

Authors' responses to the comments of reviewer#2

We appreciate your review and comments on our manuscript, “Deriving Subsurface Stormflow Mechanisms with Isotopes and ERT”. Your feedback is valuable to us, and we will make the recommended revisions accordingly. We provide detailed responses to each of your comments below.

Summary:

This study presents a carefully designed field experiment elucidating local runoff generation mechanisms on a hill slope in the Black Forest, Germany. The study combines isotopic and geophysical techniques to comprehensively track flows and storage changes throughout the relevant subsurface domain. I think experimental work, data processing, and interpretation are all sound and state of the art. I believe the impact of the paper could be increased if authors discussed transferability and scalability of these local findings. What did we learn here that can be used when trying to predict runoff response on less well instrumented hillslopes? How exactly can the knowledge acquired here be used operationally?

Review comments:

- Authors formulate three research questions in the introduction: (1) How and where does new event water contribute to SSF? (2) What are the dominant flow paths? (3) And how can isotopic tracers and ERT jointly characterize subsurface flow dynamics? The introduction should also highlight novel and original findings from this study that are transferable to other sites and systems.

We can add this to the abstract, discussion and/or conclusion, but think stating results and speculative transferability in the introduction is not an option.

- Research questions 1+2: Authors should discuss in more detail how the site-specific findings for this particular site can be generalized and transferred to other geographic areas and systems. Is the focus of the paper to understand this particular hillslope or is the purpose to derive generic and transferable insights? If it is the first, a data journal such as Scientific Data might be more appropriate.

The focus is to derive better process understanding of SSF, and having two hillslopes we can add a section on the transferability of the results.

- Research question 3 is a method development question. For a broader audience, state explicitly: Is this the first study to combine isotope tracing and ERT? If yes, this should be highlighted in the introduction as a major innovation. If no, what specific novel insights, methodological innovations did this study bring relative to what was available before? Also, research questions 3 is not evaluated in detail in the results and discussion sections, apart from the last section of the conclusions (lines 478 ff). Maybe authors could present a graphical conceptual site model and indicate which portions are constrained by the tracer data and the ERT data, respectively?

We will restate Q3 according to reviewer 1 suggestion. This is not the first study to apply both techniques together, but the first to apply it on two sites, with coring and trenched outflow. We will make the novelty clearer.

Details:

- Line 173: The standard symbology for the unit Ohm is capital omega.

[This error is going to be corrected.](#)

- Line 197: “Spatial regularization parameters of 80 and 15 were applied”: This statement is not very meaningful for readers that have no hands-on experience with the PyGIMLi software. It would be better to state how spatial regularization was implemented and how the regularization terms were weighted relative to misfit.

[More details will be added](#)