

Weekly Seminar: Spring 2010

Date: Friday March 26

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Da Zhu (University of Chicago)

Title: "A Potential Vorticity Perspective to Jet Formation in Rotating Fluids"

Abstract

In this talk I will discuss jet formation in rotating fluids from the perspective of nonuniform, nonconservative arrangements of potential vorticity (PV). I will begin by outlining how to incorporate nonconservative processes (mixing and forcing) explicitly into the finite-amplitude theory for wave-mean flow interaction. Then I will apply the diagnostic formalism to forced beta-plane turbulence and demonstrate that (1) mixing and forcing arrange PV irreversibly and reinforce jet formation and (2) mixing and forcing of PV is a strong function of PV gradient with respect to equivalent latitude. This last point prompts us to parameterize mixing and forcing in terms of PV gradient. In particular, the parameterized effective diffusivity of PV is a decreasing function of PV gradient, consistent with the 'Rossby elasticity' concept -- PV regulates its own mixing and strong PV gradient acts as a mixing barrier.