# Brian J Reich


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**Education**

PhD, Biostatistics, University of Minnesota, 2005
MS, Biostatistics, University of Minnesota, 2002
BS, Mathematics, University of Wisconsin-River Falls, 1999

**Positions**

Full Professor, Department of Statistics, NCSU, 2019–Present
Associate Professor, Department of Statistics, NCSU, 2014–2019
Assistant Professor, Department of Statistics, NCSU, 2008–2014
Postdoctoral fellow, Department of Statistics, NCSU, 2005–2008

**Awards**

Fellow of the American Statistical Association, 2019
Paper read before the Royal Statistical Society, 2018
D.D. Mason Faculty Award, 2017
LeRoy & Elva Martin Teaching Award, 2016
Thank a Teacher, 2015(S), 2016(S), 2016(F), 2017(F)
*JABES* Showcase Session, JSM, 2015
NCSU Faculty Scholar, 2014
ENVR Young Researcher Award, 2013
Discussion paper in the *American Journal of Epidemiology*, 2012
*Technometrics* Invited Lecture, JSM, 2009
ENAR Distinguished Student Paper Award, 2005

**Student Awards**

PhD adviser to the winners of:

ICSA student paper competition, Zhou Lan, 2019
JSM MHS student paper competition, Zhou Lan, 2019
JSM Imaging Section student paper competition, Zhou Lan, 2019
JSM ENVR student paper competition, Indranil Sahoo, 2018
ENVR/ASA best student presentation, Alex Larsen, 2018
JSM student poster competition, Susheela Singh, 2017
JSM HPSS student paper competition, Qian Guan, 2017
JSM ENVR student paper competition, Neal Grantham, 2017
JSM ENVR student paper competition, Ran Wei, 2017
ENAR Distinguished Student Paper Award, Neal Grantham, 2017
ENAR Distinguished Student Paper Award, Qian Guan, 2017
JSM ENVR student paper competition, Sam Morris, 2016
Best poster award for the CMAS Conference, Alex Larsen, 2015
John Van Ryzin Award, Laura Boehm, 2013
ENAR Distinguished Student Paper Award, Laura Boehm, 2013

**Books**

Reich BJ, Ghosh SK (2019). Bayesian Statistical Methods. Chapman & Hall/CRC.

PAPERS

For a complete list of my papers, please visit Google Scholar.

Grantham NS, Guan Y, Reich BJ, Borer ET, Gross K. MIMIX: A Bayesian mixed-effects model for microbiome data from designed experiments. Accepted, *Journal of the American Statistical Association*.

Singh SS, Staicu AM, Dunn RR, Fierer N, Reich, BJ. A nonparametric spatial test to identify factors that shape a microbiome. Accepted, *Annals of Applied Statistics*.

Morris SA, Reich BJ, Thibaud E. Exploration and inference in spatial extremes using empirical basis functions. Accepted, *Journal of Agricultural, Biological and Environmental Statistics*.

Pacifici K, Reich BJ, Miller DAW, Pease B. Resolving misaligned spatial data with integrated species distribution models. Accepted, *Ecology*.

Rekabdarkolaee HM, Reich BJ, Fuentes M. Multivariate space-time functional model for hurricane tracks and intensity. Accepted, *Spatial Statistics*

Sahoo I, Guinness J, Reich BJ. A test for isotropy on a sphere using spherical harmonic functions. Accepted, *Statistica Sinica*.

Jhuang AT, Fuentes M, Jones JL, Esteves G, Fancher CM, Furman M, Reich BJ. Spatial signal detection using continuous shrinkage priors. Accepted, *Technometrics*.

Huang YN, Reich BJ, Fuentes M, Sankarasubramanian A. Complete spatial model calibration. Accepted, *Annals of Applied Statistics*.

Tsai WL, Leung YF, McHale MR, Floyd MF, Reich BJ. Relationships between urban green land cover and human health at different spatial resolutions. Accepted, *Urban Ecosystems*.

King MC, Staicu A-M, Davis JM, Reich BJ, Eder B. A functional data analysis of spatiotemporal trends and variation in fine particulate matter. Accepted, *Atmospheric Environment*.

Wei R, Reich BJ, Hoppin JA, Ghosal S. Sparse Bayesian additive nonparametric regression with application to health effects of pesticides mixtures. Accepted, *Statistica Sinica*.

Miller D, Pacifici K, Reich BJ, Sanderlin, JL (2019). The recent past and promising future for data integration methods to estimate species distributions. *Methods in Ecology and Evolution*, **10**, 22-37.

Binion-Rock S, Reich BJ, Buckel J (2019). A spatial kernel density method to estimate diet composition of fish. *Canadian Journal of Fisheries and Aquatic Sciences*, **76**, 249-267.

Janko MM, Irish SR, Reich BJ, Peterson M, Doctor SM, Mwandagalirwa MK, Likwela JL, Tshefu AK, Meshnick SR, Emch ME. The links between agriculture, Anopheles

mosquitoes, and malaria risk in children under 5 in the Democratic Republic of Congo: A population-based cross-sectional and spatial study. Accepted, *The Lancet Planetary Health*.

Larsen AE, Reich BJ, Ruminski M, Rappold AG. Impacts of fire smoke plumes on regional air quality, 2006-2013. Accepted, *Journal Of Exposure Science And Environmental Epidemiology*.

Hazra A, Reich BJ, Reich DS, Shinohara RT, Staicu A-M. A spatio-temporal model for longitudinal image-on-image regression. Accepted, *Statistics in Biosciences*.

Reich BJ, Shaby BA (2019). A spatial Markov model for climate extremes. *Journal of Computational and Graphical Statistics*, **28**, 117-126.

Irizarry A, Pacifici J, Reich BJ, Collazo J (2019). Avian response to shade-layer restoration in coffee plantations in Puerto Rico. *Restoration Ecology*, **26**, 1212–1220.

Reich BJ, Shaby BA (2018). Modeling of multivariate spatial extremes. RESEARCHERS.ONE.

