Christopher J. Paciorek

CONTACT INFORMATION

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RESEARCH INTERESTS

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

EDUCATION

Carnegie Mellon University, Pittsburgh, Pennsylvania USA

Ph.D., Statistics, May 2003

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

M.S., Statistics, May 2000

Duke University, Durham, North Carolina USA

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

Carleton College, Northfield, Minnesota USA

B.A., Biology, May, 1993

HONORS AND AWARDS

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

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

CMU Statistics Department, Student of the Year, 2003

Phi Kappa Phi National Honor Society, 2002

National Science Foundation, Graduate Research Fellowship, 1996

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

ACADEMIC EXPERIENCE

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

Statistical Computing Consultant	**July, 2012 - present**
Adjunct Professor	**July, 2017 - present**
Associate Research Statistician and Lecturer	**July, 2012 - June, 2017**
Assistant Research Statistician and Lecturer	**July, 2011 - June, 2012**
Visiting Assistant Professor	**July, 2009 - June, 2011**

- Statistical computing support for faculty and students, preparation and presentation of statistical computing training materials, development of statistical computing initiatives for the department.
- Ongoing research in spatial and environmental statistics, applied to climate, global health, paleoecology, and environmental exposure and epidemiology.
- Postdoctoral advisor for Cliff Anderson-Bergman (co-advised with Perry de Valpine), Andria Dawson (co-advised with Jason McLachlan), Nick Michaud (co-advised with Perry de Valpine), Sally Paganin (co-advised with Perry de Valpine), Mark Risser, Zuofeng Shang (co-advised with Jason McLachlan), and Daniel Turek (co-advised with Perry de Valpine). PhD thesis co-advisor for Michelle Yu (2024) and Katherine Kempfert (in progress). MA thesis advisor for Joshua Hug (2021). BA thesis advisor for Biyonka Liang (2019).

- Instructor for graduate-level Bayesian statistics class, fall 2016 (Stat 238). Instructor for graduate-level statistical computing class, fall semesters, 2011-2015 and 2017-2024, with thorough course revision in fall 2011 (Stat 243) and conversion of course materials from R to Python in 2023. Taught undergraduate introduction to statistics for biology, environmental science and public health students, fall 2010 and spring 2011 (Stat 131A); undergraduate statistical theory course, spring 2010 (Stat 135); undergraduate regression class, fall 2009 (Stat 151A).
- Creator and primary instructor of an annual two-day intensive workshop teaching introduction to R to 150 graduate students and postdocs at UC Berkeley each August (2013-2023) and intensive four-day workshop on modern computational/programming practices for 50 statistics graduate students August 2024.

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

Research Scientist **July, 2011 - June, 2012**
Adjunct Assistant Professor **July, 2009 - June, 2011**
Assistant Professor **July, 2005 - June, 2009**

- Research in spatial and environmental statistics, applied to environmental exposure and epidemiology, climate, global health, and paleoecology.
- Updated and taught full semester course in Bayesian Methodology in Biostatistics, fall 2007 and spring 2009 (Bio249).
- Initiated and co-taught new full semester course in Spatial Statistics, spring 2007 (Bio283).
- Initiated two new winter session courses: 1.) an introduction to R (Bio503) and 2.) an introduction to GIS (Bio504).
- Thesis committees: Joshua Hug (advisor; Statistics, MA 2021), Mariel Finucane (co-advisor; Biostatistics, Ph.D. 2011), Rebecca Lincoln (Environmental Health, Sc.D. 2011), Len Zwack (Environmental Health, Sc.D. 2010), Casey Olives (Biostatistics, Ph.D. 2010), Loni Philip (Biostatistics, Ph.D. 2009), Paul Brochu (Environmental Health, Sc.D. 2009), Monique Perron (Environmental Health, Sc.D. 2009), Jeffrey Yanosky (Environmental Health, Sc.D. 2007), Lisa Baxter (Environmental Health, Sc.D. 2007), Jane Clougherty (Environmental Health, Sc.D. 2006).
- Department computing committee chair (2007-2009), responsible for overseeing student assistants, interaction with school information technology department, and major role in developing school's Linux cluster

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

Postdoctoral Research Fellow **July, 2003 - June, 2005**
Research in spatial and environmental statistics. Co-taught graduate level course in spatial statistics.

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

Graduate Student **August, 1998 - May, 2003**
Teaching experience included serving as co-instructor of introductory probability and statistics course for finance graduate students (summer 2002) and head teaching assistant for introductory probability class (spring 2001).

Peer-reviewed Publications

NCD Risk Factor Collaboration. 2024. Worldwide trends in diabetes prevalence and treatment from 1990 to 2022: a pooled analysis of 1108 population-representative studies with 141 million participants. The Lancet 404: 2077-2093. DOI: 10.1016/S0140-6736(24)02317-1.

Zhang, Y., W.R. Boos, I. Held, **C.J. Paciorek**, and S. Fueglistaler. 2024. Forecasting tropical annual maximum wet-bulb temperatures months in advance from the current state of El Niño. Geophysical Research Letters 51: e2023GL106990. DOI: 10.1029/2023GL106990.

Wehner, M.F., M.L. Duffy, M. Risser, **C.J. Paciorek**, D.A. Stone, and P. Paul. 2024. On the uncertainty of long-period return values of extreme daily precipitation. Frontiers in Climate 6:

:1343072. DOI: 10.3389/fclim.2024.1343072.

