UC Irvine
UC Irvine Previously Published Works

Title
Use of the NWSRFS OPt3 for calibration of the SAC-SMA model

Permalink
https://escholarship.org/uc/item/3gk5p8d0

Authors
Hogue, T
Sorooshian, S
Gupta, H
et al.

Publication Date
2000

Copyright Information

Peer reviewed

15th Conference on Hydrology

2.21

Use of the NWSRFS OPT3 for Calibration of the SAC-SMA Model

Terri S. Hogue, University of Arizona, Tucson, AZ; and S. Sorooshian, H. V. Gupta, A. Holz, and D. T. Braatz

As part of the National Weather Service (NWS) Modernization effort, many of the River Forecast Centers (RFCs) are in the process of calibrating components of their river forecasting operations. With over 4000 river forecast points located within the NWS flood forecasting program, calibration of the Sacramento Soil Moisture Accounting Model (SAC-SMA) and Snow Accumulation and Ablation Model (SNOW-17) has become a tedious and time-consuming component of the RFC hydrologists� duties. Traditional calibration efforts by NWS hydrologists include manual estimation of the SAC-SMA and SNOW-17 parameters using the Interactive Calibration Program (ICP) provided by the NWS River Forecast System (NWSRFS). The NWSRFS also includes an Automatic Parameter Optimization Program (OPT3), for use on various model components within the NWSRFS. The feasibility of using the OPT3 program for calibration of NWS basins has not been addressed. Using historical data from basins located within the North Central River Forecast Center (NCRFC) region, a three-step automatic calibration scheme was developed utilizing the OPT3 program. Sixteen parameters of the SAC-SMA and SNOW-17 model are calibrated using different objective functions for various parameters at different stages in the process. The developed method mimics the progression of calibration steps used by NWS hydrologists with the ICP. Results for the six basins in the NCRFC demonstrate that model simulations improve throughout the three-step process: flow interval percent biases, monthly percent biases, and overall percent bias, along with Daily Root Mean Square (DRMS), all generally improve throughout the calibration process. Statistics and hydrographs compared for model runs using parameters obtained from both the manual and automatic methods indicate the parameters obtained from the OPT3 process perform equally as well as the RFC manually estimated parameters. The OPT3 three-step calibration process provides forecast hydrologists with a reasonable set of parameters in a timely and efficient manner to use in their calibration efforts. With the large volume of forecast points yet to be calibrated within the NWS RFCs, the OPT3 calibration program can be a useful and practicable tool for the RFC hydrologist.

Session 2, Data, Modeling and Analysis in Hydrometeorology Part II
Tuesday, 11 January 2000, 8:00 AM-5:45 PM