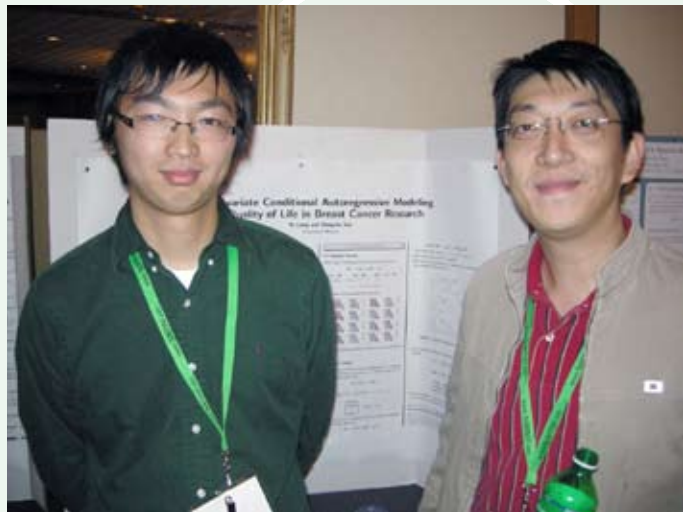


The Newsletter of the Statistical and Applied Mathematical Sciences Institute

Space-Time Analysis Opening Workshop Begins Year of Research

Attendees at the Space-Time Analysis for Environmental Mapping, Epidemiology and Climate Change opening workshop were welcomed to a standing room crowd at the Radisson in Research Triangle Park. The workshop, held September 13-16, was the beginning of a year-long program on what has become a very hot topic, one that concerns such things as climatology, ecology, environmental health and real estate marketing where highly multivariate, geographically referenced and temporally correlated data have become common.

On Sunday, lecturers gave tutorials on a variety of topics that lie at the foundations of research in these areas. Alan Gelfand of Duke University surveyed basic approaches to modeling phenomena. Jim Zidek, University of British Columbia, spoke about the prob-



Ye Liang, U. of Missouri and Frank Zou, NISS postdoc at the Space-Time Analysis poster session.

lem of monitoring environmental processes that generate some of those complex datasets. Michael Stein, University of Chicago, discussed challenging theoretical issues that confront researchers modeling those environmental processes. Finally Sylvia Richardson, Imperial College London, spoke about assessing the effect of those processes on human health.

Monday's opening session focused on climate change and the afternoon session dealt with random fields and applications. The new researcher session featured Cari Kaufman, University of California, Berkeley; Mikiyoung Jun, Texas A&M University; and Anna Michalak, University of Michigan. The poster session
(Continued on page 3)

Stochastic Dynamics Program Generating Enthusiasm for Year's Work

The opening workshop for this year's program on Stochastic Dynamics started and ended with excitement and enthusiasm. The first day of the workshop featured tutorial lectures from Peter Baxendale, University of Southern California, who reviewed some techniques in stochastic analysis and proposed the question of a stochastic bifurcation theory, Mark Alber, University of Notre Dame, who spoke about stochastic modeling related to bacterial swarming and blood clots, Grant Lythe, University of Leeds whose discourse was about numerical methods for a problem in cell biology, and Andrew Stuart, Warwick University, who showed us striking movies on MCMC estimation in action and recovering Navier Stokes from a noisy version.

The subsequent three days were spent with lecturers giving presentations on themes including: Qualitative Behavior of Stochastic Dynamical Systems and Stochastic Modeling, Stochastic



(L-R) Cindy Greenwood, ASU; Rachel Kuske, U. British Columbia; Oliver Diaz, SAMSI postdoc; Luis Gordillo, U. of Puerto Rico - Maraguez.

Dynamics Across Many Scales, Challenges in Numerical Methods for Stochastic Systems, Estimation and Data Assimilations in Stochastic Dynamics, and Dynamics of Biological Networks.

