Joshua S. North

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PROFESSIONAL EXPERIENCE

Lawrence Berkeley National Laboratory, Berkeley, California. (August 2022 - Present)

Postdoctoral Fellow
Advisor: Dr. Mark D. Risser
Climate and Ecosystem Sciences

EDUCATION

University of Missouri Columbia, Columbia, Missouri. (July, 2022)

Ph.D., Statistics
Advisors: Dr. Christopher K. Wikle and Dr. Erin M. Schliep
Dissertation: A Bayesian Approach to Data-Driven Discovery of Nonlinear Dynamic Equations

University of Missouri Columbia, Columbia, Missouri. (May, 2019)

M.A., Statistics

University of Colorado Boulder, Boulder, Colorado. (May, 2017)

B.S., Applied Mathematics
B.A., Ecology and Evolutionary Biology
Minor, Statistics

PUBLICATIONS

Zhou, Y., North, J. S., Rhoades, A. M., Tao, J., Rudisill, W., Risser, M. D., & Collins, W. D. (2025). "Atmospheric river frequency-category characteristics shape u.s. west coast runoff". *Journal of Geophysical Research: Atmospheres*, *130*(2), e2024JD041805. https://doi.org/https://doi.org/10.1029/2024JD041805

North, J. S., Risser, M. D., & Breidt, F. J. (2024). "A flexible class of priors for orthonormal matrices with basis function-specific structure". *Spatial Statistics*, *64*, 100866. https://doi.org/10.1016/j.spasta.2024.100866

Custer, C. A., **North, Joshua S.**, Schliep, E. M., Verhoeven, M. R., Hansen, G. J. A., & Wagner, T. (2024). "Predicting responses to climate change using a joint species, spatially dependent physiologically guided abundance model". *Ecology*, e4362. https://doi.org/10.1002/ecy.4362

North, J. S., Schliep, E. M., Hansen, G. J. A., Kundel, H., Custer, C. A., McLaughlin, P., & Wagner, T. (2024). "Accounting for spatiotemporal sampling variation in joint species distribution models". *Journal of Applied Ecology*, 1–16. https://doi.org/10.1111/1365-2664.14547

North, J. S., Wikle, C. K., & Schliep, E. M. (2023). "A Bayesian approach for spatio-temporal data-driven dynamic equation discovery". *Bayesian Analysis*, 1–30. https://doi.org/10.1214/23-BA1406. Advance Publication.

North, J. S., Wikle, C. K., & Schliep, E. M. (2023). "A Review of Data-Driven Discovery for Dynamic Systems". *International Statistical Review*, *91*(3), 464–492. https://doi.org/10.1111/insr.12554

Wagner, T., Schliep, E. M., **North, J. S.**, Kundel, H., Custer, C. A., Ruzich, J. K., & Hansen, G. J. A. (2023). "Predicting climate change impacts on poikilotherms using physiologically guided species abundance models". *Proceedings of the National Academy of Sciences*, *120*(15), 1–8. https://doi.org/10.1073/pnas.2214199120

North, J. S., Wikle, C. K., & Schliep, E. M. (2022). "A Bayesian approach for data-driven dynamic equation discovery". *Journal of Agricultural, Biological, and Environmental Statistics*, *1*(1), 1–28. https://doi.org/10.1007/s13253-022-00514-1. ENVR student paper competition - honorable mention; JABES 2022 best paper award - honorable mention.

North, J. S., Schliep, E. M., & Wikle, C. K. (2020). "On the spatial and temporal shift in the archetypal seasonal temperature cycle as driven by annual and semi-annual harmonics". *Environmetrics*, 1–16. https://doi.org/10.1002/env.2665

North, J. S., Stanley, Z., Kleiber, W., Deierling, W., Gilleland, E., & Steiner, M. (2020). "A statistical approach to fast nowcasting of lightning potential fields". *Advances in Statistical Climatology, Meteorology, and Oceanography*, *2*, 79–90. https://doi.org/10.5194/ascmo-6-79-2020

