

## Montserrat, Fuentes

Box 8203 NCSU  
Statistics Department  
North Carolina State University  
Raleigh, NC 27695  
919-515-1921 (phone)  
919-515-1169 (fax)  
[fuentes@stat.ncsu.edu](mailto:fuentes@stat.ncsu.edu) (email)  
[www4.stat.ncsu.edu/~fuentes](http://www4.stat.ncsu.edu/~fuentes)

## Curriculum Vitae

**Citizenship:** United States

### Education

PhD; 1998; Statistics; University of Chicago, Chicago, IL  
B.S.; 1993; Mathematics and Statistics; Extraordinary award of Graduation; University of Valladolid, Spain  
B.S.; 1993; Music; Piano; University of Valladolid, Spain

### Positions Held

#### Employment

8/2008-present: Full Professor (tenured), Department of Statistics, North Carolina State University.  
8/2003 - 8/2008: Associate Professor, Department of Statistics, North Carolina State University. Tenured.  
8/2003 - Present: Associate status, Department of Marine Earth and Atmospheric Sciences, North Carolina State University  
8/1998 - 8/2003: Assistant Professor, Department of Statistics, North Carolina State University  
1/1999 - Present: Visiting Scientist, The Environmental Protection Agency, Atmospheric Modeling Division, RTP, North Carolina

#### Other Experience

9/2009- Member of the iSMOC committee of the National Children's Study.  
7/2009-7/2012 Member of board of trustees of the National Institute of Statistical Sciences.  
1/2009-12/2011 Member of Committee on Federally Funded Research. ASA.  
6/2009-present Member of of the ASA Climate Change Policy Advisory Committee.  
1/2009/ 12/31/2010 Council of Sections representative. Section on Statistical Computing. ASA  
3/2007-Present National Academies. NRC Committee on Ozone Mortality Risk Reduction Benefits

4/2008-4/2011	Member of the scientific advisory committee of Health Canada.
8/2007-9/2010	Member of IMS council
1/2007-3/2007	Expert Witness for the Department of Justice. (U.S. v. American Electric Power).
8/2003 - 12/2003:	Visiting faculty at the Center on Global Change, Duke University
10/2006-present	Member of the US EPA Ethylene Oxide Review Panel
1/2004- 9/2009	Member of US EPA Science Advisory Board's Integrated Human Exposure Committee (second term)
9/2004-31/2012	Member of the Board of Directors of the International Environmetrics Society (second term).
1/2007-1/2008	Treasurer and secretary of the ASA Bayesian section.
6/2005-6/2009	Member of the Biostatistical Methods and Research Design (BMRD) study section, NIH.
6/2004 -present	Member of the SAMSI Local Development Committee
1/2003- 6/ 2006	Member of ENAR Regional Advisory Board.
6/2006 - 6/2009	Associate Editor of Annals of Applied Statistics
1/2003 - 6/2010:	Associate Editor of Biometrics (third term).
1/2003 - present:	Associate Editor of Environmetrics (third term).
9/2009 - 9/2012	Associate Editor of JASA case studies.
6/1998 - 1/1999:	Visiting scientist (Post-Doc), The National Center of Atmospheric Research, Geophysical Statistics Project, Boulder, CO
Summer 1996:	Researcher, Lucent Technologies, Bell Labs, New Jersey
Summer 1995,	
Fall 1995:	Researcher, AT&T. Department of Statistics, Bell Labs, New Jersey.
5/1994 - 10/1994	Researcher, European Union, Joint Research Center, Italy.

## Professional Leaves

8/2003 - 12/2003:	Visiting faculty at the Center on Global Change, Duke University, Durham, NC
6/1998 - 1/1999:	Visiting scientist, The National Center of Atmospheric Research, Geophysical Statistics Project, Boulder, CO
8/2008 -1/2009	Visiting faculty at the Statistics Department, Duke University, Durham, NC

## Honors and Awards

ASA fellow 2008

*Abdel El-Shaarawi Young Research's Award, 2003*, Recognition of outstanding contributions to environmetric research.

Member elect of ISI

Invited to write papers for special issues of the Journal of Geographic Research-Atmospheres, Ecological and Environmental Statistics, Ecological Applications, Environmetrics, Statistical Modeling: An International Journal, the Journal of International Statistical Review, the journal of Computational Statistics and Data Analysis.

NSF Travel award for the ISI conference in Portugal (2007).

Travel award for the METMA-2 conference, Granada (Spain), 2004

Travel award for the ISBA-IMS conference, San Juan, Puerto Rico, 2003

Travel award for the TIES conference, Johannesburg, South Africa, 2003.

Travel award for the Statistical Ecology workshop, Jackson, Wyoming, 2003

Travel award for the SAMSI/NCAR workshop, Boulder, CO, 2003

Travel award for the Spatial Statistics in the 21st Century conference, ASA, Chicago, May 2001.

Travel award for the Spatial Moving Average Conference, UW, Seattle, June 2001.

Travel award for the METMA-1 conference, Castellon, Spain, 2001

Travel award for the joint JAPAN-US time series conference, Tokyo, Japan, 2001

Travel award for the IMS young researchers conference, Baltimore, MA, 1999.

Invited to teach a Summer course at the School of Environment at Duke (June 2004) and a short course at Seminaire Europeen de Statistique SEMSTAT (December 2004).

## **Areas of Research**

Spatial statistics, spatial-temporal modeling, Bayesian spatial inference, computer models, applications in environmental and health sciences. Research motivated by scientific problems in weather forecasting, oceanography, climate, ecology, air pollution and human health effects from pollution.

## **Funded Grants**

**NSF DMS. CMG 2009-2010** Multivariate nonstationary spatial extremes in climate and atmospherics

PI: Fuentes

Co-PIs: Alan Gelfand (Duke), Peter Guttorp (UW), Doug Nychka (NCAR) and Kate Calder (OSU). Consultant: Richard Smith (UNC). L. Mearns (NCAR), and Rick Katz (NCAR)

**NASA.** 2009-2011.

Statistical Validation of Sea Surface Salinity Measurements from Aquarius  
Budget: \$150,000 for 2 years.  
PIs: Fred Bingham (Prof. of Oceanography, UNCW) and Fuentes.

