

Comment on hess-2022-100

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Community comment on "Transit Time index (TTi) as an adaptation of the humification index to illustrate transit time differences in karst hydrosystems: application to the karst springs of the Fontaine de Vaucluse system (southeastern France)" by Leïla Serène et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-100-CC1>, 2022

This study presents a new analysis metric (transit time index, TTi) for qualitative assessment of relative short-term transit times in karst systems. The method uses fluorescence spectroscopy of water samples. The authors perform parallel factor analysis on the excitation-emission matrix (EEM) from these samples to identify regions of the EEM that can be associated with humic (component 1) versus protein-like (components 2 – 4) substances. The TTi is then the ratio of integrated EEM intensities of humic-like to humic-like+protein-like components. More protein-like components cause the TTi to shift closer to 0 and indicate a shorter residence time. The authors present analysis that suggests the TTi may be more sensitive to short-term (< 6 months) transit times compared to other natural tracers even when significant mixing has likely occurred. This is supported by comparison to other measured constituents, specific conductance measurements, analysis of the hydrograph, and general properties of the karst systems studied.

Though I am not a user of fluorescence spectroscopy, I found the methods to be understandable and relatively clearly explained. The reasoning for the methods used is easy to follow and appears sound, although may at times be too brief. The graphics are visually pleasing and helpful for explaining the research.

As other reviewers have pointed out (RC1 and RC2), the main weakness of this research is that transit time was not actually quantified, and only indirect evidence for the effectiveness of TTi is supplied. This makes all analyses/conclusions seem somewhat tentative and the overall findings much less impactful. Nevertheless, the methods and reasoning using indirect evidence were convincing enough to be suitable for publication in my opinion. Hopefully subsequent lab/field experiments will be published to further validate and refine the method.

Therefore, I have no additional general or specific comments in addition to what other reviewers (RC1 and RC2) have already requested. Thanks for the chance to review this interesting work.