SUBMITTED/PREPRINT

Mahesh, A., Collins, W., Bonev, B., Cohen, Y., Harrington, P., Kashinath, K., Kurth, T., **North, J. S.**, O'Brien, T., Pritchard, M., Pruitt, D., Risser, M., Subramanian, S., & Willard, J. (2024). "Huge ensembles part II: Properties of a huge ensemble of hindcasts generated with spherical fourier neural operators". *arXiv*. https://doi.org/10.48550/arXiv.2408.01581. Preprint

Mahesh, A., Collins, W., Bonev, B., Brenowitz, N., Cohen, Y., Elms, J., Harrington, P., Kashinath, K., Kurth, T., **North, J. S.**, O'Brien, T., Pritchard, M., Pruitt, D., Risser, M., Subramanian, S., & Willard, J. (2024). "Huge ensembles part I: Design of ensemble weather forecasts using spherical fourier neural operators". *arXiv*. https://doi.org/10.48550/arXiv.2408.03100. Preprint

Custer, C. A., **North, J. S.**, Schliep, E. M., Verhoeven, M. R., Link, D., Hansen, G. J. A., & Wagner, T. (2024). "Climate change reduces abundance and increases extirpation of temperate lake fishes". Preprint available upon request.

Custer, C. A., **North, J. S.**, & Wagner, T. (2024). "Measuring the effectiveness of using non-dendritic spatial dependencies in stream fish abundance models". Preprint available upon request.

IN PREPARATION

North, J. S., Risser, M. D., Wehner, M. F., O'Brian, T. A., Bercos-Hickey, E., & Rhoades, A. M. (2024). "Quantifying internal variability from observations: A case study of the 2021 pacific northwest heatwave".

Wikle, C. K., **North, J. S.**, Gopalan, G., & Yoo, M. (2024). "A statistician's overview of mechanistic-informed modeling".

North, J. S., & Risser, M. D. (2024). "A Bayesian approach for higher order tensor decomposition of large spatio-temporal data".

PRESENTATIONS

* - Invited, † - Virtual, ‡ - Poster

Methods for quantifying internal variability from observations, American Geophysical Union 2024 (AGU24) Washington D.C.; December 13, 2024‡

Quantifying internal variability from observations: A case study for the Pacific Northwest, 2024 ENVR Workshop: Spatial Data Science for the Environment, NCAR, Boulder, CO, October 4, 2024‡

Quantifying internal variability from observations: A case study for the Pacific Northwest, Regional and Global Model Analysis monthly meeting, October 3, 2024*†

Uncertainty quantification for low-likelihood high-impact weather events using spatio-temporal statistical modeling, Joint Statistical Meetings, Portland, Oregon, August 6, 2024

Data-driven dynamical modeling for spatio-temporal statistics,

- University of Wyoming, Laramie, WY; February 19, 2024.*
- Cornell University, Ithaca, NY; February 7, 2024.*
- University of California Santa Cruz, Santa Cruz, CA; January 22, 2024.*
- University of Virginia, Charlottesville, VA; January 17, 2024.*
- Indiana University Bloomington, Bloomington, IN; December 14, 2023.*
- Wake Forest University, Winston-Salem, NC; December 7, 2023.*

A statistical model for structured empirical orthogonal functions, American Geophysical Union 2023 (AGU23), San Francisco, CA; December 11, 2023.

A flexible prior for structured orthonormal matrices,

- South Dakota State University, Brookings, SD; September 29, 2023.*†
- Joint Statistical Meetings 2023, Toronto, Canada; August 8, 2023.

– Spatial Statistics 2023 - Climate and the Environment, University of Colorado Boulder; July 21, 2023.

A flexible class of priors for conducting posterior inference on structured orthonormal matrices, Climate Extremes Workshop, Clemson University; May 16, 2023. ‡

A flexible class of priors for conducting posterior inference on structured orthonormal matrices, Machine Learning and Analytics Group, Lawrence Berkeley National Laboratory; May 11, 2023.*

A Bayesian Approach for Spatio-Temporal Data-Driven Dynamic Equation Discovery, ENVR 2022 Workshop, Environmental and Ecological Statistical Research and Applications with Societal Impacts, Provo, UT; October 6, 2022. ‡

A Bayesian Approach for Data-Driven Dynamic Equation Discovery, Joint Statistical Meeting, Washington D.C.; August 10, 2022.