NCD Risk Factor Collaboration. 2024. Worldwide trends in underweight and obesity from 1990 to 2022: a pooled analysis of 3663 population-representative studies with 222 million school-aged children, adolescents and adults. The Lancet 403: 1027-1050. DOI: 10.1016/S0140-6736(23)02750-2.

NCD Risk Factor Collaboration. 2023. Global variation in diabetes diagnosis and prevalence based on fasting glucose and haemoglobin A1c. Nature Medicine. DOI: 10.1038/s41591-023-02610-2.

NCD Risk Factor Collaboration. 2023. Diminishing benefits of urban living for children and adolescents' growth and development. Nature 615: 874-883. DOI: 10.1038/s41586-023-05772-8.

Paganin, S., **C.J. Paciorek**, C. Wehrhahn, A. Rodríguez, S. Rabe-Hesketh and D.P. de Valpine. 2023. Computational strategies and estimation performance with Bayesian semiparametric item response theory models. Journal of Educational and Behavioral Statistics 48: 147-188. DOI: 10.3102/10769986221136.

Stevens, G.A., M.C. Flores-Urrutia, L.M. Rogers, **C.J. Paciorek**, F. Rohner, S. Namaste, and J.P. Wirth. 2022. Associations between type of blood collection, analytical approach, mean haemoglobin and anaemia prevalence in population-based surveys: A systematic review and meta-analysis. Journal of Global Health 12: 04088. DOI: 10.7189/jogh.12.04088.

Stevens, G.A., T. Beal, M.N.N. Mbuya, H. Luo, L.M. Neufeld, and the Global Micronutrients Deficiency Group. 2022. Micronutrient deficiencies among preschool-aged children and women of reproductive age worldwide: a pooled analysis of individual-level data from population-representative surveys. Lancet Global Health 10: E1590-E1599. DOI: 10.1016/S2214-109X(22)00367-9.

Raiho, A.M., **C.J. Paciorek**, A. Dawson, S.T. Jackson, D.J. Mladenoff, J.W. Williams and J.S. McLachlan. 2022. 8,000 year doubling of Midwestern forest biomass driven by population- and biome-scale processes. Science 376: 1491-1495. DOI: 10.1126/science.abk312.

Risser, M.D., W.D. Collins, M.F. Wehner, T.A. O'Brien, **C.J. Paciorek**, J.P. O'Brien, C.M. Patricola, H. Huang, P.A. Ullrich, and B. Loring. 2022. A framework for detection and attribution of regional precipitation change: Application to the United States historical record. Climate Dynamics. DOI: 10.1007/s00382-022-06321-1.

Stevens, G.A., **C.J. Paciorek**, M.C. Flores-Urrutia, E. Borghi, S. Namaste, J.P. Wirth, P.S. Suchdev, M. Ezzati, F. Rohner, S.R. Flaxman, and L.M. Rogers. 2022. National, regional, and global estimates of anaemia by severity in women and children for 2000–19: a pooled analysis of population-representative data. The Lancet Global Health 10: e627-e639. DOI: 10.1016/S2214-109X(22)00084-5.

Rashid T., J.E. Bennett, **C.J. Paciorek**, Y. Doyle, J. Pearson-Stuttard, S. Flaxman, D. Fecht, M.B. Toledano, G. Li, H. Iyathooray Daby, E. Johnson, B. Davies, and M. Ezzati. 2021. Life expectancy and risk of death in 6,791 English communities from 2002 to 2019: high-resolution spatiotemporal analysis of civil registration data. The Lancet Global Health, 6: e805-e816. DOI: 10.1016/S2468-2667(21)00205-X.

NCD Risk Factor Collaboration. 2021. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. The Lancet 398: 957-980. DOI: 10.1016/S0140-6736(21)01330-1.

Paciorek, C.J., C.V. Cogbill, J.A. Peters, J.W. Williams, D.J. Mladenoff, A. Dawson, and J.S. McLachlan. 2021. The forests of the midwestern United States at Euro-American settlement: spatial

and physical structure based on contemporaneous survey data. PLOS ONE 16(2): e0246473. DOI: 10.1371/journal.pone.0246473.

Risser, M.D., M.F. Wehner, J.P. O'Brien, C.M. Patricola, T.A. O'Brien, W.D. Collins, **C.J. Paciorek**, and H. Huang. 2021. Quantifying the influence of natural climate variability on in situ measurements of seasonal total and extreme daily precipitation. Climate Dynamics 56: 3205-3230. DOI: 10.1007/s00382-021-05638-7.

Michaud, N., P. de Valpine, D. Turek, and **C.J. Paciorek**. 2021. Sequential Monte Carlo methods in the NIMBLE R package. Journal of Statistical Software, 100(3) 1–39. 10.18637/jss.v100.i03.

Nguyen, D., P. de Valpine, Y. Atchade, D. Turek, N. Michaud, **C.J. Paciorek**. 2020. Nested Adaptation of MCMC Algorithms. Bayesian Analysis 15: 1323-1343. DOI: 10.1214/19-BA1190.

NCD Risk Factor Collaboration. 2020. Height and body-mass index trajectories of school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a pooled analysis of 2181 population-based studies with 65 million participants. The Lancet 396: 1511-1524. DOI: 10.1016/S0140-6736(20)31859-6.

NCD Risk Factor Collaboration. 2020. Repositioning of the global epicentre of non-optimal cholesterol. Nature 582: 73–77. DOI: 10.1038/s41586-020-2338-1.

