SWWRP Courses Announcement

Introduction to Distributed Hydrologic Modeling with GSSHA using the WMS Hydrologic Model Wizard

July 19, 2011

and

Watershed Modeling with GSSHA and WMS

July 20-22, 2011

Coastal and Hydraulics Laboratory Conference Room, Waterways Experiment Station
Vicksburg, MS

The Engineer Research and Development Center (ERDC) Watershed Systems Group is pleased to announce two System Wide Water Resources Program (SWWRP) sponsored courses on spatial hydrologic modeling within the US Army Corps of Engineers (USACE). Back to back hydrologic modeling courses are offered featuring the Watershed Modeling System (WMS) and the USACE Gridded Surface Subsurface Hydrologic Analysis (GSSHA) models .

In the Introductory course, you will learn the basics of the GSSHA model, developed at ERDC and the WMS, developed at Aquaveo LLC. In the Watershed Modeling course you will extend your basic modeling knowledge to include groundwater modeling, groundwater/surface water interaction, sediment transport, constituent transport and other GSSHA capabilities. Both courses will feature the spatially distributed modeling components of this system with a combination of lecture and hands on applications. Attendees will learn to use WMS to parameterize GSSHA models through hands-on in-class experience. The Introductory course will begin with an overview of the capabilities of the WMS to ensure that the maximum benefit is derived from the hands-on portions of the class.

Course attendees in the Introductory course will:

- Learn the basic spatial data required to parameterize GSSHA distributed models
    - Learn about data requirements for physics-based hydrologic modeling
    - Learn the basics of the WMS interface for developing GSSHA gridded models
    - Learn how to find and use spatial geographic data to develop GSSHA models using the WMS Hydrologic Model Wizard.
- Set up, run, and visualize output from basic GSSHA distributed runoff simulations using the Hydrologic Modeling Wizard.

Having completed the Introductory course you will have a basic understanding of physics-based, distributed hydrologic modeling, and WMS and GSSHA models. This basic understanding should help you to understand how approach and USACE tools can help you or your group in solving hydrologic modeling problems. You will also have the basic understanding needed to get the most out of the Watershed Modeling course.

Attendees of the Watershed Modeling course will:

- Learn details about the GSSHA model formulation,
- Learn about required GSSHA inputs ,
- Use WMS to develop GSSHA models that include:
    - overland flow,
    - infiltration,
    - distributed rainfall,
    - hydraulic structures,
    - groundwater,
    - erosion and sediment transport,
    - constituent transport, and
    - subsurface storm and tile drains.
- Learn how to identify sensitive model parameters and calibrate these parameters in their models.
- Use these models to analyze storm surges, land use change effects, BMPs, sediment transport, and non-point source pollution.

Having completed the Watershed Modeling course, you will have a working knowledge of the premier spatial hydrology tools available to USACE personnel, WMS and GSSHA, and you will have been exposed to many of the advanced GSSHA features. You will also have a understanding of how, when, and why you might be able to apply the tools to your own specific studies and needs, as well as understanding of input data requirements.

Who Should Attend?

The Introductory course is intended for anyone interested in distributed -parameter physics-based hydrologic models for the purposes of hydrologic and water quality analysis related to flooding, land use change, computing total maximum daily loadings (TMDLs), analyzing best management practices (BMPs), etc. No prior experience is needed. The Watershed Modeling Course will pick up where the introductory course leaves off.

The Watershed Modeling course will be devoted to understanding the features in the GSSHA model and developing inputs for GSSHA using WMS. This course is intended for more experienced modelers who want to broaden their modeling capabilities. If you have never used WMS or GSSHA, or haven't used the models for an extended period, you should consider coming to the introductory course as well.

When: The Introductory course will be July 19, 2011. The Watershed Modeling course will immediately follow on July 20-22, 2011. Course hours are 8AM to 5PM.

Schedule: This is a four day course, with the first day being an Introduction to the tools, the next two days covering the basics of modeling using GSSHA and WMS, and the last day covering a variety of advanced features.

Day one will feature basic WMS and GSSHA features and conclude with developing a basic GSSHA model with the WMS Hydrologic Modeling Wizard, as well as running and visualizing output from the model.

During day two you will learn details about overland flow, infiltration, stream routing, and distributed rainfall modeling in GSSHA, develop the inputs for these processes using WMS, run GSSHA models, and analyze results.

Day three continues with fundamental hydrologic features in GSSHA: continuous simulations, calibration, and sensitivity analysis. You'll also use your basic GSSHA model to simulate the hydrologic effects of land use change and Best Management Practices (BMPs), used as abatement measures.

On the last day we will cover a variety of advanced topics. The morning will consist of overland boundary conditions and the basics of groundwater modeling. In the afternoon you will be able to choose from two tracks, depending on your interest: a continuation of groundwater modeling and storm and tile drain modeling, or sediment and constituent transport modeling.

Format: Students will learn about GSSHA theory and WMS mechanics through lectures followed by demonstrations and hands on tutorials that reinforce and provide application to the ideas in the preceding lectures.

Where: Coastal and Hydraulics Laboratory Conference Room, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180.

