Yawen Guan, Ph.D.

Assistant Professor
Department of Statistics, University of Nebraska - Lincoln
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Education

The Pennsylvania State University, University Park, PA

- Ph.D., Statistics — Aug. 2017

  Advisor: Dr. Murali Haran, Professor and Head, Department of Statistics
  Thesis Title: "Reduced-dimensional Non-Gaussian Spatial Models and Statistical Methods for Studying the West Antarctic Ice Sheet"

- B.S., Finance and Mathematics — May 2012

Professional Appointments

University of Nebraska - Lincoln

- Assistant Professor, Department of Statistics — Jul. 2019 - Current

Statistical and Applied Mathematical Sciences Institute (SAMSI)
and North Carolina State University — Aug. 2017 - Jul. 2019

- Postdoctoral Fellow, SAMSI Program on Mathematical and Statistical Methods for Climate and the Earth System (CLIM)
- Postdoctoral Fellow, Department of Statistics, NC State University

  Advisor: Dr. Brian Reich, Gertrude M. Cox Distinguished Professor of Statistics.

Research Interests

Spatial and Spatiotemporal Statistics; Spatial Causal Inference; Bayesian Statistics; Random Projection Method; Computer Model Emulation and Calibration; Environmental Applications

Grant Activities

- DOE-SciDAC, *Improved Coupled Climate Simulations in E3SM Through Enhanced Sea-Ice Mechanics.*
  PI: Deborah Sulsky (UNM). Co-I: Yawen Guan, Kara Peterson (Sandia), Onkar Sahni (RPI), Adrian Turner (LANL)
  Approved Total Funding anticipated to UNL: $470,000 over 2022-2027
- NIH-NIEHS-R01ES031651, *Spatial Causal Inference for Wildland Fire Smoke Effects on Air Pollution and Health*
  PI: Shu Yang (NCSU). Co-PI: Brian Reich (NCSU) and Yawen Guan
  Total Funding Awarded to UNL: $88,768 over 2020-2024
- NSF RII Track-2 FEC, *From Genes to Ecosystems: Harnessing Elemental Data to Detect Stoichiometric Control-Points and Their Consequences for Organismal Evolution.*
  PI: Jessica Corman (UNL). Co-PI: Amy Krist, Catherine Wagner, Halvor Halvorson and

Eric Moody Total Funding: $5,987,352 over 2021-2024.
My role: Senior Personnel, responsible for developing statistical analysis (5% effort)

Honors and Awards

Penn State University

- Poster Award at the Rao Prize Conference 2017
- Recipient of theJ. Keith Ord Scholarship in Statistics for research and mentoring in the area of spatial and environmental statistics 2016
- Recipient of the Jack and Eleanor Pettit Scholarship in Science 2016

Travel Awards

- Networking with program officers at D.C. Awarded by the Research Development Fellows Program at University of Nebraska upcoming
- SAMSI opening workshop on Causal Inference 2019
- IMS The 21th Meeting of New Researchers in Statistics and Probability 2019
- Statistics for the Environment: Research, Practice & Policy (ENVR 2018) 2018
- IMA workshop on Forecasting from Complexity 2018
- STATMOS/SAMSI workshop on Climate Statistics 2017
- STATMOS workshop on Climate and Weather Extremes 2016
- Rossbypalooza workshop: Climate meets Statistics at UChicago 2016
- STATMOS workshop on High Performance Computing for Spatial Statistics 2015
- International conference on Extreme Value Analysis 2015
- STATMOS workshop on Spatial Statistics 2015

