



# Large-Scale Computer Models for Environmental Systems

## Workshop on Multi-Scale Modeling February 2 – 7, 2002

*Radisson Governors Inn, 3rd floor ballroom*

The Radisson is located in Research Triangle Park, on Davis Drive at Interstate 40, Exit 280.  
Phone: (919) 549-8631

### PROGRAM & SCHEDULE OF EVENTS

#### **Sunday, February 2**

- 8:00-8:30:** Registration
- 8:30-10:00:** “An Introduction to Porous Medium Systems”  
*Cass T. Miller, University of North Carolina*
- 10:00-10:30:** Coffee Break
- 10:30-12:00:** “Physical Parameterization Techniques in Large-Scale Atmospheric Models”  
*James Hack, National Center for Atmospheric Research*
- 12:00-1:30** Lunch
- 1:30-3:00** “An Introduction to Methods of Homogenized Averaging for Problems with Multiple Scales”  
*Richard McLaughlin, University of North Carolina*
- 3:00-3:30** Coffee Break
- 3:30-5:00** “Some Multiscale Approaches in Statistical Computation and Modeling”  
*David Higdon, Los Alamos National Laboratory*

## Monday, February 3

- 8:00-8:30** Registration
- 8:30-8:45** Opening Remarks  
*James Berger*, Director of SAMSI  
*Richard Smith*--Program Leader, University of North Carolina
- 8:45-10:15** **SESSION I**  
“Breeding, Data Assimilation and Probability of Atmospheric-Ocean Models”  
*Eugenia Kalnay*, University of Maryland
- 10:15-10:45** Coffee Break
- 10:45-12:15** **SESSION II**  
“Inference for Misaligned Spatial Data Layers: The “Change of Support” and “Modifiable Areal Unit” Problem”  
*Alan Gelfand*, Duke University  
  
“Anthropogenic Carbon in the Ocean Inferred from Tracer Measurements”  
*Timothy Hall*, National Aeronautics and Space Administration
- 12:15-1:30** Lunch
- 1:30-3:00** **SESSION III**  
“Practical Considerations in the Use of Averaging Procedures in Porous Media Flow Studies”  
*William Gray*, University of Notre Dame
- 3:00-3:30** Coffee Break
- 3:30-5:00** **SESSION IV**  
“Density-Coupled Transport in Heterogeneous Aquifers”  
*Claire Welty*, Drexel University  
  
“Boundary Conditions Between Porous Media and Bulk Fluid”  
*Lynn Bennethum*, University of Colorado-Denver
- 8:00-10:00** **Poster Session and Reception**  
NISS-SAMSI Building  
Transportation from Radisson Governor’s Inn will be provided by Carolina Livery

## Tuesday, February 4

- 8:00-8:30** Registration
- 8:30-10:00** **SESSION I**  
“Statistical Models for Models”  
*Doug Nychka*, National Center for Atmospheric Research
- 10:00-10:30** Coffee Break
- 10:30-12:00** **SESSION II**  
“Physical-Statistical Modeling”  
*Mark Berliner*, Ohio State University
- “Hierarchical Bayesian Modeling of Multiscale Spatio-Temporal Processes”  
*Chris Wikle*, University of Missouri
- 12:00-1:15** Lunch
- 1:15-2:45** **SESSION III**  
“Effective Transport by a Spatiotemporal Mean Flow with Small-Scale Periodic Fluctuations”  
*Peter R. Kramer*, Rensselaer Polytechnic Institute
- “Inertial Particles in a Random Field”  
*Andrew Stuart*, University of Warwick
- 2:45-3:15** Coffee Break
- 3:15-4:15** Breakout Discussion Groups
- 4:15-4:30** Break
- 4:30** **SAMSI Distinguished Lecture:** *Andrew Majda*, New York University  
“Mathematical Strategies for Stochastic Modeling in Climate”

**Wednesday, February 5**

**8:00-8:30** Registration

**8:30-10:00** **SESSION I**

“Aggregating Clouds”

*Bjorn Stevens*, University of California-Los Angeles

“Determining Sources and Sinks of Carbon Dioxide from Atmospheric Concentration Measurements: A Multiscale Inverse Problem”

*Tapio Schneider*, California Institute of Technology

**10:00-10:30** Coffee Break

**10:30-12:00** **SESSION II**

“Coarse-grained Stochastic Processes and Monte Carlo Simulations in Lattice Systems”

*Markos Katsoulakis*, University of Massachusetts

“Multi-scale Dynamical Systems with Stochastic Effects: Mathematical Aspects and Numerical Techniques”

*Eric Vanden Eijnden*, New York University

**12:00-1:30** Lunch

**1:30-3:00** **SESSION III**

“Statistical Assessment of Air Quality Numerical Models”

*Montserrat Fuentes*, North Carolina State University

“Nonstationary Spatial Covariance Modeling Via Spatial Deformation and Extensions to Covariates and Models for Dynamic Atmospheric Processes”

*Paul D. Sampson*, University of Washington

**Thursday, February 6**

- 8:30-10:00**    **SESSION I**  
“Turbulent Scalar Statistics and Application to Reactive Scalar Modeling”  
*Anne Bourlioux*, University of Montreal
- “Convection of Miscible Binary Mixtures in Porous Media”  
*R.P. Behringer*, Duke University
- 10:00-10:30**    Coffee Break
- 10:30-12:00**    **SESSION II**  
“Field Experiments and Observations of Subgrid-Scale Processes in the Atmospheric Surface Layer”  
*Marc Parlange*, Johns Hopkins University
- “Pushing the State of the Art in Ocean Modeling and Data Assimilation: Intrinsic Variability of Ocean Currents”  
*Robert Miller*, Centre National de Recherches Meteorologiques and Oregon State University
- 12:00-1:30**    Lunch
- 1:30-3:00**    **SESSION III**  
“Upscaling and Hysteresis in Models of Soil Moisture, Evaporation and Transportation”  
*Mike Celia*, Princeton University
- “Non-Equilibrium Effects in the Capillary Pressure-Saturation Relationship for Two-Phase Flow in Porous Media”  
*Majid Hassanizadeh*, Delft University of Technology
- 3:00-3:30**    Coffee Break
- 3:30-5:00**    **SESSION IV**  
“Long Tails in Probability Distributions in Passive Scalar Transport”  
*Jared Bronski*, University of Illinois at Urbana-Champaign
- “Interaction of Waves and Currents”  
*Juan Restrepo*, University of Arizona

**Friday, February 7**

**8:30-10:00**    **SESSION I**  
“Challenges in Parameterizations for Global Circulation Models of the Atmosphere”  
*Joe Tribbia*, University Corporation for Atmospheric Research

“A Bayesian Analysis of Regional Climate Change Projections, Based on a Multi-Model Ensemble”  
*Claudia Tebaldi*, University Corporation for Atmospheric Research

**10:00-10:30**    Coffee Break

**10:30-12:00**    **SESSION II**  
“Forecasting and Hindcasting in Multiscale, Nonlinear Systems”  
*Gregory Eyink*, Johns Hopkins University

“Flow, Transport and Reaction in Porous Media: Upscaling from Pore-Network Models”  
*Yannis Yortsos*, University of Southern California