

Interactive comment on “The influence of heterogeneous groundwater discharge on the timescales of contaminant mass flux from streambed sediments – field evidence and long-term predictions¹” by C. Schmidt et al.

C. Schmidt et al.

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We are grateful to the reviewer for his helpful comments on the initial manuscript. The reviewer particularly remarked the selection of the studied compounds. We selected chlorobenzenes as example compounds since these substances are the main contaminants that are currently present at the site in the streambed sediments, the groundwater and the surface water. We agree with the reviewer that there are other compounds present at the study site and that all compounds are successively transported towards the Mulde river. However, it was not the subject of the study to assess

¹Invited contribution by C. Schmidt, one of the Union Young Scientist Award winners 2007.

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the sources of contamination of the Mulde river. We were attempting to elucidate the time that is required to remove the studied compounds from streambed sediments of the Schachtgraben stream. Of course, this stream is a tributary to the Mulde river and therefore constitutes a contaminant source of the Mulde river, but, as mentioned before, this was not the subject of our study. The reviewer asks to consider changing DOC concentrations and other parameters to better describe the sorption and desorption phenomena in the streambed. We are aware that a variety of processes influences the sorption/desorption behaviour of organic compounds at sediments. Unfortunately, there is no common physically based theory that predicts the release of organic contaminants from sediments a priori. The sorption behaviour strongly depends on the sediment properties of a certain sample or location in the streambed. We based our estimates on well established concepts and parameters. The main drawback of our approach is the assumption that the ambient conditions such as groundwater discharge, concentration in the groundwater, and temperatures remain constant over time. DOC can facilitate the desorption from sediments. However, with our passive sampling approach it was not possible to measure DOC in the streambed. We are currently performing additional column experiments to further elucidate the desorption behaviour of the target compounds in the investigated streambed sediments. These results will be incorporated in the revised manuscript. We based our work on established relationships to describe the desorption behaviour and the sediment water partition coefficients. Our estimates are based on observations that have been made using field samples. There is also evidence that the partitioning between the sediments and the water is subject to aging effects.

Reply to specific comments:

Methods: The adsorbent material used was Dowex Optipore L-493 (Supelco, Bellefonte, PA). There might be an influence of temperature but the passive samplers were buried in the streambed and the temperature amplitudes are damped there. So we do not expect any significant influence from the temperature. We will add a short dis-

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cussion on these issues in the revised manuscript. The acetone elution was repeated. The methods will be clarified in the final paper

Fig. 4. We will improve the figure and we will additionally provide a bigger, high resolution version as supplementary material

Other technical issues will be incorporated in the final manuscript as the reviewer suggested.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 971, 2008.

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