EPA- STAR (3 years) Starting Dec 2008.  
Spatial Temporal Analysis of Health Effects Associated With sources and Speciation of  
Fine PM  
Total Budget: \$893,439  
PI: Fuentes

NIH- R01 (3 years) Starting Jan 2008.  
A Spatial temporal modeling approach for Environmental Epidemiological Data.  
Total Budget: \$1,086,133  
PI: Fuentes (30% of time + a graduate student)

NSF award for 2,000 from the associated for women in Mathematics. \$2,000 (August 2007)

Centers for Disease Control and Prevention (CDC)  
The North Carolina Center for Birth Defects Research and Prevention  
PI: Andrew Olshan. Budget: \$ 6,321,731. 12/01/2008 – 12/01/2013  
Fuentes is a co-PI (Summer support).

GIT: Graduate industrial trainee program. GIT with Waratah Corporation under EPA  
Prime contract EP-D-06-072  
Impact of climate change on future ambient ozone values.  
PI: Fuentes  
Student supported: Jingwen Zhou (advisor: Fuentes). Research conducted in  
collaboration with EPA. *This GIT provides full support for the student.*

Center for Environmental Health and Susceptibility, UNC.  
PIs: A. Herring and M. Fuentes. August 2007.  
“New Statistical Approaches for Combining Multiple-Source Environmental Data.”  
(Summer 07 support for Fuentes)

NSF-DMS. 2007-2010. PI: Fuentes. Co-PIs: Lian Xie (Professor of Oceanography) and  
Brian Reich (postdoc). \$260,000.  
Multivariate space-time models and methods to combine large disparate spatial data and  
numerical models

NSF-DMS. 2004-2007. PI: Fuentes. \$111,652  
Estimation, Modeling and prediction of nonseparable and nonstationary space-time  
processes.

NSF-DMS. 2000-2004. PI: Fuentes. \$149,754  
Spatial Modeling, Analysis and Prediction of Nonstationary Environmental Processes

NSF-DMS. PI: Fuentes Travel award for the IMS-ISBA conference (Italy) 2005 To  
support student traveling. \$10,000

NSF-DMS. PI: Fuentes Travel award for the ISI Environmental and health statistics  
(Spain) 2003. To support student traveling. \$9,000

NSF-DMS. VIGRE. Co-PI: Fuentes. 2005-2008. "Integrated and Mentored Program of  
Research and Education in Statistical Sciences" \$3,807,965.

NSF-DMS. 2001-2002. PI: Bloomfield. Co-PI: Fuentes. "Scientific Computing Research  
Environments for the Mathematical Sciences" \$21,942

NIH.PI: Fuentes. 2003. Travel award for the ISI international conference on  
Environmental Statistics and Health. \$9,000. To support student/junior  
investigators traveling.

EPA PI: Fuentes. 2003. Travel award for the ISI international conference on  
Environmental Statistics and Health. \$9,000. To support student/junior  
investigators/invited speakers traveling.

Center for Environmental Health and Susceptibility, UNC.

PIs: A. Herring and M. Fuentes. 2007.

"New Statistical Approaches for Combining Multiple-Source Environmental Data."  
(Summer support for Fuentes)

EPA PI: Fuentes. Co-PI: Dave Higdon. 2001-2005.

"Statistical Methodology for Spatial Modeling and Interpolation of Air and Deposition  
Pollutants" \$.469,978

DOD PI: Fuentes. Co-PI: J. Davis. 2001-2004.

"The development of a model for predicting the wind field over the Chesapeake Bay"  
\$230,402.

NOAA. PIs: Fuentes and Morrison. 2001-2003. "Climate Scale Sea-Surface-Temperature  
Analyses" (support for a graduate student). \$100,000

NOAA. PI: Pietrafesa. Project leaders: Xie and Fuentes. 2003 – 2007

\$3,00,000 (1 month of Summer and 1 graduate student for Fuentes)

"Climate and Weather Impacts on Society & the Environment"

Faculty Research and Professional Development Fund, NCSU. PI: Fuentes. 2001. "New methodology for spatial interpolation of nonstationary environmental processes" \$5000.

Alfred P. Sloan Foundation. PI: Fuentes \$29,239. 2002-2003.

EPA. PI: Fuentes 1999-2001. "Spatial structure of dry deposition" \$62,100/year for salary + \$5,000/year for travel

EPA

1. Coop with EPA to support a PhD students working with Fuentes (Man Sik Park). Jan. 2004-Dec 2005.
2. Coop with EPA to support a PhD student working with Jungsoong Choi. June 2005-June 2006.
3. Coop with EPA to support a PhD student working with Fuentes (Hae-Ryoung Song). May 2004-Dec 2006.

## Refereed Publications

## Chapters

1. Fuentes, M., Doney, S. C., Glove D. M. and McCue S. J. (2000). *Spatial structure of ocean color data in the North Atlantic, "Case Studies in Statistics and the Atmospheric Sciences"*. Springer-Verlag, New York, pp. 153-172.
2. Fuentes, M. (2002). *Spatial interpolation of environmental processes, "Spatial Statistics through Applications"*. WIT Press, Boston. Chapter 4, pp. 71-104.
3. Chen, L., Fuentes, M. and Davis, J.M. (2006). Spatial-temporal statistical modeling and prediction of environmental processes. Pages 121-144 in *Hierarchical Modelling for the Environmental Sciences: Statistical methods and applications* (eds., J.S. Clark and A.E. Gelfand). New York: Oxford University Press, 205pp.
4. Fuentes, Montserrat, Guttorp, Peter, and Sampson, Paul. (2007). *Using transforms to analyze space-time processes*, chapter in *Statistics of Spatio-Temporal Systems*. Editors, Held and Finkenstadt. CRC/Chapman Hall. Pages: 77-151.
5. Steel, M. and Fuentes, M. (2009). *Nonparametric Modeling of Spatial Data*. Chapter in the upcoming *Handbook of Spatial Statistics*. CRC Press.
6. Fuentes, M. and Reich, B. (2009). *Spectral Analysis for Spatial Data*. Chapter in the upcoming *Handbook of Spatial Statistics*. CRC Press.
7. Gelfand, A., Fuentes, M., Guttorp, P., and Diggle, P. (2009). *The Handbook of Spatial Statistics*. CRC Press.
8. Fuentes and members of the National Research Council Committee on Ozone Mortality Risk Reduction Benefits (2008). *Estimating Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure*. National Academies of Science.