Stochastic dynamics can be understood in several ways, including the remodeling of dynamical systems to include sources of stochasticity, the study of how systems of stochastic differential equations and partial differential equations behave, the challenge of dealing numerically with these systems, and the use of such models to study phenomena of interest. This year's research will
(Continued on page 2)

From the director...

Whew! We all fit! It was touch and go because, even with the new wing of the NISS/SAMSI building now available for the full year, we knew space was going to be exceptionally tight because of the overwhelming demand for participation in this year's research programs. It was a mad dash finishing the outfitting of all the offices, and hoping that we had counted right in terms of visitors, but it all worked fine. Everyone is cozy and participating in a great scientific atmosphere.

The two lead articles in this newsletter highlight the exciting beginnings of this year's two major research programs. A near-record 14 research working groups were formed to pursue the research throughout the year. Together with the many SAMSI workshops and courses, this ensures that there is a lot happening here most every day.

With the working groups off and running, the Directorate is now turning its primary attention to finalizing the plans for next year's two year-long research programs: the *Analysis of Object-Oriented Data*, and *Complex Networks*, as well as the July 12-23, 2010 Summer Program on *Semiparametric Bayesian Inference: Applications in Pharmacokinetics and Pharmacodynamics*. Enthusiasm for these programs is also exceptional, and we expect another full house next year. Note that there is still time to contact us about possible participation in these programs; see the SAMSI website for information.

SAMSI is always evolving, which is good! Part of this evolution is that we now have a new Operations Director – Gordon Campbell; will have a new Deputy Director – Pierre Gremaud (starting January 1, 2010); and will have a new Director (starting July 1, 2010). Details on the latter two appointments will be forthcoming in the next newsletter. Gordon is introduced in this newsletter; welcome Gordon!

One of the stimulating oddities of SAMSI programs is that, while we are in the midst of starting this year's programs and doing the major arrangements for next year's programs, we have the considerable pleasure of seeing the end of a previous year's program. Indeed, the Transition Workshop of last year's program on Sequential Monte Carlo Methods is happening in November, and I can't wait to see what they have accomplished throughout the program. We will be highlighting some of these results in the winter edition of *SAMSI.info*.



Stochastic (Continued)

include a focus on problems in the biological sciences and the dynamics of networks. The objectives include the formation of working groups which will continue after this current topic-year ends, and the production of one or more volumes which will describe the current state of research in this area, as well as the progress made and important questions raised.

The group decided to form five working groups, including Network Dynamics, Numerical Methods, Qualitative Behavior, Data Assimilation and Biological Systems.

Cindy Greenwood said, "Each group is now exploring the current state of research in its topic in order to choose explicit questions for investigation during the year. These questions should be timely, realistically accessible, and have intrinsic importance for society and for the development of effective mathematical tools in the area of stochastic dynamics."

Organizers of the Stochastic Dynamics program include: Alejandro Garcia of San Jose State University, Cindy Greenwood of Arizona State University and Hongyun Wang from University of California-Santa Cruz. Local organizers include Alan Karr, Director of the National Institute of Statistical Sciences (NISS), Jonathan Mattingly from Duke University and Peter Mucha, UNC. The directorate liaison is Michael Minion from UNC and the national advisory committee liaison is Rick Durrett from Cornell University.



Peter Mucha, UNC, helps lead the discussions at the Stochastic Dynamics Opening Workshop.

SAMSI Staff Profile: Gordon Campbell

Gordon Campbell joins SAMSI as its new Operations Director. Campbell started working at SAMSI this summer. He will be responsible for the operation of all Institute activities and program logistics and research reporting to the NSF. He will coordinate the administrative operations such as finance, budget, personnel, space and facilities planning, grants management, manage the support staff and coordinate with administrative and financial staff at Duke, North Carolina-Chapel Hill and North Carolina State Universities.

