



Fate of organic micropollutants in the hyporheic zone of eutrophic lowland streams: results of a field study in the Erpe, Germany

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Many streams worldwide are impacted by organic micropollutants such as pharmaceuticals originating from wastewater. The hyporheic zone underlying streams is often regarded as reactive bioreactor with the potential for eliminating such wastewater-born micropollutants. Our study aims at checking the elimination potential and analyzing the coupling of hydrodynamics, biogeochemistry and micropollutant processing. To this end, two sites at the lowland stream Erpe, which receives a high wastewater burden, were equipped and sampled with nested piezometers. From temperature depth profiles we determined that at one of the sites infiltration of surface water into the aquifer occurs while exfiltration dominates at the other site. Biogeochemical data reveal intense mineralization processes and strictly anoxic conditions in the hyporheic zone at both sites. Concentrations of the pharmaceuticals indomethacin, diclofenac, ibuprofen, bezafibrate, ketoprofen, naproxen and clofibrac acid were high in the surface water and also in the subsurface at the infiltrating site. The evaluation of the depth profiles indicates some attenuation but due to temporally varying surface water composition the evaluation of subsurface processes is quite complex. Borate and non-geogenic gadolinium were measured as conservative wastewater indicators. To eliminate the influence of fluctuating wastewater proportions in the surface water, micropollutant concentrations are related to these indicators. The indicators can cope with different dilutions of the wastewater but not with temporally varying wastewater composition.