



## The National Research Center for Statistics and the Environment

The University of Washington  
October 13, 2000

### RECOGNITION AND AWARDS

#### **Peter Guttorp President-Elect of TIES**

Peter Guttorp is the new President-Elect of the International Environmetrics Society. His term goes for two years. In 2002 he will be President of the society, also for two years.

#### **June Morita at Bothell Campus**

June Morita has been appointed Associate Professor (with tenure) in the Interdisciplinary Arts and Sciences Program on the UW Bothell Campus, and Adjunct Associate Professor in the UW Statistics Department. She continues to work at NRCSE part of the week (member's office, B220) and to work with the NSF-funded "Creating a Community of Mathematics Learners" (CCML) and "Expanding the Community of Mathematics Learners" (ECML) projects in educational outreach to six of our local school districts.

### CENTER MEMBERS PUBLISH BOOKS

#### **David Ford**

Center member David Ford has published a new book entitled, "Scientific Method for Ecological Research", published by Cambridge University Press.

#### **Donald Percival**

Donald Percival, with Andrew Walden of the Imperial College of Science in London, published a new book, "Wavelet Methods for Time Series Analysis", published also by Cambridge University Press.

#### **Tim Nyerges**

Tim Nyerges has a book that will appear in early 2001 entitled "GIS for Group Decision Making" with Piotr Jankowski, published by Taylor and Francis.

#### **Jon Wakefield**

Jon Wakefield, along with Elliott, Best and Briggs, has written a new book "Spatial Epidemiology" that is to be published by Oxford University Press in September 2000.

### DEGREES AWARDED

**Enrica Bellone**, who was a student in Statistics and RA at NRCSE, passed her final exam for Ph.D. in April. Her dissertation was entitled "Nonhomogeneous hidden Markov models for downscaling synoptic atmospheric patterns to precipitation amounts". Co-supervisors were NRCSE members Jim Hughes, Biostatistics, and Peter Guttorp, Statistics. Enrica is a postdoc at NCAR in Boulder, CO.

**Florentina Bunea**, from the Statistics department, received her Ph.D. in Summer, 2000. Her supervisor was Jon Wellner and the title of her dissertation was "A model selection approach to partially linear regression". Flori is an assistant professor at the University of Florida in Gainesville.

**Barnali Das** received her Ph.D. in Summer 2000, with supervisor Peter Guttorp. Her dissertation title was "Global covariance modeling: a deformation approach to anisotropy". She is now working at NRCSE's consulting affiliate WESTAT, in Washington, D.C.

**Daniela Golinelli** also received her Ph.D. in Summer 2000. Her supervisor was Peter Guttorp and her dissertation title "Bayesian inference in hidden stochastic population processes". Daniela has a postdoctoral position at the University of Southern California.

**Erin Sullivan** recently received her M.S. in Statistics under the supervision of Peter Guttorp. Her thesis title was "Estimating the association between ambient particulate matter and elderly mortality in Phoenix and Seattle using Bayesian model averaging". Erin is currently working in Portland, OR.

## Degrees Awarded to Center Visitors

**Per Settergren Sørensen**, who visited from Denmark in Autumn 1998, received his Ph.D. this September. Peter Guttorp was one of his external examiners.

**Jasha Oosterbaan**, from the Ecole de Mines in France, visited in March 1998 and again this year. She just finished her Ph.D. exam and Paul Sampson was one of her external examiners.

## PAPERS SUBMITTED/PUBLISHED BY CENTER MEMBERS

“The actual size of the chi-squared and the likelihood ratio test of independence in a contingency table”, by Seung-Ho Kang and Eun Sug Park, submitted to *Journal of Statistical Computation and Simulation*.

“Multivariate receptor modeling for temporally correlated data by using MCMC”, by Eun Sug Park, Peter Guttorp, and Ronald Henry, submitted to *Journal of the American Statistical Association (JASA)*.

“Estimating the Number of Factors to Include in a High-dimensional Multivariate Bilinear Model” by Eun Sug Park, R. Henry, C. Spiegelman, was accepted by *Communications in Statistics, B*, Vol. 29, Iss. 3, 2000.

“Bilinear Estimation of Pollution Source Profiles and Amounts by Using Multivariate Receptor Models”, by E. Park, C. Spiegelman and R. Henry, submitted to *Technometrics*.

“Multivariate Receptor Models and Model Uncertainty” by E. Park, Man-Suk Oh and P. Guttorp, submitted to *Chemometrics and Intelligent Laboratory Systems*.

Dean Billheimer’s paper, “Compositional Receptor Modeling” has been accepted for publication in *Environmetrics*.

