

Cari G. Kaufman

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Research Interests Spatial statistics, Bayesian hierarchical modeling, uncertainty quantification, methods for large datasets, nonparametric function estimation. Primary application areas: atmospheric science, cosmology, neuroscience, education.

Academic Appointments Assistant Professor 7/2008 - present
Department of Statistics
University of California, Berkeley, CA, USA

Postdoctoral Researcher (joint appointment) 8/2006 - 7/2008
Geophysical Statistics Project, National Center for Atmospheric Research, Boulder, CO

Postdoctoral Fellow (joint appointment) 8/2006 - 7/2008
Statistical and Applied Mathematical Sciences Institute, Research Triangle Park, NC

Education Ph.D., Statistics 5/2003 - 8/2006
Carnegie Mellon University, Pittsburgh, Pennsylvania
Advisor: Mark J. Schervish
Dissertation: Covariance Tapering for Likelihood-Based Estimation in Large Spatial Datasets
Winner of Umesh Gavasakar Thesis Award by Carnegie Mellon University 3/2007

M.S., Statistics 9/2001 - 5/2003
Carnegie Mellon University, Pittsburgh, Pennsylvania

B.S., Psychology (Statistics Minor) 9/1998 - 5/2001
Carnegie Mellon University, Pittsburgh, Pennsylvania
Graduated with University and College Honors, Phi Beta Kappa, Phi Beta Phi

Peer Reviewed Articles Kaufman, C. and Shaby, B. (2013) "The Role of the Range Parameter for Estimation and Prediction in Geostatistics," *Biometrika*, 100, 473–484.

Kaufman, C., Bingham, D., Habib, S., Heitmann, K., and Frieman, J. (2011) "Emulators of Computer Experiments Using Compactly Supported Correlation Functions, With an Application to Cosmology," *Annals of Applied Statistics*, 5, 2470–2492.

Kaufman, C. and Sain, S. (2010) "Bayesian Functional ANOVA Modeling Using Gaussian Process Prior Distributions," *Bayesian Analysis*, 5, 123–150.

Kaufman, C., Schervish, M., and Nychka, D. (2008) "Covariance Tapering for Likelihood-Based Estimation in Large Spatial Datasets," *Journal of the American Statistical Association*, 103, 1545–1555.

Kaufman, C., Ventura, V., and Kass, R. (2005) "Spline-Based Nonparametric Regression for Periodic Functions and Its Application to Directional Tuning of Neurons," *Statistics in Medicine*, 24, 2255–2265.

Submitted Articles Jeon, M., Kaufman, C., and Rabe-Hesketh, S. "Monte Carlo Local Likelihood for Estimating Generalized Linear Mixed Models," Under revision.

Lee, W., Kaufman, C., and Thomas, R. "Efficient Bayesian Inference for Extrema Location," Submitted.

Wu, R. and Kaufman, C. "Comparing Non-informative Priors for Estimation and Prediction in Spatial Models," Submitted.

Paciorek, C., Lipshitz, B., Zhuo, W., Prabhat, Kaufman, C., and Thomas, R. "Parallelizing Gaussian Process Calculations in R." Submitted.

Other Publications Lee, W., Kaufman, C. "Varying Coefficient Model for Surface Wind Fields Over Land and Sea," In preparation.

Lee, W. and Kaufman, C. (2011), Comment on "An Explicit Link between Gaussian Fields and Gaussian Markov Random Fields: The SPDE Approach" by Lindgren, F., Rue, H., and Lindstrom, J., *Journal of the Royal Statistical Society, Series B*, 73, 57–58.

Kaufman, C. (2011) Review of *The Oxford Handbook of Applied Bayesian Analysis* by O'Hagan, A., and West, M., *Journal of the American Statistical Association*, 106, 1223.

Kaufman, C. and Ventura, V. (2006) Controlling a Neuroprosthetic Arm: Real Time Estimation and Prediction. Technical Report 838, Department of Statistics, Carnegie Mellon University.

Software Developed Available at <http://www.stat.berkeley.edu/~cgk/rcode>
R package `SparseEm` for building computationally efficient emulators
R code and examples for Bayesian functional ANOVA modeling
R package `sphere` for visualizing and analyzing spherical data
R code and examples for spatial parameter estimation using covariance tapering

Grants Office of Naval Research (subcontract from Naval Postgraduate School) 12/2010 - 12/2013
State-Space Analysis of Model Error: A Probabilistic Parameter Estimation Framework with Spatial Analysis of Variance. PI. Total: \$372,169

National Science Foundation 9/2010 - 8/2013
SCREMS: Building a Statistical Computing Environment to Support Scientific Research. Co-PI. Total: \$101,213.

