## Christopher J. Paciorek


CONTACT INFORMATION

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RESEARCH INTERESTS

Bayesian statistics, spatial and spatio-temporal statistics, smoothing methods, statistical methods for large datasets, statistics for environmental and public health data

EDUCATION

**Carnegie Mellon University**, Pittsburgh, Pennsylvania USA

Ph.D., Statistics, May 2003

- Dissertation Topic: "Nonstationary Gaussian Processes for Regression and Spatial Modelling"
- Winner of the 2003 Leonard J. Savage Award for best dissertation in the area of Bayesian Theory and Methods
- Advisor: Mark J. Schervish

M.S., Statistics, May 2000

**Duke University**, Durham, North Carolina USA

M.S., Botany (Ecology), May, 1998

**Carleton College**, Northfield, Minnesota USA

B.A., Biology, May, 1993

HONORS AND AWARDS

Health Effects Institute, Walter A. Rosenblith New Investigator Award, 2006

Leonard J. Savage dissertation award (see above), 2004

CMU Statistics Department, Student of the Year, 2003

Phi Kappa Phi National Honor Society, 2002

National Science Foundation, Graduate Research Fellowship, 1996

Carleton College: graduated Magna Cum Laude, Honors in Biology, Phi Beta Kappa, 1993

ACADEMIC EXPERIENCE

**University of California, Berkeley**, Department of Statistics, Berkeley, California USA

*Visiting Assistant Professor* **July, 2009 - present**

- Ongoing research in spatial and environmental statistics, including spatial modelling of exposure to particulate matter and other pollutants with use of remote sensing data, spatial structure in environmental epidemiology, and Bayesian hierarchical modeling of forest composition.

**Harvard School of Public Health**, Department of Biostatistics, Boston, Massachusetts USA

*Adjunct Assistant Professor* **July, 2009 - present**
*Assistant Professor* **July, 2005 - June, 2009**

- Ongoing research in spatial and environmental statistics, including spatial modelling of exposure to particulate matter and other pollutants with use of remote sensing data, spatial structure in environmental epidemiology, and Bayesian hierarchical modeling of forest composition.
- Taught updated full semester course in Bayesian Methodology in Biostatistics, fall 2007 and spring 2009 (Bio249).
- Initiated and taught new full semester course in Spatial Statistics, spring 2007 (Bio283).

- Initiated two new winter session courses: 1.) an introduction to R (Bio503) and 2.) an introduction to GIS (Bio504).
- Thesis committees: Paul Brochu (Environmental Health, Sc.D. 2009), Monique Perron (Environmental Health, Sc.D. 2009), Jeffrey Yanosky (Environmental Health, Sc.D. 2007), Lisa Baxter (Environmental Health, Sc.D. 2007), Jane Clougherty (Environmental Health, Sc.D. 2006), several ongoing in Biostatistics and Environmental Health
- Department computing committee chair (2007-2009), responsible for overseeing student assistants, interaction with school information technology department, and major role in developing school's Linux cluster

**Harvard School of Public Health**, Department of Biostatistics, Boston, Massachusetts USA

*Postdoctoral Research Fellow* **July, 2003 - June, 2005**

Research in spatial and environmental statistics, including methods for fitting generalized regression models with spatial covariates, spatial modelling of particulate matter exposure, and accounting for measurement error in smoothed covariates. Co-taught graduate level course in spatial statistics.

**Carnegie Mellon University**, Department of Statistics, Pittsburgh, Pennsylvania USA

*Graduate Student* **August, 1998 - May, 2003**

Experience included Ph.D. research, Ph.D. and Masters level coursework and research/consulting projects.

*Instructor* **May - June, 2002**

Co-taught graduate level course for the Master of Science in Computational Finance program. Shared responsibility for lectures, exams, homework assignments, and grades.

- 46-731 Probability and Statistics, Summer 2002.

*NSF VIGRE Teaching Fellow* **January - May, 2001**

Head teaching assistant. Duties included shared administrative responsibilities with faculty instructor, fielding of all student inquiries, and oversight of graduate student teaching assistants and graders.

- 36-217 Probability Theory and Random Processes, Spring 2001.

*Teaching Assistant* **August, 2001 - May, 2003**

Duties at various times included office hours and leading weekly computer lab exercises.

## Papers in submission

**Paciorek, C.J.** The importance of scale for spatial-confounding bias and precision of spatial regression estimators. Submitted to Statistical Science.

Brochu, P.J., J.D. Yanosky, **C.J. Paciorek**, J. Schwartz, J.T. Chen, R.F. Herrick, and H.H. Suh. Particulate air pollution and socioeconomic position in rural and urban areas of the northeastern United States. In submission.