Trachsel, M., A. Dawson, **C.J. Paciorek**, J.W. Williams, J.S. McLachlan, C.V. Cogbill, D.R. Foster, S.J. Goring, S.T. Jackson, W.W. Oswald, and B.N. Shuman. 2020. Comparison of settlement-era vegetation reconstructions for STEPPS and REVEALS pollen–vegetation models in the northeastern United States. Quaternary Research 95: 23-42. DOI: 10.1017/qua.2019.81.

Risser, M., **C.J. Paciorek**, T.A. O'Brien, M.F. Wehner, and W.D. Collins. 2019. Detected changes in precipitation extremes at their native scales derived from in situ measurements. Journal of Climate 32: 8087–8109. DOI: 10.1175/JCLI-D-19-0077.1.

Dawson, A., **C.J. Paciorek**, S. Goring, S. Jackson, J. McLachlan, and J. Williams. 2019. Quantifying trends and uncertainty in prehistoric forest composition in the upper Midwestern United States. Ecology 100: e02856. DOI: 10.1002/ecy.2856.

NCD Risk Factor Collaboration. 2019. Rising rural body-mass index is the main driver of the global obesity epidemic. Nature 569: 260–264. DOI: 10.1038/s41586-019-1171-x.

Risser, M., **C.J. Paciorek**, M.F. Wehner, T.A. O'Brien, and W.D. Collins. 2019. A probabilistic gridded product for daily precipitation extremes over the United States. Climate Dynamics, 53, 2517-2538. DOI: 10.1007/s00382-019-04636-0.

Risser, M.D., **C.J. Paciorek**, D. Stone. 2019. Spatially-dependent multiple testing under model misspecification, with application to detection of anthropogenic influence on extreme climate events. JASA Applications and Case Studies, 114: 61-78. DOI: 10.1080/01621459.2018.1451335.

Paciorek, C.J., D.A. Stone, and M.F. Wehner. 2018. Quantifying statistical uncertainty in the attribution of human influence on severe weather. Weather and Climate Extremes 20: 69-80. DOI: 10.1016/j.wace.2018.01.002.

Pall, P., C. Patricola, M. Wehner, D. Stone, **C.J. Paciorek**, W. Collins. 2017. Diagnosing conditional anthropogenic contributions to heavy Colorado rainfall in September 2013. Weather and Climate Extremes 17: 1-6. DOI: 10.1016/j.wace.2017.03.004.

Risser, M.D., D.A. Stone, **C.J. Paciorek**, M.F. Wehner, and O. Angélil. 2017. Quantifying the effect of interannual ocean variability on the attribution of extreme climate events to human influence. Climate Dynamics 49: 3051-3073. DOI: 10.1007/s00382-016-3492-x.

de Valpine, P., D. Turek, **C.J. Paciorek**, C. Anderson-Bergman, D. Temple Lang, and R. Bodik. 2017. Programming with models: writing statistical algorithms for general model structures with NIMBLE. Journal of Computational and Graphical Statistics 26: 403-413.
DOI: 10.1080/10618600.2016.1172487.

Angélil, O., D. Stone, M. Wehner, **C.J. Paciorek**, H. Krishnan and W. Collins. 2017. An independent assessment of anthropogenic attribution statements for recent extreme temperature and rainfall events. Journal of Climate 30: 5-16. DOI: 10.1175/JCLI-D-16-0077.

Turek, D., P. de Valpine, **C.J. Paciorek**, and C. Anderson-Bergman. 2017. Automated parameter blocking for efficient Markov chain Monte Carlo sampling. Bayesian Analysis 12: 465-490. DOI: 10.1214/16-BA1008.

NCD Risk Factor Collaboration. 2016. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. The Lancet 389: 37-55. DOI: 10.1016/S0140-6736(16)31919-5.

Turek, D., P. de Valpine, and **C.J. Paciorek**. 2016. Efficient Markov chain Monte Carlo sampling for hierarchical hidden Markov models. Environmental and Ecological Statistics 23(4): 549-564. DOI: 10.1007/s10651-016-0353-z.

NCD Risk Factor Collaboration. 2016. The height of the world - A century of trends in adult human height. eLife 2016;5:e13410. DOI: http://dx.doi.org/10.7554/eLife.13410.

Goring, S.J., J.W. Wlliams, D.J. Mladenoff, C.V. Cogbill, S. Record, **C.J. Paciorek**, S.T. Jackson, M.C. Dietze, J.H. Matthes, and J.S. McLachlan. 2016. Novel and lost forests in the upper Midwestern United States, from new estimates of settlement-era composition, stem density, and biomass. PLoS ONE 11(12): e0151935. DOI: 10.1371/journal.pone.0151935.

NCD Risk Factor Collaboration. 2016. Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants. The Lancet 387: 1513-1530. DOI: http://dx.doi.org/10.1016/S0140-6736(16)00618-8.

Paciorek, C.J., S.J. Goring, A.L. Thurman, C.V. Cogbill, J.W. Williams, D.J. Mladenoff, J.A. Peters, J. Zhu, and J.S. McLachlan. 2016. Statistically-estimated tree composition for the northeastern United States at the time of Euro-American settlement. PLoS ONE 11(2): e0150087. DOI: 10.1371/journal.pone.0150087.

Jeon, S., **C.J. Paciorek**, M.F. Wehner. 2016. Quantile-based bias correction and uncertainty quantification of extreme event attribution statements. Weather and Climate Extremes 12: 24-32. DOI: 10.1016/j.wace.2016.02.001.