## Journals:

9. Fuentes, M. (2009). Statistical issues in health impact assessment at the state and local levels. *Air Quality, Atmosphere and Health*, 2, 47-55.
10. Reich, B., Fuentes, M. and Herring, A. (2009). Bayesian Variable Selection for Multivariate Spatially-Varying Coefficient Regression. *Biometrics*, accepted.
11. Choi, J., Fuentes, M. and Reich, B. (2008). Spatial-temporal association between fine particulate matter and daily mortality. *Journal of Computational Statistics and Data Analysis*, accepted.
12. Fuentes, M., Peter Guttorp, P., and Stein, M.L. (2008) Special section on statistics in the atmospheric sciences. *Annals of Applied Statistics*, Volume 2, Number 4 (2008), 1143-1147.
13. Fuentes, M. (2009). The role of statisticians in U.S. environmental regulation and policy. *Boletín de Estadística e Investigación Operativa*, 25, 46-50.
14. Fuentes, M. (2008). Comments on: Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations (Rue, Martino and Chopin). *Journal of the Royal Statistical Society, B*, in press.
15. Choi, J., Reich, B., Fuentes, M., and Davis, J.M. (2008). Multivariate spatial-temporal modeling and prediction of speciated fine particles. *Journal of Statistical Theory and Practice*, accepted.
16. Fuentes, M., Reich, B., and Lee, G. (2008). Spatial-temporal mesoscale modelling of rainfall intensity using gage and radar data. *Annals of Applied Statistics*, 4, 1148-1169.
17. Reich, B., Fuentes, M., and Burke, J. (2009). Analysis of the effects of ultrafine particulate matter while accounting for human exposure. *Environmetrics*, in press.
18. Park, M.S., and Fuentes, M. (2008). New Classes of Asymmetric Spatial-Temporal Covariance Models. *Statistical Modelling: An International Journal*, accepted.
19. Song, H.R., Fuentes, M., Ghosh, S. (2008). A comparative study of Gaussian geostatistical models and Gaussian Markov random field models. *Journal of Multivariate analysis*, 99, 1681-1697.
20. Fuentes, M., Chen, L., and Davis, J. (2008) A class of nonseparable and nonstationary spatial temporal covariance functions. *Environmetrics*, 19, 487-507.
21. Park, M.S., and Fuentes, M. (2008). Testing Lack of Symmetry in Spatial-Temporal Processes. *Journal of Statistical Planning and Inference*, 138, 2847-2866.
22. Foley, M. and Fuentes, (2008). A statistical framework to combine multivariate spatial data and physical models for hurricane surface wind prediction. *Journal of Agricultural, Biological, and Environmental Statistics*, 13, 37-59
23. Fuentes, M. (2007) Approximate likelihood for large irregularly spaced spatial data. *Journal of the American Statistical Association*, Theory and Methods. Vol. 102, No. 477, 321-331
24. Foley, M., Fuentes, M. and Xie, L. (2007). Ensemble Kalman filter experiments for coastal ocean prediction under hurricane conditions. *Ocean Modelling*, accepted.

25. Reich, B., and Fuentes, M. (2007). A multivariate semiparametric Bayesian spatial modeling framework for hurricane surface wind fields. *Annals of Applied Statistics*, 1, 249-264.
26. M. Foley, and M. Fuentes (2007). Multivariate space-time models for environmental processes. GIS encyclopedia, Springer, to appear.
27. Xie, L., Bao, S., L.P. Pietrafesa, Foley, K., and Fuentes, M. (2006). A real-time hurricane surface wind forecasting model: formulation and verification. *Monthly Weather Review*, 134, No. 5, pages 1355–1370.
28. Flores, F.J. H. L. Allen, H. Cheshire, J.M. Davis, M. Fuentes, and D. L. Kelting. (2006). Using multispectral satellite imagery to estimate leaf area and response to silvicultural treatments in loblolly pine stands. *Can. J. Forest Research*. 37: 1587-1596
29. Fuentes, M., Chaudhuri, A. and Holland, D. (2007). Bayesian entropy for spatial sampling design of environmental data. *Environmental and Ecological Statistics*, 14, 323-340
30. Fuentes, M. (2006). Dynamic Gaussian Process Priors, with Applications to the Analysis of Space-time Data (discussion of chapter by Gamerman, Salazar and Reis). *Bayesian Statistics 8*. Editors: Bernardo, Bayarri, Berger, Dawid, Heckerman, Smith and West.
31. Fuentes, M., Kittel, T. and Nychka, D. (2006). Sensitivity of ecological models to spatial-temporal estimation of their climate drivers: Statistical ensembles for forcing. *Ecological Applications*: Vol. 16, No. 1, pp. 99–116.
32. Fuentes, M., Song, H.R., Ghosh, S., Holland, D. and Davis, J. (2006). Spatial association between speciated particulate matter and mortality. *Biometrics*, 62, 855-863.
33. Taylor, C., Thompson, J., Rand, P., and Fuentes, M. (2005). Sampling and statistical considerations for hydroacoustic surveys used in estimating abundance of forage fishes in reservoirs, *North American Journal of Fisheries Management*, 25, 73-85
34. Fuentes, M. (2005). A formal test for nonstationarity of spatial stochastic processes. *Journal of Multivariate Analysis*, 96, 30-55
35. Fuentes, M. and Raftery, A. (2005). Model evaluation and spatial interpolation by Bayesian combination of observations with output from numerical models. *Biometrics*, 61, 36-45.
36. Fuentes, M., Chen, L., Davis, J. and Lackmann, G. (2005). A new class of nonseparable and nonstationary covariance models for wind fields. *Environmetrics*, 16, 449-464.
37. Fuentes, M. (2004). Nonstationary multivariate process modeling through spatially varying coregionalization: Comment. *TEST* (invited discussion of a paper by Gelfand, Schmidt and Banerjee), **13**, 33-36.
38. Fuentes, M. (2004). Testing for separability of spatial-temporal covariance functions. *Journal of Statistical Planning and Inference*, 136, 447-466.
39. Fuentes, M. (2003). Statistical analysis of areas of compliance with the air pollution standards. Invited paper for a special issue in *Journal of Geophysical Research, Atmosphere*, **108** (D24), 8780.
40. Fuentes, M. (2003). Book review: Predictions in time series using regression models. *Journal of the American Statistical Association*, **98**, 768-769.