Refereed Publications

16. Chang, W., Konomi, B. A., Karagiannis, G., Guan, Y., and Haran, M. (2022). Ice model calibration using semi-continuous spatial data. *The Annals of Applied Statistics*, 16(3):1937 – 1961
15. Srikrishnan, V., Guan, Y., Tol, R. S. J., and Keller, K. (2022). Probabilistic projections of baseline 21st century co_2 emissions using a simple calibrated integrated assessment model. *Climatic Change*, (3)
14. Majumder, S., Guan, Y., Reich, B. J., and Saibaba, A. K. (2022). Kryging: Geostatistical analysis of large-scale datasets using Krylov subspace methods. *Statistics and Computing*, 32(5):74
13. Reich, B. J., Yang, S., and Guan, Y. (2022). Discussion on "spatial+: A novel approach to spatial confounding" by dupont, wood, and augustin. *Biometrics*, 0(0):1–4
12. Reich, B. J., Yang, S., Guan, Y., Giffin, A. B., Miller, M. J., and Rappold, A. G. (2021). A review of spatial causal inference methods for environmental and epidemiological applications. *International Statistical Review*, 89(3):605–634
11. Majumder, S., Guan, Y., Reich, B., O'Neill, S., and Rappold, A. G. (2021). Statistical downscaling with spatial misalignment: Application to wildland fire PM2.5 concentration forecasting. *Journal of Agricultural, Biological and Environmental Statistics*, 26:23–44

10. Berrocal, V. J., Guan, Y., Muyskens, A., Wang, H., Reich, B. J., Mulholland, J. A., and Chang, H. H. (2020). A comparison of statistical and machine learning methods for creating national daily maps of ambient PM2.5 concentration. *Atmospheric Environment*, 222:117–130 (Code https://github.com/yawenguan/DataFusion)
9. Guan, Y., Johnson, M. C., Katzfuss, M., Mannshardt, E., Messier, K. P., Reich, B. J., and Song, J. J. (2020). Fine-scale spatiotemporal air pollution analysis using mobile monitors on Google street view vehicles. *Journal of the American Statistical Association*, 115(531):1111–1124
8. Reich, B. J., Guan, Y., Fourches, D., Warren, J. L., Sarnat, S. E., and Chang, H. H. (2020). Integrative statistical methods for exposure mixtures and health. *Ann. Appl. Stat.*, 14(4):1945–1963
7. Grantham, N. S., Guan, Y., Reich, B. J., Borer, E. T., and Gross, K. (2020). MIMIX: A Bayesian mixed-effects model for microbiome data from designed experiments. *Journal of the American Statistical Association*, 115(530):599–609
6. Wang, H., Guan, Y., and Reich, B. (2019). Nearest-neighbor neural networks for geostatistics. In *2019 International Conference on Data Mining Workshops (ICDMW)*, pages 196–205
5. Guan, Y., Sampson, C., Tucker, J. D., Chang, W., Mondal, A., Haran, M., and Sulsky, D. (2019b). Computer model calibration based on image warping metrics: an application for sea ice deformation. *Journal of Agricultural, Biological, and Environmental Statistics*, 24:444
4. Guan, Y. and Haran, M. (2018). A computationally efficient projection-based approach for spatial generalized linear mixed models. *Journal of Computational and Graphical Statistics*, 27(4):701–714
3. Guan, Y., Haran, M., and Pollard, D. (2017). Inferring Ice Thickness from a Glacier Dynamics Model and Multiple Surface Datasets. *Environmetrics*
2. Ruckert, K. L., Shaffer, G., Pollard, D., Guan, Y., Wong, T. E., Forest, C. E., and Keller, K. (2017). Assessing the Impact of Retreat Mechanisms in a Simple Antarctic Ice Sheet Model Using Bayesian Calibration. *PLOSONE*
1. Ruckert, K. L., Guan, Y., Bakker, A. M. R., Forest, C. E., and Keller, K. (2016). The effects of time-varying observation errors on semi-empirical sea-level projections. *Climatic Change*, pages 1–12

Submitted

4. Guan, Y., Page, G. L., Reich, B. J., Ventrucci, M., and Yang, S. (2022+). A spectral adjustment for spatial confounding. *Under revision at Biometrika*
(Code https://github.com/yawenguan/spatial_confounding)
3. Pokal, S., Guan, Y., Zhou, Y., and Wang, H. (2022+). An improved doubly robust estimator using partially recovered unmeasured spatial confounder. *Submitted to Biostatistics*, doi 10.2172/1769711
2. Guan, Y., Reich, B., and Chang, H. (2019a). Multivariate Spectral Downscaling for Multiple Air Pollutants. *Preprint on ArXiv* (Code https://github.com/yawenguan/multires)
1. Guan, Y. and Haran, M. (2022+). Fast expectation-maximization algorithms for spatial generalized linear mixed models. *Submitted to Environmetrics*
(Code https://github.com/yawenguan/projSGLMM)

