



Which model enhancements improved predictions: time series, geo-data or process representation?

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Results of field monitoring, remote sensing and research were integrated into the hydro-sedimentological model WASA-SED in the Esera catchment in the Pyrenees in northeastern Spain (1370 km²). WASA-SED employs a hierarchical top-down disaggregation of the landscape based on characteristic toposequences. Now, by improving 1. time series (rainfall and discharge) 2. geo-data (land use, LAI and C-factor and their seasonality) and 3. the representation of water and sediment connectivity in the model, we intend to evaluate which model enhancements (MEs) have a positive effect on the model predictions.

The evaluation of the model prediction is performed in two ways: first, in a forward selection step each model enhancement is added to the base configuration (setting A). Any change in performance is compared with respect to setting A. Complementary, in a backward elimination step each ME is withheld from the full configuration (setting B); the change in performance is compared with respect to setting B. This stepwise approach allows a more differentiated view on the role of the single enhancements: in the case that some MEs only become viable if others have already surpassed a certain level (i.e. better rainfall data is only useful if landuse information is detailed enough), this effect will become apparent.

The model enhancements may improve model predictions globally or only in some particular aspect of the model. The enhancements were therefore evaluated against 1. a calibrated and an uncalibrated model, 2. with respect to results at the outlet and on the subcatchment, 3. in water and sediment and 4. in terms of dynamics and yield. We expect this investigation to demonstrate the potential of a model as a tool for integrating and quantifying the value of additional knowledge as well as a framework for assessing research outcomes.