

Impacts of geological heterogeneity and artificial decolmation on hydrogeochemistry during bank filtration

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Bank filtration (BF) is a technology for drinking water withdrawal extensively applied all over the world^[1]. There is a debate of the potential effects of declogging on waterworks treatment efficiency in the BF sites, especially for geological heterogeneity sites^[2]. Moreover, the temporal and spatial variations in the redox environment after artificial decolmation at BF sites with substantial geological heterogeneity has not been systemically studied. Thus, the objective of this study is to explore effects of artificial decolmation on hydrogeochemical characteristics and water quality at a BF site characterized by geological heterogeneity.

The study area locates at a BF waterwork in the south of a human-made canal in Potsdam, Germany. It was built on a highly heterogeneous distribution of glacial tills deposits^[3]. According to the sampling analysis results, the geological heterogeneity has significant impacts on groundwater flow patterns, which further induces discrepancy of redox zonation in the near-bank wells after decolmation. Overall, after reconstruction, the redox condition has been changed locally in the near-bank wells (about 13.2~16.7 m to the cannal), but buffered by the long travel time, remained constant in the distant wells. The infiltration pathway is more than 126 m, which is long enough to act as an efficient buffer for the drastic change caused by the reconstruction, leading to no decline in the water quality indices (DOC, SUVA, redox zonation) of the BF site after the decolmation works.

[1] Hu et al., 2016 JH, 895-899

[2] Ascott et al., 2016 STE, 554, 89-101

[3] Wang et al., 2019 HJ, 1-21