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Submission
Review
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Ensemble modelling of nitrogen fluxes: data fusi a Swedish meso-scale catchment

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Abstract. Model predictions of biogeochemical fluxes at the landsc are highly uncertain, both with respect to stochastic (parameter) a structural uncertainty. In this study 5 different models (LASCAM, LA a self-developed tool, SWAT and HBV-N-D) designed to simulate hydrological fluxes as well as mobilisation and transport of one or nitrogen species were applied to the mesoscale River Fyris catchm mid-eastern Sweden.

Hydrological calibration against 5 years of recorded daily discharge stations gave highly variable results with Nash-Sutcliffe Efficiency (ranging between 0.48 and 0.83. Using the calibrated hydrological parameter sets, the parameter uncertainty linked to the nitrogen parameters was explored in order to cover the range of possible predictions of exported loads for 3 nitrogen species: nitrate (NO_3), ammonium (NH_4) and total nitrogen (Tot-N). For each model and e nitrogen species, predictions were ranked in two different ways ac to the performance indicated by two different goodness-of-fit mea the coefficient of determination R^2 and the root mean square error total of 2160 deterministic Single Model Ensembles (SME) was gen using an increasing number of members (from the 2 best to the 1C single predictions). Finally the best SME for each model, nitrogen s and discharge station were selected and merged into 330 differen Model Ensembles (MME). The evolution of changes in R^2 and RMSE used as a performance descriptor of the ensemble procedure.

In each studied case, numerous ensemble merging schemes were identified which outperformed any of their members. Improvement were generally higher when worse members were introduced. The improvements were achieved for the nitrogen SMEs compiled with linear regression models with R^2 selected members, which resulte RMSE decreasing by up to 90%.

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