Special CEAFM Seminar: Spring 2016

JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Date: **Friday, March 18, 2016 (Special Date)**

Time: 11:00 AM

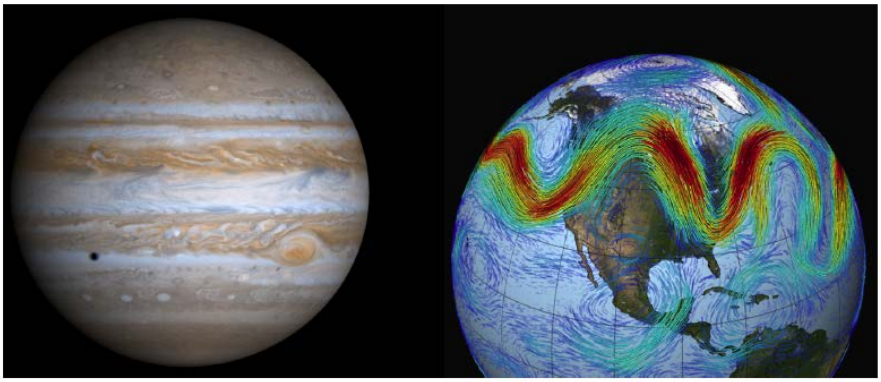
Location: Gilman Hall # 50

Speaker: **Dr. Navid C. Constantinou** (Scripps Inst. of Oceanography - UCSD)

Title: ***"Statistical State Dynamics of Planetary Turbulence"***

Abstract

Planetary turbulence is dominated by large-scale coherent structures in the form of zonal jets and vortices and is therefore inhomogeneous. These large-scale structures exhibit great persistence on time scales long compared to dissipation or advection, despite being embedded in strong turbulence. A new theory for the statistical state dynamics of planetary turbulence is presented. This theory, called Stochastic Structural Stability Theory (S3T), studies the dynamics of the first two statistical moments of the turbulent flow. It predicts the transition from homogeneous to inhomogeneous turbulent states and explains the persistence of the large-scale structure. The success of S3T implies that the dynamics in planetary turbulence essentially involves the quasi-linear interaction between the coherent flow and the incoherent eddies. S3T understands the transition from homogeneous to inhomogeneous turbulence as a symmetry breaking bifurcation. The theory provides constructive proof that classical inverse energy cascades are not necessary for the formation of large-scale structures in 2D turbulence. More importantly though, it provides an insight into the dynamics responsible for large-scale structure formation. Moreover, the theory provides a pathway for understanding the large-scale roll/streak structure in wallbounded turbulence.



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