

Barbara Ann Bailey

Department of Mathematics and Statistics
San Diego State University
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Education

- B.S. 1981 Mathematics and Physical Education
Springfield College, Springfield, MA
- M.S. 1988 Mathematics
University of Illinois, Champaign-Urbana, IL
- Ph.D. 1996 Biomathematics
Department of Statistics
North Carolina State University, Raleigh, NC

Academic Experience

- 8/06 - present Assistant Professor
San Diego State University
Research emphasis on temporal and spatial modeling of environmental processes and diagnostics and visualization for nonlinear statistical models.
- 8/05 - 5/06 Visiting Assistant Professor, Department of Mathematics
University of Colorado at Denver and Health Sciences Center
- 8/98 - 8/05 Assistant Professor of Statistics
University of Illinois at Urbana-Champaign
- 3/96 - 7/98 Postdoctoral Research Fellow, National Center for Atmospheric Research
NCAR, Boulder CO
The Geophysical Statistical Project is a project to further development of statistical analysis to the problems faced in the Earth sciences. Research emphasis on modeling the spatial and temporal distribution of cloud cover.

Other Experience

- 9/95 - 2/96 Programming and Documentation Support for FUNFITS
Becton Dickinson Research Center, Research Triangle Park, NC
FUNFITS is a suite of functions and statistical tools for data analysis that enhance the S-PLUS statistical package and facilitate curve and surface fitting.

Publications

- Rupp, A.J., Bailey, B., Shen, S.S.P., Lee, C.K., and Strachan, B.S.** (2009). "An Error Analysis for the Hybrid Gridding of Texas Daily Precipitation Data." *Intl J. Climatology*, 29, doi: 10.1002/joc.1917.
- Xie, H., Eheart, J.W., Chen Y., and Bailey, B.A.** (2009), "An Approach for Improving the Sampling Efficiency in the Bayesian Calibration of Computationally Expensive Simulation Models." *Water Resources Research* 45, W06419, doi:10.1029/2007WR006773.
- Demissie, Y.K., Valocchi, A.J., Minsker, B.S., and Bailey, B.A.** (2009), "Integrating a calibrated groundwater flow model with error-correcting data-driven models to improve predictions." *Journal of Hydrology*, 364(3-4), 257-271.
- Lee, C., Shen, S.S.P, Bailey, B.A., and North, G.R.** (2008). "Factor Analysis for El Nino Signals in Sea Surface Temperature." *Theoretical and Applied Climatology*, 97, 195-203, DOI:10.1007/s00704-008-0056-y.
- Kononov, J., Bailey, B.A., and Allery, B.K.** (2008), "Exploratory Examination of the Relationships between Safety and Congestion and Safety and the Number of Lanes on Urban Freeways." *Transportation Research Record, TRB, National Research Council*, 2083, 25-39.
- Demissie, Y.K., Valocchi, A.J., Minsker, B.S, and Bailey, B.A.** (2008), "Bias Corrected Groundwater Model Prediction Uncertainty Analysis." *International Conference ModelCARE 2007, Calibration and Reliability in Groundwater Modeling, Credibility of Modeling*, Copenhagen, Denmark, Sept. 9-13, 2007.
- Demissie, Y.K., Valocchi, A.J., Minsker, B.S., and Bailey, B.A.** (2006), "Data-driven modeling approach to enhance MODFLOW head predictions." *Proceedings of MODFLOW and More 2006: Managing Ground-Water Systems*, v. 1, E. Poeter, M. Hill and C. Zheng (eds.), May 21-24, Colorado School of Mines, Golden, CO., 51-55.
- Frigon, D., Guthrie, R.M, Backman, G.T., Royer, J., Bailey, B.A., and Raskin, L.** (2006), "Long-Term Analysis of a Full Scale Activated Sludge Wastewater Treatment System Exhibiting Seasonal Biological Foaming." *Water Research*, 40(5), 990-1008
- Pershing, A.J., Greene, C.H., Jossi, J.W., O'Brien, L, Brodziak, J.K.T, and Bailey, B.A.** (2005), "Interdecadal Variability in the Gulf of Maine Zooplankton Community with Potential Impacts on Fish Recruitment." *ICES Journal of Marine Science*, 62(7), 1511-1523.
- Bailey, B.A., Doney S.C., and Lima, I.** (2004), "Quantifying the Effects of Dynamical Noise on the Predictability of a Simple Ecosystem Model." *Environmetrics*, 15, 337-355.
- Lin, N., Bailey, B.A., He, X., and Buttlar, W.G.** (2004), "Adjustment of Measuring Devices with Linear Models." *Technometrics*, 46(2), 127-134.
- Kuurman, W.W., Bailey, B.A., Koops, W.J., and Grossman, M.** (2003), "A Model for Failure of a Chicken Embryo to Survive." *Poultry Science*, 82, 214-222.
- Kuurman, W.W., Bailey, B.A., Koops, W.J., and Grossman, M** (2002), "Influence of Storage Days on the Distribution for Time of Embryonic Mortality During Incubation." *Poultry Science*, 81, 1-8.
- Bailey, B.A. and Doney, S.C.** (2001), "Quantifying the Effects of Noise on Biogeochemical Models." *Computing Science and Statistics*, 32, 447-453.
- Kuurman, W.W., B.A. Bailey, W.J Koops, M. Grossman** (2001), "Effect of Hatch on the Distribution for Failure of an Embryo to Survive Incubation." *Poultry Science*, 80, 710-717.

