowledge I think HydroGeoSphere is a commercial model and is not open-source - Why would you use it? I noticed that the code development paper is in press on WRR, and I'm wondering how much reproducibility of this work from a commercial model? For example, did the authors reuse codes or functions from HydroGeoSphere? Is this work of code development going to be publicly available?

L94: I think here should follow up with a few particle tracking paper introduction to say that particle tracking is the method without using the solute transport.

L247: Is this equation 4) defined by the authors or from other literatures? If the former, a more detailed explanation may be needed. If the latter, a citation will be needed.

L297: Is Schmadel et al (2016) a study at the same research region? Would the discharge event affect the calculation? I feel it is not a direct comparison between this modeling result with other studies, unless more justification is needed. Also, what is "average losses" and "simulated losses" being defined?

L350: I'm more or less confused about the GW initial component in this plot. If GW initial term indicate the water budget from initial condition, does the  $F_{GW}$  term should be 0?

Fig.5: Still, I'm trying to understand the fraction response to a rainfall event, for example, summer 2013. I see that fSW actually decreases when this new rainfall event occurs - could you explain why and is this something you are expecting?

Fig.6: I think the figure caption does not explain why multiple profiles are shown in each plot? This is confusing to me - what each slice represents?

L526: Why is Spearman's rank correlation used instead of Pearson's correlation, which I think is more widely used?

L635: I know a solute transport model is not yet developed so it is difficult to estimate how much computational saving by using this method. This can be an open questions I guess, but how do you justify the computational saving?