Dawson, A., **C.J. Paciorek**, S.J. Goring, J.W. Williams, S.T. Jackson, and J.S. McLachlan. 2016. Quantifying pollen-vegetation relationships to reconstruct ancient forests using 19th-century forest composition and pollen data. Quaternary Science Reviews 137: 156-175.
DOI: 10.1016/j.quascirev.2016.01.012.

NCD Risk Factor Collaboration. 2016. Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. The Lancet 387: 1377-1396. DOI: 10.1016/S0140-6736(16)30054-X.

Finucane, M.M., C.F. Rowley, **C.J. Paciorek**, M. Essex, and M. Pagano. 2016. Estimating the prevalence of transmitted HIV drug resistance using pooled samples. Statistical Methods in Medical Research 25: 917-935. DOI: 10.1177/0962280212473514.

Finucane, M.M, **C.J. Paciorek**, G.A. Stevens, and M. Ezzati. 2015. Semiparametric Bayesian density estimation with disparate data sources: A meta-analysis of global childhood undernutrition (with discussion). Journal of the American Statistical Association, 110: 889-901. DOI: 10.1080/01621459.2014.937487.

Paciorek, C.J., B. Lipshitz, W. Zhuo, Prabhat, C.G. Kaufman, and R.C. Thomas. 2015. Parallelizing Gaussian process calculations in R. Journal of Statistical Software 63:10.

Wehner, M.F., K.A. Reed, F. Li, Prabhat, J. Bacmeister, C.-T. Chen, **C.J. Paciorek**, P.J. Gleckler, K.R. Sperber, W.D. Collins, A. Gettelman, and C. Jablonowski. 2014. The effect of horizontal resolution on simulation quality in the Community Atmospheric Model, CAM5.1. Journal of Advances in Modeling Earth Systems 6: 980-997. DOI: 10.1002/2013MS000276.

Yanosky, J.D., **C.J. Paciorek**, F. Laden, J.E. Hart, R.C. Puett, D. Liao and H.H. Suh. 2014. Spatio-temporal modeling of particulate air pollution in the conterminous United States using geographic and meteorological predictors. Environmental Health 13:63. DOI: 10.1186/1476-069X-13-63.

Bliznyuk, N., **C.J. Paciorek**, J. Schwartz and B. Coull. 2014. Nonlinear predictive latent process models for integrating spatio-temporal exposure data from multiple sources. Annals of Applied Statistics 8: 1538-1560. DOI: 10.1214/14-AOAS737.

Finucane, M.M., **C.J. Paciorek**, G. Danaei, and M. Ezzati. 2014. Bayesian estimation of population-level trends in measures of health status. Statistical Science 29: 18-25, special issue on "Big Bayes Stories: A Collection of Vignettes". DOI: 10.1214/13-STS427.

Szpiro, A.A. and **C.J. Paciorek**. 2013. Measurement error in two-stage analyses, with application to air pollution epidemiology (with discussion). Environmetrics, 24: 501-517. doi:10.1002/env.2233.

Paciorek, C.J., G.A. Stevens, M.M. Finucane, and M. Ezzati. 2013. Urban living, urbanisation, and children's height and weight in low- and middle-income countries. The Lancet Global Health, 1:e300-e309. doi:10.1016/S2214-109X(13)70109-8.

Stevens, G.A., M.M. Finucane, L.M. De-Regil, **C.J. Paciorek**, S.R. Flaxman, F. Branca, J.P. Pena-Rosas, Z.A. Bhutta, and M. Ezzati. 2013. Global, regional, and national trends in haemoglobin and total and severe anaemia prevalence in children and pregnant and non-pregnant women. The Lancet Global Health 1:e16-e25. doi:10.1016/S2214-109X(13)70001-9.

Peterson, T., R.R. Heim, Jr., R. Hirsch, D.P. Kaiser, H. Brooks, N.S. Diffenbaugh, R.M. Dole, J.P. Giovannettone, K. Guirguis, T.R. Karl, R.W. Katz, K. Kunkel, D. Lettenmaier, G.J. McCabe, **C.J. Paciorek**, K.R. Ryberg, S. Schubert, V.B.S. Silva, B.C. Stewart, A.V. Vecchia, G. Villarini, R.S. Vose, J. Walsh, M. Wehner, D. Wolock, K. Wolter, C.A. Woodhouse, and D. Wuebbles. 2013. Monitoring and understanding changes in heat waves, cold waves, floods and droughts in the United States: State of knowledge. Bulletin of the American Meteorological Society 94: 821-834. doi:10.1175/BAMS-D-12-00066.1.

Danaei, G., G.M. Singh, **C.J. Paciorek**, M.M. Finucane, J.K. Lin, F. Farzadfar, G.A. Stevens, M.J. Cowan, L.M. Riley, Y. Lu, M. Rao, and M. Ezzati. 2013. The global cardiovascular risk transition: associations of four metabolic risk factors with macroeconomic variables in 1980 and 2008. Circulation 127: 1493-1502. doi:10.1161/CIRCULATIONAHA.113.001470.