- Monrad, D., Stout, W.F, Gould, R.L., Roussos, L.A., Bailey, B.A., Fryxell, J. R., He, X., and Plessner, V.R.** (2000), Chapter 11 and 12 in *Statistics: The Craft of Data Collection, Description, and Inference*, Mobius Communications, Ltd., Champaign, IL.
- Bailey, B.A., Berliner, L.M, Collins W., Nychka, D., Kiehl, J.T.** (2000), "Neural Networks: Cloud Parameterizations," Chapter 7 in *Case Studies in Statistics and the Atmospheric Sciences*, Springer-Verlag, New York.
- Davis, J, Nychka, D.W., and Bailey, B.A.** (2000), "A Comparison of Regional Oxidant Model (ROM) Output with Observed Ozone Data. " *Atmospheric Environment*, 34(15), 2413-2423.
- Ellner, S.P., Bailey, B.A., Bobashev, G.V., Gallant, A.R., Grenfell, B.T., and Nychka, D.W.** (1998), "Noise and Nonlinearity in Measles Epidemics: Combining Mechanistic and Statistical Approaches to Population Modeling." *American Naturalist*, 15(5), 425-440.
- Bailey, B.A., Ellner, S., and Nychka, D.W.** (1997), "Chaos with Confidence: Asymptotics and Applications of Local Lyapunov Exponents." *Proceedings of the Fields/CRM Workshop on Nonlinear Dynamics and Time Series: Building a Bridge Between the Natural and Statistical Sciences*, *American Mathematical Society*, 115-133.
- Bailey, B.A.** (1996), "Local Lyapunov Exponents: predictability depends on where you are." *Nonlinear Dynamics in Economics, Proceedings of the Ninth International Symposium in Economic Theory and Econometrics*, eds. Barnett, W., Kirman, A., and Salmon, M., Cambridge University Press, 345-360.

Conference Proceedings

- Li, X. and Bailey, B.A.** (2004), "Hierarchical Bayesian Space-time Models for Groundwater Data." *2004 Proceedings of the American Statistical Association*, Statistical Computing Section [CD-ROM], Alexandria, VA: American Statistical Association.
- Bailey, B.A.** (2003), "Diagnostics and Visualization of Nonlinear Statistical Models." *2003 Proceedings of the American Statistical Association*, Statistical Computing Section [CD-ROM], Alexandria, VA: American Statistical Association.
- Bailey, B.A., Nychka, D.W., and Ellner, S.** (1998), "A Central Limit Theorem for Local Lyapunov Exponents." Technical Report 76, Department of Statistics, University of Illinois, Champaign, IL.
- Nychka, D.W. , Davis, J., and Bailey, B.A.** (1995), "A Comparison of the Regional Oxidant Model with Observational Ozone Data." *National Institute of Statistical Sciences Technical Report*, National Institute of Statistical Sciences, Research Triangle Park, NC.
- Bailey, B.A., Chia-yee, J.L., and Smith, C.E.** (1992), "Conditional Plots for Nonrenewal Neural Spike Train Data." In *Proceedings of the Section on Statistical Education, American Statistical Association*, 224-229.