Reich BJ, Guinness J, Vandekar SN, Shinohara RT, Staicu AM (2018). Fully-Bayesian spectral methods for imaging data. *Biometrics*, **74**, 645–652.

Reich BJ, Pacifici K, Stallings JW (2018). Integrating auxiliary data in optimal spatial design for species distribution modeling. *Methods in Ecology and Evolution*, **9**, 1626–1637.

Grantham NS, Reich BJ, Liu Y, Chang HH. Spatial regression with an informatively-missing covariate: Application to mapping fine particulate matter (2018). *Environmetrics*, **29**, e2499.

Libera DA, Sankarasubramanian A, Sharma A, Reich BJ (2018). A non-parametric bootstrapping framework embedded in a toolkit for assessing water quality model performance. *Environmental Modelling & Software*, **107**, 25–33.

Kang J, Reich BJ, Staicu A-M (2018). Scalar-on-image regression via the soft-thresholded Gaussian process. *Biometrika*, **105**, 165–184.

Laber EB, Meyer NJ, Reich BJ, Pacifici KP, Collazo J, Drake J (2018). Optimal treatment allocations in space and time for on-line control of an emerging infectious disease (with discussion). *Journal of the Royal Statistical Society: Series C*, **67**, 1-28.

Reich BJ, Haran M (2018). Precision maps for public health. *Nature*, **555**, 32-33.

Kaufeld KA, Fuentes M, Reich BJ, Herring A, Shaw GM, Terres M (2017). A multivariate dynamic spatial factor model for speciated pollutants and adverse birth outcomes. *International Journal of Environmental Research and Public Health*, **14**, 1046.

Li D, Reich, BJ, Brenner DW (2017). Using spatial cross-correlation image analysis to characterize the influence of strain rate on plastic damage in molecular dynamics simulation. *Modelling and Simulation in Materials Science and Engineering*, **25**, 075010.

Li D, Reich BJ, Brenner DW (2017). Statistical and image analysis for characterizing simulated atomic-scale damage in crystals. *Computational Materials Science*, **135**, 119-126.

Li D, Brenner DW, Reich BJ, Peterson CG, Bucholz E, Russ J (2017). How predictable is plastic damage at the atomic scale? *Applied Physics Letters*, **110**, 091902.

Pacifici K, Reich BJ, Miller D, Gardner B, Stauffer G, Singh, S, McKerrow A, Collazo J (2017). Integrating multiple data sources in species distribution modeling: A framework for data fusion. *Ecology*, **98**, 840-850.

Wootten A, Terando AJ, Reich BJ, Semazzi F, Boyles R (2017). Characterizing sources of uncertainty from global climate models and downscaling techniques. *Journal of Applied Meteorology and Climatology*, **56**, 3245–3262.

Morris SA, Reich BJ, Pacifici K, Lei Y (2017). A spatial model for rare binary events. *Environmental and Ecological Statistics*, **24**, 485-504.

Li Q, Guindani M, Reich BJ, Bondell HD and Vannucci M (2017). A Bayesian mixture model for clustering and selection of feature occurrence rates under mean constraints. *Statistical Analysis and Data Mining*, **10**, 393–409.

Morris SA, Reich BJ, Thibaud E, Cooley DA (2017). A space-time skew-t model for threshold exceedances. *Biometrics*, **73**, 749-778.

Farjat AE, Reich BJ, Guinness J, Whetten R, McKeand S, Isik F (2017). Optimal seed deployment under climate change using spatial models: Application to loblolly pine in the Southeastern US. *Journal of the American Statistical Association*, **112**, 909-920.

Cabral M, Zhang S, Chi J, Reich BJ, Dickey E, LeBeau J. (2017). Correlating local chemistry and local cation displacements in the relaxor ferroelectric PMN. *Microscopy and Microanalysis*, **23**, 1616-1617.

Monroe KD, Collazo JA, Pacifici K, Reich BJ, Puente-Roln AR, Terando AJ (2017). Occupancy and index of abundance of *Eleutherodactylus Wightmanae* and *E. Brittoni* along elevation gradients in West-Central Puerto Rico. *Caribbean Naturalist*, **40**, 1–18.

Peterson GC, Reich BJ, Li D, Brenner DW (2017). Spatial prediction of crystalline defects observed in molecular dynamic simulations of plastic damage. *Journal of Applied Statistics*, **44**, 1761–1784.

Storlie CB, Reich BJ, Rust WN, Ticknor LO, Bonnie AM, Montoya AJ, Michalak SE (2017). Spatiotemporal modeling of node temperatures in supercomputers. *Journal of the American Statistical Association*, **112**, 92-108.

Pazdernik K, Reich BJ, Page K, Wilson AG (2017). Hierarchical Bayesian modeling of atomic structural disorder. M&C 2017 - International Conference on Mathematics & Computational Methods Applied to Nuclear Science & Engineering, Jeju, Korea.

Wilson, A, Reich BJ, Nolte, CG, Spero, TL, Hubbell, B, Rappold, AG (2017). Pro-

jecting excess mortality in 2030 with spatially-varying ozone-temperature risk surfaces. *Journal Of Exposure Science And Environmental Epidemiology*, **27**, 118-124.

Monroe KD, Collazo JA, Pacifici K, Reich BJ, Puente-Roln AR, Terando AJ (2017). Occupancy and abundance of eleutherodactylus frogs in coffee plantations in Puerto Rico. *Herpetologica*, **73**, 297-306.

Guan Q, Laber EB, Reich BJ (2016). Discussion of "Bayesian nonparametric estimation for dynamic treatment regimes with sequential transition times". *Journal of the American Statistical Association*, **111**, 936-942.

Fancher C, Han Z, Levin I, Page K, Reich BJ, Smith R, Wilson A, Jones, J (2016). Use of Bayesian inference in crystallographic structure refinement via full diffraction profile analysis. *Scientific Reports*, **6**, 31625.

