



Comprehensive analysis of multiple sources of uncertainties in an integrated hydrological model focusing on simulated groundwater levels

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When unexpected high groundwater levels were observed near a newly constructed motorway located in an unconfined groundwater aquifer, an integrated hydrological model was consulted to investigate the problem. The modelling experiment was designed to explore multiple sources of uncertainties of the model focusing on their spatial pattern. Five uncertainty sources were assessed, namely, parameters (MonteCarlo simulation), the location of the prequaternary boundary (Sequential Gaussian simulation), the placement of the pile, which is part of the motorway construction (MonteCarlo simulation), nine climate scenarios and finally a climate adaption scenario. These uncertainty sources were considered independent and could therefore be cumulatively stacked to represent an overall uncertainty. The aim of the study was not only, to identify areas with high uncertainty, but also to investigate the individual contribution from each uncertainty source and how this varies in space. The analysis is based on more than 500 model simulations that investigate the individual sources of uncertainty.