Technical Report

- Guan, Y., Sulsky, D., Tucker, J., and Sampson, C. (2021). Feature detection. *DOE Whitepaper*, doi 10.2172/1769711

Mentoring

University of Nebraska - Lincoln 2019 - present

Student Advising as the Main Advisor* or Co-Advisor+

- Zeinab Mohamed*, Ph.D. student in Statistics. Anticipated graduation May 2023
- Alison Kleffner+, Ph.D. student in Statistics. Anticipated graduation May 2023
- Jiaqi Chen*, Ph.D. student in Statistics. Anticipated graduation May 2025
- David Nguyen*, M.S. in Statistics. Anticipated graduation May 2023
- Logan Keeler*,, M.S. in Statistics 2021. Currently a Data Analyst at Propio Language Services
- Allie Cruikshank+,, B.S. in Mathematics and Biochemistry 2021. Currently a PhD student in Mathematics at Duke University.

Ph.D. Committe Member

- Fei Sha, Ph.D. student in Statistics
- Daniel Gschwentner, Ph.D. student in School of Natural Resources
- Wenqi Ou, Ph.D. student in School of Natural Resources
- Heydi Calderon Ambelis, Ph.D. student in Biological Systems Engineering
- Aimee Kessell, Ph.D. student in Biological Systems Engineering
- Muhammad Umer Farooq, Ph.D. student in Civil and Environmental Engineering
- Sayli Pokal, Ph.D. Statistics 2021

North Carolina State University 2017 - 2019

Co-mentor

Co-mentor two Ph.D. students in Statistics with Prof. Brain Reich on topics "A Deep Learning Approach for Spatial Temporal Data" and "Spatiotemporal Modeling for PM2.5 caused by Wildfire".

Penn State University Summer 2016

Mentor

Mentored 4 undergraduate researchers to conduct research on spatial statistics methods for studying the Antarctic ice sheet.

Teaching

University of Nebraska

STAT101 Introduction to Data - Fall 2021 | Fall 2022
STAT380 Statistics and Applications - Spring 2020
STAT462 Introduction to Mathematical Statistics I - Fall 2020 | Fall 2021
STAT463 Introduction to Mathematical Statistics II - Spring 2021| Spring 2022
STAT801 Statistical Methods in Research - Fall 2019
STAT983 Statistical Learning (Ph.D. level)- Spring 2023 (Anticipated)

North Carolina State University

Guest Lecturer Fall 2018

Spatial Statistics for Ph.D. students. Lectured selected topics on "Introduction to Bayesian Methods", "MCMC sampling techniques", "Mean and Covariance for Gaussian Process" and "Gaussian Process Representations".

Institute of Advanced Analytics, NC State University, North Carolina USA
SAMSI Undergraduate Modelling Workshop May 2018

Project Leader

Designed and led a week-long project on "Data Analysis on Air Pollutant Exposures". Mentored a team of 6 undergrad students with Statistics and Mathematics majors.

Penn State University

Instructor Fall 2016

Statistical Concepts and Reasoning: Introduction to the art and science of decision making in the presence of uncertainty.

Instructor Fall 2015

Statistical Analysis for Engineering Statistics: probability concepts; nature of statistical methods; elementary distribution and sampling theory; fundamental ideas relative to estimation and testing hypotheses.