National Science Foundation (subcontract from Purdue University) 8/2010 - 7/2015
Emerging Frontiers of the Science of Information. Senior Personnel. Total: \$3,750,000.

Department of Energy (subcontract from LBNL) 8/2010 - 8/2013
Visual Data Exploration and Analysis of Ultra-Large Climate Data. PI. Total: \$123,111.
(Supervisory and administrative duties only.)

UCB Committee on Research 12/2008 - 6/2009
Junior Faculty Research Grant. PI. Total: \$2,955.

Invited Presentations (Since 7/2008) Joint Statistical Meetings 2013, Montréal, Canada, 8/2013
Time-Structured PCA for Describing Modes of Variability in Large Global Climate Datasets

IMS Asia Pacific Rim Meeting, Tsukuba, Japan, 7/2012
Statistical Issues in Catchment-Scale Hydrology

ISBA 2012 World Meeting, Kyoto, Japan, 6/2012
Efficient Emulators of Computer Experiments Using Compactly Supported Correlation Functions

Climate Modeling Opening Workshop, SAMSI Program on Uncertainty Quantification, Pleasanton, CA, 11/2011

Functional ANOVA Models for Comparing Sources of Variability in Climate Model Output

INFORMS Annual Meeting, Charlotte, NC, 11/2011 (Declined)

Accelerating Industrial Productivity via Deterministic Computer Experiments and Stochastic Simulation Experiments, Cambridge, England, sponsored by Isaac Newton Institute, 9/2011 (Declined)

UC Berkeley Statistics Department Neyman Seminar, Berkeley, CA, 9/2011

Modeling Dependence in Physical Systems Using Gaussian Processes: Applications and Asymptotic Theory

University of Michigan Statistics Department Seminar, Ann Arbor, MI, 11/2010

Statistical Issues in Catchment-Scale Hydrology

University of Michigan Center for Radiative Shock Hydrodynamics Seminar, Ann Arbor, MI, 11/2010

Efficient Emulators of Computer Experiments Using Compactly Supported Correlation Functions

Center for Science of Information Theory Kickoff Workshop, Chicago, IL, 10/2010

Computer Models of Climate and Environmental Processes

UCLA Statistics Department Seminar, Los Angeles, CA, 8/2010

Statistical Issues in Catchment-Scale Hydrology

Uncertainty in Computer Models 2010, Sheffield, England, England, 7/2010

Efficient Emulators of Computer Experiments Using Compactly Supported Correlation Functions

University of Bristol Mathematics Department Seminar, Bristol, England, England, 7/2010

Probabilistic Calibration of a Stochastic Catchment-Scale Hydrological Model

Conference on Nonparametric Statistics and Statistical Learning, Columbus, OH, 5/2010

Functional ANOVA Models for Comparing Sources of Variability in Climate Model Output

UC Berkeley Artificial Intelligence Seminar, Berkeley, CA, 3/2010

Efficient Emulators of Computer Experiments

UC Berkeley Paleoethnobotany Research Group Seminar, Berkeley, CA, 3/2010

Some Notes on Bayesian Statistics

Climate Change Workshop, SAMSI Program on Space-Time Analysis, Research Triangle Park, NC, 2/2010

Functional ANOVA Models for Regional Climate Model Experiments

UC Berkeley Statistics Department Neyman Seminar, Berkeley, CA, 10/2009

Calibration and Prediction Problems in Catchment Scale Hydrology

Opening Workshop, SAMSI Program on Space-Time Analysis, Research Triangle Park, NC, 9/2009

Calibration and Prediction Problems in Catchment Scale Hydrology

Joint Statistical Meetings, Washington, DC, 8/2009

Functional ANOVA Models for Comparing Sources of Variability in Climate Model Output

Lawrence Livermore National Laboratory Seminar, Livermore, CA, 7/2009
Functional ANOVA Models for Regional Climate Model Experiments

ICSA Applied Statistics Symposium, San Francisco, CA, 6/2009
Dynamic Modeling of Soil Moisture Under Climate Change

Statistical Society of Canada Annual Meeting, Vancouver, Canada, 6/2009
Calibration and Prediction Problems in Catchment Scale Hydrology

Spring Research Conference on Statistics in Industry and Technology, Vancouver, Canada, 5/2009
Calibration and Prediction Problems in Catchment Scale Hydrology

Stanford University Statistics Department Seminar, Palo Alto, CA, 2/2009
Functional ANOVA Models for Comparing Sources of Variability in Climate Model Output

UC Santa Cruz Applied Mathematics and Statistics Department Seminar, Santa Cruz, CA, 2/2009
Functional ANOVA Models for Comparing Sources of Variability in Climate Model Output

