# Weekly CEAFM Seminar: Spring 2017

JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Date: **Friday, April 21, 2017**

Time: 11:00 AM

Location: Gilman Hall # 132

Speaker: **Dr. Timothy F. Duda** (Woods Hole Oceanographic Institution)

***"Tidally Generated Internal Waves: Discoveries and Challenges"***

## Abstract

Barotropic tidal flow at slopes is well-known to generate baroclinic waves under stratified conditions. The essence of the wave generation effect is understood, but the details of what happens in this not-completely linear process and what happens at complex bathymetry are not completely known. One motivation for better understanding and better prediction of the resulting waves is that they can have important effects on ocean acoustic propagation variability. Here, some of the motivating acoustic effects will be reviewed. Then, wave generation at the outer continental shelf edge and at canyons will be examined with the aid of computational modeling and theory, under conditions of subcritical Froude number (current velocity less than mode-one internal tide speed). Signatures and ramifications of nonlinear effects in internal tide generation are shown. The process by which multiple scattering effects make beams of internal tides at canyons is described. The propagation of internal tides in arbitrary shear flow is examined, with a new method for analyzing waves with anisotropic wavenumber introduced. The transition of internal tides to packets of short nonlinear internal waves is examined briefly. Challenges regarding conversion of internal-tidal beams to mode-one waves, nonlinear wave generation under conditions of strong horizontal convergence, and wave character and timing (phase) predictability are explored.