

Global Sensitivity Analysis of the South Florida Regional Simulation Model (RSM) using the Method of Morris

Zuzanna Zajac¹, Rafael Muñoz-Carpena¹, Wendy Graham¹, and Jayantha Obeysekera²

1. Department of Agriculturam and Biological Engineering, UF

2. South Florida Water Management District

Regional hydrological models are often complex and require a large number of uncertain inputs. The role of the sensitivity analysis is to determine the strength of the relation between uncertain input factors and the model outputs. Sensitivity analysis is often performed using local one-at-a-time (OAT) methods. These are customarily expressed as a simple derivative of model output with respect to the variation of a single input factor, while other input factors are fixed to their nominal values. Local, OAT methods are only effective for the purpose of assessing the relative importance of input factors if the model is linear and additive. In contrast, global techniques enable exploration of the entire interval of definition for each input factor and do not require any assumptions on the model nature (such as linearity or additivity). This study presents the statistical evaluation of Regional Simulation Model (RSM), which is a regional, management oriented spatially-distributed hydrologic model developed for application in South Florida. RSM accounts for interaction between surface and groundwater hydrology, structure and canal hydraulics and management of those hydraulic components. The Method of Morris is selected for the global sensitivity analysis in this study since it is computationally efficient method. Probability distributions of uncertain input factors, required for the analysis, are obtained from the available databases and literature specific to the South Florida region. The global sensitivity analysis presented here will allow for: exploration of the RSM behavior, identification of factors with small / large influence on selected model outputs, and characterization of interactions between factors. The formal evaluation of RSM can contribute to the successful adoption of the model as a tool for water resources management in South Florida.

Keywords: Hydrological modeling, Sensitivity analysis, Model evaluation

Challenge(s) and Issue(s): Increasing the reliability and efficiency of hydrological modeling for water resources management in South Florida