41. Fuentes, M. (2003). Spatial-Temporal Nonlinear Filtering Based on Hierarchical Statistical Models: Comment. *TEST* (invited discussion of a paper by Irwin, Cressie and Johannesson), **2**, 284-287.
42. Doney, S., Glover, Fuentes, M., and McCue, S. (2003). Mesoscale variability of Sea-viewing Wide Field-of-View Sensor (SeaWiFS) satellite ocean color: Global patterns and spatial scales. *Journal of Geophysical Research, Oceans*. **108** (C2), 3024
43. Fuentes, M, Guttorp, and Challenor, P. (2003). Statistical assessment of numerical models. *International Statistical Review*. **71**, **2**, 201-221.
44. Fuentes, M. (2002). Modeling and prediction of nonstationary spatial processes. *Statistical Modelling: An International Journal*, **2**, 281-298.
45. Fuentes, M. (2002). Periodogram and other spectral methods for nonstationary spatial processes. *Biometrika*, **89**, 197-210.
46. Fuentes, M. (2001). A High Frequency Kriging for Nonstationary Environmental Processes. *Environmetrics*, **12**, 1-15.
47. Fuentes, M. (2001). Fixed-domain asymptotics for variograms using subsampling. *Mathematical Geology*, Vol 33, **6**, pp. 679-691.
48. Fuentes, M. (2000). Predicting Integrals of Diffusion Processes with unknown diffusion parameters. *Stochastics*, **69**, pp. 255-283.
49. Fuentes, M. (2000). Predicting Integrals of Diffusion Processes. *Journal of Statistical Planning and Inference*, **90**, pp. 183-193.
50. Smith, R.L., Kim, Y., Fuentes, M., and Spitzner, D. (2000). Threshold dependence of mortality effects for fine and coarse particles in Phoenix, Arizona. *Journal of the Air and Waste Management Association* **50**, 1367-1379.
51. LeGrange, Carter, Fuentes, Boo, Freeny, Cleveland, and Miller. (1997). The Dependence of the Electro-Optical Properties of Polymer Dispersed Liquid Crystals on the hotopolymerization Process. *Journal of Applied Physics*, vol. 81 (**9**).

## **Presentations at Regional, National or International Meetings**

### **Invited Presentations (August 1999- August 2008)**

1. Spatial modeling of health effects from pollution (invited talk). Washington, DC. JSM, August 2009.
2. Bayesian spatial variable selection: applied to pregnancy data (invited talk). San Antonio, TX. ENAR, March 2009.
3. *Get involved in the research on environmental statistics going on in RTP!* (invited discussant, leading a luncheon). JSM, August 2008
4. *Bayesian variable selection for spatially-varying coefficient regression: application to physical activity in prenatal women.* (invited speaker). TIES, June 9-13 2008.
5. *Bayesian variable selection for spatially-varying coefficient regression: application to physical activity in prenatal women.* (invited speaker) Reich will give this talk. IISA conference in Connecticut, Storrs. May 22-25, 2008.
6. *Nonparametric spatial models.* Invited speaker for the ISI international

- conference 2007 (August 23 2007, Portugal).
7. *Nonparametric models for spatial data*. Plenary speaker for the International Conference on Advances in Interdisciplinary Statistics and Combinatorics, North Carolina. October 12-14, 2007.
  8. *Uncertainty analysis of air quality deterministic models*. Invited speaker for an EPA regional meeting (August 8, 2007, North Carolina).
  9. Nonparametric spatial models. Invited speaker for the ISI international conference 2007 (August 23 2007, Portugal),
  10. Likelihood approximation for spatial temporal processes. Invited speaker for ENAR 2007 (March 13, 2007, Atlanta).
  11. Spatial temporal modeling framework for hurricane wind fields. Plenary speaker for the CLAPEM international conference in Lima, Peru (Feb. 27, 2007).
  12. Combining data and numerical models for hurricane forecasting. Invited speaker for the JSM conference in Seattle, August 2006.
  13. Spatial temporal covariance models. 26<sup>th</sup> European Meeting of Statisticians (invited speaker), Torun, Poland, July 2006.
  14. Should ultrafine particules be regulated? TIES, Sweden, June 2006 (invited talk).
  15. Spatial association between speciated particulate matter and mortality. Invited speaker for the Bayes Workshop at Warwick, May 2006.
  16. Dynamic priors for space-time modeling. Invited discussant for the Bayesian Valencia 8 meeting, June 2006.
  17. Data assimilation for hurricane forecasting. Invited speaker for the ENAR conference in Tampa, March 2006.
  18. Probabilistic methods for environmental exposure risk analysis. (invited talk) by Fuentes. Society for Risk Analysis (SRA) conference in Orlando, December 2005.
  19. Multivariate spatial-temporal models for wind fields. Invited speaker for the Royal Statistical Society Environmental Statistics Section workshop, June 2, London, UK.
  20. The use of statistics within a regulatory framework. Invited speaker for the LPR (Law, Probability and Risk) conference, June 5, Edinburgh, UK
  21. *Combining numerical models and data for wind forecasting*. JSM conference in Minneapolis, August 2005.
  22. *Bayesian hierarchical models for association between pollution and mortality*. Song, Fuentes, Ghosh, ENAR, Austin, March 2005. (national meeting)
  23. *Combining numerical models and spatial data*. Fuentes, JSM (invited paper, sponsored by ENAR), Minneapolis, 2005. (international meeting)
  24. *Likelihood approximation methods*. Cooney, Fuentes, JSM, Minneapolis, 2005. (international meeting)
  25. *New models for asymmetric spatial processes*. Park, Fuentes. JSM, Minneapolis, 2005. (international meeting)
  26. *Combining disparate spatial data*. Fuentes. Royal Statistical Society (invited paper), London, June 2005. (invited speaker with travel expenses covered by RSS) (international meeting)
  27. Fuentes, M. (invited speaker). (title, TBA). Probabilistic Risk Assessment (PRA): Bridging Components Along the Exposure-Dose-Response Continuum workshop.

