

Does increased hydrochemical model complexity decrease robustness?

C. Medici¹, A.J. Wade² and F.Francés¹

The aim of this study was to analyse if additional model complexity gives better capability to model the hydrology and nitrogen dynamics of a small Mediterranean forested catchment or if additional parameters cause over-fitting. Three nitrogen-models of varying hydrological complexity (LU4-N, LU4-R-N and SD4-R-N) were considered. For each model, general sensitivity analysis (GSA) and Generalized Likelihood Uncertainty Estimation (GLUE) were applied, each based on 100,000 Monte Carlo simulations. The results show that as the complexity of a hydrological model increases over-parameterisation occurs, but the converse is true for a water quality model where additional process representation leads to additional acceptable model simulations. Water quality data help constrain the hydrological representation in process-based models. Increased complexity was justifiable for modelling river-system hydrochemistry.

1. Research Institute of Water and Environmental Engineering, Universitat Politècnica de València, Valencia, Spain

2. Department of Geography and Environmental Science, University of Reading, Reading RG6 6DW, UK