Manuscripts in Process

- Bailey, B.A. and Perhing, A.J.** (2009) "Developing Ecological Forecasts from Time Series Data." (in process)

Grants and Funding

UGP, SDSU University Grants Program, “Diagnostics for Nonlinear Statistical Models Applied to Ground-water Flow”, \$4,924, 2009. Student support.

NSF (UMB), “Interdisciplinary Training for Undergraduates in Mathematics and Biology at San Diego State University”

(PI) Anca Segal, (Co-PI) Peter Salamon. \$80K/year for 3 years, 2008-2010. I am one of the participating faculty.

NIH/NIGMS, 1R01GM068946-01, “Models for Gene Expression”

(PI) Sandra Rodriguez-Zas, Department of Animal Sciences, UIUC; (Co-PIs) Barbara Bailey; Gene Robinson, Department of Entomology, UIUC

\$1,000,000, 6/15/03-5/31/07, 1 summer month support and 1 RA for 2 years. Involves dimension reduction and visualization of gene expression data.

Department of Energy, “A New Framework for Adaptive Sampling and Analysis During Long-term Monitoring and Remediation Action Management”

(PI) Barbara Minsker, Department of Civil and Environmental Engineering, UIUC; (Co-PIs) Barbara Bailey, Al Valocchi, Department of Civil and Environmental Engineering, UIUC, Robert Johnson, Argonne National Laboratory

\$540,000, 09/01/02-08/31/05, 0.5 summer month yearly support, 1 RA. Involves space-time modeling of ground water contaminants.

NOAA-Costal Ocean Program, “Climate-based Forecasts of the Gulf of Maine Ecosystem”

(PI) Andrew Pershing, Department of Earth and Atmospheric Sciences, Cornell University; (Co-PIs) Barbara Bailey; Charles Green, Department of Earth and Atmospheric Sciences, Cornell University; Jack Jossi, NOAA Fisheries, Narragansett Laboratory.

\$350,546, 09/01/02-08/31/04, 1 summer month yearly support. Involves nonlinear time series modeling and prediction of whale and other marine populations.

NASA/USRA Earth System Science Education for the 21st Century (ESSE 21) Program for the new interdisciplinary LAS major in The Earth System, Environment and Society.

NCSA-UIUC Faculty Fellow, “Visualization and Diagnostics of Nonlinear Statistical Models”

\$10,000, 08/21/02-08/21/03. Involves the development of visualization tools for nonlinear optimization methods.

Professional Activities

American Statistical Association Section on Statistical Computing, Publications Officer, 2008-2010.

The International Biometric Society, Eastern North American Region (ENAR) Regional Advisory Board Member, January 1, 2005-December 31, 2007

Invited Session Organizer: Visualization of Data, Spring Research Conference, Gaithersburg, MD, May, 2004

Invited Participant: Workshop on Multiscale Modeling of Environmental Systems at Statistical and Applied Mathematical Sciences Institute, RTP, NC, February 2-7, 2003

Invited Session Chair: Statistics, Psychiatry and Neuroscience: Working together, at the Joint Statistical Meetings, New York City, August, 2002

Invited participant: Institute for Mathematics and its Applications Workshop on Frontiers of Mathematics in Geoscience, University of Minnesota, Twin Cities Campus, March 5-7, 2001

Invited Session Organizer: Statistical Issues in Modeling and Dynamical Systems, ENAR, ASA, Atlanta, GA , 2001

Contributed Session Chair: Computational and Estimation Issues in Modeling, Interface 2000, New Orleans, LA, 2000

Invited Session Chair: Mining Genes and Compounds, Interface 1999, Schaumburg, IL, 1999

Contributed Session Chair: Section on Physical Sciences and Engineering (SPES), ASA annual meetings, Anaheim, 1997

Vice President Statistics/Biomathematics Graduate Student Association, NCSU, 1992-1994

Biomathematics Admissions Committee, NCSU, 1993-1995

Reviewed papers and proposals for:

