

Date: December 8th

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Dr. Peter Wilcock
JohnsHopkins University

Title: "Fluids go to bed: Transport and sorting in coarse-bedded streams"

Abstract

The bed surface of gravel rivers is often coarsened, or armored, relative to the subsurface. The composition of the bed surface strongly influences channel hydraulics, mediates the exchange of water between flow and bed, defines invertebrate and fish habitat, and determines the sediment available for transport. Although the essential mechanics of transport and sorting are simple in detail, the composition and dynamics of the bed surface are difficult to predict. Initial and boundary conditions are poorly known and determine not only the rates, but the mechanisms of transport and sorting. Flow conditions that shape and sort the bed – floods – are not particularly accessible, making flume investigations of particular importance. Flume experiments capture only the end-members of actual stream dynamics, such that any connection between flume and field requires a general model capable of predicting transient conditions. In this presentation, we examine the controls and mechanisms of transport and sorting in coarse-bedded streams, explain how standard flume experiments have provided both guidance and confusion, and present observations leading to definition of the governing equations of transport and sorting: a constitutive relation for transport rate and mass conservation of individual size fractions as they exchange between transport, bed surface, and subsurface.