Ohio State University Statistics Department Seminar, Columbus, OH, 11/2008
Functional ANOVA Models for Comparing Sources of Variability in Climate Model Output

Berkeley Atmospheric Sciences Center Seminar, Berkeley, CA, 11/2008
Comparing Sources of Variability in Regional Climate Model Experiments

Workshop on Environmetrics, Boulder, CO, 10/2008
Attributing Sources of Variability in Regional Climate Model Experiments

7th World Congress in Probability and Statistics, Singapore, 7/2008
Functional ANOVA Modeling of Regional Climate Model Experiments

Other presentations
(Since 7/2008) Berkeley Atmospheric Science Center Symposium, Berkeley, CA, 2/2011
Nonstationary Statistical Model for Surface Wind Fields (Contributed poster, co-author)

SuperComputing 2010, New Orleans, LA, 11/2010
Distributed Likelihood Computation for Large Spatial Data (Contributed poster, co-author)

Berkeley Atmospheric Science Center Symposium, Berkeley, CA, 10/2008
Attributing Sources of Variability in Regional Climate Model Experiments (Contributed poster)

American Geophysical Union Fall Meeting, San Francisco, CA, 12/2008
Comparing Sources of Variability in Regional Climate Model Experiments (Contributed talk)

Invited workshop
participation
(Since 7/2008) Climate and Math Retreat, Berkeley, CA, Mathematical Sciences Research Institute. 5/2011
Mathematical Challenges for Sustainability, Piscataway, NJ, Sponsored by NSF-NSERC. 11/2010 (Declined)
Integrating Computing into the Statistics Curricula: A Workshop to Develop Educational Materials, Berkeley, CA 7/2009

Courses Taught

(Evaluation averages are out of a possible 7)

Statistics 133, Concepts in Computing with Data. Fall 2008, Fall 2009, Fall 2010, Fall 2011
Evaluation averages 6.09, 6.04, 6.36, 6.10 (historical average 5.85)

Statistics 157, Seminar on Topics in Probability and Statistics: Bayesian Statistics. Spring 2009
Evaluation average 6.09 (historical average 5.62)

Statistics 200B, Introduction to Probability and Statistics at an Advanced Level. Spring 2010
Evaluation average 6.44 (historical average 5.85)

Statistics 201B, Introduction to Probability and Statistics at an Advanced Level. Fall 2012
Evaluation average 6.11 (not taught previously)

Statistics 260, Topics in Probability and Statistics: Spatial Statistics. Spring 2011, Spring 2013
Evaluation averages 6.40 and 6.71 (historical average 6.08)

Students and
Post-Docs Advised

Benjamin Shaby, Statistics Post-Doc, 8/2011 - present
Accepted tenure-track position at Penn State University

Linda Tran, Statistics Ph.D., 9/2011 - present
Research topic: Emulators for Numerically Unstable Computer Experiments

Wayne Lee, Statistics Ph.D. (degree received), 1/2010 - 5/2013
Dissertation title: Bayesian Analysis in Problems with High Dimensional Data and Complex Dependence Structure

Yu-Jay Huoh, Statistics Ph.D. (degree anticipated 8/2013), 6/2009 - present
Dissertation title: Information Theoretic Sensitivity Analysis of Stochastic Simulators

Harry Kim, Statistics Ph.D. (degree received, co-advised with Bin Yu), 9/2008 - 05/2011
Dissertation title: Spatio-Temporal Point Process Models for the Spread of Avian Influenza Virus (H5N1)

Morgan Levy, Statistics M.A., 2/2013 - present
Research topic: Sensitivity Analysis of the Pennman Monteith Method of Determining Evapotranspiration

Regina Wu, Statistics M.A., 3/2013 - 5/2013
Thesis title: Comparing Non-Informative Priors for Estimation and Prediction in Spatial Models

Min-Jeong Jeon, Statistics M.A. (degree received), 2/2010 - 5/2011
Thesis title: Monte Carlo Kernel Likelihood Method for Generalized Linear Mixed Models with Crossed Random Effects

Eva Vivalt, Mathematics M.A. (degree received, co-advised with Steve Evans), 10/2009 - 12/2010
Thesis title: Modeling Gaussian Fields and Geostatistical Data Using Gaussian Markov Random Fields

Zhifei Feng, Statistics B.S. (degree received), 2/2010 - 5/2010
Research topic: Visualizing data from the Keck Hydrowatch Project

Regina Wu, Statistics B.S. (degree received), 5/2009 - 5/2011
Honors thesis title: Comparing Non-Informative Priors for Estimation and Prediction in Spatial Models

Dissertation and Thesis Committees (not including advisees)

