Performance benchmarking linked diffuse pollution and in-stream water quality models

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With 3 figures and 5 tables in the text

Abstract: A linked modelling approach using a diffuse model (CASCADE) and a river water quality model (QUESTOR) was implemented to simulate flow and nitrate dynamics in the River Aire catchment in Northern England as a way of exploring the use of performance benchmarking as proposed by the EC 5th Framework Programme Benchmark Models for the Water Framework Directive project (BMW). A sequence of linked models is presented and discussed in terms of their conceptualization, calibration and performance. Two main conclusions were drawn. Firstly, although it is considered essential that the overall performance criteria for the linked model must be defined and agreed prior to model application, these criteria may not be appropriate or sufficient for the internal data exchange between the two models. In general, when undertaking linked modelling studies, an essential consideration should be that individual models may need to be constrained to produce simulations that do not compromise the performance of the entire model system. Secondly, quantitative assessment of performance should not be used uncritically to determine which model is best. It is important that conceptually flawed model structures should be eliminated from consideration, although such models may still be helpful in indicating an achievable level of performance.

Introduction

The concept of benchmarking, as developed by the Benchmark Models for the Water Framework Directive (BMW) project, comprises three stages: model code selection, performance assessment, and post-project review, as elaborated in Kämäri et al. (2006). The focus of this paper is entirely on the second stage of this process during which the performance of a model is assessed in order to determine the credibility of the model application, and therefore whether the model application provides an appropriate framework for the evaluation of management strategies.

The BMW approach to performance assessment is based on an objective goodness-of-fit measure derived from a comparison of observed and simulated data.

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