- Washington, DC. July 2005. Sponsored by ACS, SOT, and U.S. EPA (invited speaker with travel expenses covered by EPA). (regional meeting)
28. *Statistical association between Particulate Matter and mortality*. TIES conference in Portland (Maine) June 2004, (invited paper). Fuentes, Song, Ghosh, Holland and Davis. (international meeting)
  29. *Nonseparable models for wind fields*. Chen, Fuentes, and Davis. (invited paper). TIES conference. June 2004. (international meeting)
  30. *Bayesian hierarchical spatial-temporal models for wind data*. Chen and Fuentes (invited paper). International Chinese Statistical Association 2004 Applied Statistics Symposium. San Diego, June 6-9, 2004. (international meeting)
  31. *Bayesian wind field prediction and evaluation of mesoscale numerical models*. Fuentes, Davis and Chen. Workshop sponsored by DTRA. Washington DC. July 2004. (regional meeting)
  32. *Likelihood approximation methods for large spatial datasets*. Fuentes, JSM (invited paper), Toronto, August, 2004. (international meeting)
  33. *Spatial association between particulate matter and mortality*. Song, Fuentes, JSM, Toronto, August 2004. (international meeting)
  34. *Spatial association between pollution and health effects*. Fuentes. Computational Environmetrics Conference, Chicago, October 21-23, 2004, sponsored by the Center for Integrating Statistical and Environmental Science (CISES), University of Chicago (invited speaker with travel expenses covered by CISES). (regional meeting)
  35. *Spatial association of particulate matter and human health effects*. ENAR conference in Pittsburg, March 2004. (invited speaker).
  36. *Spatial temporal modeling of wind fields*. (invited speaker). 2nd Spanish Workshop on "Spatio-Temporal Modelling of Environmental Processes" June 1-3, 2004 Granada, Spain
  37. *Statistical data assimilation methods for weather numerical models. Multiscale model development and control design*, SAMSI workshop, RTP, NC. January 2004. Fuentes, M. (2003).
  38. *Sensitivity of ecological models to spatial-temporal estimation of their climate drivers: Statistical ensembles for forcing*, (invited paper). Fuentes, M. (2003).
  39. *Statistics in Ecology workshop*. Jackson, Wyoming, December 2003. (co-authors: Kitel, Kelly and Nychka). Fuentes, M. (2003).
  40. *Estimating space-time trends combining observations with output of numerical models*, (invited paper). Fuentes, M. (2003). TIES 2003, Johannesburg (South Africa). November 2003.
  41. *Testing and modeling for nonseparability*, (invited paper). Fuentes, M. (2003). Joint Statistical Meeting, San Francisco. August, 2003
  42. *Testing and modeling nonstationarity for spatial processes*, (invited paper). Fuentes, M. (2003). Annual Meeting of the Statistical Society of Canada, Halifax, June 2003.
  43. *Bayesian entropy for monitoring network design* (invited paper). International ISBA-IMS meeting, Puerto Rico. July 2003. (co-authors: Chaudhuri, Holland).
  44. *Test for separability of spatial-temporal covariances*, (invited paper). Fuentes, M. (2003). ISI- International Conference on Environmental Statistics and Health,

- Santiago, Spain. July 2003. (co-authors: Chen, Davis).
45. *Bayesian melding approach to combine disparate spatial data*, (invited paper). Fuentes, M. (2003). Eastern North American Region of the Biometric Society (ENAR) Conference. Tampa, Florida. March 2003. (co-author: Raftery).
  46. Statistical modeling and interpolation of air quality. SAMSI workshop, (invited paper). RTP, NC, April 2003. Fuentes, M. (2003).
  47. Quantifying uncertainty in weather forecast, (invited paper). Fuentes, M. (2002). US Army Conference. October 2002. (co-authors: Raftery and Mass).
  48. Spectral methods for spatial data, (invited paper). Fuentes, M. (2002). Eastern North American Region of the Biometric Society (ENAR) Conference. Washington, DC. March 2002.
  49. *Statistical assessment of numerical models*, (invited paper). Fuentes, M. (2002). The International Environmetrics Society (TIES) Conference. Italy, June 2002.
  50. *Spatial interpolation by combining observations with outputs from numerical models via Bayesian melding*. (invited paper). Fuentes, M. and Raftery, A. (2002). The 22nd International Symposium on Forecasting (ISF). Dublin, Ireland. June 2002.
  51. *Model validation and spatial interpolation via Bayesian melding*. Fuentes, M. and Raftery, A. (2002). Valencia 7 International Meeting on Bayesian Statistics. Tenerife, Spain. June 2002.
  52. *Spatial prediction of nonstationary environmental processes*. Barber, J. and Fuentes, M. ENAR Conference, Washington DC, March 2002.
  53. *Role of Wavelets in the Physical and Statistical Modelling and Visualization of Complex Geological Processes* (invited talk). David A. Yuen, Gordon Erlebacher, Oleg V. Vasilyev, Dan Goldstein, and Montserrat Fuentes. (2002). International ACES Meeting. Maui, Hawaii. May 5-10. ACES stands for "APEC (the Asia Pacific Economic Cooperation) Cooperation for Earthquake Simulation".
  54. *Analytical issues of spatial econometrics in watershed analysis of geographically referenced data*. Lee, Fuentes and Zering (2002). Water Resources Research Institute conference, Raleigh, NC, April 2002.
  55. *Explorations in the spatial analysis of hydroacoustic data for populations assessments in temperate and tropical reservoirs*. Taylor, Rand and Fuentes (2002). American Fisheries Society annual meeting, Baltimore, Maryland, August 2002
  56. *Modeling and Prediction of Nonstationary Environmental Processes* (invited paper) Fuentes, M. (2001). 1st Spanish Workshop on Spatio-Temporal Modelling of Environmental Processes (METMA) Conference, Spain, October 2001.
  57. *Entropy approaches for air pollution monitoring network design* (invited paper). Fuentes, M. (2001). Spatial Data Analysis Technical Exchange Workshop, sponsored by the US EPA. North Carolina, December 2001.
  58. Bayesian hierarchical statistical models for analysis of images, (invited paper). Fuentes, M. (2001) Society for Industrial and Applied Mathematics (SIAM) Conference on Imaging Science. Boston, September 2001.
  59. *Models and computations for nonstationary spatial processes*, (invited paper). Fuentes, M. (2001). The International Environmetrics Society (TIES) Conference. Portland, August 2001.