A Bayesian Approach to Data-Driven Discovery of Nonlinear Dynamic Equations, Lawrence Berkeley National Laboratory, Berkeley, CA; January 21, 2022.*†

A Bayesian Approach to Data-Driven Discovery of Nonlinear Dynamic Equations, Sandia National Laboratory, Albuquerque, NM; December 14, 2021.*†

Data-Driven Approach to Nonlinear Dynamic Equation Discovery, Joint Statistical Meeting; August 9, 2021.†

On the Spatial and Temporal Shift in the Archetypal Seasonal Temperature Cycle as Driven by Annual and Semi-Annual Harmonics, Joint Statistical Meeting; Virtual, August 4, 2020. *†

Accuracy of Radial Support Vector Classifiers; Effect of Imbalanced Training Sets on Varying Minority Class Prevalence, University of Colorado Boulder, Boulder, Colorado; May 1, 2017. ‡

Creating Reproducible Research, University of Colorado Boulder, Boulder, Colorado; March 21, 2017.

PROPOSALS/GRANTS

Data-driven methods and open-source software toolkit for analyzing compound extremes. White paper, decision pending.

Scientific Machine Learning for Complex Systems, DE-FOA-0002958. Not awarded.

TEACHING

University of Missouri Columbia, Columbia, Missouri.

Course Development

STAT 4330/7330 - Methods in Sports Analytics I

STAT 4340/7340 - Methods in Sports Analytics II

Graduate Teaching Assistant

STAT 4340/7340 - Methods in Sports Analytics II (S20, S21, S22)

STAT 4330/7330 - Methods in Sports Analytics I (F20, F21)

STAT 3500 - Introduction to Probability and Statistics II (F18)

STAT 2500 - Introduction to Probability and Statistics I (F17, S18)

University of Colorado Boulder, Boulder, Colorado.

Undergraduate Teaching Assistant

APPM 3570 - Applied Probability (S16)

APPM 1235 - Pre-Calculus for Engineers (F15)

ADVISING

Rae Fadlovich (Anticipated Start Summer 2025) - Department of Energy Computational Science Graduate Fellow

Robert Born (Summer 2024) - DOE-RENEW CREW-RA, co-advisor with Alan Rhoades

Karthik Tadigiri (Summer 2024) - DOE-RENEW CREW-RA, co-advisor with Alan Rhoades

AWARDS

Journal of Agricultural, Biological, and Environmental Statistics 2022 best paper award - Honorable Mention

ENVR Student Paper competition - Honorable Mention (2022)

PROFESSIONAL ROLES

American Statistical Association Advisory Climate Change Policy Committee Member (2025-2027)

Associate Editor for Advances in Statistical Climatology, Meteorology and Oceanography

PROFESSIONAL ACTIVITIES

Organizer for the session *Advanced Statistical Methods for the Earth Sciences: Innovations in Climatology, Meteorology, and Oceanography* at the American Geophysical Union (AGU) December, 2024

Organized the session *Climatology Through the Lens of Dynamic Spatio-Temporal Processes* at the Joint Statistical Meetings (JSM) August, 2024

Organized the *2024 CASCADE retreat and workshop*, Berkeley, CA, July 23-25, 2024

Organized the *Statmospheric Seminar Series*, Earth and Environmental Sciences Area, Lawrence Berkeley National Laboratory, Fall, 2023

Graduate Student Leader, Space-Time Reading Group, University of Missouri (2021-2022)

Instructor and VIP Consultant for University of Missouri DataFest (2018-2022)

University of Missouri Statistics Graduate Student Association Vice-President (2017-2018)

University of Missouri Statistics Graduate Student Association Treasurer (2018-2019)

PROFESSIONAL MEMBERSHIPS

American Statistical Association (ASA) member (2017 - present)

International Society for Bayesian Analysis (ISBA) member (2023 - present)

American Geophysical Union (AGU) member (2023 - present)

REFEREE

Bayesian Analysis; Earth System Dynamics; Engineering with Computers; Geoscientific Model Development; Geophysical Research Letters; Journal of Agricultural, Biological and Environmental Statistics; Journal of the American Statistical Association; Methods in Ecology and Evolution; Nonlinear Dynamics; Spatial Statistics