



FEST-WB hydrological model manual and automatic calibration using a model independent Particle Swarm Optimization software HydroPSO: Bonis catchment, Italy

Mouna Feki (1), Giovanni Ravazzani (1), Tommaso Caloiero (2), Alessandro Ceppi (1), and Gaetano Pellicone (2)

(1) Politecnico di Milano, Department of Civil and Environmental Engineering (D.I.C.A.), Piazza Leonardo da Vinci, 32, 20133 Milano, Italy (mouna.feki@polimi.it), (2) National Research Council of Italy, Institute for Agriculture and Forest Systems in the Mediterranean (CNR-ISAFOM), 87036 Rende (CS), Italy

Eco-hydrological modelling is in the center of interest of INNOMED project for a better quantification of the green-water footprint of current and alternative forest management options. The study site is Bonis catchment located in Southern Italy-Calabria region. The aim behind carrying out of the modeling part is to simulate the water balance of our pilot study catchment under different land uses / management scenarios, combined with climate change forcing to quantify the effect of alternative management options on the land-water cycle. To this purpose, FEST-WB hydrological model was used to simulate the hydrological balance of the Bonis basin with an hourly time step for the period 1998–2018. In this study FEST model was coupled with a model-independent R package HYDROPSO that is an optimization algorithm based on evolutionary Particle Swarm technique (PSO). HydroPSO allows to perform sensitivity analysis (based on Latin hypercube one at a time method), parameter calibration and post processing of the results. Sensitivity analysis were carried out as a first step. The output of these analysis allowed to reduce the number of parameters to be calibrated manually and automatically. Later, manual and automatic calibrations were implemented. The results of both methods were compared in terms of goodness-of-fit measures. The assessment of the results of manual and automatic calibrations was based on the total runoff volume. Several tests were performed on the automatic calibration to assess the dependency of the optimized parameters on the selected goodness of fit function, as well as the population size.