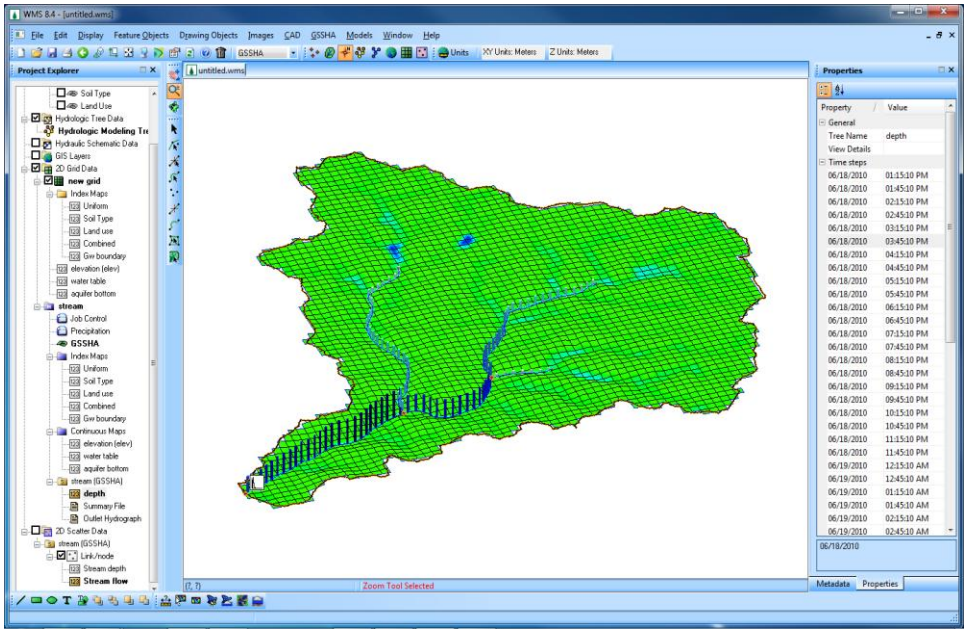
WMS

v. 9.0

WMS 9.0 Tutorial

GSSHA – Calibration – Manual Calibration of GSSHA models

Learn how to manually calibrate a GSSHA model



Objectives

In this tutorial, you learn how to calibrate a GSSHA model by running a sensitivity analysis on the input parameters. A sensitivity analysis helps you understand how changes in input parameters impact the output of the model.

Prerequisite Tutorials

- GSSHA – Modeling Basics – Developing a GSSHA Model Using the Hydrologic Modeling Wizard in WMS

Required Components

- Data
- Drainage
- Map
- Hydrology
- 2D Grid
- GSSHA

Time

- 20-40 minutes

AQUAVEO™

1 Contents

2 Introduction

Creating a working GSSHA model is a preliminary step in hydrologic modeling. Such models can be used in analyzing different hydrologic problems only if the model developer has enough confidence in the model. Generally, such models should be calibrated.

In this tutorial, you will read a pre-existing GSSHA project for the Goodwin Creek watershed and perform a sensitivity analysis on the parameter in order to understand how parameters can be modified to calibrate the model. In this tutorial we will manually adjust parameters for a calibration, in the next tutorial we will use a series of batch or stochastic runs to calibrate the model and then finally we will use an automated shuffle, complex, evolution scheme to automate the calibration. In all cases a sensitivity analysis on the parameters is helpful in guiding the calibration.

3 Open an Existing GSSHA Project

Open the GSSHA model for the Goodwin Creek Watershed

1. In the *2D Grid Module*  select ***GSSHA | Open Project File…***
2. Locate the ***\GSSHA Distributed Hydrologic modeling*** folder in your tutorial files. If you have used default installation settings in WMS, the tutorial files will be located in ***\My documents\WMS 9.0\Tutorials\.***
3. Browse and open the file ***\GSSHA Distributed Hydrologic modeling\ Calibration\Manual\ goodwin.prj***
4. Select ***GSSHA | Save Project File*** to save the base project to a different location, so that the original project remains unchanged. Save your project as ***\GSSHA Distributed Hydrologic modeling\Personal \Calibration\Manual\ goodwin.prj***
5. Select ***GSSHA | Run GSSHA*** to compute the base model.

4 Replacing Parameters

Now you have seen that there are differences between your simulation results and the observed flow. You should have observed whether your model is under or over-predicting the flow (under-predicting in this case) which guides what you need to do next with the parameters so that the simulation results match up with the observed data.

© Aquaveo 2012

Although there are several parameters that affect the outflow, there are a few which are more sensitive. We will investigate some of these.

- Increase and Decrease Hydraulic Conductivity
- Increase and Decrease Initial Moisture (Initial Moisture tab)
- Increase and Decrease Overland Roughness (Roughness tab)
- Increase and Decrease Channel Roughness

Here are the steps that we will follow for the sensitivity analysis of each parameter:

1. In windows explorer, browse and open an Excel spreadsheet ***\GSSHA Distributed Hydrologic modeling\Calibration\ManualCalib.xls***.
2. For your convenience, a table is created in the spreadsheet (***\GSSHA Distributed Hydrologic modeling\Calibration\ManualCalib.xls***) which has the original values of the parameters to begin with and places to enter the weight.
3. In the spreadsheet, you will see blue color cells in which enter **1.25** to increase the parameter value by 25% and enter **0.75** to decrease those by 25%. Some formulae are created in it which will use the weights you enter to compute the modified values for the parameters.
4. Then select and copy the values corresponding to 25% increase as we will paste those to WMS.
5. Change your window to WMS and switch to the *2D Grid Module* 
6. Select **GSSHA| Map Tables…**
7. In the "*Infiltration*" tab paste the hydraulic conductivity values you just copied from the spreadsheet.
8. *Save* and run the model (you can just overwrite the same GSSHA project).
9. Copy the hydrograph to the same spreadsheet and paste the values under columns 'Hydraulic conductivity'.
10. Repeat the same process to get new values of Hydraulic conductivity, decreased by 25%.
11. Save and run the model and export hydrograph ordinates to the spreadsheet.
12. Now copy the original values of Hydraulic conductivity from the spreadsheet and paste in WMS map tables before you start changing other parameters.
13. Follow the same steps to adjust another parameter (1 at a time to see the sensitivity) for the following parameters. Do not forget to replace original values before you move on to another set of parameters.
    - Initial Moisture (Initial Moisture tab)
    - Overland Roughness (Roughness tab)
    - Channel Roughness (in the map module, click on *Select feature line branch*  tool and double click on the most downstream channel segment).

With all these sensitivity analyses, you should have noticed how each of these parameter affect your model results. Now, instead of just playing with one parameter at a time,

 © Aquaveo 2012

change a combination of parameters (with the values you think will best calibrate your model) and rerun GSSHA one more time.

14. Copy the hydrograph to the spreadsheet
15. Toggle through all different plots in the spreadsheet.

© Aquaveo 2012