Turbulence and the motion of sand along the bed of rivers

Dr. Mark Schmeeckle

Arizona State University

Date: Friday, October 16, 2015

Time: 9:00 - 10:00 AM

Location: 358 Willard Blg.

Coffee and donuts will be provided

Abstract: It has been generally accepted that the flux of sand at the bed of rivers is primarily by the process of saltation, in which particles move in a series of ballistic trajectories between collisions with the bed. Tracking of particles using high-speed video reveals that saltation models do a poor job of predicting the full distribution of grain motions; many grains move more slowly and for shorter distances than by saltation. The video particle tracking results also show that the temporal variability of grain motion due to turbulence is large at all mean transport rates. Numerical results of bedload transport using large eddy simulation (LES) of turbulence coupled to a distinct element model (DEM) of grains reproduce the exponential-like distribution of sediment velocity. These numerical simulations suggest that penetration of turbulence structures into the bed plays a key role in grain entrainment and may be important in the growth and stability of ripples and dunes.

Bio: Mark Schmeeckle is a professor at Arizona State University who uses numerical simulations, laboratory experiments, and field observations to study sediment transport and the mechanics of rivers. He received a B.S. in Geology, and an M.S. in Geophysics at the University of Washington, and a Ph.D. in Geography from the University of Colorado.