

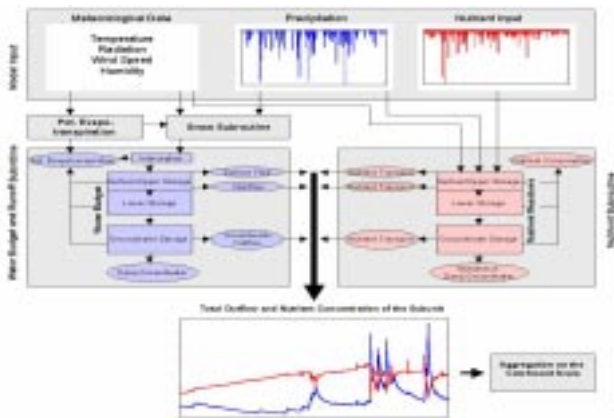


### APPLICATION OF A CATCHMENT WATER QUALITY MODEL FOR ASSESSMENT AND PREDICTION OF SOLUTE BUDGETS

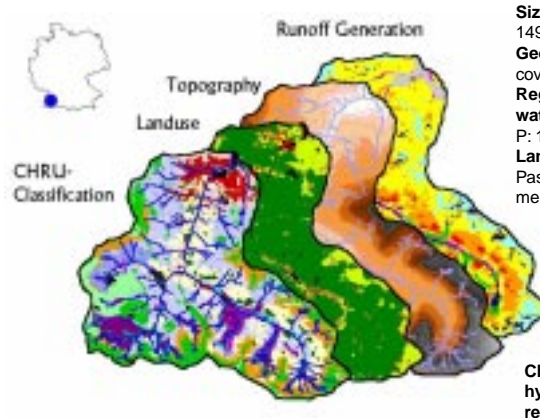
#### Objective

The objective of this study is to assess the conceptual semi-distributed water budget and water quality model NPSM (Non Point Source Model) regarding its suitability for simulation of nutrient transport and prediction of solute budgets. The model has been applied in a meso-scale catchment in Southwest Germany.

#### Model Concept



#### Study Area

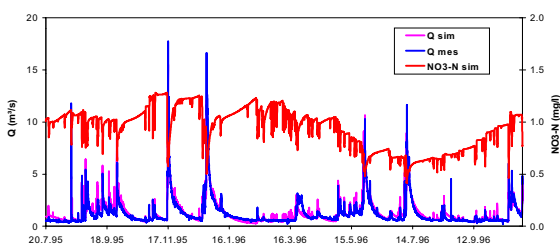


Brugga-Basin:  
Size: 39.9 km<sup>2</sup>, Altitude: 438 - 1493 m a.s.l. Mean Slope: 19°  
Geology: Gneiss and Anatexit covered by (peri-) glacial debris  
Regime: nival, Mean annual water balance (mm): P: 1750, ET: 525, Q: 1225  
Land Use: Forest: 75.2 %, Pasture: 22.3 %, Settlement: 1.6 %, Other: 0.9 %

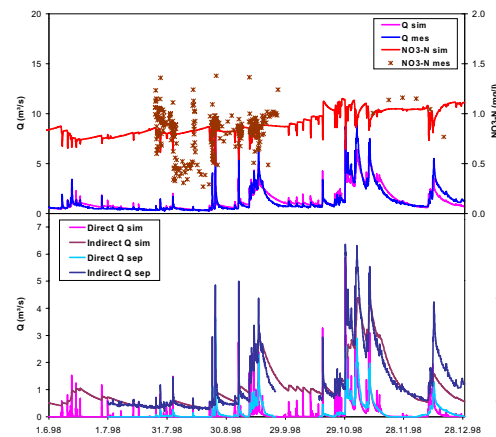
Classification of hydrological chemical response units (CHRU's)

#### Model Calibration and Validation

The runoff simulation was calibrated using the runoff curve. Calibration of the nutrient simulation resulted from the mean stream concentration level. Validation was achieved for an independent time period using measured runoff and measured nutrient concentrations. The simulated runoff components were compared with runoff separations based on the natural tracer silica.



Simulation of runoff and nitrate for the calibration period



Simulation of runoff and nitrate transport as well as comparison of simulated and separated runoff components for the validation period

#### Discussion

- The simulation of nitrate transport shows a general conformance with the measured concentration levels, but the short time dynamic of the measured curve could not be fitted.
- The simulated concentration level is controlled by the nutrient inputs, nutrient reactions in the soil and the runoff generation processes.
- Validation of the runoff generation concept revealed an overestimation of direct runoff components during runoff peaks. Improvement of the runoff generation is limited by the Model conception.
- Due to the lack of data the parameterization of the nutrient contents in the soil and the nutrient reactions remains uncertain.

#### Conclusions

- NPSM works satisfying for the simulation of runoff and the calculation of long term nutrient budgets for meso-scale catchments.
- Due to the inadequate simulation of the short time dynamics, predicting the effects of different management options and impact scenarios on the solute budgets is limited to long term considerations.
- To improve the nutrient simulation a more detailed soil and agricultural data basis is needed.