Valerie Morash, Statistics M.A., 2/2013 - present
Welong Zhang, Mechanical Engineering Ph.D., 1/2013 - present
Ying Xiang Wang, Statistics Ph.D., 8/2012 - present
Tamara Broderick, Statistics Ph.D., 4/2012 - present
Danielle Svehla Christianson, Energy and Resources Ph.D., 1/2012 - present
Mu Cai, Statistics Ph.D., 8/2011 - present
Molly Davies, Biostatistics M.A., 2/2011 - 5/2011
Brianna Heggeseth, Statistics Ph.D., 2/2011 - present
Arthur Wiedmer, Civil and Environmental Engineering Ph.D., 1/2011 - present
Min-Jeong Jeon, Education Ph.D., 12/2010 - 8/2012
Nancy Yueqing Wang, Statistics Ph.D., 01/2010 - 12/2012
Alexander Simma, Computer Science Ph.D. 1/2010 - 5/2010
Alexandru Hening, Mathematics Ph.D., 6/2009 - present
Daisy Zhe Wang, Computer Science Ph.D., 1/2009 - 12/201

Qualifying Exam Committees (not including advisees)

Lee Clemon, Mechanical Engineering M.S., 5/2013
Brian Zimmer, Electrical Engineering and Computer Sciences Ph.D., 4/2013
David Anderson, Applied Mathematics Ph.D., 2/2013
Welong Zhang, Mechanical Engineering Ph.D., 12/2012
Ying Xiang Wang, Statistics Ph.D., 8/2012
Kan Kanjanapas, Mechanical Engineering Ph.D., 5/2012
Tamara Broderick, Statistics Ph.D., 3/2012
Mu Cai, Statistics Ph.D., 6/2011
Elizabeth Secor, Biostatistics M.A., 5/2011
Arthur Wiedmer, Civil and Environmental Engineering Ph.D., 12/2010
Min-Jeong Jeon, Education Ph.D., 11/2010
Brianna Heggeseth, Statistics Ph.D., 11/2010
Nancy Yueqing Wang, Statistics Ph.D., 12/2009
Alexandru Hening, Mathematics Ph.D., 6/2009
Daisy Zhe Wang, Computer Science Ph.D., 12/2008
Aleksandr Simma, Computer Science Ph.D., 12/2008

University Service

Member, Ph.D. Admissions Committee, 9/2012 - 5/2013
Reviewed applications and recruited admitted students.

Chair, Computing Curriculum Committee, 1/2011 - 5/2011
Proposed new graduate-level curriculum for statistical computing approved by faculty.

Institutional Coordinator for Education and Diversity, Center for the Science of Information, 10/2010 - 5/2011

Acted as a liaison between Berkeley faculty and CSol Education and Diversity Team.

Faculty representative, Statistical Computing Facility Committee, 8/2010 - 5/2012
Co-wrote 9 page "Vision Statement" for future of SCF and new organizational structure prior to hiring of new staff.

Member, Hiring Committee for SCF Manager, 8/2010
Reviewed applications, participated in interviews and hiring decision meetings.

Examiner, Statistics M.A. qualifying exams, 5/2010, 5/2011
Created and graded written exams for the Statistics M.A. degree.

Chair, Statistical Computing Facility Committee, 8/2009-7/2010
Held monthly meetings, co-wrote NSF proposal funded for >\$100K in computing equipment.

Chair, Web Committee, 6/2009 - 5/2010
Held monthly meetings; supervised updating of site in preparation for VIGRE site visit.

Member, Berkeley Atmospheric Science Center Fellowships Award Committee, 11/2008 - 12/2008
Reviewed applications and met to discuss award decisions.

Co-Chair, Neyman Seminar, 8/2008 - 12/2008
Invited and hosted speakers, maintained seminar webpage.

Other Service

Associate Editor for The Annals of Applied Statistics 12/2011 - present

Journal article reviewer for Journal of the American Statistical Association, The Annals of Statistics, The Annals of Applied Statistics, Journal of Computational and Graphical Statistics, Biometrics, Journal of the Royal Statistical Society, Series B, Environmetrics, Journal of Climate, Monthly Weather Review

Manuscript reviewer for Springer

Reviewer for Student Travel Award papers, Section on Bayesian Statistical Science, Joint Statistical Meetings, 12/2012

Reviewer for NSF Proposals "Decadal and Regional Climate Prediction Using Earth System Models," 7/2012

Session Chair, Joint Statistical Meetings, Washington, DC. 8/2009

Session Co-Organizer, Joint Statistical Meetings, Salt Lake City, UT. 12/2006 - 7/2009

Memberships

Berkeley Atmospheric Science Center, 7/2008 - present

American Statistical Association, 9/2003 - present