Date: **September 13th**

Time: **11:00 AM**

Location: **Maryland Hall 110**

Speaker: **Dr. James McWilliams**
University of California, Los Angeles

Title: **“The Submesoscale Dynamical Transition in the Ocean”**

Abstract

Analogous to the fact that weather phenomena are essential to climate dynamics, oceanic esoscale eddies with a horizontal scale of about 50 km are essential to the general circulation in the ocean. The prevailing view is that eddies approximately satisfy a diagnostic force balance --- hydrostatic in the vertical and geostrophic or gradient-wind in the horizontal --- and are both weakly dissipative and nearly adiabatic in the sense of retaining material parcels on isentropic surfaces in stably stratified, interior regions. It is becoming increasingly clear that this view is falsely simplistic; i.e., there is an intrinsic submeoscale current regime, spawned by mesoscale eddies, on a scale of a few km. It is not highly force-balanced, and it effects a significant forward kinetic energy cascade toward microscale dissipation and transports material across isentropic surfaces. Its flow patterns are comprised of lateral density fronts and vortices arising from frontal instabilities. Particularly in association with its frontogenesis, submesoscale flows act to restratify the fluid near vertical boundaries, where boundary-layer turbulence tends to mix and destratify. Illustrations will be shown from upper-ocean measurements and from computational simulations for an idealized boundary current and for Eady's uniform vertical shear flow in turbulent equilibrium balance.