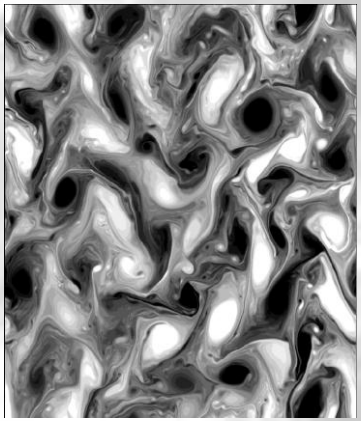
Geostrophic Turbulence and Active Tracer Transport in 2 Dimensions



13-15 March 2013
Jadwin Hall, Fourth Floor
PCTS Seminar Room 407

REQUIRED REGISTRATION is available on line at
http://physics.princeton.edu/pcts

Program Organizers: Peter Constantin, Isaac Held, Bill Young

Many idealized models of atmospheric and oceanic flows reduce to the two-dimensional (2D) advection of a tracer that in turn determines the flow field. The classic example is non-divergent 2D flow on a plane (or a sphere), where the tracer is the vertical (or radial) component of the vorticity. Of special interest is the "geostrophic trubulence" generated in systems with two interacting active tracers, representing flow at the tropopause and the earth's surface in the simplest atmospheric case. Another example of special interest is surface quasi-geostrophic (SQG) flow, in which the state of the system is determined by the completely temperature at the surface. SQG flows bear some formal resemblance to 3D incompressible flows – for example, dimensional arguments suggest a -5/3 kinetic energy spectrum for the direct turbulent cascade to small scales, just as in 3D. SQG has developed into a model problem for those interested in singularity formation in 3D Euler or Navier-Stokes. The possible formation of singularities in SQG remains unsolved. There is also interest in possible blow-up of active scalar equations with more singular constitutive laws and in questions relating to long time behavior in the limit of small dissipative mechanisms. Our goal in this interdisciplinary workshop is to familiarize mathematicians and atmosphere/ocean scientists with ongoing research outside of their fields, and possibly fertilize new work within both groups.

CONFIRMED SPEAKERS

Guido Boffetta, University Torino
Diego Cordoba, ICMAT, Madrid
Boris Galperin, University South Florida
Tom Hou, CalTech
Alex Kiselev, University Wisconsin
Guillaume Lapeyre, ÉNS, Paris
Brad Marston, Brown University
Rick Salmon, UC San Diego
Richard Scott, St Andrews
Vladimir Sverak, University of Minnesota
Edriss Titi, Weizmann Institute, Rehovot
Antoine Venaille, CNRS, Lyon
Jiahong Wu, Oklahoma State University
Bill Young, UC San Diego