Date: **April 20th**

Time: **11:00 AM**

Location: **Maryland Hall 110**

Speaker: **Dr. Ming Li**
University of Maryland

Title: **"How Turbulent Mixing Affects Circulation in the Chesapeake Bay"**

Abstract

In the classic paradigm of estuarine dynamics developed by Don Pritchard, turbulence effects are averaged over tidal cycles and the tidally averaged residual circulation is driven by baroclinic pressure gradients associated with sloping isopycnals. However, recent observations have revealed significant asymmetry in turbulent mixing and stratification over a tidal cycle. It has been proposed that the straining of density field by barotropic tidal currents drives the estuarine exchange flow. In this talk I will describe modeling investigations into the role of turbulent mixing processes in estuarine circulation. First, a LES (Large Eddy Simulation) model is used to examine the relative roles of the baroclinic pressure gradient and tidal straining in generating flood-ebb mixing asymmetry in an idealized estuary. Second, the ROMS (Regional Ocean Modeling System, RANS) model is used to investigate how tidal and wind mixing affect stratification and circulation in the Chesapeake Bay estuary. Tidally driven mixing exhibits both flood-ebb and spring-neap variations, but the strength of residual circulation only varies over the spring-neap cycle. Tidal mixing is highly non-uniform in the Bay: 40% of tidal energy is dissipated in four topographic hotspots, indicating the importance of topographically-controlled mixing processes in regulating estuarine transport. Moreover, mixing events driven by episodic weather events strongly affect the stratification and circulation in the Bay. Although tidal forcing dominates in many estuaries, tidal and wind forcing appear to have equal importance in Chesapeake Bay. This suggests that Chesapeake Bay may be an interesting test site for investigating the relative roles of wind and tidal mixing in the ocean.

Date