60. *Spectral methods for nonstationary random fields*, (invited paper). Fuentes, M. (2001). Joint Statistical Meeting (JSM), Atlanta, August 2001.
61. *Models and computations for nonstationary spatial processes*, (invited paper). Smith, R. and Fuentes, M. (2001). International Statistical Institute (ISI), 53rd Biennial Session. Seoul, Korea. August, 2001.
62. *Spectral methods for nonstationary processes*, (invited paper). Fuentes, M. (2001). Japan-U.S. Seminar of Statistical Time Series Analysis (funded by NSF), June 2001.
63. *Models and spectral methods for nonstationary processes*, (invited paper). Fuentes, M. (2001). Spatial Moving Average Conference, UW, Seattle, June 2001.
64. *Models and computations for nonstationary spatial processes*, (invited paper). Fuentes, M. (2001). Spatial Statistics in the 21st Century, ASA, Chicago, May 2001.
65. *New areas of research of statistics in the geosciences*. Fuentes, M. (2001). Institute for Mathematics and its Applications, Minnesota (invited). March 6, 2001.
66. *Spatial Interpolation of Nonstationary Environmental Processes*. Fuentes, M. (2000) 12th Conference on Applied Climatology, Asheville, NC, May 2000.
67. *High Frequency Kriging for Non-stationary Environmental Processes*, (invited paper). Fuentes, M. (2000). Fifth World Congress of the Bernoulli Society for Mathematical Statistics and Probability and 63rd Annual Meeting of the Institute of Mathematical Statistics, Mexico, May 2000.
68. *Spatial Modeling and Prediction of Nonstationary Environmental Processes*, (invited paper). Fuentes, M. (2000). International Conference on Statistics in the 21st Century. University of Maine, Orono, ME, June 2000.
69. *Interpolation of Nonstationary Environmental Processes*, (invited paper). Fuentes, M. (2000). Joint Statistical Meeting 2000, Indianapolis, IN, August 2000.
70. *Spatial Prediction of Climate Fields for Ecological Models*, (invited paper). Fuentes, M. (1999). Fourth North American New Researchers Conference, Baltimore August 1999. (co-authors: Kelly, Kitel and Nychka).
71. *Spatial Structure of Satellite Ocean Color Data for the North Atlantic Ocean*. Fuentes, M. (1999). Special Contributed Paper. JSM, Baltimore August 1999. (co-author: Doney).

### **Invited Presentations (Dec 1998- August 2008)**

1. *Large spatial prediction problems*. Statistics Department, Davis. California. December 1998.
2. *Methodology in Spatial Statistics*. Mathematics Department, School of Mines, Colorado. December 1998.
3. *Spatial Prediction of Climate Fields for Ecological Models*. National Institute of Statistical Sciences (NISS), NC. January 1999.
4. *Spatial Prediction of Climate Fields for Ecological Models*. Department of Statistics, University of North Carolina (UNC). February 1999.

5. *Spatial Statistics Methodology*. Department of Electrical and Computer Engineering, NCSU. February 1999.
6. *Spatial Interpolation for Nonstationary Fields*. Statistics Department, NCSU, September 24, 1999.
7. *Sensitivity of ecological models to their climate drivers: Statistical ensembles for forcing*. Water Resources and Environmental Engineering, NCSU. September 27, 1999.
8. *Loading of atmospheric pollutant concentrations over different geo-political boundaries*. Columbia University, NY. October 7, 1999.
9. *Spatial Interpolation for Nonstationary Fields*. Duke University, NC. November 19, 1999.
10. *Spatial Statistics and applications*. UNC School of Public Health, NC. February 25, 2000.
11. *Spatial prediction of air pollutant fluxes and deposition*. Environmental Protection Agency, RTP, NC. April 12, 2000.
12. *Spectral methods for nonstationary spatial processes*. Boston University, Mathematics Department. December 2000.
13. *Bayesian spatial statistics*. Harvard University, Statistics Department. December 2000.
14. *Spectral methods for spatial modeling*. University of Connecticut, Statistics Department. December 2000.
15. *Nonstationary modeling and prediction of air pollution*. University of Washington, National Research Center for Statistics in the Environment. October 2000.
16. *Models and computations for nonstationary spatial processes*. University of Virginia, January 19, 2001.
17. *Spectral methods for spatial nonstationary processes*. Statistics Department. University of North Carolina, CH. February 5, 2001.
18. *Bayesian Hierarchical Statistical Models for Analysis of Images*. Electrical Engineering Department, NCSU. October 2001.
19. *Modeling and Prediction of Nonstationary Spatial Processes*. Statistics Department. The University of Georgia. October 2001.
20. *Spatial Interpolation by Combining Observations with Outputs from Numerical Models*. Center for Statistics and Social Sciences, University of Washington, Seattle. January 2002.
21. *Modern Spatial Statistics Approaches for Environmental Data*. Multidisciplinary University Research (MURI) group. University of Washington, Seattle. January 2002.
22. *Spatial temporal nonseparable covariances*. Statistics Department, North Carolina State University. January 2003.
23. *Modeling and testing for lack of separability and stationarity of spatial-temporal processes*. Statistics Department, University of Chicago. January 2003.
24. *Assessing uncertainty in weather forecasting*. SAMSI outreach program, RTP, NC. January 2003.
25. *Modeling and testing for lack of separability and stationarity of spatial-temporal processes*. Iowa State University, Ames, Iowa. February 2003.