## Publications

Puett, R.C., J.E. Hart, J.D. Yanosky, **C.J. Paciorek**, J. Schwartz, H.H. Suh, F.E. Speizer, and F. Laden. 2009. Chronic fine and coarse particulate exposure, mortality and coronary heart disease in the Nurses' Health Study. In press in Environmental Health Perspectives. doi:10.1289/ehp.0900572.

**Paciorek, C.J.** and Y. Liu. 2009. Limitations of remotely-sensed aerosol as a spatial proxy for fine particulate matter. Environmental Health Perspectives 117:904-909. doi:10.1289/ehp.0800360.

**Paciorek, C.J.** and J.S. McLachlan. 2009. Mapping ancient forests: Bayesian inference for spatio-temporal trends in forest composition. Journal of the American Statistical Association 104:608-622. PMCID: PMC2744074.

Liu, Y., **C.J. Paciorek**, and P. Koutrakis. 2009. Estimating regional spatial and temporal variability of $PM_{2.5}$ concentrations using satellite data, meteorology, and land use information. Environmental Health Perspectives 117:886-892. doi:10.1289/ehp.0800123.

Baxter, L.K., R.J. Wright, **C.J. Paciorek**, F. Laden, H.H. Suh, and J.I. Levy. 2009. Effects of exposure measurement error in the analysis of health effects from traffic-related air pollution. In press in Journal of Exposure Science and Environmental Epidemiology. doi: 10.1038/jes.2009.5.

**Paciorek, C.J.**, J.D. Yanosky, R.C. Puett, F. Laden, and H.H. Suh. 2009. Practical large-scale spatio-temporal modeling of particulate matter concentrations. Annals of Applied Statistics 3:370-397.

Gryparis, A., **C.J. Paciorek**, A. Zeka, J. Schwartz, and B. Coull. 2009. Measurement error caused by spatial misalignment in environmental epidemiology. Biostatistics 10:258-274. doi:10.1093/biostatistics/kxn03
PMCID: PMC Journal - In Process.

Yanosky, J.D., **C.J. Paciorek**, and H.H. Suh. 2009. Predicting chronic fine and coarse particulate exposures using spatio-temporal models for the northeastern and midwestern U.S. Environmental Health Perspectives 117:522-529. doi:10.1289/ehp.11692.

Puett R.C., J. Schwartz, J.E. Hart, J.D. Yanosky, F.E. Speizer, H.H. Suh, **C.J. Paciorek**, L.M. Neas and F. Laden. 2008. Chronic particulate exposure, mortality and cardiovascular outcomes in the Nurses Health Study. American Journal of Epidemiology 168:1161-1168. doi:10.1093/aje/kwn232.

**Paciorek, C.J.**, Y. Liu, H. Moreno, and S. Kondragunta. 2008. Spatio-temporal associations between GOES aerosol optical depth retrievals and ground-level $PM_{2.5}$. Environmental Science and Technology 42:5800-5806.

Yanosky, J.D., **C.J. Paciorek**, J. Schwartz, F. Laden, R.C. Puett, and H.H. Suh. 2008. Spatio-temporal modeling of chronic $PM_{10}$ exposure for the Nurses' Health Study. Atmospheric Environment 42:4047-4062. doi:10.1016/j.atmosenv.2008.01.044.

**Paciorek, C.J.** 2008. Discussion of "Bivariate Binomial Spatial Modeling of *Loa loa* Prevalence in Tropical Africa". Journal of the American Statistical Association 103:37-40.

Baxter, L.K., J.E. Clougherty, **C.J. Paciorek**, R.J. Wright, and J.I. Levy. 2007. Predicting residential indoor concentrations of nitrogen dioxide, fine particulate matter, and elemental carbon using questionnaire and geographic information system based data. Atmospheric Environment 41:6561-6571.

**Paciorek, C.J.** 2007. Bayesian smoothing with Gaussian processes using Fourier basis functions in the spectralGP package. Journal of Statistical Software 19(2). PMCID: PMC2156645.

**Paciorek, C.J.** 2007. Computational techniques for spatial logistic regression with large datasets. Computational Statistics and Data Analysis, 51:3631-3653. doi:10.1016/j.csda.2006.11.008. PMCID PMC2350194.

**Paciorek, C.J.**, and M. Schervish. 2006. Spatial modelling using a new class of nonstationary covariance functions. Environmetrics 17:483-506.

**Paciorek, C.J.** 2006. Misinformation in the conjugate prior for the linear model with implications for free-knot spline modelling. Bayesian Analysis 1:375-383.

Ickes, K., **C.J. Paciorek**, and S. Thomas. 2005. Impacts of nest construction by native pigs (*Sus*

*scrofa*) on saplings in a lowland Malaysian rain forest. Ecology, 86:1540-1547.

Ventura, V., **C.J. Paciorek**, and J.S. Risbey. 2004. Controlling the proportion of falsely-rejected hypotheses when conducting multiple tests with climatological data. Journal of Climate 17:4343-4356.

