

Date: February 10th

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Dr. Diane Foster
Civil and Environmental Engineering and Geodetic Science
Ohio State University

Title: “The Initiation of Motion and Transport of Sediment in Nearshore Environments”

Abstract

At the societal level, we accept that 'big waves move sand'. However, the fine scale mechanics of how sediment responds to the fluid forcing provided waves and mean currents present in coastal environments remains a challenge for scientists and engineers. Theories regarding the incipient motion of sediment are largely derived from unidirectional steady flows over flat immovable sediment beds. The objective of this effort is to identify the dominant physical mechanisms responsible for rapid transformation of coastal seabeds. In this presentation, two mechanisms for the initiation of motion and transport of sediment are examined. Traditional theories for transporting sediment assume a fixed seabed responds to the shear applied by the surrounding fluid. When this stress exceeds some value, the bed slips and the sediment transport process begins. A recent re-examination of some previously collected hot-film anemometer observations indicate that under certain conditions, the pressure gradient applied by free surface gravity waves may also destabilize the bed and provide for an additional mechanism for incipient motion. In this presentation, we examine the two mechanisms with two data sets of the flow and sediment transport over flat beds. Finally, we show some very recent PIV observations of the flow and vortex ejection over rippled beds.