Jon Wakefield, “Hospital admissions for asthma and chronic obstructive airways disease in east London hospitals and proximity to major roads”, with Morris, Sale, Falconer, Elliott and Boucher, in the *Journal of Epidemiology and Community Health*, 54, 75-76.

Jon Wakefield, “Risk of mortality, cancer incidence and stroke in a population potentially exposed to cadmium”, with Elliott, Arnold, Cockings, Eaton, Jarup, Jones, Quinn, Rosato, Thornton, Toledano, and Tristan, in *Occupational and Environmental Medicine*, 57, 94-97.

“The analysis of matched case-control studies in spatial epidemiology”, by Diggle, Morris and J. Wakefield, published in *Biostatistics*.

S.P Charles, Bryson Bates, and James Hughes, published “Statistical Downscaling from Numerical Climate Models for Southwest Australia”. *Proc. 3rd International Conference on Water Research and Environmental Research*, the Institution of Engineers, Australia.

“Effects of a Transient Cancer Scare on Property Values: Implications for Risk Valuation and the Value of Life” by Alison Cullen and Nicholas Gertler will appear in the October issue of *Human and Ecological Risk Assessment*.

## WORKSHOPS/SEMINARS

### Statistical Downscaling of Precipitation

On May 24, a NRCSE-sponsored workshop on statistical downscaling of precipitation was held in Padelford Hall. Attendees heard presentations by Jim Hughes (UW Biostat and NRCSE), Bryson Bates (CSIRO, Australia), Dennis Cox (Rice University and NCAR) and Claudia Tebaldi (NCAR). Jim Hughes opened the workshop by giving a review of the downscaling problem (predicting local atmospheric measurements, such as precipitation, from broad scale measures such as sea level pressure) and summarizing the various approaches that have been used to solve it. Bryson Bates discussed applications of downscaling in southwestern Australia and future research plans in that area. Dennis Cox discussed his work on rainfall modelling at five rain gauge stations in the Southeast U.S. and the development of methods of model goodness of fit assessment. Finally, Claudia Tebaldi discussed her work using eight rain gauge stations in the southeast U.S., which has focused on the development of atmospheric summary measures at temporal scales that are useful for downscaling. In addition to these four talks there was extensive discussion on the utility, strengths and limitations of downscaling.

### Teaching Environmental Statistics at the UW

A workshop on "Teaching Environmental Statistics" was organized by Alison Cullen on May 26, 2000. 14 participants from 10 departments discussed current offering of environmental statistics, and identified some areas of need. In particular, undergraduate courses on correlated data, multivariate analysis, and risk analysis/decision making are lacking on campus. Among the ideas for improvement were: development of web site as a clearing house for environmental statistics courses; development of a data set or case repository; development of a Speakers' Bureau to bring in researchers to talk about their use of statistics in their work.

## Spatial Covariance

Following the Joint Statistics Meetings in Indianapolis, Paul Sampson organized a small (internationally diverse) workshop/working group the week of August 21 on spatial deformation methods for nonstationary spatial covariance modeling. Two of the speakers at his session at the JSM, Alexandra Schmidt (Brazil), a student at the University of Sheffield, and Olivier Perrin (France), who is now at the University of Toulouse, came to Seattle to present their work and collaborate with our former student Wendy Meiring (South Africa), now at the University of California, Santa Barbara, and current students Doris Damian (Israel) and Sinjini Mitra (India).

## JSM 2001

The NRCSE will organize two sessions at the 2001 Joint Statistical Meetings in Atlanta, GA. Paul Sampson is organizing a special invited session on "Environmental Monitoring Network Design, while Peter Guttorp is organizing one on "Statistical Analysis of Multivariate Air Quality Data".

## Spatial Moving Average Models Workshop

There will be a Spatial Moving Average Models Workshop on May 20-22, 2001, HUB, Room 200AB. It is currently still in the planning stages and will be organized by Jay Ver Hoef, from the Alaska Department of Fish and Game, and David Higdon at Duke University.

## Seminar on October 30

NRCSE and Statistics are sponsoring a talk by our visitor, Caren Marzban, on Monday, October 30, 2000. The title of his talk is "On the Correlation Between U.S. Tornadoes and the Pacific Sea Surface Temperatures". This presentation will be in the Communications building, Room 120 at 3:30 p.m.

## Resources for the Future

Alison Cullen attended a workshop on the Resources for the Future in Washington, DC, 9/18-20, 2000. The session she attended was called "Advanced Methods for Dose-Response Assessment: Bayesian Approaches" and she led a group exercise on Eliciting Priors. The website for more information is <http://www.sra.org/events.htm#workshop>.