Logistics: The Waterways Experiment Station is a Department of Defense (DoD) facility with controlled access. Students with CAC cards should bring their cards with them to facilitate access. All students must report to the public affairs office (PAO) at Headquarters to check in and obtain temporary badges and parking permits. Students should enter at the main gage on Halls Ferry Road, just to the south of I-20. The guard can direct you to PAO. Entry of non-US citizens is strictly controlled and the approval process can be time consuming. Any non-US citizens wishing to attend the course should contact Barbara Parsons, contact info below, as soon as possible to learn the requirements and begin the approval process. Non-US citizens will have to be escorted by a course instructor at all times when on the premises. Everyone should allow an extra 15 minutes the first day for check in and arrival at the training facilities.

Computers and Software: Students are expected to provide their own laptop computers for this course. Students will be provided the WMS and GSSHA software prior to the course, and students should coordinate with their IT staff to have the software installed

on their machines prior to the course. A limited number of computers will be made available to students without access to a laptop. Please make Barbara aware of your laptop availability when signing up for the course.

Attendance: Attendance is limited to 30 students for each of the courses. These courses are intended primarily for USACE, other DoD, and EPA personnel. Other Federal, state, and local government personnel, as well as university and private agency personnel will be permitted as space allows. Preference will be given to agencies and individuals actively working with USACE, DoD, and EPA.

Costs: There is no fee for this course.

Transportation: Vicksburg is located on I-20 on the western edge of Mississippi near the middle of the state. The nearest airports are located in Jackson, MS, 35 miles to the east, and Monroe, Louisiana, 70 miles to the west. Both airports have rental cars available. Airport shuttles can also be arranged through Go-Fer Girls Incorporated (601) 638-2574.

Accommodations: Vicksburg offers a wide variety of hotels and bed and breakfast accommodations at or below the per diem rate of $77.00 a day. Contact SATO travel or the Vicksburg Convention and Visitor's Bureau for more information http://www.visitvicksburg.com/

Meals and Breaks: Meals and refreshments will not be provided. The CHL break room has soft drinks, coffee, and snacks for purchase. In addition to the cafeteria on station, there are numerous off-site restaurants located nearby.

Activities: Vicksburg Mississippi is located on a bluff overlooking the Mississippi River. The National Military Park in Vicksburg preserves and documents the site of the civil war battle at Vicksburg, and is a must see. The city also offers several water based casinos, restaurants, pubs and shopping in the downtown area. See the Vicksburg Convention and Visitor's Bureau for more information http://www.visitvicksburg.com/

Contact: To sign up for one or both of the courses, or for information on the materials covered, contact Barbara Parsons at (601) 634-2344, barbara.a.parsons@usace.army.mil or Natalie Elwart (601) 634-4862, Natalie.S.Elwart@usace.army.mil.

Instructors: Instruction will be provided by the WMS and GSSHA model developers. Students will have a unique opportunity to work directly with the leading experts on the various models. Your instructors are:

Dr. Charles W. Downer, PE - Research Hydraulic Engineer, USACE-ERDC-CHL. Dr. Downer is a leader and innovator in the development and application of distributed hydrologic models. Dr Downer is one of the original developers of the GSSHA model, and as such has also played an important part in the development of the WMS interface,

particularly in the area of distributed modeling in support of GSSHA. Dr. Downer leads the development, application, and instruction of the GSSHA model.

Dr. E. James Nelson – Professor, Department of Civil Engineering, Brigham Young University. Dr. Nelson is the architect and director of the WMS interface development. He is also the author of the WMS reference manual and tutorials. Dr. Nelson has taught hydrologic modeling courses at the university level and around the world for over 15 years. He has published several papers in the field of hydrologic modeling and maintains an ongoing research program to improve hydrologic modeling methods. Dr. Nelson is currently teaching a course on spatial hydrologic modeling at BYU and also teaches a course on GIS applications of Civil Engineering. He brings a wealth of teaching knowledge to the courses.

Dr. Fred L. Ogden, PE, PH - Professor Cline Distinguished Chair of Engineering, Environment and Natural Resources Department of Civil & Architectural Engineering and Haub School of Environment and Natural Resources University of Wyoming. Dr Ogden is one of the pioneers in the field of distributed hydrologic modeling. He is one of the original developers of the GSSHA model and of the CASC2D model, the predecessor to GSSHA. Many of the features in GSSHA were taken from or patterned after the work by Dr. Ogden within the CASC2D model. Dr. Ogden developed and oversees various components of the GSSHA model and uses GSSHA for numerous research applications.

Dr. Nawa Raj Pradhan – Dr Pradhan has recently joined the staff at the Coastal and Hydraulics Laboratory after working for several years in a post-doctoral position under Dr. Fred L. Ogden at the University of Wyoming. Dr. Pradhan has years of experience as a hydrologic modeler, model developer, and course instructor. Dr. Pradhan has worked with and developed portions of the GSSHA source code for X years. He is also the developer of the one variable hydrologic model. Dr. Pradhan is an excellent addition to both the staff, and to the list of GSSHA/WMS course instructors.