Geophysical Research Abstracts
Vol. 19, EGU2017-10523, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Flow characteristics control turnover of polar trace organic compounds in the hyporheic zone of an urban lowland river

Jonas L. Schaper (1,3), Wiebke Seher (1), Anna Jaeger (1,2), Jason Galloway (1,2), Gunnar Nuetzmann (1,2), Anke Putschew (3), Joerg Lewandowski (1,2)

(1) Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Department Ecohydrology, Müggelseedamm 310, 12587 Berlin, Germany, (2) Humboldt University Berlin, Geography Department, Rudower Chaussee 16, 12489 Berlin, Germany., (3) Technical University Berlin, Chair of Water Quality Control, Strasse des 17. Juni 135, 10623 Berlin, Germany

Hyporheic zones are hypothesized to be important sinks for polar trace organic compounds (TrOCs) in lotic systems, mitigating potential adverse effects of TrOCs on ecosystem functioning and drinking water production. Predicting the fate of TrOCs in the hyporheic zone, however, is difficult as the attenuation rate itself as well as the biogeochemical factors and hydrological conditions controlling attenuation rates are unknown. We used time series of temperature depth profiles as well as heat pulse sensing with a 1D advection dispersion transport model to calculate first order attenuation rates of several TrOCs from equilibrium depth profiles in an urban lowland river in Berlin, Germany. Ring enclosures were used to prohibit horizontal flow and to create distinct biogeochemical conditions within the hyporheic zone. Flow characteristics as well as biogeochemical conditions showed pronounced differences between depth profiles inside and outside of enclosures. TrOCs attenuation rates varied considerably among compounds reflecting their general susceptibility to biodegradation and sorption. While for some compounds such as benzotriazole and sulfamethoxazole redox conditions had an influence on attenuation rates, the fate of other compounds was not affected by biogeochemical parameters. Under loosing conditions, hyporheic zones of urban lowland rivers can thus be regarded as sinks for TrOCs. Their effectiveness is dependent on both, hyporheic exchange characteristics as well as biogeochemical parameters.