Kunkel, K.E., T.R. Karl, H. Brooks, J. Kossin, J.H. Lawrimore, D. Arndt, L. Bosart, D. Changnon, S.L. Cutter, N. Doesken, K. Emanuel, P.Y. Groisman, R.W. Katz, T. Knutson, J. O'Brien, **C.J. Paciorek**, T.C. Peterson, K. Redmond, D. Robinson, J. Trapp, R. Vose, S. Weaver, M. Wehner, K. Wolter, and D. Wuebbles. 2013. Monitoring and understanding trends in extreme storms: State of knowledge. Bulletin of the American Meteorological Society 94: 499-514. doi: 10.1175/BAMS-D-11-00262.1.

C.J. Paciorek. 2013. Spatial models for point and areal data using Markov random fields on a fine grid. Electronic Journal of Statistics 7:946-972. doi:10.1214/13-EJS791.

Stevens, G.A., G.M. Singh, Y. Lu, G. Danaei, J.K. Lin, M.M. Finucane, A.N. Bahalim, R.K. McIntire, H.R. Gutierrez, M. Cowan, **C.J. Paciorek**, L. Riley, and M. Ezzati. 2012. National, regional, and global trends in adult overweight and obesity prevalences. Population Health Metrics 10:22. doi:10.1186/1478-7954-10-22.

Stevens, G.A., M.M. Finucane, **C.J. Paciorek**, S.R. Flaxman, R.A. White, A.J. Donner, and M. Ezzati. 2012. Trends in mild, moderate, and severe stunting and underweight, and progress towards MDG 1 in 141 developing countries: a systematic analysis. The Lancet 380: 824-834. doi:10.1016/S0140-6736(12)60647-3.

Goring, S., J.W. Williams, J.L. Blois, S.T. Jackson, **C.J. Paciorek**, R.K. Booth, J.R. Marlon, M. Blaauw, and J.A. Christen. 2012. Deposition times in the northeastern United States during the Holocene: establishing valid priors for Bayesian age models. Quaternary Science Reviews 48: 54-60.

Rooney, M.S., R.E. Arku, K.L. Dionisio, **C.J. Paciorek**, A.B. Friedman, H. Carmichael, Z. Zhou, A.F. Hughes, J. Vallarino, S. Mensha-Agyei, J.D. Spengler, and M. Ezzati. 2012. Spatial patterns of particulate matter sources and pollution in four Communities in Accra, Ghana. Science of the Total Environment 435-436: 107-114. doi:10.1016/j.scitotenv.2012.06.077.

Paciorek, C.J., and Y. Liu. 2012. Assessment and Statistical Modeling of the Relationship between Remotely-Sensed Aerosol Optical Depth and $PM_{2.5}$. Health Effects Institute Research Report 167 (peer-reviewed).

Paciorek, C.J. 2012. Combining spatial information sources while accounting for systematic errors in proxies. Journal of the Royal Statistical Society, Series C (Applied Statistics) 61: 429-451. doi:10.1111/j.1467-9876.2011.01035.x.

Lin, H.-H., S.S. Shin, C. Contreras, L. Asencios, **C.J. Paciorek**, and T. Cohen. 2012. Use of spatial information to predict multidrug resistance in tuberculosis patients, Peru. Emerging Infectious Diseases 18: 811-813.

Szpiro, A.A., **C.J. Paciorek**, L. Sheppard. 2011. Does more accurate exposure prediction improve health effect estimates? Epidemiology 22: 680-685. doi:10.1097/EDE.0b013e3182254cc6.

Brochu, P.J., J.D. Yanosky, **C.J. Paciorek**, J. Schwartz, J.T. Chen, R.F. Herrick, and H.H. Suh. 2011. Particulate air pollution and socioeconomic position in rural and urban areas of the northeastern United States. American Journal of Public Health 101: S224-S230. doi:10.2105/AJPH.2011.300232.

Zwack, L.M., **C.J. Paciorek**, J.D. Spengler, and J.I. Levy. 2011. Modeling spatial patterns of traffic-related air pollutants in complex urban terrain. Environmental Health Perspectives 119: 852-859. doi:10.1289/ehp.1002519.

Zwack L.M., **C.J. Paciorek**, J.D. Spengler, and J.I. Levy. 2011. Characterizing local traffic

contributions to particulate air pollution in street canyons using mobile monitoring techniques. Atmospheric Environment 45: 2507-2514. doi:10.1016/jatmosenv.2011.02.035.

Danaei, G., M.M. Finucane, Y. Lu, G. Singh, M.J. Cowan, **C.J. Paciorek**, J.K. Lin, F. Farzadfar, Y.-H. Khang, G.A. Stevens, M. Rao, M.K. Ali, L.M. Riley, C.A. Robinson, and M. Ezzati. National, regional, and global trends in fasting plasma glucose and diabetes prevalence since 1980: Systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants. The Lancet 378: 31-40. doi:10.1016/S0140-6736(11)60679-X.

Danaei, G., M.M. Finucane, J.K. Lin, G.M. Singh, **C.J. Paciorek**, M.J. Cowan, F. Farzadfar, G.A. Stevens, S.S. Lim, L.M. Riley, and M. Ezzati. 2011. National, regional, and global trends in systolic blood pressure since 1980: Systematic analysis of health examination surveys and epidemiological studies with 786 country-years and 5.4 million participants. The Lancet 377: 568-577. doi:10.1016/S0140-6736(10)62036-3.

Farzadfar, F., M.M. Finucane, G. Danaei, **C.J. Paciorek**, P. Pelizzari, M.J. Cowan, G.M. Singh, J.K. Lin, G.A. Stevens, L.M. Riley, and M. Ezzati. 2011. National, regional, and global trends in serum total cholesterol since 1980: Systematic analysis of health examination surveys and epidemiological studies with 321 country-years and 3.0 million participants. The Lancet 377: 578-586. doi:10.1016/S0140-6736(10)62038-7.