## PRESENTATIONS

In March, Loveday Conquest gave a talk on "Incorporating Judgment into Ecological Sampling" at the University of Uruguay in Montevideo, Uruguay. It was very well received. A result of this is a possible joint proposal for using ranked set sampling and other sampling techniques in the Rio de la Plata.

She also gave a talk on "Analysis of Short Repeated Measures Series from Designed Experiments" at the Oceanic Institute, Waimanalo, HI, on June 23.

Adrian Raftery gave an invited talk at the Conference on the Statistical Analysis of Computer Codes, in Gregynog, Wales, April 2000. The title was "Inference for Deterministic Simulation Models: The Bayesian Melding Approach". This paper also was he subject of a special discussion session at the conference.

Three members attended and gave presentations at the Fourth International Conference on Environmetrics and Chemometrics in Las Vegas, 9/18-9/20/00. Talk titles and authors are: Eun Sug Park, "Multivariate Receptor Models and Model Uncertainty"; Thomas Lumley, "Visualising high-dimensional data in time and space: ideas and tools from the Orca Project"; Loveday Conquest, "Incorporating Judgment in Ecological Sampling".

Thomas Lumley was an invited discussant for a session on case-crossover studies at the International Society for Environmental Epidemiology meeting in Buffalo, NY, in August. His title was, "Is it true, is it kind, is it necessary?"

Samantha Bates gave a talk titled "Bayesian Assessment of Uncertainty in Deterministic Environmental Exposure Models" in an invited session called "The Utility of Bayesian Decision Analysis and Environmental Problems" at Interface 2000 on April 7.

Peter Craigmile attended the Wavelet Applications in Signal Processing minisymposium, 3rd European Congress in Mathematics, in Barcelona, July 10-15, 2000. His talk was entitled "Decorrelation Properties of Wavelet Based Estimators for Fractionally Differenced Processes".

### **Presentations cont.**

Paul Sampson was an invited plenary speaker for the 2000 general meeting and conference jointly sponsored by the International Environmetric Society and SPRUCE at the University of Sheffield, Sept 4-8. His title was "Developments in the Modeling of the Nonstationary Spatial Covariance Structure of Environmental Processes". He is one of two plenary speakers for GeoENV 2000, the Third European Conference on Geostatistics for Environmental Applications.

### **JSM 2000**

Paul Sampson served as discussant for a special invited session organized by Peter Guttorp and sponsored by NRCSE and the ASA Section on Statistics and the Environment on "Modeling of heterogeneous spatial covariances" at the JSM. The three invited speakers were Alexandra Schmidt from the University of Sheffield, Olivier Perrin from the University of Toulouse, and Jenise Swall of Duke University.

Samantha Bates, Peter Guttorp and David Ford gave presentations in an invited session on "Statistical Approaches to the Assessment of Environmental Models". John Irwin from EPA was a discussant. Peter Guttorp also chaired a roundtable luncheon on the same subject.

## **PROPOSALS**

### **Environmental Statistics Lecture Series**

A lecture series proposal entitled "NSF/CBMS Regional Conference in the Mathematical Sciences - Environmental Statistics" was recently awarded to NRCSE by the National Science Foundation. The principal lecturer will be Richard Smith from the University of North Carolina, and the series will take place at the University of Washington in June 2001. The lectures will cover topics in geostatistics, nonstationary models, lattice models, spatio-temporal models, monitoring network design, time series, trend detection, and extreme values, with motivation for each topic drawn from environmental applications. In addition, Doug Nychka, Paul Switzer, John Zidek, Paul Sampson and Peter Guttorp will give lectures at the conference.

### **USC Collaboration**

A supplemental proposal has been funded by EPA for the project "Statistical Studies of Spatial Air Quality Models and Standards", with a subcontract for USC and Ronald Henry. Various people at the Center would work on it: Paul Sampson, Eun Sug Park, Pip Courbois, and Dean Billheimer. The main EPA collaborator is Larry Cox. The proposal focuses on three areas of research: particular matter chemical composition estimated from multiple receptor sites; statistical properties of air quality statistics used to assess standards compliance; and statistical inference for multi-dimensional contingency tables.

### **Raftery and Heagerty**

The new Center for Statistics and the Social Sciences (CSSS) has funded proposals for two NRCSE members: One is for Adrian E. Raftery and Fadoua Balabdaoui, "Demand, Diffusion or Ideation? Explaining Fertility Decline", and the other for Patrick Heagerty for "Spatial Analyses of War and Democracy".

