Geophysical Research Abstracts,
Vol. 11, EGU2009-9217, 2009
EGU General Assembly 2009

Hydrological processes involved in groundwater-surface water exchange at a lowland river: measurements and modelling

G. Nuetzmann and J. Lewandowski

Institute of Freshwater Ecology, Ecohydrology, Berlin, Germany (nuetzmann@igb-berlin.de)

Water exchange processes in the floodplain of a lowland groundwater-surface water system are studied on the basis of a study site near Freienbrink, NE Germany. The surface water boundaries of this site are formed by an oxbow and the current bed of the river Spree, section Müggelspree. Surface and ground water levels and water temperatures were collected in 12 piezometers and 2 recording stage gauges of a 300 m long transect throughout a one-year-period. Due to water level fluctuations alternation of infiltration and exfiltration occurred. However, most of the time groundwater flux is directed into the river Spree and, river water infiltration events into the aquifer are usually short and of minor importance. Due to clogging of the oxbow bed with a mud layer of different thickness the hydraulic contact between the oxbow and the adjacent aquifer is heterogeneously distributed and partially marginal. These features are modelled quantitatively using MODFLOW and MT3DMS in order to simulate ground water flow and heat transport. Two different model approaches are developed: with the help of a 3D model the whole test site was simulated describing the main vertical and lateral flow components; with a 2D vertical model along transect the exchange processes close to the surface water bodies are studied in more detail in order to quantify the leakage parameters of both river sections. With the results the following questions will be answered: (1) How fast does the exchange between the surface water and the aquifer occur? (2) Can the hydraulic processes (in- and exfiltration) between both river sections and the aquifer be identified and quantified? (3) What are the driving forces for groundwater dynamics in the floodplain – groundwater recharge, regional groundwater flow, or water level fluctuations of the river sections?