



Is it possible to control the water exchanges in the hyporheic zone by long-term bank-side extraction field tests?

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The natural attenuation of pollutants by biogeochemical processes in the hyporheic zone is recognized by the scientific community. Nevertheless, the different factors controlling these processes, especially the influence of hydrodynamic conditions on biodegradation, are not fully understood. An innovative experiment is described in which controlled long-term extraction from a bank-side well installed adjacent to the River Tame, Birmingham, UK, is used to modify the hydrodynamic conditions locally within the hyporheic zone. Extraction induces a decrease in the vertical components of flows from groundwater to surface water increasing their residence time within this interface as well as, potentially, increasing the river / groundwater mixing depths. The resulting temporal evolution of hydrodynamic and chemical conditions is monitored using a network of riverbed minipiezometers and multilevel samplers. This allows a better understanding to be gained of the processes involved in surface water / groundwater mixing and the conditions causing changes in biodegradation. Both the field measurements and the 3D hydrogeological model results show a coupled influence of the river levels and of the extraction test on the hydraulic heads within the hyporheic zone. It has been nevertheless difficult with this approach to investigate the real impact of the long term extraction tests on the vertical distribution of major ions within the riverbed, apparently strongly influenced by short-term variations of the river level.