### **Mark Handcock**

A proposal entitled "Statistical Methods for Ecological Assessment of Riverine Systems by Combining Information from Multiple Sources" by Mark Handcock, new faculty in Statistics, has been funded by NSF/EPA. He submitted the proposal through NRCSE. The objective of the project is to improve understanding of the biological integrity of stream and river systems in the United States Mid-Atlantic Region by combining information from separate monitoring surveys, available contextual information on hydrologic units and remote sensing information.

### **Slovakia**

Alison Cullen has submitted a supplemental proposal to the EPA entitled "Study of Exposure Factors for Air Quality Effects on Childhood Disease and Health". The funds would assist a Slovak-U.S. collaboration that was created to study environmental factors affecting the respiratory health of children. This project will use advanced GIS approaches to explore data from both new field work and existing sources such as the CESAR study. Alison's collaborators on this are John Vandenberg from the EPA and Frantiska Hruby from the State Institute of Public Health in Slovakia.

## NEW PEOPLE AT THE CENTER

**Kirsten Bjørkestøl** is currently visiting the Center and will be here until June, 2001. She comes from Agder University College in Norway. Kirsten's research interests are applied mixture problems and optimization in multistep processes. She is located in Padelford B213 and her phone is 6-6236.

**Paul Murtaugh**, from Oregon State University, will be a visitor until June also. He is on sabbatical and currently working on improvements to the before-after-control-impact design, and regression modeling of longitudinal growth data for two endangered fish species from the Klamath Basin in southern Oregon. He is in Room B213.

**Caren Marzban**, is visiting from NOAA's National Severe Storms Laboratory, and the Department of Physics, University of Oklahoma. He is dividing his time between his home in Seattle and Padelford B213. He is currently working on two projects: the development of a neural network modeling the effect of El Niño on tornadic activity in the U.S. and the other aimed at understanding the effect of self-organization in dynamical systems.

## VISITORS

Bryson Bates, CSIRO Land and Water, Australia, visited from 4/30-5/28/00 and worked with Jim Hughes.

David Harte, Victoria University, New Zealand, from 8/23-8/28/00, worked with Peter Craigmile and Mathssoft.

Ronald Henry, U.S.C., from 5/31-6/2/00, worked with Eun Sug Park and Peter Guttorp.

Ho Kim, Seoul National University, Korea, visited 8/22-8/25/00 and met with Eun Sug Park.

Wendy Meiring, UC Santa Barbara, from 8/20-8/24/00; Olivier Perrin, University of Toulouse, France, from 8/17-9/1/00; Alexandra Schmidt, University of Sheffield, England, 8/17/00-8/25/00; all participating in the spatial covariance workshop.

Ronit Nirel, Hebrew University, Israel, visited for the second time from 7/1-8/15, working with Paul Sampson, Peter Guttorp and Bruno Sanso.

Doug Nychka, UCAR, visiting from 7/14-7/15/00, here to attend a Center graduate student final exam.

Bruno Sanso, Universidad Simon Bolivar, Venezuela, from 7/8-8/10/00, worked with Peter Guttorp, Paul Sampson and Ronit Nirel.

Alfred Stein, Wageningen University, The Netherlands, from 5/17-5/19/00, visiting NRCSE and Julian Besag.

Claudia Tebaldi, NCAR, from 4/9-5/31/00, working with Peter Guttorp and Enrica Bellone.

David Vere-Jones, Victoria University, New Zealand, 8/23-8/28/00, here to work with Peter Guttorp and Mathssoft.

Montserrat Fuentes, North Carolina State University, will be visiting 10/12-10/21/00. She will be here to work with Peter Guttorp and Paul Sampson.

## EXECUTIVE COMMITTEE NEWS

Ray Hilborn, from the School of Fisheries, has been elected as a new center member. His e-mail is rayh@u.

The Executive Committee decided at the July 28 meeting to submit a proposal to the NSF Math Institute Competition as well as requesting renewal funding for NRCSE from the EPA.

## FROM THE DIRECTOR

On July 19, 2000, Peter Preuss, Jack Puzak and Chris Saint from the EPA National Center of Environmental Research (the EPA office in charge of our funding) conducted a site visit at NRCSE. Mary Lou Thompson, David Ford, Paul Sampson, June Morita, Thomas Lumley and Peter Guttorp presented a variety of aspects of NRCSE work. The EPA response was very positive. There will be another competition for Environmental Statistics centers, this time with more of an ecological focus.

As part of the NSF Math Institute proposal we are considering development of a certificate program in Environmental Statistics. The certificate will require a year-long sequence (to be developed) in Environmental Statistics, appropriate coursework from environmental science disciplines, and an internship at a government lab or research institute.