Finucane, M.M., G.A. Stevens, M. Cowan, G. Danaei, J.K. Lin, **C.J. Paciorek**, G.M. Singh, H.R. Gutierrez, Y. Lu, A.N. Bahalim, F. Farzadfar, L.M. Riley, and M. Ezzati. 2011. National, regional, and global trends in body mass index since 1980: Systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. The Lancet 377:557-567. doi:10.1016/S0140-6736(10)62037-5.

Lin, H., S. Shin, J.A. Blaya, Z. Zhang, P. Cegielski, C. Contreras, L. Asencios, C. Bonilla, J. Bayona, **Paciorek, C.J.**, and T. Cohen. 2011. Assessing spatiotemporal patterns of multidrug-resistant and drug-sensitive tuberculosis in a South American setting. Epidemiology and Infection 139: 1784-1793. doi:10.1017/S0950268810002797.

Paciorek, C.J. 2010. The importance of scale for spatial-confounding bias and precision of spatial regression estimators. Statistical Science 25:107-125. doi: 10.1214/10-STS326.

Baxter, L.K., R.J. Wright, **C.J. Paciorek**, F. Laden, H.H. Suh, and J.I. Levy. 2010. Effects of exposure measurement error in the analysis of health effects from traffic-related air pollution. Journal of Exposure Science and Environmental Epidemiology 20:101-111. doi: 10.1038/jes.2009.5.

Puett, R.C., J.E. Hart, J.D. Yanosky, **C.J. Paciorek**, J. Schwartz, H.H. Suh, F.E. Speizer, and F. Laden. 2009. Chronic fine and coarse particulate exposure, mortality and coronary heart disease in the Nurses' Health Study. Environmental Health Perspectives 117:1697-1701. doi:10.1289/ehp.0900572.

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

Paciorek, C.J. and J.S. McLachlan. 2009. Mapping ancient forests: Bayesian inference for spatio-temporal trends in forest composition. Journal of the American Statistical Association 104:608-–622. doi:10.1198/jasa.2009.0026.

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

Paciorek, C.J., J.D. Yanosky, R.C. Puett, F. Laden, and H.H. Suh. 2009. Practical large-scale spatio-temporal modeling of particulate matter concentrations. Annals of Applied Statistics 3:370-397. doi:10.1214/08-AOAS204.

Gryparis, A., **C.J. Paciorek**, A. Zeka, J. Schwartz, and B. Coull. 2009. Measurement error caused by spatial misalignment in environmental epidemiology. Biostatistics 10:258-274. doi:10.1093/biostatistics/kxn033. .

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

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

Paciorek, C.J., Y. Liu, H. Moreno, and S. Kondragunta. 2008. Spatio-temporal associations between GOES aerosol optical depth retrievals and ground-level $PM_{2.5}$. Environmental Science and Technology 42:5800-5806. doi:10.1021/es703181j.

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

Baxter, L.K., J.E. Clougherty, **C.J. Paciorek**, R.J. Wright, and J.I. Levy. 2007. Predicting residential indoor concentrations of nitrogen dioxide, fine particulate matter, and elemental carbon using questionnaire and geographic information system based data. Atmospheric Environment 41:6561-6571. doi:10.1016/j.atmosenv.2007.04.027.

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

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

Paciorek, C.J., and M. Schervish. 2006. Spatial modelling using a new class of nonstationary covariance functions. Environmetrics 17:483-506. doi:10.1002/env.785.

Paciorek, C.J. 2006. Misinformation in the conjugate prior for the linear model with implications for free-knot spline modelling. Bayesian Analysis 1:375-383. doi:10.1214/06-BA114.

Ickes, K., **C.J. Paciorek**, and S. Thomas. 2005. Impacts of nest construction by native pigs (*Sus scrofa*) on saplings in a lowland Malaysian rain forest. Ecology 86:1540-1547.

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

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

Paciorek, C.J., J.S. Risbey, V. Ventura, and R.D. Rosen. 2002. Multiple indices of Northern hemisphere cyclone activity, winters 1949-1999. Journal of Climate 15:1573-1590.

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

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

Other Publications

National Academies of Sciences, Engineering, and Medicine. 2024. Modernizing Probable Maximum Precipitation Estimation. Washington, DC: National Academies Press. DOI: 10.17226/27460. (one of 12 committee members authoring the report)

Paciorek, C.J. and M.F. Wehner. 2024. Comment on 'Five Decades of Observed Daily Precipitation Reveal Longer and More Variable Drought Events Across Much of the Western United States'. Geophysical Research Letters, 51, e2023GL104550. DOI:10.1029/2023GL104550.

Paciorek, C.J.. 2022. Analyzing trends in precipitation patterns using Hidden Markov model stochastic weather generators. arXiv preprint 2207.08649.

Hug, J. and **C.J. Paciorek**. 2021. A numerically stable online implementation and exploration of WAIC through variations of the predictive density, using NIMBLE. arXiv preprint 2106.13359.