Journal of Hydraulic Engineering, 2007
 Mathematics and Computers in Simulation, 2007
 NSF-International Polar Year, 2006
 NSF-Collaborations in Mathematical Geosciences (CMG), 2004
 Journal of Agriculture, Biological, and Environmental Statistics, 2006
 Journal of North American Actuarial Journal, 2003
 Chemometrics and Intelligent Laboratory Systems, 2002
 Ecological Modelling, 2006
 Journal of Geophysical Research, 2001-2003
 Journal of Climate, 2000,2005
 NSF-Environmental Statistics Panel, June 1-2, 2000
 NSF-Statistics, 1999
 IEEE Transactions on Information Theory, 1998
 Technometrics, 1997
 Journal of Econometrics, 1997
 Journal of the Atmospheric Sciences, 1996
 ASCE Journal of Hydrologic Engineering, 1996
 IEEE Transactions on Circuits and Systems, 1995
 Journal of Nonlinear Dynamics, 1994, 2001

Departmental and University Activities

Statistics Undergraduate Advisor (SDSU), Spring, 2007-present.

Statistics Search Committee (SDSU), Spring 2007, 2008.

Computation Sciences Statistics Ph.D. Program Admissions Committee (SDSU), 2007

Mathematics Department (UCDHSC) Undergraduate Committee member, Fall 2005.

Co-Participant on development team for new interdisciplinary LAS major, "The Earth System, Environment and Society." This is a joint effort with Atmospheric Sciences, Entomology, Geography, Geology, History, Plant Biology, Sociology, and Statistics (UIUC), January 2003 - August 2005.

Statistics Department Executive Committee (UIUC), 2001-2005

Statistics Department Director of Undergraduate Studies (UIUC), 2000-2005

Statistics Department Colloquium Chair (UIUC), 1998-2001

Statistics Departmental Qualifying Exam Committee (UIUC):

STAT 326-329, Jan. and Aug. 2000, Aug. 2001, Aug. 2002, Jan. 2003
 STAT 410-411, Jan. 2001, Aug. 2003

Graduate Student Supervision:

Scott Nelson, M.S. Statistics (SDSU), 2009
 Jing Zheng, M.S. Statistics (SDSU), 2008
 Doug Noe, Statistics (UIUC), 2005-2006, Research Assistant
 Xiaodong Li, Statistics (UIUC), 2004, Research Assistant
 Xueying Li, M.S., Statistics (UIUC), 2003, Research Assistant, (Jointly supervised with Professor Sandra Rodriguez-Zas)
 Darren Glosemeyer, M.S., Statistics (UIUC), 2003, Research Assistant
 Pim Kuurman, Ph.D., Animal Science (UIUC), 2002

Committee Member:

Stefan Kolb, M.S., Applied Mathematics (SDSU), 2009
 Patrick Dussler, M.S., Applied Mathematics (SDSU), 2009
 Scott Strachan, M.S., Applied Mathematics (SDSU), 2009
 Markus Bantle, M.S., Applied Mathematics (SDSU), 2009
 Benedict Kramps, M.S., Applied Mathematics (SDSU), 2009
 Katja Sauler, M.S. Applied Mathematics (SDSU), 2007
 Andreas Rupp, M.S. Applied Mathematics (SDSU), 2007
 Michael Qingling Fan, M.S. Economics (SDSU), 2007
 Terressa Whitaker, M.S., Geography (SDSU) William Kilpatrick, M.S., Statistics (SDSU)
 Paula Chapman, M.S., Statistics (SDSU)
 Yonas Demissi, Ph. D. candidate, Civil and Environmental Engineering, 2007
 Hua Xie, Ph.D. candidate, Civil and Environmental Engineering, 2007
 Sang-Ock Kim, Ph.D., Civil Engineering, 2006
 Tereza Neocleous, Ph.D., Statistics , 2005
 Jianhui Zhou, Ph.D., Statistics, Research Assistant, 2005
 Dominic Frigon, Ph.D., Civil and Environmental Engineering, 2005
 Hairong Huang, M.S., Statistics, 2003, Research Assistant
 Nan Lin, Ph.D., Statistics, 2003
 Masha Kocherginsky, Ph.D. Statistics, 2002
 Luyang Fu, Ph.D, Agricultural and Consumer Economics, 2002
 Xiangyun Xiao, M.S. Natural Resources and Environmental Sciences, 2001
 Hedi Idris, Ph.D., Agricultural and Consumer Economics, 2001
 Sarah Hartz, Ph.D., Statistics, 2000
 Li Liu, Ph.D., Statistics, 2000
 Hanga Galfalvy, Ph.D., Statistics, 1999

Women in Mathematics, Science and Engineering (WIMSE) Living/Learning Communities at the University of Illinois, 1999-2002, activities include:

Attending dinner with students
 Participating in faculty panel discussions
 Volunteered for students to visit lab and conduct informational interview

Honors

Incomplete Lists of Teachers Ranked as Excellent (UIUC): STAT 428, Spring 2005; STAT 309, Fall 2002, Fall 2003, and Fall 2004.

