Date:	May 7 <sup>th</sup>
Time:	11:00 AM
Location:	Ames 234
Speaker:	Dr. Todd Cowen Cornell University
Title:	"The effect of boundary conditions on turbulent transport in the environment as revealed by quantitative imaging techniques"

## Abstract

Environmental turbulence shows strong evidence of the boundary conditions, which can effect, if not establish, the range of turbulent length scales. Quantitative imaging (QI) techniques are uniquely appropriate for capturing extremely small-scale processes as well as the range of scales that exist in a flow. This presentation will focus on the use of particle image velocimetry (PIV), laser induced fluorescence (LIF), and pH sensitive LIF in the DeFrees Hydraulics Laboratory to fully quantify turbulence, scalar turbulence, and the turbulent transport of carbon dioxide, respectively. The approaches to these three QI techniques will be briefly described and their use in elucidating the fundamental characteristics of three representative turbulent processes in the environment will be discussed. The first of these, swash zone turbulence, is characterized by thin oscillatory boundary layers, strongly constrained scales in the vertical and periodic forcing by an onshore propagating bore front. The second flow, dispersion of a passive tracer in the littoral zone, looks at the effect of moving the horizontal boundary condition out to essentially infinity and reveals the range of dispersion processes that can occur, including the Richardson 4/3 regime. Finally, we will return to the small-scale mass and momentum boundary layers that occur at turbulent free surfaces and the transfer of CO2 across an air-water interface.