Uncertainties in the simulation of long-term groundwater recharge

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Digital spatial data always imply some kind of uncertainty. The source of this uncertainty is due to their compilation as well as due to the conceptual design that causes a more or less exact abstraction of the real world, depending on the considered scale. In the framework of hydrological modelling, in which numerous data sets from diverse sources having different thematic and unequal quality are combined, the various uncertainties are accumulated. In this study, the GROWA model (Kunkel and Wendland, 2002) is taken as an example to examine the effects of different types of uncertainties on the calculated groundwater recharge. Distributed input errors are determined for the parameters slope and aspect using a Monte Carlo approach. Landcover classification uncertainties are analysed by using the conditional probabilities of a remote sensing classification procedure. The uncertainties of data ensembles at different scales and study areas are discussed. The analysis shows that the Gauß error propagation method is a useful technique to analyse the influence of input data on the simulated groundwater recharge.

Kunkel, R. and Wendland, F. (2002): The GROWA98 model for water balance analysis in large river basins, Journal of Hydrology 259, 152-162.