Russell BT, Cooley DS, Porter WC, Heald CL, Reich BJ (2016). Data mining to investigate the meteorological drivers for extreme ground level ozone events. *Annals of Applied Statistics*, **10**, 1673-1698.

Balderama E, Gardner B, Reich BJ (2016). A spatial-temporal double-hurdle model for extremely over-dispersed avian count data. *Spatial Statistics*, **18**, 263-275.

Reich BJ, Fuentes M (2016). Discussion of "Spatial product partition models" by Page and Quintana. *Bayesian Analysis*, **11**, 303-305.

Pacifici, JK, Reich BJ, Conroy M, Dorazio, B (2016). Occupancy estimation for rare species using a spatially-adaptive sampling design. *Methods in Ecology and Evolution*, **7**, 285-293.

Parker R, Reich BJ, Eidsvik J (2016). A fused lasso approach to nonstationary spatial covariance estimation. *Journal of Agricultural, Biological, and Environmental Statistics*, **21**, 569-587.

Shaby BA, Reich BJ, Cooley D, Kaufman, CG (2016). A Markov-switching model for heat waves. *Annals of Applied Statistics*, **10**, 74-93.

Tsai W-L, Floyd MF, Leung Y-F, McHale MM, Reich BJ (2016). Urban Vegetative Cover Fragmentation in the U.S.: Associations with Physical Activity and Body Mass Index. *American Journal of Preventive Medicine*, **50**, 509-517.

Smith LB, Gordon-Larsen P, Reich BJ, Fuentes M (2015). Quantile regression for mixed models. *Annals of Applied Statistics*, **9**, 1226–1246.

Terando AJ, Reich BJ, Pacifici K, Costanza J, McKerrow A, Collazo J (2015). Uncertainty quantification and propagation for projections of extremes in monthly area burned under climate change: A case study in the coastal plain of Georgia, USA. Accepted. AGU Monograph Series: Characterizing Uncertainties in Natural Hazard Modeling.

Smith LB, Fuentes M, Reich BJ, Herring AH, Langlois PH (2015). Multilevel quantile

function modeling with application to birth outcomes. *Biometrics*, **71**, 508–519.

Chang HH, Warren JL, Darrow LA, Reich BJ, Waller LA (2105). Assessment of critical exposure and outcome windows in time-to-event analysis with application to air pollution and preterm birth study. *Biostatistics*, **16**, 509-521.

Farjat AE, Isik F, Reich BJ, Whetten RW, McKeand SE (2015). Modeling climate change effects on the height growth of loblolly pine. *Forest Science*, **61**, 703-715.

Schnell P, Bandyopadhyay D, Reich BJ, Nunn ME (2015). A marginal cure-rate proportional hazards model for spatial survival data. *Journal of the Royal Statistical Society: Series C*, **64**, 673?691.

Kao Y, Reich BJ, Storlie CB, Anderson B (2015). Malware detection using nonparametric Bayesian clustering and classification techniques. *Technometrics*, **57**, 535-546.

Coleman D, Martin D, Reich BJ (2015). Multiple window discrete scan statistic for higher-order Markovian sequences. *Journal of Applied Statistics*, **42**, 1-16.

Barberán A, Dunn RR, Reich BJ, Pacifici JK, Laber EB, Menninger HL, Morton J, Henley JB, Leff JW, Miller S, Fierer N (2015). The ecology of microscopic life in household dust. *Proceedings of the Royal Society B*, **282**, 20151139.

Parker R, Reich BJ, Sain S (2015). A multiresolution approach to estimating the value added by regional climate models. *Journal of Climate*, **28**, 8873-8887.

Langley RL, Kao Y, Mort SA, Bateman A, Simpson BD, Reich BJ (2015). Adverse neurodevelopmental effects and hearing loss in children associated with manganese in well water, North Carolina, USA. *Journal of Environmental and Occupational Science*, **4**, 62-69.

Grantham NS, Reich BJ, Pacifici K, Laber EB, Menninger HL, Henley JB, Barberán A, Leff JW, Fierer N, Dunn RR (2015). Fungi identify the geographic origin of dust samples. *PLoS ONE*, **10**, e0122605.

Boehm Vock LF, Reich BJ, Fuentes M, Dominici F (2015). Spatial variable selection methods for investigating acute health effects of fine particulate matter components. *Biometrics*, **71**, 167-177.

Stephenson A, Shaby BA, Reich BJ, Sullivan A (2015). Estimating spatially varying severity thresholds of the forest fire danger rating system using max-stable extreme event modelling. *Journal of Applied Meteorology and Climatology*, **54**, 395-407.

Reich BJ, Porter MD (2015). Partially-supervised spatiotemporal clustering for burglary crime series identification. *Journal of the Royal Statistical Society: Series A*, **178**, 465-480.

Sun W, Reich BJ, Cai T, Guindani M, Schwartzman A (2015). False discovery control in large-scale spatial multiple testing. *Journal of the Royal Statistical Society: Series B*, **77**, 59-83.

Reich BJ, Gardner B (2014). A spatial capture-recapture model for territorial species. *Environmetrics*, **25**, 630-637.

Wilson A, Reich BJ (2014). Confounder selection via penalized credible regions. *Biometrics*, **70**, 852-861.

Reich BJ, Chang HH, Foley KM (2014). A spectral method for spatial downscaling. *Biometrics*, **70**, 932-942.

Wilson A, Rappold AG, Neas LM, Reich BJ (2014). Modeling the effect of temperature on ozone-related mortality. *Annals of Applied Statistics*, **8**, 1728-1749.

Eidsvik J, Shaby B, Reich BJ, Wheeler M, and Niemi J (2014). Estimation and prediction in spatial models with block composite likelihoods. *Journal of Computational and Graphical Statistics*, **23**, 295-315.

Reich BJ, Chang HH, Strickland MJ (2014). Spatial health effects analysis with uncertain residential locations. *Statistical Methods in Medical Research*, **23**, 156-168.

