Comment on hess-2021-584

Anonymous Referee #2

Referee comment on "Delineation of discrete conduit networks in karst aquifers via combined analysis of tracer tests and geophysical data" by Jacques Bodin et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-584-RC2, 2022

This manuscript is a revised version of a manuscript I previously reviewed for another journal. My overall assessment of the previous version was minor revision and I also provided several comments. These comments have been addressed to my satisfaction in this version. This version also makes some changes to Introduction and Discussion, making it clear of the overall objective and limitations of their method. Overall, I think the manuscript is an improvement from the previous version and therefore suggest for publication. Below is my review for the previous version with minor comments removed.

This manuscript presents a novel approach to estimate discrete conduit network using seismic, vertical flow, and dye tracing data. The authors treat the question of estimating a subsurface conduit network as a k-shortest path (KSP) problem and nicely fit the three type of data to build a KSP model. Even though the estimated conduit network showed visible artifacts as admitted by the authors, the overall research approach is quite interesting. I particularly like how the authors combine three very different types of data into a single model. These artifacts may be just a reflection that vertical flow and dye tracing data were collected through boreholes/wells and some other parts of the aquifer have not been explored by the data collection methods. I recommend this manuscript to be accepted with minor revision. I just need some clarification regarding model result verification and explanation of primary/secondary paths. Here are my comments:

- Using two independent dye tracing data to verify the estimated conduit network is nice (Figure 7). But I can't see clearly which estimated paths are confirmed or missed by the dye tracing data (Figure 6). Instead of coloring the paths in figure 6, maybe a separate sub-image showing the estimated paths just for the area affected by each dye tracing can be added to Figure 7. Mark confirmed/missed path using different colors.
- I can't distinguish between primary and secondary paths from Figure 6. Maybe use different colors.