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Effects of an restorated stream channel on groundwater dynamics and quality

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The effects of the restoration of an former oxbow on the interactions of groundwater and stream water is analyzed by principal component analysis of the water table series. With this approach it is possible to quantify in a spatial discrete way the impact of processes on the ground water table (Lischeid et al. 2010). At the Freienbrink site, situated in the east of Berlin (Germany), water tables were measured during a four year period at up to 18 groundwater and 2 stream water sites along two transects across an artificial peninsula surrounded by an oxbow and the regulated stream channel. In the first two years of the monitoring period the straight, artificial stream channel was the main stream channel and the oxbow was hydrologically decoupled at the upstream end. In the second two years it was the opposite. After restoration the former shortcut is now hydrologically decoupled and the former oxbow reactivated. In a study about the first year of the monitoring period colmation of the oxbow has been identified as main hindrance for the exchange of groundwater and stream water (Lewandowski et al., 2009). Subsequently the effects of the removal of the colmation in the former oxbow during the restoration process is analyzed. The analysis of the propagation of hydrological signals in the coupled groundwater stream water system is combined with the analysis of the spatial and temporal dynamics of the dominant hydrogeochemical processes. Those are identified with a non-linear variant of the principal component analysis based on water quality data.

References

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