

We would like to thank you for taking the time to carefully review our manuscript and for providing valuable comments and suggestions. We have made the necessary changes to improve the paper and our responses to their comments are provided below.

Community comments are shown in bold and the authors' responses in blue.

CC1

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.

Thanks a lot for your comment. We tried, according to RC2, to detail the method a little bit more. Please, feel free to tell us what is too brief and if the new version is also too brief or not.

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.

Thanks for this observation. We agree with you, RC1 and RC2. But this paper doesn't aim to quantify transit time. Its goal is to build a strong methodological basis and to assess TTI potential to be a natural tracer of short transit time. We tried to clarify these aspects in the paper, in particular in the abstract, introduction, conclusion and by adding section 3.4.

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.