Sigma Xi Honor Society

Section on Physical Sciences and Engineering (SPES) Special Contributed Paper Honorable Mention,
ASA annual meetings, Anaheim (1997)

Distinguished Service Award, Biomathematics Graduate Program (1996)

Outstanding Graduate Teaching Assistant, Mathematics Department, NCSU (1990)

Invited and Selected Presentations

“Neural Networks: A Flexible Nonlinear Model”

American Statistical Association annual meetings, Washington DC, August 2009. (invited speaker)

“Nonlinear Forecasts for the the Gulf of Maine Zooplankton Ecosystem”

Conservation and Research of Endangered Species (CRES), Zoological Society of San Diego, CA,
April, 2008.

American Statistical Association annual meetings, Salt Lake City, UT, August 2007.

International Biometric Society (WNAS), University of California, Irvine, June 27, 2007.

“A Statistical Approach to Modelling Nonlinear Systems” (invited speaker)

U.S. Geological Survey, San Diego, CA, August, 2008.

Division of Biostatistics and Bioinformatics, University of California, San Diego, May 16, 2007.

Department of Mathematics and Statistics, California State University, Long Beach, March 16, 2007.

Department of Statistics, University of California, Riverside, October 19, 2006.

“Dimension Reduction of Large Datasets in the Atmospheric Sciences”

American Statistical Association annual meetings, Seattle, August 2006. (invited speaker)

“Quantifying the Predictability of Noisy Nonlinear Biogeochemical Systems”

Computational Science Research Center (CSRC) Colloquium, SDSU, November 7, 2008. (invited
speaker)

Canadian Meteorological and Oceanographical Society, Vancouver, B.C., Canada, May 31, 2005. (in-
vited speaker)

“A Statistical Approach to Modeling Nonlinear Systems”

Department of Mathematics and Statistics, Portland State University, March 18, 2005. (invited
speaker)

“A Statistical Approach to Modeling Nonlinear Systems” Department of Earth and Atmospheric Science,
Cornell University, November 23, 2004. (invited speaker)

“Visualization of Nonlinear Statistical Models”

Spring Research Conference (SRC) on Statistics in Industry and Technology, NIST, Gaithersburg, MD,
May 19-21, 2004. (invited speaker)

“Developing Ecological Forecasts from Time Series Data”

Ocean Research Conference, Honolulu, Hawaii, Feb. 15-20, 2004.

“Visualization and Diagnostics of Nonlinear Statistical Models”

American Statistical Association annual meetings, San Francisco, August 2003.

“Visualization and Diagnostics of Nonlinear Statistical Models” Los Alamos National Laboratory, Los
Alamos, NM, July 2, 2003. (invited speaker)

“Statistics and Modeling: Nonlinear Time Series Analysis”

Climate-based Assessment and Forecasting for Ecosystems in the Gulf of Maine, Woods Hole, MA,
June 6, 2003. (invited speaker)

