Short Course **Introduction to Modeling River Flow, Sediment Transport, and Morphodynamics within the IRIC Interface**

August 25-26, 2015, Lima, PERU

Contact person: Dr. Jonathan Nelson, jmn@usgs.gov

Lecturers: Dr. Jonathan Nelson[1], Prof. Yasuyuki Shimizu[2], Prof. Ichiro Kimura[2], Richard McDonald[1], others

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Language of instruction: English (Spanish support will be provided)

Pre-requisite: Basic fluid mechanics, sediment transport

Contents: This class covers a broad spectrum of river modeling techniques within the International River Interface Cooperative (IRIC) public-domain modeling interface. The course will be taught in a workshop format starting with basic data input and stepping through the processes of grid generation, model execution, visualization, and verification. The interface incorporates a variety of computational modeling approaches including finite difference and finite volume models using both structured and unstructured coordinate systems; only a subset of the available techniques will be covered in this short class. Basic principles will be briefly covered, but the emphasis of this short course is hands-on application using data sets for realistic problems on real rivers. Students should bring a laptop with at least 4 GB of ram and a few gigs of empty hard disk space. The system was designed for use with current 64-bit PC operating systems or PC emulators on Macs. Users will need to have software installation capabilities on their laptops, so check with your administrator if necessary. Bring data sets with topography, water-surface elevations, and any other data if you would like some assistance with your own projects.

Learning outcomes: After completion of the short course, the students are expected to:

- Construct basic multidimensional flow modeling projects on rivers, including editing bathymetric data, generating grids and meshes, setting boundary conditions, running models and visualizing results in two and three dimensions.
- Understand and use the FaSTMECH finite difference, quasi-steady, quasi-three-dimensional flow, sediment transport, and morphodynamics model
- Understand and use the NAYS2DH finite different, unsteady, two-dimensional flow, sediment transport and morphodynamics model

- Understand and use the CUBE finite-difference, unsteady. fully three-dimensional flow, sediment transport and morphodynamics model
- Students will leave the course with a full set of the iRIC public domain river modeling interface and at least 14 solvers suitable for solving almost any problem in river hydraulics, sediment transport, and bed evolution.

Calendar:

Tuesday, August 25:

9:00 – 12:00 Introduction to iRIC

12:00 – 13:00 Lunch

13.00 – 17.00 FaSTMECH flow, sediment transport and morphodynamics modeling

Wednesday, August 26:

09:00 – 12:00 NAYS2DH flow, sediment transport and morphodynamics modeling

12:00 – 13:00 Lunch

13:00 – 15:00 Introduction to CUBE three-dimensional modeling

15:00 – 17:00 Introduction to RIVER2D unstructured grid model

Course notes and comprehensive user's guides will be supplied with course materials