

Impacts of using different soil databases on streamflow simulation in the Pípiripau river basin

Leandro de Almeida Salles*¹, Henrique Marinho Leite Chaves, Jorge Enoch Furquim Werneck Lima, Sara Ferrigo, Heloisa do Espirito Santo Carvalho

1. Email: leandro.ibram@gmail (corresponding author)

Abstract

The purpose of this study was to analyze the influence of the soil database on streamflow simulation with SWAT model in Pípiripau's river basin (Brazil, Federal District), a 235km² experimental rural catchment of the Brazilian savanna (Cerrado biome). To achieve this goal, a soil database developed with measured data collected from an experimental catchment near the Pípiripau's river basin, whose soils have similar physical proprieties (SDB1), and another from the literature (SDB2) were tested. The evaluation was performed using a 10 years record of streamflow historical data (1989-1998) on monthly and daily basis. The analysis was made without calibration using only SWATs first simulation, in order to examine the improvement of the model's soil physical basis, which is very important, especially for ungagged basins, a common situation throughout the Brazilian territory. For daily simulation, the Nash & Sutcliffe model efficiency (NSE), the adapted Nash & Sutcliffe model efficiency (ANSE), and the Percent Bias (PBIAS) were, respectively, -11.88, -11.80, and -23,15% for the SDB1, and -9.94, -9.88, and -84.72, for SDB2. For the monthly simulation, the NSE, ANSE, and PBIAS results were, respectively, -1.78, -2.98, and -24,53% for SDB1, and -6.51, -9.88, and -84.72, for SDB2. The negative results of NSE and ANSE indicates that the simulations failed to represent observed data. However, the PBIAS analysis and the annual water budget results for the SDB1 simulations had better results. The study indicates the importance of developing soil databases for specific regions throughout Brazil and furthermore research on other parameters in order to improve SWATs physical basis.

Keywords

Hydrological modeling, model parameters, soil database, Brazil.