Impacts of a specific soil database on streamflow simulation with SWAT in an experimental rural catchment of the Brazilian savanna

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Abstract

This study aimed to evaluate the impacts of using a specific soil database on streamflow simulation with SWAT model in an experimental rural catchment of the Brazilian savanna (Cerrado biome). In order to accomplish that, two soil databases were tested, one generated by data measured in the studied area (Sim1), and the other from literature (Sim2). The Upper Jardim Experimental River Basin (105 km^2), located in a rural zone of the Brazilian Federal District, due to this remarkable soil database, was chosen as the study area. Streamflow simulations were performed for two consecutive years (2006-2008), on a daily basis. No calibration was performed to make it possible to analyze the impact of the soil database on the first simulation, what is relevant mainly for ungagged basins. Even having better physical basis, the results obtained by Sim1 (NSE = -10.81) was worse than the ones generated by Sim2 (NSE = -6.15). The negative NSE values indicate that both simulations failed to represent observed data. Analyzing the hydrographs, it is noticed that: (i) both simulations underestimated baseflow during the dry season; (ii) both simulations overestimated streamflow peaks, but Sim1 presented higher (worst) values; (iii) during the rainy season, the baseflow simulation of Sim1 was satisfactory, while it was overestimated in Sim2. The results reinforce that the model is sensible to soil information, but it shows that it is still necessary more studies about other SWAT parameters, as the ones that control runoff generation.

Keywords

Hydrological modeling, model parameters, model calibration, Brazil