



EQUATION HIERARCHIES FOR CLIMATE MODELING

March 22-26, 2010

ORGANIZING COMMITTEE: Andrew J. Majda (NYU), Simona Bordoni (NCAR), Dargan Frierson, University of Chicago, Jonathan Mitchell (IAS)

Scientific Overview

The atmosphere-ocean system is a unique one in science in that the dynamical equations are essentially known. However in order to distill the nonlinearity and turbulence of the forced-dissipative fluid equations on a rotating sphere into a more readily understandable system requires a hierarchical approach. This workshop will focus on the development, use, and study of "equation hierarchies": sets of equations and models which make idealizations in order to construct progressively simpler (and more understandable), but self-consistent frameworks for the study of climate dynamics. The use of hierarchies of equations has been remarkably successful in developing understanding of climate and weather phenomena: e.g., the quasi-geostrophic equations for study of baroclinic instability, and the diffusive energy balance model to investigate ice sheet growth as a function of solar intensity. The equation hierarchies week will focus the discussion on problems such as: 1) the development of new balanced systems of equations using techniques such as multiple scales asymptotics, 2) the use of simplified sets of equations as models of the Earth or other planetary climates, 3) balance dynamics and the breakdown of balance, and 4) the role of latent heating in the dynamics of the tropical and extratropical atmosphere and simplified ways to account for condensation in models.

Confirmed Speakers

Joseph Biello (U.C. Davis), Cecilia Bitz (Univ of Washington), Simona Bordoni (Caltech), Steve Cavalho (NCAR), Stamen Dolaptchiev (Univ of Frankfurt), Raff Ferrari (MIT), Dargan Frierson (Univ of Washington), Gregory Hakim (Univ of Washington), Andy Ingersoll (Caltech), Keith Julien (Univ of Colorado), Sarah Kang (Princeton), Boualem Khouider (Univ of Victoria), Sukyoung Lee (Penn State), Andy Majda (Courant), James McWilliams (UCLA), Mark Richardson (Caltech), Rick Salmon (UCSD), Tiffany Shaw (Univ of Toronto), Shafer Smith (Courant), Sam Stechmann (UCLA), Bjorn Stevens (UCLA), Joe Teixeira (JPL), Geoff Vallis (Princeton)

Long Program Schedule

- Tutorials: March 9 - 12, 2010
- **Workshop 1: Equation Hierarchies for Climate Modeling, March 22 – 26, 2010**
- Workshop 2: Numerical Hierarchies for Climate Modeling, April 12 – 16, 2010
- Workshop 3: Simulation Hierarchies for Climate Modeling, May 3 – 7, 2010
- Workshop 4: Data Hierarchies for Climate Modeling, May 24 – 28, 2010
- Culminating Workshop at Lake Arrowhead, June 6 – 11, 2010

Participation

Additional information about this workshop including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.

www.ipam.ucla.edu/programs/clws1



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