26. *Bayesian spatial interpolation combining observations with outputs from numerical models*. Graduate School of Business, University of Chicago. February 2003
27. *Spatial modeling and interpolation of disparate spatial*. University of Minnesota, Biostat. March 2003.
28. *Statistical ensemble forecasting for mesoscale weather prediction models*. Center on Global Change (Duke University). October 2003.
29. *Spatial association between speciated particulate matter and health effects*. John Hopkins University, Biostatistics Department, September 2004.
30. Fuentes, M. Modeling and prediction of spatial environmental processes. March 18, 2005. Biostatistics Department, School of Public Health, Harvard University.
31. Fuentes, M. Combining numerical deterministic models with stochastic spatial models. March 17, 2005. Statistics Department, Harvard University.
32. Fuentes, M. A series of lectures at CEH (May 24-June 1 2005), Scotland. Topics: "Intro to Bayesian model uncertainty" "Bayesian entropy for monitoring network design." "The use of statistics within a regulatory framework"
33. Fuentes, M. A new class of nonseparable spatial-temporal covariance models. June 9, 2005. Glasgow University.
34. Fuentes, M. Spatial association between fine particulate matter and mortality. October 2005. Biostatistics Department, University of North Carolina, Chapel Hill.
35. Fuentes, M. A new class of nonseparable models for wind fields. February, 2006. Statistics Department, Penn State University.
36. Fuentes, M. A multivariate space-time framework for modeling hurricane wind fields. NCAR, Boulder. CO. April 2006.
37. Fuentes, M. Spatial temporal modeling of wind fields. University of Waterloo, Canada. May 2006.
38. Fuentes, M. Fusing deterministic models and data: A Bayesian multivariate spatial-temporal framework. Statistics Department, Carnegie Mellon University, Pittsburgh, PA. October 12, 2006.
39. Fuentes, M. A multivariate Bayesian spatial modeling framework for hurricane surface wind fields. Brown University, Department of Biostatistics, Providence RI October 23, 2006.
40. Fuentes, M. A multivariate Bayesian nonparametric modeling framework for wind fields. Columbia University, Biostatistics, New York. February 5, 2007.
41. Fuentes, M. Nonparametric spatial temporal models. Rice University, Department of Statistics, Texas. March 26, 2007.
42. Fuentes, M. Spatial modeling of speciated fine particulate matter. M.D. Anderson, Biostatistics, Texas. March 27, 2007.
43. Fuentes, M. Statistical modeling of storm surge. RAND, Santa Monica, California. April 12, 2007.
44. Fuentes, M. Spatial temporal modeling of speciated fine particulate matter. Biostatistics Department and Center for Environmental Health and Susceptibility.

- UNC. North Carolina. April 18, 2007.
45. Fuentes, M. Evaluation of deterministic models. A&WMA Student Chapter at NCSU. April 25, 2007.
  46. Fuentes, M. Nonstationary covariance models. National Center for Atmospheric Research, Boulder. CO. May 9, 2007.
  47. Fuentes, M. Nonparametric spatial temporal models. Statistics Department. University of Warwick, UK. May 24, 2007.
  48. Fuentes, M. Spatial temporal modeling of wind fields. Statistics Department. University Politecnica, Barcelona, Spain. June 4, 2007.
  49. Fuentes, M. *Uncertainty analysis of air quality deterministic models*. Invited speaker for an EPA regional meeting (August 8, 2007, North Carolina).
  50. Fuentes, M. *Health Tracking of Air Pollution Effects*". HEI/CDC/EPA Workshop on Methodologies for Environmental Public Health. Baltimore, Jan 15-16, 2008.
  51. Fuentes, M. *Climate change and expected trends for air pollution*. RTP Climate/Air Quality Dialogue. EPA workshop. RTP. March 28, 2008.
  52. Fuentes, M. *Neighborhood and Environmental Factors Associated with Physical Activity During and After Pregnancy*. Center for Research in Environmental Epidemiology (CREAL) at Institut Municipal d'Investigació Mèdica (IMIM) Biomedical Research Park - Parc de Recerca Biomèdica de Barcelona. June 27, 2008.
  53. Fuentes, M. Workshop on Spatial Statistics (invited lecturer). University of Washington, Seattle. June 5-6, 2008.
  54. Fuentes, M. *Spatial-temporal mesoscale modeling of rainfall intensity using gage and radar data*. University of Cataluna, Barcelona. June 20, 2008.
  55. Fuentes, M. Bayesian spatial variable selection Columbia University, NY. October 2009.
  56. Fuentes, M. Association between environmental stressors and physical activity during pregnancy. Yale University. November 2008.
  57. Fuentes, M. Spatial variable selection. Duke University, NC. February 2009.

## Students Directed

### PhD Thesis Students

1. Hon-Jung Kim, Ph.D. "Spectral Analysis with Spatial periodogram and Data Tapers." PhD. August 2000. She is currently an assistant professor (tenure-track) at University of Oulu (Finland), (co-advisor: Dennis Boos).
2. Jarrett Barber, Ph.D. "Modeling and prediction of non-stationary environmental processes." May 2002. Assistant professor (tenure-track) at Montana State University.
3. Prashenn Agarwal, Ph.D. "Bootstrap for spatial data", graduated in March 2003. Research biostatistician at Bristol-Myers Squibb, Pharmaceutical