National Academies of Sciences, Engineering, and Medicine. 2016. Attribution of Extreme Weather Events in the Context of Climate Change. Washington, DC: National Academies Press. DOI: 10.17226/21852. (one of 10 committee members authoring the report)

Stone, D., **C.J. Paciorek**, Prabhat, P. Pall, and M. Wehner. 2013. "Inferring the anthropogenic contribution to local temperature extremes". Letter to the Editor in response to Hansen et al. "Perception of climate change". Proceedings of the National Academy of Sciences 110:E1543.

Paciorek, C.J. 2008. Discussion of "Bivariate binomial spatial modeling of *Loa loa* prevalence in tropical Africa". Journal of the American Statistical Association 103:37-40. doi:10.1198/jasa.2009.0026.

Grants

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

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

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

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

Bill and Melinda Gates Foundation
Co-investigator **October, 2009 - June, 2012**
Databases, impact model, and impact analysis of nutritional conditions and deficiencies in developing countries, $692,416.

Department of Energy
Co-investigator **September, 2010 - August, 2013**
Visual data exploration and analysis of ultra-large climate data, $1,024,980.

National Science Foundation
Co-PI (unofficial) and statistics lead **May, 2011 - April, 2013**
PalEON - a PaleoEcological Observatory Network to assess terrestrial ecosystem models, $750,000.

National Science Foundation
Co-PI **April, 2012 - March, 2015**
ABI Development: An extensible software platform for integrating multiple sources of data and uncertainty using hierarchical statistical models, $912,896.

National Science Foundation
Co-PI and statistics lead **September, 2013 - August, 2018**
PalEON - a PaleoEcological Observatory Network to assess terrestrial ecosystem models, $5,113,060.

Department of Energy
Statistics lead **October, 2013 - September, 2016**
CAlibrated and Systematic Characterization, Attribution, and Detection of Extremes (CASCADE) Scientific Focus Area (SFA), $6,559,238.

Department of Energy
Statistics lead **October, 2016 - September, 2019**
CAlibrated and Systematic Characterization, Attribution, and Detection of Extremes (CASCADE) Scientific Focus Area (SFA), $5,000,000.

National Science Foundation
Co-PI **September, 2016 - August, 2020**
SI2-SSI: Integrating the NIMBLE statistical algorithm platform with advanced computational tools and analysis workflows, $1,000,000.

National Science Foundation
Co-PI **September, 2016 - August, 2019**
Collaborative Research: Expanding the Computational Statistics Toolbox for General Hierarchical Models, $200,000.

Department of Energy
Investigator **October, 2019 - September, 2023**
CAlibrated and Systematic Characterization, Attribution, and Detection of Extremes (CASCADE) Scientific Focus Area (SFA), $6,000,000.

National Science Foundation
Co-PI **July, 2022 - June, 2025**
Collaborative Research: Enabling hybrid methods in the NIMBLE hierarchical statistical modeling platform, $200,000.

California Department of Fish and Wildlife
Co-PI **July, 2023 - December, 2025**
A nimbler analysis of large biodiversity data sets in quicker response to current conservation planning needs, $250,000.

Department of Energy
Investigator **October, 2023 - September, 2026**

CAlibrated and Systematic Characterization, Attribution, and Detection of Extremes (CASCADE) Scientific Focus Area (SFA), $6,000,000.

Professional Experience

Statistical consulting

- Global Alliance for Improved Nutrition (GAIN): consultant on modeling national-level joint micronutrient deficiencies (May 2021 - June 2022)
- World Health Organization (WHO): consultant on modeling national-level anemia prevalence from survey data (sporadically from 2017 to present)
- Electric Power Research Institute (EPRI): consultant on integrated uncertainty assessment methods and software for air pollution health impacts (June 2020 - August, 2020)

SAS, Inc., Cary, North Carolina, USA

Bayesian statistical computing consultant **October, 2005 - October, 2009**
Occasional consultant on Bayesian statistical computing, primarily for the development of Proc MCMC.

X-CEL Adult Education Services, Boston, Massachusetts USA

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

Bureau of Transportation Statistics, U.S. Department of Transportation, Washington, District of Columbia USA

Summer researcher **May, 2000 - August, 2000**
Carried out several consulting projects, including modelling of injuries to cadavers in crash test experiments, analysis of airline delay data, and advice on analysis of airline economics data.

Abt Associates, Bethesda, Maryland USA

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

Computing Skills

- Languages and packages: R, Python, C/C++, bash, SQL, JAGS/BUGS, limited exposure to MATLAB and Julia.
- R packages: created climextRemes, bigGP, and spectralGP packages. Co-developer and co-principal investigator for the NIMBLE package.
- Algorithms: Extensive experience programming/evaluating/debugging Markov chain Monte Carlo simulations of Bayesian posterior distributions.
- Operating Systems: UNIX/Linux, MacOS.

Professional Service

Committee member:

- 2021-present: Member, HEI-Energy Research Committee.
- 2023: Member, National Academies of Sciences, Engineering, and Medicine report committee on Modernizing Probable Maximum Precipitation Estimation.
- 2016: Member, National Academies of Sciences, Engineering, and Medicine report committee on Attribution of Extreme Weather Events in the Context of Climate Change.