Wilson A, Reif D, Reich BJ (2014). Hierarchical dose-response modeling for high-throughput toxicity screening of environmental chemicals. *Biometrics*, **70**, 237-246.

Reich BJ, Shaby BJ, Cooley D (2014). A hierarchical model for serially-dependent extremes: A study of heat waves in the western US. *Journal of Agricultural, Biological, and Environmental Statistics*, **19**, 119-135.

Reich BJ, Porter MD (2013). Discussion of "Estimating the historical and future probabilities of large terrorist events". *Annals of Applied Statistics*, **7**, 1871-1875.

Smith LB, Fuentes M, Reich BJ, Eder BK (2013). Prediction of speciated particulate matter and bias assessment of numerical output data. *International Journal of Environmental Science and Engineering Research*, **4**, 8-17.

Mannshardt E, Sucic K, Jiao W, Dominici F, Frey C, Reich BJ, Fuentes, M (2013). Comparing exposure metrics for the effects on fine particulate matter on emergency hospital admissions. *Journal Of Exposure Science And Environmental Epidemiology*, **23**, 627-636.

Fuentes M, Reich BJ (2013). Multivariate spatial nonparametric modeling via kernel processes mixing. *Statistica Sinica*, **23**, 75-97.

Reich BJ, Bandyopadhyay D, Bondell HD (2013). A nonparametric spatial model for periodontal data with non-random missingness. *Journal of the American Statistical Association*, **108**, 820-831.

Reich BJ, Smith LB (2013). Bayesian quantile regression for censored data. *Biometrics*, **69**, 651–661.

Boehm L, Reich BJ, Bandyopadhyay D (2013). Bridging conditional and marginal

inference for spatially-referenced binary data. *Biometrics*, **69**, 545-554.

Reich BJ, Cooley D, Foley KM, Napelenok SL, Shaby BA (2013). Extreme value analysis for evaluating ozone control strategies. *Annals of Applied Statistics*, **7**, 739-762.

Wang H, Reich BJ, Lim Y (2013). A Bayesian approach to probabilistic streamflow forecasts. *Journal of Hydroinformatics*, **15**, 381-391.

Storlie CB, Reich BJ, Helton JC, Swiler LP (2013). Analysis of computationally demanding models with continuous and categorical inputs. *Reliability Engineering & System Safety*, **113**, 30-41.

Chang HH, Reich BJ, Miranda ML (2013). Spatial time-to-event analysis of fine particulate matter and preterm birth. *Journal of the Royal Statistical Society: Series C*, **62**, 167-179.

Fuentes M, Henry JB, Reich BJ (2013). Nonparametric spatial models for extremes: Application to extreme temperature data. *Extremes*, **16**, 75-101.

Shaby BA, Reich BJ (2012). Bayesian spatial extreme value analysis to assess the changing risk of concurrent extremely high temperatures across large portions of European cropland. *Environmetrics*, **23**, 638-648.

Bondell HD, Reich BJ (2012). Consistent high-dimensional Bayesian variable selection via penalized credible regions. *Journal of the American Statistical Association*, **107**, 1610-1624.

Foley KM, Reich BJ, Napelenok SL (2012). Bayesian analysis of a reduced-form air quality model. *Environmental Science & Technology*, **46**, 7604-7611.

Reich BJ (2012). Spatiotemporal quantile regression for detecting distributional changes in environmental processes. *Journal of the Royal Statistical Society: Series C*, **64**, 535-553.

Shaby B, Reich BJ (2012). Comment on "Statistical modelling of spatial extremes" by Davison, Padoan, and Ribatet. *Statistical Science*, **27**, 197-198.

Reich BJ, Shaby BA (2012). A hierarchical max-stable spatial model for extreme precipitation. *Annals of Applied Statistics*, **6**, 1430-1451.

Porter MP, Reich BJ (2012). Evaluating temporally weighted kernel density methods for predicting the next event location in a series. *Annals of GIS*, **18**, 225–240.

Chang HH, Reich BJ, Miranda ML (2012). Response to "Epidemiology studies of the health associations of environmental exposures on preterm births. *American Journal of Epidemiology*, **175**, 111-112.

Chang HH, Reich BJ, Miranda ML (2012). Fine particle air pollution and preterm Birth in North Carolina, 2001-2005 (with discussion). *American Journal of Epidemiology*,

**175**, 91–98.

Modlin D, Fuentes M, Reich BJ (2012). Circular conditional autoregressive modeling of vector fields. *Environmetrics*, **23**, 46–53.

Reich BJ, Kalendra E, Storlie CB, Bondell HD, Fuentes M (2012). Variable selection for high-dimensional Bayesian density estimation: Application to human exposure simulation. *Journal of the Royal Statistical Society: Series C*, **61**, 47–66.

Reich BJ, Fuentes M (2012). Nonparametric Bayesian models for a spatial covariance. *Statistical Methodology*, **9**, 265-274.

Hayashi K,Hayashia M, Reich BJ, Lee S-P, Sachdevaa AUC, Mizoguchi I (2012). Functional data analysis of mandibular movement using third-degree b-spline basis functions and self-modeling regression. *Orthodontic Waves*, **71**, 17-25.

Pati D, Reich BJ, Dunson DB (2011). Bayesian geostatistical modeling with informative sampling locations. *Biometrika*, **98**, 35–48.

Havard S, Reich BJ, Bean K, Chaix B (2011). Social inequalities in residential exposure to road traffic noise: An environmental justice analysis based on the RECORD Cohort Study. *Occupational and Environmental Medicine*, **68**, 366-374.

Storlie CB, Bondell HD, Reich BJ, Zhang HH (2011). Surface estimation, variable selection, and the nonparametric oracle property. *Statistica Sinica*, **21**, 679–705.

Reich BJ, Li L, Bondell HD (2011). Sufficient dimension reduction via Bayesian mixture modeling. *Biometrics*, **67**, 886–895.

