JOHNS HOPKINS
Center for Environmental & Applied Fluid Mechanics

Weekly CEAFM Seminar: Spring 2012

Friday, February 17, 2012
11:00 a.m. – 12:00 p.m.
Gilman 50 (Marjorie M. Fisher Hall)

"The Effects of Turbulent Mixing on an Overturning Circulation"

Presented by
Dr. Kial Stewart
Earth & Planetary Sciences
Johns Hopkins University

Abstract: Turbulent mixing is thought to influence the ocean meridional overturning circulation (MOC), however a detailed physical understanding of the coupling between mixing and the MOC is yet to emerge. This coupling is examined through idealized laboratory experiments with a convective overturning driven by an applied salt flux at the surface. Additional mechanical mixing was imposed using horizontal rods that are yo-yoed continuously through the water column. The resulting density stratification and overturning rate were, for large rod velocities, found to be consistent with an existing theoretical model. The overturning rate increased with increasing mixing rates. The total diffusivity is parameterized and it is found that for weak (or no) externally imposed stirring the convection itself maintained an apparent background vertical diffusivity that is 100 times larger than the molecular level, outweighing the externally forced mixing. Insights into relevant mechanisms governing ocean mixing and stratification will be discussed.