



Hydrologic SWAT Model Calibration over Cloud by gSWATCloud

Victor Bacu, Teodor Stefanut, Constantin Nandra, and Dorian Gorgan

Technical University of Cluj-Napoca, Cluj-Napoca, Romania (victor.bacu@cs.utcluj.ro)

The water quality and quantity can be estimated using the well-known SWAT (Soil and Water Assessment Tool) [1] hydrologic model, which is built at watershed scale and takes into consideration land uses and land practices and other parameters. To develop a SWAT model three phases are to be considered: model build-up, calibration and validation. The calibration phase, which is an iterative process, is based on adjusting a set of model parameters in order to improve the initial model. This is the most time consuming phase of the entire process based on the fact that is using a Monte Carlo approach to estimate the best parameters values.

The calibration and execution of SWAT models is enabled by the SWAT-CUP [2] application, which is a desktop application allowing the processing of a single current model. Based on the SWAT model dimension, this process requires significant computing resources and some administrative skill of the single user.

gSWATCloud [3] application offers a software solution for calibration and execution of multiple SWAT models, by different users, in a parallel and distributed manner, through the Web browser. In order to accommodate multiple calibrations and execution sessions of different SWAT models the gSWATCloud uses cloud infrastructure.

The users have the possibility to start multiple calibration sessions in parallel and to control them remotely, even on a different computer than the one on which he started the execution. The gSWATCloud and SWAT-CUP applications can be combined in the same processing pipeline, based on the fact that they interact and collaborate through the input and output files of a SWAT model.

[1] J. G. Arnold, R. Srinivasan, R. S. Muttiah, and J. R. Williams, "Large area hydrologic modeling and assessment part i: Model development1," JAWRA Journal of the American Water Resources Association, vol. 34, no. 1, pp. 73–89, (1998)

[2] K. Abbaspour, M. Vejdani, S. Haghighat, and J. Yang, "SWAT-CUP calibration and uncertainty programs for SWAT," MODSIM 2007 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, 2007, pp. 1596–1602, (2007)

[3] V. Bacu, C. Nandra, T. Stefanut, and D. Gorgan, "SWAT model calibration over Cloud infrastructures using the BigEarth platform", Proceedings of the Intelligent Computer Communication and Processing (ICCP), IEEE-Press, pp. 453-460, (2017)