Reich BJ, Bondell HD (2011). A spatial Dirichlet process mixture model for clustering population genetics data. *Biometrics*, **67**, 381–390.

Reich BJ, Eidsvik J, Guindani M, Nail AJ, Schmidt AM (2011). A class of covariate-dependent spatiotemporal covariance functions for the analysis of daily ozone concentrations. *Annals of Applied Statistics*, **5**, 2425–2447.

Reich BJ, Haran M (2011). Guest editors' introduction to the special issue on computer models and spatial statistics for environmental science. *Journal of Agricultural, Biological, and Environmental Sciences*, **16**, 451-452.

Bandyopadhyay D, Reich BJ, Slate E (2011). A spatial beta-binomial model for clustered count data on dental caries. *Statistical Methods in Medical Research*, **20**, 85–102.

Reich BJ, Fuentes M, Dunson DB (2011). Bayesian spatial quantile regression. *Journal of the American Statistical Association*, **106**, 6–20.

Bondell HD, Reich BJ, Wang H (2010). Non-crossing quantile regression curve estimation. *Biometrika*, **97**, 825–838.

Hayashi K, Mizoguchi I, Lee SP, Reich BJ (2010). Development of a novel statistical

model for mandibular kinematics. *Medical Engineering and Physics*, **32**, 423-428.

Storlie CB, Bondell HD, Reich BJ (2010). A locally adaptive penalty for estimation of functions with varying roughness. *Journal of Computational and Graphical Statistics*, **19**, 569–589.

Reich BJ, Fuentes M, Herring AH, Evenson KR (2010). Bayesian variable selection for multivariate spatially-varying coefficient regression. *Biometrics*, **66**, 772-782.

Hodges JS, Reich BJ (2010). Adding spatially-correlated errors can mess up the fixed effect you love. *The American Statistician*, **64**, 325–334.

Reich BJ, Bandyopadhyay D (2010). A latent factor model for spatial data with informative missingness. *Annals of Applied Statistics*, **4**, 439–459.

Reich BJ, Bondell HD, Wang H (2010). Flexible Bayesian quantile regression for independent and clustered data. *Biostatistics*, **11**, 337-352.

Bandyopadhyay D, Reich BJ, Slate E (2009). Bayesian modeling of multivariate spatial binary data with applications to dental caries. *Statistics in Medicine*, **28**, 34923508.

Reich BJ, Storlie CS, Bondell HD (2009). Variable selection in Bayesian smoothing spline ANOVA models: Application to deterministic computer codes. *Technometrics*, **51**, 110-120.

Reich BJ, Fuentes M, Burke J (2009). A Bayesian analysis of the effects of particulate matter using a human exposure simulator. *Environmetrics*, **20**, 131-146.

Bondell HD, Reich BJ. (2009) Simultaneous factor selection and collapsing of levels in ANOVA. *Biometrics*, **69**, 169-177.

Hayashi K, Reich BJ, DeLong R, Lee SP, Mizoguchi I (2009). A novel statistical model for mandibular helical axis analysis. *Journal of Oral Rehabilitation*, **36**, 102–109.

Costalonga M, Batas L, Reich BJ (2009). Effects of toll-like receptor-4 in porphyromonas gingivalis-induced bone loss. *Journal of Periodontal Research*, **44**, 537–542.

Choi J, Fuentes M, Reich BJ (2009). Spatial-temporal association between fine particulate matter and daily mortality. *Journal of Computational and Graphical Statistics*, **53**, 2989-3000.

Choi J, Reich BJ, Fuentes M, Davis JM (2009). Multivariate spatial-temporal modeling and prediction of speciated fine particles. *Journal of Statistical Theory and Practice*, **3**, 407–418.

Fuentes M, Reich BJ, Lee G (2008). Spatial–temporal mesoscale modeling of rainfall intensity using gage and radar data. *The Annals of Applied Statistics*, **4**, 1148–1169.

Reich BJ, Hodges JS (2008). Modeling longitudinal spatial periodontal data: A spatially-adaptive model with tools for specifying priors and checking fit. *Biometrics*,

**64**, 790–799.

Bondell HD, Reich BJ (2008). Simultaneous regression shrinkage, variable selection and clustering of predictors with OSCAR. *Biometrics*, **64**, 115–123.

Reich BJ, Hodges JS (2008). Identification of the variance components in the general two-variance linear model. *Journal of Statistical Planning and Inference*, **138**, 1592–1604.

Niemi JB, Porter MD, Reich BJ. (2008) Mixture likelihood ratio scan statistic for disease outbreak detection. *Advances in Disease Surveillance*, 5:49.

Reich BJ, Fuentes M (2007). A multivariate nonparametric Bayesian spatial framework for hurricane surface wind fields. *The Annals of Applied Statistics*, **1**, 249–264.

Reich BJ, Fuentes M (2007). Non-Gaussian Bayesian spatial modeling of hurricane surface wind fields. *In the proceedings of the International Statistical Institute Conference*, IMP08, Lisboa, 2007.

Reich BJ, Hodges JS, Carlin BP (2007). Spatial analysis of periodontal data using conditionally autoregressive priors having two types of neighbor relations. *Journal of the American Statistical Association*, **102**, 44–55.

Reich BJ, Hodges JS, Zadnik V (2006). Effects of residual smoothing on estimation of the fixed effects in disease-mapping models. *Biometrics*, **62**, 1197-1206.

Reich BJ, Hodges JS, Carlin BP, Reich AM (2006). Spatial analysis of Sam Cassell's 2003-2004 shot chart data. *American Statistician*, **60**, 3–12.

Zadnik V, Reich BJ (2006). Analysis of the relationship between socioeconomic factors and stomach cancer incidence in Slovenia. *Neoplasma*, **53**, 103–10.

Allen SS, Britnell D, Hatsukami DK, Reich BJ (2004). Energy intake and physical activity during short-term smoking cessation in post-menopausal women. *Addictive Behaviors*, **29**, 947–951.

