

A flexible approach for coupled reactive transport modelling in post-mining areas

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Abstract The River Pleiße flows through the dump of the open pit lignite mine Witznitz close to Leipzig, Germany, and is impacted by discharging groundwater with high iron concentrations. A two-dimensional (2D) reactive transport model was set up based on an existing 3D model and an extensive study of dump development. A new template-based tool for reactive transport was developed, giving the modeller great flexibility without the need for programming. Primary and secondary iron oxidation, as well as dissolution, precipitation and exchange processes, were modelled. A comparison of modelled and measured values shows a good correspondence, indicating that the model can represent the important processes. Modelling results show the influence of spatial variability and provide quantitative results for long-term water quality developments in the subsurface and fluxes to the river. The newly developed modelling tool can be used for a variety of hydrogeochemical problems.

Key words water; rivers; groundwater; River Pleiße, Germany; PCGEOFIM; PHREEQC; coupled modelling