- “Visualization and Diagnostics of Nonlinear Statistical Models”
NCSA FY03 Faculty Fellows Presentation, March 19, 2003. (invited speaker)
- “Quantifying the Predictability of Nonlinear Space-Time Processes”
American Statistical Association annual meetings, New York City, August 2002.
- “A Comparison of the Regional Oxidant Model with Observational Ozone Data”
Environmental Hydrology and Hydraulic Engineering, University of Illinois at Urbana-Champaign,
April 24, 2002. (invited speaker)
- “A Comparison of the Regional Oxidant Model with Observational Ozone Data”
Environmental and Resource Economics, University of Illinois at Urbana-Champaign, September 19,
2001. (invited speaker)
- “Quantifying the Predictability of Noisy Nonlinear Biogeochemical Systems”
Department of Statistics Colloquium, University of Illinois at Urbana-Champaign, September 4, 2001.
(invited speaker)
- “Quantifying the Predictability of Noisy Nonlinear Systems”
American Statistical Association annual meetings, Atlanta, August 2001.
- “Modeling Cloud Cover as a Dynamical System”
The 3rd Japan-US Joint Seminar on Statistical Time Series Analysis, Kyoto, Japan, June 18-22, 2001.
(invited speaker)
- “A Statistical Approach to Quantifying the Predictability of Noisy Nonlinear Systems”
, Mathematical Sciences Research Institute: Workshop on Nonlinear Estimation and Classification,
Berkeley, CA, March 19-29, 2001.
- “Quantifying the Predictability of Noisy Nonlinear Systems”
Los Alamos National Laboratory, Los Alamos, NM, August 22, 2000. (invited speaker)
- “Quantifying the Predictability of Noisy Nonlinear Systems: A Statistical Approach”
Climate and Global Dynamics Seminar, NCAR, Boulder, CO May 2, 2000. (invited speaker)
- “Quantifying the Effects of Noise on Biogeochemical Models”
Interface 2000, New Orleans, LA, April 5-8, 2000.
- “Statistical Issues in Data Mining and Neural Network Models”
Meeting of Central Illinois Chapter of the American Statistical Association, Illinois State University,
Normal, IL, November 20, 1999. (invited speaker)
- “Statistics and Modeling Dynamical Systems”
Department of Mathematics, Division of Statistics, Northern Illinois University, Dekalb, IL, November
5, 1999. (invited speaker)
- “A Short Short-course in Data Mining”
Psychology Department Quantitative Seminar, October, 1999. (invited speaker)
- “A Short Short-course in Data Mining”
Department of Statistics Colloquium, University of Illinois at Urbana-Champaign, September 7, 1999.
- “Computational Aspects of Modeling the Spatial and Temporal Distribution of Cloud Cover”
Interface 1999, Schaumburg, IL, June 9-12, 1999 (invited speaker)

- “Modeling the Spatial and Temporal Distribution of Cloud Cover”
Department of Atmospheric Science, University of Illinois at Urbana-Champaign, April, 1999. (invited speaker)
- “Modeling Clouds as a Dynamical System”
Joint Purdue-Illinois Colloquium, Department of Statistics, Purdue University, October 15, 1998.
- “Statistics and Dynamical Systems, Beyond Chaos”
Statistics Department Seminar, Colorado State University, Fort Collins, CO. April, 1998. (invited speaker)
- “Modeling the Spatial and Temporal Distribution of Cloud Cover”
American Meteorological Society, 14th Conference on Probability and Statistics, Phoenix, AZ, January 1998.
- “Modeling the Spatial and Temporal Distribution of Cloud Cover”
American Statistical Association annual meetings, Anaheim, August 1997.
- “Local Lyapunov Exponents: A Closer Look at Chaos, with Confidence”
Third North American Conference of New Researchers’ in Statistics and Probability, Laramie, WY, July 1997
- “Issues in Modeling the Distribution of Cloud Cover”
A Symposium by Faculty and Postdoctoral Fellows of the Geophysical Statistics Project of NCAR, Colorado State University, Fort Collins, February 1997.
- “A Comparison of the Regional Oxidant Model with Observational Ozone Data”
4th World Congress of the Bernoulli Society, Vienna, Austria, August 1996. (invited speaker)
- “Local Lyapunov Exponents: A Closer Look at Chaos, with Confidence”
Society for Industrial and Applied Mathematics annual meeting, Kansas City, July 1996 (invited speaker)
- “On Asymptotics and Applications of Local Lyapunov Exponents” (joint with Stephen Ellner)
Workshop on: Nonlinear Dynamics and Time Series: Building a Bridge Between the Natural and Statistical Sciences, Montreal, July 1995.
- “Local Lyapunov Exponent: predictability depends on where you are”
American Institute of Biological Sciences annual meetings, Knoxville, TN, August 1994.
Southeast Regional Mathematical and Statistical Ecology Conference, April 1994
American Statistical Association annual meetings, San Francisco, August 1993. (invited speaker)
- “Neural Networks for Function Estimation” (joint with Douglas Nychka)
Interface 1994, Research Triangle Park, June 1994.