- Research Institute, (co-advisor: M. Overton from Civil Engineering).
4. Li Chen, Ph.D. “Spatial-temporal non-separable models for wind fields”. Ph.D. May 2004 (co-advisor: J. Davis from MEAS). Currently a postdoc at the University of Chicago working with Dr. M. Stein.
  5. Man Sik Park, Ph.D. “Test for axial and diagonal symmetry of space-time processes”. May 06. Postdoc at Colorado State University (working with Dr. Hoeting)
  6. Hae-Ryoung Song, Ph.D. “Spatial-temporal hierarchical Poisson model to study association between speciated fine particles and human health effects from pollution“. May 06. She is currently a Postdoc working with Andrew Lawson at University of South Carolina.
  7. Kristen M. Foley, Ph.D. “Data assimilation methods for space-time processes”. Graduation date: August 2006. She is a statistician (permanent position) at U.S. EPA, RTP, NC.
  8. Liyun Ma, Ph.D. “Spectral likelihood methods for incomplete large spatial datasets”. Graduation date: August 2006. She is currently working as a research analyst at the headquarters of Capital One financial corporation in Mclean, VA.
  9. Jungsoon Choi. Multivariate space-time models for air pollutants. Graduated in December 2008. Assistant Professor Department of Biostatistics, College of Medicine, Korea University, Seoul, South Korea
  10. Tsuei-long Chen. Started to work on his dissertation under Fuentes’s supervision on Jan 07. Topic: Multivariate spatial temporal models to study association between mortality and speciated particulate matter.
  11. Darryl Cooney, Ph.D. “Methods to approximate the spatial likelihood of nonstationary processes”. Expected graduation date: 2009. GIT at Scimetrika
  12. Shenek Heyward. Spatial temporal modeling of temperature trends (modeling climate change). Expected graduation date: August 2009 (supported by NOAA award).
  13. Arin Chaudhuri, Ph.D. “Bayesian entropy methods for monitoring network design”. Expected graduation data: August 2009. Currently research analyst at SAS.
  14. Danny Modlin. Topic: probabilistic hurricane forecasting. Expected grad. date: august 2010 (supported by Fuentes’s NSF award).
  15. Eric Kalandra. Topic: Space-time modeling of health effects due to exposure to particulate matter. Expected grad. date: august 2010 (supported by Fuentes’s NIH award)
  16. Jingwen Zhou. Topic: Spatial quantile nonparametric regression, in the context of air atmospherics. Expected grad.: August 2010. (supported by Fuentes’s GIT with EPA)
  17. Josh Warren. Spatial nonparametric modeling of the association between exposure to air pollution and birth outcomes. Expect grad: August 2010. (supported by Fuentes’s STAR-EPA award)
  18. Morgan Gieseck. Spatial modeling of geocoded birth defects data.

**Current Postdocs:**

John Henry, PhD from Oregon State University. (starting as postdoc July 1 2008)  
Brian J. Reich, PhD from Biostatistics, University of Minnesota. (2006-2008) Faculty position (tenure-track) starting August 2008.  
Guillaume Vernieres, Ph.D in oceanography from Oregon State University.

#### **Undergraduate students:**

Jera Mendenhall (2006-2007)  
Anu Bulusu (2007)

#### **Editorial Service**

Regular reviewer for *NSF-DMS (Mathematical Sciences)*, *NSF-OPP (Antarctic Glaciology)*, *NSF- EAR (Earth Sciences)*, and EPA.

Participated in *NSF, NIH, HEI, and EPA* review panels.

Member of BMRD (NIH panel review).

Associate Editor 2003-2010 ,for *Environmetrics* (third term).

Associate Editor 2006-2009 of *Annals of Applied Statistics*.

Associate Editor of *Biometrics* since 2003 (third term).

Associate Editor of *JASA case studies* 2009-2012.

Reviewer for the journals: *Journal of the American Statistical Society Theory and Methods*, *Journal of the American Statistical Society Applications and Case Studies*, *Biometrics*, *Environmetrics*, *Journal of Multivariate Analysis*, *Journal of Statistical Planning and Inference*, *Statistica Sinica*, *Statistical Modelling: An International Journal*, *Stochastic Environmental Research and Risk Assessment Journal*, *Atmospheric Environment*, *Journal of Geographic Research-Atmosphere*, *Journal of the Royal Statistical Society*, *Journal of Geographic Research-Atmosphere*, and *Statistics in Medicine*.

#### **Recent service at the Statistics Department at NCSU**

- Chair of PhD curriculum committee (2006-07)
- Chair of the senior and junior search committee (2007-2008)

#### **Professional Service**

- Secretary of the Bayesian Section of the ASA ( Jan. 2006-jan. 2008)
- US EPA Science advisory board member (since 2004, second term).
- Member of the board of directors of TIES (since 2004).
- Member of the ENAR student award committee (2006-2007).
- Member of BMRD study section of NIH (since 2005).
- Member of the SAMSI local committee (since 2006).
- Member of the IMS council (since 2007).
- Nominated for the ASA computational section council (2008).
- Member of the organizing committee for TIES 2008
- Member of the organizing committee for ISI 2009

- Organizer of an invited session for JSM 2008 (also hosting a luncheon at JSM 2008)
- Member of the EPA steering committee organizing a workshop (August 2007) about Evaluation of EPA Air Quality Numerical Models
- Member of the organizing committee of 3 SAMSI/NCAR joint workshops (2006-2007) about computer models.
- Program chair of ENAR 2006 in Tampa, Florida.
- Member of the SAMSI scientific committee for the DA program (2005-2006), and the complex models program (2006-2007), and the spatial statistics (2009-2010)..
- Member of the ENAR Regional Advisory Board (2003-2006).
- Regional director for North America of TIES (2004-2008).
- Member of the program committee for the second ISBA-IMS international meeting 2005, Bormio Italy.
- Member of the program committee for TIES 2004.
- Program chair of the ISI international conference on environmental statistics and health, 2003, Santiago de Compostela, Spain.
- Organizer of a roundtable for ENAR 2004.
- Chair of General Methodology for the 2004 Joint Statistical Meeting (JSM).
- Chair of the section on Statistics and the Environment, ENAR 2003.
- Organizer of a SAMSI workshop, “Spatial-temporal modeling”. Boulder, June 2003.
- Program chair for the 2002 Southern Regional Council on Statistics (SRCOS) and ASA.
- Member of the scientific committee for the environmental program of the Statistical and Applied Mathematical Sciences Institute (SAMSI), 2002-2003..
- Chair of General Methodology for the 2001 Joint Statistical Meeting (JSM).
- Organizer of several sessions and roundtables for the Joint Statistical Meeting 2000, 2001, 2002, 2003 and 2004.
- Organizer of seminars at NISS, NC.

## **Professional Society Memberships**

Member-elect of the International Statistical Institute (ISI)

American Statistical Association (ASA)

Institute of Mathematical Science (IMS)

Eastern North American Region of the Biometric Society (ENAR)

American Meteorological Society (AMS)

The International Environmetrics Society (TIES)

The International Society for Bayesian Analysis (ISBA).