**Paciorek, C.J.**, and M.J. Schervish. 2004. Nonstationary covariance functions for Gaussian process regression. Advances in Neural Information Processing Systems 16:273-280.

**Paciorek, C.J.**, J.S. Risbey, V. Ventura, and R.D.Rosen. 2002. Multiple indices of Northern Hemisphere Cyclone Activity, Winters 1949-1999. Journal of Climate 15:1573-1590.

**Paciorek, C.J.**, R. Condit, S.P. Hubbell, and R.B. Foster. 2000. The demographics of resprouting in tree and shrub species of a moist tropical forest. Journal of Ecology 88:765-777.

**Paciorek, C.J.**, B.R. Moyer, R.A. Levin, and S.L. Halpern. 1995. Pollen consumption by hummingbird flower mite *Proctolaelaps kirmsei* and possible fitness effects on *Hamelia patens*. Biotropica 27:258-262. (author order determined by lot)

## Grants

**Health Effects Institute**
*Principal investigator* **August, 2006 - September, 2009**
Integrating satellite and monitoring data to retrospectively estimate monthly $PM_{2.5}$ concentrations in the eastern United States, $300,000.

**National Institute of Environmental Health Sciences**
*Co-investigator* **December, 2007 - November, 2010**
Analysis of high-dimensional environmental health data, $735,194

**National Cancer Institute, Program Project**
*Co-project leader and computing core director* **September, 2008 - August, 2013**
Statistical informatics for cancer research, $4,170,148.

**National Institute of Environmental Health Sciences**
*Co-investigator* **July, 2009 - June, 2013**
Diet, physical activity, and the relationship between air pollution and CVD, $1,200,000.

## Professional Experience

**SAS, Inc.**, Cary, North Carolina, USA
*Bayesian statistical computing consultant* **October, 2005 - present**
Occasional consultant on Bayesian statistical computing, primarily for a new SAS proc for performing Markov chain Monte Carlo.

**X-CEL Adult Education Services**, Boston, Massachusetts USA
*Volunteer GED teacher/tutor* **October, 2003 - July 2008**
Taught weekly 2.5 hour GED prep reading/writing/social studies/science class for 4-12 students (after summer 2005). Tutored weekly 2.5 hour GED prep to small group (prior to summer 2005).

**Bureau of Transportation Statistics, U.S. Department of Transportation**, Washington, District of Columbia USA
*Summer researcher* **May, 2000 - August, 2000**
Carried out several consulting projects, including modelling of injuries to cadavers in crash test experiments, analysis of airline delay data, and advice on analysis of airline economics data.

**Abt Associates**, Bethesda, Maryland USA

*Associate Programmer Analyst and Research Assistant* **October, 1994 - August, 1996**
Researcher and computer model developer for U.S. EPA Regulatory Impact Analysis of Section 403 Lead Paint Hazard Rule. Other projects included database analysis, literature reviews, and cost-benefit analysis.

## Computing Skills

- Statistical computing environments: R, S-Plus, Matlab, BUGS, database operations in SAS, C and Fortran statistical libraries.
- R libraries created: spectralGP
- Languages: extensive use of C++, Perl, Pascal; some use of Unix shell scripts, MPI parallel processing library.
- Applications: Generic Mapping Tools (GMT) - UNIX mapping software, LaTeX, LyX, common Windows database, spreadsheet, and presentation software, some use of ArcGIS
- Algorithms: Experience programming Markov chain Monte Carlo simulations of Bayesian posterior distributions
- Operating Systems: UNIX/Linux

## Professional Service

Journal reviewer:

- 2009: Canadian Journal of Statistics, Journal of the American Statistical Association, Environmetrics (2), Weather and Forecasting
- 2008: Biometrics, Ecology, Environmental Health, Journal of Computational and Graphical Statistics, Journal of the American Statistical Association, Statistics in Medicine
- 2007: American Journal of Epidemiology, Annals of Applied Statistics, Canadian Journal of Statistics, Journal of the American Statistical Association
- 2006: Bayesian Analysis, Biometrics, Journal of the American Statistical Association (3), Statistica Sinica (2)
- 2005: American Journal of Epidemiology, Journal of Applied Meteorology, Journal of Statistical Computation and Simulation, Statistics in Medicine
- 2004: Bayesian Analysis, Biometrics, Statistics in Medicine

Grant review panel member:

- EPA STAR Consequences of Global Change for Water Quality review panel member, 2008
- EPA STAR Coarse Particles review panel member, 2007
- NIEHS-EPA Children's Centers special emphasis review panel member, 2006

ASA Section on Environmental Statistics, JSM award committee member, 2005.

Session organizer:

- ENAR, 2009: Statistical Modeling and Design Issues in Epidemiological Studies
- ENAR, 2006: Statistical Issues in Using Exposure Estimates in Environmental Epidemiology