Lemmonds CA, Mooney M, Reich BJ, Hatsukami D (2004). Characteristics of cigarette smokers seeking treatment for cessation versus reduction. *Addictive Behaviors*, **29**, 357–364.

CHAPTERS

Michalak SE, Bonnie AM, Montoya AJ, Storlie CB, Rust WN, Ticknor LO, Davey LA, Moxley III TE, Reich BJ (2018). A Temperature Monitoring Infrastructure and Process for Improving Data Center Energy Efficiency with Results for a High Performance Computing Data Center. *Analytic Methods in Systems and Software Testing*, editors Ruggeri F, Faltin F and Kenett R.

Singh SP, Paterson AR, Wendelberger LJ, Fancher CM, Reich BJ, Smith RC, Wilson AG, Jones JL (2018). Algorithms in Diffraction Profile Analysis in *Big, Deep, and Smart Data in Physical and Chemical Imaging, World Scientific Publishers*, editors Foster I and Kalinin SV.

Paterson AR, Reich BJ, Smith RC, Wilson AG, Jones JL (2018). Bayesian approaches to uncertainty quantification and structure refinement from x-ray diffraction. Chapter within *Materials Discovery and Design: Data Science and Optimal Learning*, edited by Turab Lookman, Springer publishing.

Fuentes M, Reich BJ, Huang YN (2018). Statistical methods for exposure assessment. *Handbook of Environmental and Ecological Statistics*. Chapman & Hall/CRC.

Reich BJ (2016). Quantile regression for epidemiological applications. *The Handbook of Spatial Epidemiology*. CRC Press.

Reich BJ, Fuentes M (2015). Spatial Bayesian nonparametric methods. *Nonparametric Bayesian Methods in Biostatistics and Bioinformatics*. Springer.

Reich BJ, Shaby BA (2015). Time series of extremes. *Extreme Value Modeling and Risk Analysis: Methods and Applications*. ASA-SIAM series on statistics and applied probability.

Reich BJ, Fuentes M (2013). Accounting for design in the analysis of spatial data. *Spatio-temporal design: Advances in efficient data acquisition*. Wiley.

Fuentes M, Reich BJ (2010). Spectral analysis for spatial data. *Handbook of Spatial Statistics*. CRC Press.

## Invited Talks

Georg-August University, Statistics and Economics, Gottingen Germany, 2018
Joint Statistical Meetings, Vancouver, BC, 2018
Mayo Clinic, Division of Biomedical Statistics and Informatics, 2018
SAMSI Workshop on Climate Extremes, RTP, NC, 2018
SAMSI Transition Workshop, RTP, NC, 2018
IMA Workshop on "Predictions from complexity", University of Minnesota, 2018
ENAR, Altanta, GA, 2018
NASA Jet Propulsion Lab, Pasadena, CA, 2017
Maxpoint, RTP, NC, 2017
Joint Statistical Meetings, Baltimore, MD, 2017
Notre Dame, The Department of Applied and Computational Mathematics and Statistics, 2017
North Carolina State University, Center for Geospatial Analytics, 2017
Purdue University, Department of Statistics, 2017
STATMOS Workshop on Climate Extremes, Penn State University, 2016
Colorado State University, Department of Statistics, 2016
Virginia Commonwealth University, Department of Biostatistics, 2016
Joint Statistical Meetings, Chicago, IL, 2016
The International Environmetrics Society Annual Conference, Edinburgh, UK, 2016
National Center for Atmospheric Research, Boulder, CO, 2016
Extreme Events in Climate and Weather Workshop, Banff, AB, 2016
Statistical Methods and Analysis of Environmental Health Data, Mumbai, India, 2016
CMStatistics Conference, London, UK, 2015
Virginia Tech University, Department of Statistics, 2015
Florida State University, Department of Statistics, 2015
Harvard University, Department of Biostatistics, 2015

Joint Statistical Meetings, Seattle, WA, 2015
Conference on Extreme Value Analysis, Ann Arbor, MI, 2015
SRCOS Summer Research Conference, Wilmington, NC, 2015
Medical University of South Carolina, Division of Biostatistics, 2015
Emory University, Department of Biostatistics and Bioinformatics, 2015
Workshop of Spatial Statistics, Texas A&M University, 2015
Brigham Young University, Department of Statistics, 2014
University of Michigan, Department of Statistics, 2014
Graybill Conference, Fort Collins, CO, 2014
Joint Statistical Meetings, Boston, MA, 2014
Los Alamos National Lab, Statistical Sciences Group, 2014
University of Chicago, Booth School of Business, 2014
ENAR, Baltimore, MD, 2014
Penn State University, Department of Statistics, 2014
University of Southern California, Marshall School of Business, 2013
MD Anderson Cancer Center, Department of Biostatistics, 2013
Harvard University, Department of Statistics, 2013
JSM, Montreal, Canada, 2013
CSU Workshop on Spatial Statistics, Fort Collins, CO, 2013
University of Georgia, Department of Statistics, 2012
JSM, San Diego, CA, 2012
WNAR/Graybill Conference, Fort Collins, CO, 2012
SAMSI Transition Workshop on Uncertainty Quantification, RTP, NC, 2012
ENAR, Washington, DC, 2012
SAMSI Workshop on Uncertainty Quantification, Asheville, NC, 2012
JSM, Miami, FL, 2011
Workshop on Environmental Risk and Extreme Events, Ascona, Switzerland, 2011
The Seventh Conference on Extreme Value Analysis, Lyon, France, 2011
U.S. EPA, Research Triangle Park, NC, 2011
IISA Annual Meeting, Raleigh, NC, 2011
NCSU Scope Lecture Series, Raleigh, NC, 2011
SAMSI transition workshop, RTP, NC, 2010
TIES Annual Meeting, Venezuela, 2010
New England Statistics Symposium, Cambridge, MA, 2010
Harvard University, Department of Biostatistics, 2010
SAMSI Workshop on Environmental Risk, RTP, NC, 2010
Chilean Biometric Conference, Santiago, Chile, 2010
Chilean Dental Statistics Meeting, Santiago, 2010
Conference on Geomedical Systems, Charleston, SC, 2009
The University of South Carolina, Department of Statistics, 2009
Duke University, Division of Statistical Sciences, 2009
NCSU, Department of Statistics, 2009
JSM, Washington, DC, 2009
NCSU, Undergraduate Statistics Club, 2009
University of New Mexico, Department of Mathematics and Statistics, 2009
JSM, Denver, CO, 2008
IISA Annual Meeting, Storrs, CT, 2008
NCSU, Department of Statistics, 2006
TIES Annual Meeting, Kalmar, Sweden, 2006
NCSU, Department of Statistics, 2005