Journal editing:

- 2016-present: associate editor for reproducibility (founding/coordinating) for JASA
- 2015-present: board of statistical reviewers for JAMA

- 2014-present: associate editor for Advances in Statistical Climatology, Meteorology and Oceanography
- 2010-2012: associate editor for Electronic Journal of Statistics

Journal and proposal reviewer:

- 2024: Climate Dynamics, Environmental Health Perspectives, Fondecyt (Chile) proposal review, Geophysical Research Letters, JAMA (14), Journal of the American Statistical Association, Stochastic Environmental Research and Risk Assessment
- 2023: Climatic Change, JAMA (11), Journal of Computational and Graphical Statistics, Weather and Climate Extremes
- 2022: The American Statistician, Bulletin of the American Meteorological Society, Environmetrics, Epidemiology, Geophysical Model Development, HEI ad hoc special report reviewer, JAMA (14), Journal of Climate
- 2021: Climatic Change, Environmental Research Letters, HEI ad hoc special report reviewer, Israel Science Foundation proposal review, JAMA (12), JAMA Oncology, Journal of Causal Inference
- 2020: Biometrika, JAMA (12), Geophysical Research Letters, HEI ad hoc special report reviewer, Journal of Climate, NOAA proposal review panel, Statistical Science
- 2019: Chapman and Hall (book manuscript), Environmental Research Letters, Environmental Science & Technology, Geophysical Research Letters, HEI ad hoc special report reviewer, JAMA (12), JAMA Oncology, Journal of the American Statistical Association, Journal of Climate, MRC (UK) proposal review, NSF proposal review, Statistical Methods in Medical Research
- 2018: Chapman and Hall (book proposal), Health Effects Institute (HEI) ad hoc site visit reviewer, HEI ad hoc special report reviewer, JAMA (11), Journal of Statistical Planning and Inference, National Science Foundation proposal review, Statistical Science, Statistics in Medicine, World Bank Economic Review
- 2017: Air Quality Atmosphere and Health, American Journal of Epidemiology, JAMA (7), Mathematical Geosciences, NSERC (Canada) proposal review, PLOS ONE, Statistical Science
- 2016: Climate Dynamics, JAMA (6), National Environmental Research Council (UK) proposal review, NSERC (Canada) proposal review, Nature
- 2015: Bayesian Analysis, JAMA (5), International Journal of Health Geographics, Journal of the American Statistical Association, Journal of Statistical Software, Scandinavian Journal of Statistics, SIAM Journal of Uncertainty Quantification
- 2014: BMC Public Health, Climatic Change, Environmetrics, Journal of Agricultural Biological and Environmental Statistics, JAMA (2), Journal of the American Statistical Association, National Science Foundation proposal review (2), Statistics in Medicine
- 2013: Climate Dynamics, Environmental Health Perspectives, Environmetrics, Health Effects Institute research report review, International Journal of Environmental Research and Public Health, JAMA, Journal of Agricultural Biological, and Environmental Statistics (book review), Journal of the American Statistical Association (2), Journal of the Royal Statistical Society Series B, Journal of the Royal Statistical Society Series C, Statistica Sinica, Statistical Methods in Medical Research
- 2012: Annals of Applied Statistics, Fondecyt (Chile) proposal review, BMJ Open, Environmental Health Perspectives, Environmental Monitoring and Assessment, Health Effects Institute proposal review, Journal of the American Statistical Association
- 2011: Annals of Applied Statistics, Atmospheric Environment, Biometrics, Environmental Health Perspectives, Journal of the American Statistical Association
- 2010: Annals of Applied Statistics, Bayesian Analysis, Ecological Applications, Environmental Science and Technology, Environmetrics, Epidemiology, Journal of the American Statistical Association (2), Journal of Geophysical Research - Atmospheres, Journal of the Royal Statistical Society Series C
- 2009: Canadian Journal of Statistics, Journal of the American Statistical Association, Environmetrics (2), Weather and Forecasting
- 2008: Biometrics, Ecology, Environmental Health, Journal of Computational and Graphical

Statistics, Journal of the American Statistical Association, NSERC proposal review, Statistics in Medicine
- 2007: American Journal of Epidemiology, Annals of Applied Statistics, Canadian Journal of Statistics, Journal of the American Statistical Association
- 2006: Bayesian Analysis, Biometrics, Journal of the American Statistical Association (3), Statistica Sinica (2)
- 2005: American Journal of Epidemiology, Journal of Applied Meteorology, Journal of Statistical Computation and Simulation, Statistics in Medicine
- 2004: Bayesian Analysis, Biometrics, Statistics in Medicine

Grant review panel member:
- NOAA Explaining Extremes review, 2020
- EPA CMU Clean Air Center grant Scientic Advisory Committee member, 2016-2020
- NCI SBIR Facilitating the Transfer of Statistical Methodology into Practice round2 review, 2012
- EPA STAR Clean Air Research (formerly PM) Center review, 2010
- NCI SBIR Data Harmonization and Advanced Computation of Population Health Data and Facilitating the Transfer of Statistical Methodology into Practice combined review, 2010
- EPA STAR Consequences of Global Change for Water Quality review, 2008
- EPA STAR Coarse Particles review, 2007
- NIEHS-EPA Children's Centers special emphasis review, 2006

Professional society committees:
- Member, American Statistical Association Advisory Committee on Climate Change Policy, 2014-2016
- ASA Section on Bayesian Statistical Science, JSM student paper award committee, 2012.
- ASA Section on Environmental Statistics, JSM award committee, 2005.

Conference invited session organizer:
- JSM, 2014: Challenges and Solutions in Developing and Disseminating Flexible Software for Hierarchical Modeling
- ENAR, 2009: Statistical Modeling and Design Issues in Epidemiological Studies
- ENAR, 2006: Statistical Issues in Using Exposure Estimates in Environmental Epidemiology