



Experiments with cloud and cluster computing in uncertainty analysis of models

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Hydroinformatics assumes the holistic integrated approach to managing the information propagating through models, and analysis of uncertainty propagation through models is an important part of such studies (usually, input and parametric uncertainties are considered). Uncertainty analysis typically involves Monte Carlo simulations when a model is run a large number of times, so that in case of complex river systems, this procedure becomes very time consuming.

In a considered case study (Timis Bega catchment in Romania) hydrological modelling system HEC-HMS, and hydraulic modelling system HEC-RAS coupled with Sobek1D2D were used. A number of parameters and data sets were considered uncertain and the propagation of this uncertainty to the model output (discharges and inundated areas) was studied. Special attention was given to uncertainty of input data, particularly DEM. In the present case, changing the grid cells elevation within a clear established range showed to have influence in the flood extend. Uncertainty of the DEM influence on the flood was analyzed by changing the cells elevation. Monte Carlo analysis needed hundreds of simulations, so a decision was made to use cluster computing and cloud computing by employing Amazon Web Services (<http://aws.amazon.com>). Overall computation time was reduced considerably and in general such approach proved to be very effective in uncertainty analysis of hydrological and hydraulic models.