

Biogeosciences Discuss., author comment AC1
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Reply on RC1

Swamini Khurana et al.

Author comment on "Predicting the impact of spatial heterogeneity on microbially mediated nutrient cycling in the subsurface" by Swamini Khurana et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-72-AC1>, 2021

We thank the reviewer for the constructive comments. We acknowledge that we have to provide an improved explanation of the aims of our study and of the used approach, and an improved discussion of our results and we address this in the revised version of our manuscript. With these revisions we address all the specific comments made by the reviewer. Besides this, we try to clarify that the aim of our study is to find general relationships between the spatial heterogeneity of the aquifer matrix and the dynamics of biogeochemical reactions. We do use data from our subject site as well as from the literature to constrain the model scenarios but it has not been our aim to provide a simulation of any specific part of the subject site. For the sake of generality we thus also consider higher initial reaction rates than those likely to be found at the site which allowed us to span a larger range of conditions. We are also fully aware of the uncertainties associated with the parameter values used in our simulations. However the parameter values we used are consistent in their relative magnitude to each other and with the range of experimental observations. We found independently of the compound and its specific reactivity in a given domain that the Damköhler number is a good predictor of the importance of spatial heterogeneities which allowed us to present and discuss our findings independently of the specific parameter values used. In the revised manuscript we expand our discussion of the uncertainties associated with our approach and the associated limitations. Please refer to the attachment for the response to the specific comments. Since we can't upload the revised manuscript as an attachment to this response, we directly quote from the revised manuscript where required to aid the reviewer. If it helps the discussion process, we will be happy to share the revised manuscript as well.

Please also note the supplement to this comment:

<https://bg.copernicus.org/preprints/bg-2021-72/bg-2021-72-AC1-supplement.pdf>