Teaching Assistant 2012 - 2014

Teaching assistant for courses on Elementary Statistics, Stochastic Modeling, and Stochastic Processes & Monte Carlo Methods. Responsible for running labs, assisting students during office hours and grading

Invited Presentations

- *A spectral adjustment for spatial confounding*
  - Dept. of Applied Statistics and Data Science, Yonsei University, virtual Apr. 2022
  - Dept. of Math and Statistics, Auburn University, virtual Apr. 2022
  - Math and Statistical Sciences, Univ. of Texas Rio Grande Valley, virtual Apr. 2022
  - Data Science cluster at the University of Memphis, virtual Apr. 2022
- *Fast expectation-maximization algorithms for spatial generalized linear mixed models*
  - CFE-CMStatistics 2021, virtual Dec. 2021
- *A Comparison of Statistical and Machine Learning Methods for Mapping PM2.5*
  - EPA, Durham, NC Feb. 2020
- *Spatiotemporal air pollution analysis using mobile monitors on Google Street View vehicles*
  - International Conference on Advances in Interdisciplinary Statistics and Combinatorics (AISC 2018), Greensboro, NC Oct 2018
- *Multivariate Spectral Downscaling for Multiple Air Pollutants*
  - International Conference on Econometrics and Statistics, virtual June 2021
  - IISA Conference, virtual May 2021
  - ENAR Spring Meeting 2020, virtual Mar 2020
  - ICSA Applied Statistics Symposium, Raleigh, NC Jun 2019
  - Statistics for the Environment (ENVR 2018), Asheville, NC Oct 2018

The 28th Annual Conference of the International Environmetrics Society (TIES 2018), Guanajuato, Mexico Jul 2018
Symposium on Data Science & Statistics (SDSS 2018), Reston, VA May 2018
Environmental Protection Agency, Durham, NC Mar 2018

- *Fast Maximum Likelihood Inference for Spatial Generalized Linear Mixed Models*
  Invited poster session at the Joint Statistical Meeting, Baltimore, MD Aug 2017
- *A Projection-Based Approach for Spatial Generalized Linear Mixed Models*
  Department of Statistics, Purdue University, West Lafayett, IN Nov 2016
  LANS Informal Seminar, Argonne National Laboratory, Argonne, IN Nov 2016
  IMAGe Brown Bag Seminar, National Center for Atmospheric Research Sep 2016
- *Statistical Methods for Studying the West Antarctic Ice Sheet*
  Department of Mathematics and Computer Science, Muhlenberg College, Allentown, PA Oct 2016
- *A Study of Models for High-dim Spatial Binary Data (Continuous Domain)*
  Invited Poster Session at Joint Statistical Meeting, Seattle, WA Aug 2015

Administrative, Teaching and Other Services

Conference Session Organization:

- JSM 2022, Invited session on "Causal Inference for Spatiotemporal Data"
- ENAR 2020, Invited session on "Novel spatial modeling approaches for air pollution exposure assessment"
- ICSA 2019, Invited "SAMSI session on advances in spatio temporal modeling for health and environment"

University Service: Department of Statistics Faculty Search Committee (Spring 2022, Fall 2022), The Nebraska Cooperative Fish and Wildlife Research Unit Faculty Search Committee (Fall 2022), Department of Statistics Seminar Committee (Fall 2021, Spring 2022), IANR Faculty Annual Evaluation Working Group (Spring 2021), Faculty Senate Committee (Fall 2020, Spring 2021), Faculty Advisory Committee (Fall 2019, Spring 2020), Undergrad Curriculum Committee (Spring 2020), Advanced Spatial Statistics Course Curriculum Committee (Fall 2019).

Journal Referee: American Statistician; Annals of Applied Statistics; Bayesian Analysis; Biometrics; Computational Statistics and Data; Environmetrics; Geographical Analysis; J. of Agricultural, Biological and Environmental Statistics; J. of the American Statistical Association; J. of Computational and Graphical Statistics; J. of Nonparametric Statistics; Sensors; Stat; Technometrics; Journal of Data Science.

Editorial Service:

2021 - present Associate Editor, Data Science in Science

2022 - present Associate Editor, Statistical Analysis and Data Mining

Other: JSM2022 ENVR student paper competition committee. WSDS 2021 Panelist on "Advice for the final stretch of graduate school"