COURSES

Applied Bayesian Statistics, Spring 2015–2019
Spatial Statistics, Fall 2016, 2018
Statistics for Climate Research, Fall 2017 (SAMSI)
Big Data, Fall 2015
Bayesian Inference, Fall 2008–2012, 2014
Statistical Theory I, Fall 2012-2013
Applied Spatial Statistics, Spring 2012-2013
Statistics for Management and the Social Sciences II, Fall 2007, 2010-2011
Introduction to Regression Analysis, Fall 2010-2011
Introduction to Probability and Distribution Theory, Spring 2011
Preparation for Statistical Research, Spring 2007–2009
Economics and Business Statistics, Fall 2005–2006

SHORT COURSES

Beyond p-values: Regression analysis, National Center for Atmospheric Research, 2017.
Bayesian statistics for pharmaceutical applications, Parexcel, 2015.
Introduction to Bayesian statistics, University of Southern California, 2015.

FUNDING

Developing data-to-decision pipelines for agroecosystem management through high-performance computing and big data analytics (2019-2022). NIFA, co-PI, $500,000.

Maintaining and enriching the Infants' Environmental Health Study (2019-2022). NIH, co-I, $1,522,322.

An advanced spatio-temporal statistical methodology for impact studies on air quality and renewable energy (2019-2023). KAUST, co-PI, $919,615.

Data driven discovery of singlet fission materials (2018-2020). National Science Foundation, co-PI, $237,841.

Novel statistical methods for estimating the health effects of chemical mixtures (2018-2019). CHHE Pilot Grant, PI, $37,875.

MATDAT18: Materials and data sciences hackathon (2017-2018). NSF, PI, $148,810.

Data integration methods for environmental exposures with application in air pollution and asthma morbidity (2017-2021). NIH, co-PI, $2,722,000.

A spatiotemporal recommendation engine for malaria control (2016-2018). Bill and Melinda Gates Foundation, PI, $100,000.

NRT-DESE: Data-enabled research traineeships in the science and engineering of atomic structure (SEAS). NSF, co-PI, $2,999,310.

Forensic geolocation via biological signatures (2016-2018). DOD, co-PI, $1,164,161.

Designing material-liquid-nanoparticle interfaces for tribological control (2015-2018). NSF, co-PI, $1,200,000.

Spatiotemporal models for periodontal disease monitoring and recall frequencies (2015-2018). NIH, PI, $1,145,035

Optimal decision strategies for large spatio-temporal decision problems (2015-2018). NSF, co-PI, $150,000.

Environmental pesticide exposure and respiratory outcomes in women and children (2015-2017). NIH, co-I, $351,007.

Estimating fire smoke related health burden and novel tools to manage impacts on urban populations (2014-2018). DOI, PI, $289,143.

10th Conference on Bayesian Nonparametrics (2015). US Army Research Office, co-PI, $10,000.

10th Conference on Bayesian Nonparametrics (2015). NSF, co-PI, $25,000.

Monitoring federal trust avian species in managed shade coffee plantations under the partner for fish and wildlife and coastal programs in Puerto Rico (2014-2015). US Fish & Wildlife Service, co-I, $30,000.

Research and applications in support of the National GAP Analysis Program (2014-2017). USGS, Co-PI, $1,616,571.

Advancing the use and application of diverse data sources and species distribution models (2014-2017). USGS, Co-PI, $300,000.

Exploring tooth survival using Bayesian spatial models (2014-2016). NIDCR, PI, $319,000.

Optimal sampling of animal communities (2014-2017). USGS, Co-PI, $300,000.

Conservation design and habitat conservation in Puerto Rico (2013-2017). US FWS, Co-PI, $1,734,995.

Statistical methods for exposure uncertainty in air pollution and health studies (2013-2016). NIH, Co-PI, $118,069.

CSUMS: NC State University computation for undergraduates in statistics program (2007-2014). NSF, Joined as PI in 2013, $770,714.

Molecular semulation: A new paradigm in materials modeling (2012-2015). NSF, Co-PI, $456,331.

Mapping the distribution, abundance and risk assessment of marine birds in the Northwest Atlantic (2012-2014). US FWS, PI, $115,000.

Studying the associations between manganese exposure and childhood development in North Carolina (2012-2013). North Carolina Division of Public Health, PI, $15,000.

Using advanced statistical techniques to identify the drivers and occurrence of historical and future extreme air quality events in the United States from observations and models (2012-2015). US EPA, Co-I, $749,930.

Collaborative research: RNMS statistical methods for atmospheric and oceanic sciences (2011-2016). NSF, Co-I, $2,837,003.

Robust spatial models for periodontal data (2011-2014). NIDCR, PI, $145,390.

Space-time modeling for linking climate change, pollutant exposure, built environments, and health outcomes (2010-2014). NIH, Co-I, $1,204,878.

Statistical methods for spatiotemporal crime series linkage analysis (2011-2013). NIJ, co-PI, $234,000.

Multivariate nonstationary spatial extremes in climate and atmospherics (2009-2010). NSF, Co-PI, $325,000.

A spatial-temporal modeling approach for evaluating the impact of environmental stressors, in conjunction with human activity, on human health outcomes (2007-2010). US EPA, Co-I, $893,439.