Previously, Campbell was a business manager at Duke University's Center for Clinical Health Policy. He was the financial and program manager at the Duke Center for International Development, Sanford School of Public Policy from 2004-2008. Prior to that, he was the administrative assistant for the Division of Pediatric Hematology-Oncology at Duke University Medical Center from 2002-2004. He was vice president of PS International, Inc., an agricultural commodities trading firm, from 1998-2001. Campbell spent his earlier career as a financial executive in international commodities trading and shipping.

Campbell resides in Durham. In his spare time, he is a musician and likes to spend time in the woods with his dog.



Gordon Campbell is SAMSI's new operations director.

Spatial (Continued)

sion Monday evening was jam packed, with many interesting presentations about weather events, climate change, disease predictions and tracking and models that can be used in a space-time analysis.

Tuesday's sessions included one on Spatial Epidemiology, and one on Spatial and Time-space Point Processes. The new researcher presentations in the afternoon included Ethan Anderes, University of California, Davis; Dan Cooley, Colorado State University; Crystal Linkletter, Brown University; Chris Paciorek, University of California, Berkeley and Hiuyan Sang, Texas A&M University.

Wednesday, the group broke into nine working groups. These groups will meet throughout the year on a weekly basis via WebEx to continue their research. The groups include: Climate Modeling, Spatial Health, Statistics and Stochastics, Computational Visualization & Dimension Reduction in Spatio-Temporal Modeling, Spatial Extremes, Fundamentals, Geostatistics, Spatial Point Processes and Non-Gaussian and Non-Stationary Spatial Modeling.

Program leaders of this year-long program include: Noel Cressie, from Ohio State University, Michael Stein, from University of Chicago, Dongchu Sun, from University of Missouri, and Jim Zidek, from University of British Columbia, who is chairing the program. The scientific advisory committee is comprised of: Peter Diggle, Lancaster University, Peter Guttorp, University of Washington, and Jesper Møller, Aalborg University.

Jim Zidek said he was sure he spoke for all the organizers in saying how greatly pleased and surprised he was by the very high level of interest shown in the Program. He ascribed that interest to accelerating concern about the effects of a broad range of environmental processes such as climate change, on human health and welfare. "These complex processes involve high levels of uncertainty, making them central to the domain of the statistical sciences. Yet their study presents brand new and very high theoretical hurdles making collaboration with mathematical and other scientists essential," said Zidek. He concluded with the hope that the program would "generate breakthroughs in the development of methods for the analysis of these complex environmental space-time processes, inspire a cadre of new researchers to take up the challenges, and ultimately yield better ways to assess the risks now confronting society as a whole."



(L-R) Jaeyong Lee, Seoul National U; Robert Wolpert, Duke U.; Jim Berger, Director of SAMSI; Ernst Linder, U. of New Hampshire, Harvard Rue, Norwegian U. of Science and Technology.



Bledar Konomi, Texas A&M, presents his poster at the Spatial Opening Workshop.



David Higdon, Los Alamos National Laboratories, Melvin Hooten, Utah State and Gavino Puggioni, UNC at the Spatial Opening Workshop Poster Session.

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Calendar of Events for SAMSI

For more information about SAMSI programs and workshops, visit SAMSI's web site at <http://www.samsi.info>

2009-10 Education and Outreach Program
The Mathematics Institutes' Modern Math Workshop at SACNAS
October 14-15, 2009

2009-10 Program on Stochastic Dynamics
Self-Organization and Multi-Scale Mathematical Modeling of Active Biological Systems
October 26-28, 2009

2009-10 Education and Outreach Program
Two-Day Undergraduate Workshop
October 30 - 31, 2009

2008-09 Program on Sequential Monte Carlo Methods
Transition Workshop
November 9-10, 2009

2009-10 Program on Space-time Analysis for Environmental Mapping, Epidemiology and Climate Change
GEOMED: Spatial Epidemiology 2009 Workshop
November 14-16, 2009
Charleston, SC

