Courses Announcement

Watershed Modeling with GSSHA and WMS

July 17-19, 2012

Department of Civil & Architectural Engineering, Room 3065,
University of Wyoming
Laramie, Wyoming

The Engineer Research and Development Center (ERDC) Watershed Systems Group, in conjunction with the University of Wyoming (UW) Department of Civil & Architectural Engineering, is pleased to announce a course on spatial hydrologic modeling within the US Army Corps of Engineers (USACE) featuring the Watershed Modeling System (WMS) and the USACE Gridded Surface Subsurface Hydrologic Analysis (GSSHA) models .

In this course, you will learn the basics of the GSSHA model, developed at ERDC and UW, and the WMS, developed at Aquaveo LLC. The GSSHA/WMS models constitute a complete watershed analysis system that can be used for a variety of engineering computation and design issues, such as flood control, hydrologic impacts of land use change, and BMP design and location. The course 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 in-class experience. This 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 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.
- 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,
    - continuous simulations with frozen precipitation, and
    - erosion and sediment transport.

- Set up, run, and visualize output from basic GSSHA distributed runoff simulations.
- Use these models to analyze practical engineering problems, such as storm surges, land use change effects, BMPs, and sediment transport.

Having completed this course, you will have a working knowledge of the premier spatial hydrology tools available to USACE personnel, WMS and GSSHA. 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 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. Experience with hydrologic modeling, numerical methods, and GIS are helpful, but not required.

When: The will be July 17-19, 2012. Course hours are 8AM to 5PM.

Schedule: This is a three day course that will cover the basics of watershed modeling with GSSHA and WMS.

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

During day two you will continue to develop your basic model, learn about using the WMS Hydrologic Wizard to assist in developing models, and then use your basic model to simulate land use change and abatement scenarios.

On day three you will learn how to use GSSHA in continuous mode including periods with frozen precipitation, sediment transport, and about GSSHA input files.

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: Room 3065, Dept. of Civil & Architectural Engineering, College of Engineering and Applied Sciences, University of Wyoming, Laramie, Wyoming, 82071.

Computers and Software: The classroom contains 18 computers, and the software will be installed. Copies of the software will be available to install on your laptops, if desired. The WMS software installed during the course will have a temporary expiring license. Participants will be required to procure a license to use the software after this temporary period. WMS is free to USACE and DoD personnel and may be purchased through

vendors for everyone else. GSSHA is free software available on the GSSHA wiki, http://gsshawiki.com/gssha/Main_Page

Attendance: Attendance is limited to 20 students for the courses which is 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, EPA, and UW.

Costs: There is no fee for this course for U.S. Army Corps of Engineers and other Federal personnel. For all others there is a $200 registration fee.

Transportation: Laramie is located on I-80 approximately 135 miles northwest of Denver, Colorado, and 65 miles northwest of Fort Collins, Colorado, on U.S. Highway 287. Laramie is served by Great Lakes commuter airline, although flights to Laramie usually add over $100 to the ticket price. Most often, travelers will fly into the Denver International Airport (DEN), rent a car and then drive the 2-½ hours to Laramie. There is a shuttle van available: http://www.greenrideco.com/ that costs $75 each way to/from DEN. For driving directions see Google maps.

Accommodations: Laramie offers a wide variety of hotels and bed and breakfast accommodations.

Meals and Breaks: Refreshments (coffee, snacks) will be provided.   There are numerous on and off-campus restaurants located nearby for lunch and dinner.

Activities: Laramie is in the Rocky Mountains. East and west are the Medicine Bow National Forest, and south is Rocky Mountain National Park. Outdoor recreational opportunities abound including fly-fishing, hiking, camping, and whitewater rafting. July in Laramie, Wyoming, is heavenly, with daily high temperatures in the low 80's, nightly lows in the 40's and dew points in the 20's.

Contact: USACE and other DoD personnel should contact 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. All others should contact Dr. Fred Ogden, at UW, fogden@uwyo.edu.

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. 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. Ogden has an active research program at UW, and is the author of numerous scientific journal articles related to hydrology and hydrologic modeling. He has a particular interest in tropical hydrology and has a robust research program in Panama. In addition to his research program Dr. Ogden is also a noted instructor at UW and has been an instructor at the University of Connecticut, and the University of Iowa.

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. 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 UWY. 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 several years. He is also the developer of the "one parameter" hydrologic model. Dr. Pradhan is an excellent addition to both the staff, and to the list of GSSHA/WMS course instructors.

Mr. Mike Follum – Mike Follum is also a Research Hydraulic Engineer at ERDC, working in the Coastal and Hydraulics Laboratory. Mr. Follum is an experienced hydrologic modeler and model developer. Much of his modeling experience is in cold regions and Mr. Follum has greatly enhanced the snow accumulation and melt routines in the GSSHA model. Mr. Follum is also a recent graduate of UW. Go Cowboys!