Multivariate space-time models and methods to combine large disparate spatial data and numerical models (2007-2010). NSF, Co-PI, $260,000.

## Advising

**PhD advisor / co-advisor (*):**

Zhao Lan* (expected, 2019)
Dave Huberman (expected, 2019)
Yuan Tian (expected, 2019)
Marschall Furman, (expected, 2020)
Matt Miller, (expected, 2020)
Suman Majumder, (expected, 2020)
Andrew Giffin*, (expected, 2021)
Laura Wendelberger*, (expected, 2021)
Can Cui (expected, 2021)
Steven Xu (expected, 2021)
Zun Yin (expected, 2021)

Qian Guan (expected, 2019). Bayesian methods for optimal treatment allocation and causal inference. First position, Eli Lilly.

Rui Li* (expected, 2019). Machine learning methods for uncertainty estimation and decision-making. First position, Facebook.

Haoyu Wang* (2019). Advances and applications of nonparametric statistics. First position, SAS.

Alexandra Larson (2018). Spatial methods for quantifying the impact of wildfire smoke on air quality in the U.S. First position, Duke University.

Munir Winkel* (2018). New applications of sequential experimental design. First position, Swiss Tropical and Public Health Institute.

Susheela Singh (2018). Bayesian methods for nonlinear and discrete data with complex dependence. First position, YouTube.

Arnab Harza* (2018). Spatiotemporal modeling with biomedical and environmental applications. First position, KAUST.

Indranil Sahoo* (2018). Spatiotemporal Models for Physical Processes. First position, Wake Forest University.

An-Ting Jhuang* (2018). Spatial signal detection using continuous shrinkage priors. First position, United Health.

Jennifer Wei* (2017). Bayesian variable selection using continuous shrinkage priors for nonparametric models and non-Gaussian Data. First position, Eli Lilly.

Neal Grantham (2017). Statistical methods for high-dimensional, spatially-distributed microbiome data from next-generation sequencing. First position, Phylogen.

Colin Peterson* (2016). Mean-dependent spatial statistical prediction methods with applications to material sciences. First position, US Environmental Protection Agency.

Sam Morris (2016). Spatial methods for modeling extreme and rare events. First position, Google, Inc.

Alfredo Farjat* (2015). Optimal seed deployment under climate change using spatial models and prediction of genetic merit in loblolly pine. First position, Duke University Medical Center.

Ryan Parker (2015). Efficient computational methods for large spatial data sets. First position, JMP.

Deidra Coleman* (2015). Advances in significance testing for cluster detection. First position, Philander Smith College.

Beth Ann Tidemann-Miller* (2014). Statistical modeling of multivariate functional data that exhibit complex correlation structures. First position, Biogen Idec.

Luke Smith* (2014). Bayesian quantile regression in biostatistical applications. First position, Amazon.

Yimin Kao (2014). Advances in nonparametric Bayesian methods for clustering and classification. First position, Gogolook.

Ander Wilson (2014). Advances in Bayesian methods for high-dimensional environmental data. First position, Colorado State University.

Laura Boehm* (2013). Bridge models and variable selection methods for spatial data.

First position, St Olaf College.

Eric Kalendra* (2010). Space-time modeling of health effects while controlling for spatially varying exposure surfaces. First position, Apple.

**MS advisor / co-advisor (*)**:

Shana McDowell* (North Carolina Central University, 2019). A sequential analysis of x-ray diffraction data. First position, PhD biostatistics student at the University of Alabama – Birmingham.

**Post-doc advisor / co-advisor (*)**:

Yawen Guan (2017-2019), Current position, University of Nebraska – Lincoln
Margaret Johnson (2017-2018), Current position, NASA Jet Propulsion Laboratory
Yen-Ning Huang* (2015-2016), Current position, Indiana University
Earvin Balderama* (2012-2014). Current position, Fresno State University

## Service

**Editor-in-Chief**:

Journal of Agricultural, Biological, and Environmental Statistics (2019-2021)

**Associate Editor**:

Technometrics (2018)
Biostatistics (2012-2018)
Journal of the American Statistical Association - Applications & Case Studies (2015-2018)
Journal of the American Statistical Association - Theory & Methods (2014-2017)
Annals of Applied Statistics (2011-2016)
Journal of Agricultural, Biological, and Environmental Statistics (2011-2015)

**Guest Co-Editor**:

Journal of Agricultural, Biological, and Environmental Statistics, special issue on "Computer models and spatial statistics for environmental science", 2011.

Journal of Agricultural, Biological, and Environmental Statistics, special issue on "Mathematical and statistical methods for climate and the earth system", 2019.

**Review Panel Member**:

NIH, Infectious Disease, Reproductive Health, and Asthma/Pulmonary Conditions (2018)
NSF, Computational and Data-Enabled Science and Engineering (2012, 2018)
NIH, National Institute of Dental and Craniofacial Research (2017)
NSF, Division of Mathematical Sciences (2014)

**Conference Co-Organizer**:

MATDAT18: Materials and Data Science Hackathon, Washington, DC (2018).
ISBA/BNP Conference on Bayesian Nonparametrics, Raleigh, NC (2015).
SAMSI Summer Program on Bayesian Nonparametrics: Synergies between Statistics, Probability and Mathematics, RTP, NC (2015).
ASA Workshop for the Statistics and the Environment Section, Raleigh, NC (2012).

**Conference Committees**: ENVR Student Paper Awards Committee Chair (2019); ENVR Student Paper Awards Committee (2016-2018); ENAR representative on the JSM Program Committee (2017-2108); ASA Section on Statistics and the Environment (ENVR) Program Chair (2016); Section on Bayesian Statistical Science Student Award Selection Committee (2011-2013); ENVR representative on the ENAR Program Committee (2012, 2013, 2017); ENAR Student Paper Awards Committee (2013-2015).

**Undergraduate research leader**: Computation for Undergraduates in Statistics Program (2012-2014).

**Standing committees**: ASA Advisory Committee on Climate Change (2018-Present).