Nathan B Wikle

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Personal Profile

My research interests include spatial and spatio-temporal statistics, causal inference with interference, Bayesian hierarchical modeling, and statistical inference for dynamical systems. I am especially interested in applications of statistics to environmental health, environmental science, epidemiology, and ecology, where I'm motivated by problems that combine scientific knowledge with data-driven inference.

Professional Experience

Assistant Professor, Department of Statistics and Actuarial Science, University of Iowa.
August 2023 – present.

Postdoctoral Research Fellow, Department of Statistics and Data Sciences, University of Texas.
August 2021 – July 2023.

Education

Ph.D. Statistics, Pennsylvania State University, 2021.

Dissertation: *Mechanistic models for spatial and spatio-temporal data.*

Advisor: Ephraim Hanks.

B.S. Mathematics, Truman State University, 2016.

Minors: Computer Science, Statistics, and Mathematical Biology.

Honors: *Summa cum laude*, Departmental Honors in Mathematics.

Honors/Awards

J. Keith Ord Scholarship for Research in Spatial and Environmental Statistics, Pennsylvania State University, 2020.

JSM Student Paper Award: Honorable Mention, Section on Statistics in the Environment, 2020.

NSF Graduate Research Fellowship: Honorable Mention, National Science Foundation, 2018.

Robert W. and Ann M. Emery Endowed Scholarship, Pennsylvania State University, 2017.

Paul Berg and Daniel J. Larson Distinguished Graduate Fellowship, Pennsylvania State University, 2016.

Publications

Journal Articles

Wikle, N.B., Hanks, E.M., Henneman, L.R.F., and Zigler, C.M. (2022) A mechanistic model of annual sulfate concentrations in the United States. *Journal of the American Statistical Association*. **117**(539), 1082–1093. doi:10.1080/01621459.2022.2027774

Tran, T.N.*, **Wikle, N.B.***, Hanks, E.M., Boni, M.F. [and 10 others]. (2022). SARS-CoV-2 attack rate and population immunity in southern New England, March 2020 to May 2021. *JAMA Network Open*. **5**(5):e2214171. doi:10.1001/jamanetworkopen.2022.14171

Wikle, N.B.*, Tran, T.N.*, Hanks, E.M., Boni, M.F. [and 12 others]. (2022) SARS-CoV-2 epidemic after social and economic reopening in three US states reveals shifts in age structure and clinical characteristics. *Science Advances*. **8**(4). doi:10.1126/sciadv.abf9868

Tran, T.N., **Wikle, N.B.**, Hanks, E.M., Boni, M.F. [and 11 others]. (2021) Optimal SARS-CoV-2 vaccine allocation using real-time seroprevalence estimates in Rhode Island and Massachusetts. *BMC Medicine*, **19**(162). doi:10.1186/s12916-021-02038-w

Wagner, T., Lottig, N.R. [and 16 others, including **Wikle, N.B.**]. (2020) Increasing accuracy of lake nutrient predictions in thousands of lakes by leveraging water clarity data. *Limnology and Oceanography Letters*. **5**(2), 228–235. doi:10.1002/lol2.10134

Wikle, N.B., Hanks, E.M., and Hughes, D.P. (2019) A dynamic individual-based model for high-resolution ant interactions. *Journal of Agricultural, Biological, and Environmental Statistics*. **24**(4), 589–609. doi:10.1007/s13253-019-00363-5

* Indicates co-first authorship.

Preprints and Papers Under Review

Wikle, N.B., Zigler, C.M. (2023+) Causal health impacts of power plant emission controls under modeled and uncertain physical process interference. *Submitted*.

Presentations

Talks

"Causal inference for environmental health data: Estimating causal effects in the presence of spatial interference," American Casual Inference Conference, Austin, TX. May 2023.

"Causal inference for environmental health data: Estimating causal effects in the presence of spatial interference," University of Michigan Biostatistics, Ann Arbor, MI. February 2023. *Invited*.

"Causal inference for environmental health data: Estimating causal effects in the presence of spatial interference," University of Connecticut Statistics Department, Storrs, CT. January 2023. *Invited*.

"Asthma and air pollution: Estimating direct and indirect effects of power plant interventions on asthma-related ED visits with a probabilistic exposure model," International Conference on Health Policy Statistics (ICHPS), Scottsdale, AZ. January 2023.

"Causal inference for environmental health data: Estimating causal effects in the presence of spatial interference," University of Iowa Statistics Department, Iowa City, IA. December 2022. *Invited*.

"Causal inference for spatial data: Estimation of causal effects under interference and a probabilistic exposure model," UT Austin Statistics Department Seminar, Austin, TX. September 2022. *Invited*.

"Estimation of causal effects under interference and a probabilistic exposure model," Joint Statistical Meetings, Washington, DC. August 2022. *Invited*.

"Asthma and air pollution: estimating the effect of power plant interventions on asthma-related emergency department visits in Texas," Matsui Research Group, Austin, TX. May 2022. *Invited*.

"Constructing mechanistic spatial models from Ornstein-Uhlenbeck processes," CMStatistics, London. December 2021. *Invited*.

"A negative binomial process model of the 2020–2021 COVID-19 epidemic in Rhode Island," Joint Statistical Meetings, Seattle, WA. August 2021.

"Mechanistic models for spatial data from Ornstein-Uhlenbeck processes," Joint Statistical Meetings, Philadelphia, PA. August 2020. *Invited*.

"Bayesian selection of tuning parameters," Joint Statistical Meetings, Denver, CO. July 2019.

"A dynamic individual-based model of ant interaction events," Joint Statistical Meetings, Vancouver. July 2018.

Posters

"A dynamic individual-based model of ant interaction events"

- Rao Prize Conference, Pennsylvania State University, University Park, PA. May 2019.
- Statistics for the Environment (ENVR) Workshop, Asheville, NC. October 2018.

Teaching Experience

Professor, University of Iowa

Introduction to Mathematical Statistics I, Fall 2023. (STAT 3100)

Graduate Instructor, Pennsylvania State University

Stochastic Modeling, Spring 2021. (STAT/MATH 416)

Experimental Methods for Engineering and the Sciences, Spring 2019. (STAT 401)

Teaching Assistant, Pennsylvania State University

Regression Analysis and Modeling, Fall 2020. (STAT 510)

Stochastic Processes and Monte Carlo Methods, Spring 2018. (STAT 515)

Referee Experience

Annals of Applied Statistics, *Computational Statistics and Data Analysis*, *Ecography*, *WIREs Computational Statistics*, *Biometrics*, *Environmetrics*, *International Journal of Biostatistics*, *Journal of Agricultural, Biological, and Environmental Statistics*.