Samantha Roth

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RESEARCH EXPERIENCE:

Postdoctoral Research Associate, Thayer School of Engineering at Dartmouth College 2024-Present

Graduate Research Assistant, The Pennsylvania State University Department of Statistics 2022-2024

Maryland Sea Grant REU Intern, University of Maryland Center for Environmental Science 2018

EDUCATION:

The Pennsylvania State University: State College, PA 2019-2024
Doctor of Philosophy in Statistics
Advisor: Murali Haran, Co-Advisor: Klaus Keller

Lehigh University: Bethlehem, PA 2015-2019
Bachelor of Science in Statistics, with Highest Honors Cumulative GPA: 3.82

HONORS AND AWARDS:

2024: ASA ENVR Workshop Travel Award
2024: SIAM Conference on Uncertainty Quantification Travel Award
2023-2024: Jack and Eleanor Pettit Scholarship in Science
2022-2023: J. Keith Ord Scholarship for Research in Spatial and Environmental Statistics
2019- 2024: Janet L. Norwood Science Achievement Graduate Fellowship in Statistics
2019- 2021: Institute for Computation and Data Science Scholarship
2019: Verne M. Willaman Distinguished Graduate Fellowship in the Eberly College of Science

RESEARCH INTERESTS:

Environmental statistics, spatial/spatiotemporal statistics, climate science, high performance computing, computer model calibration, sensitivity analysis, statistical downscaling, uncertainty quantification

PUBLICATIONS:

Roth, S.M., Lee, B.S., Nicholas, R.E., Keller, K., & Haran, M. (2024) Bayesian spatial models for projecting corn yields. *Remote Sensing*. 16(1): 69. https://doi.org/10.3390/rs16010069.

Roth, S. M., Lee, B. S., Sharma, S., Hosseini-Shakib, I., Keller, K., & Haran, M. (2023). Flood hazard model calibration using multiresolution model output. *Environmetrics*, 34(2): e2769. https://doi.org/10.1002/env.2769.

Ye, H., Nicholas, R.E., **Roth, S.M.**, & Keller, K. (2021). Considering uncertainties expands the lower tail of maize yield projections. *PLoS ONE* 16(11): e0259180. https://doi.org/10.1371/journal.pone.0259180.

PAPERS UNDER REVIEW:

Roth, S.M., Sharma, S., Alipour, A., Keller, K., & Haran, M. (2025) Probabilistic Flood Model Downscaling. *Under review at The Annals of Applied Statistics*. Pre-print available at http://arxiv.org/abs/2503.20962.

Pollack, A., Auermueller, L., Burleyson, C., Campbell, J.E., Condon, M., Cooper, C., Coronese, M., Dangendorf, S., Doss-Gollin, J., Hedge, P., Helgeson, C., Kopp, R., Kwakkel, J., Leaf, A., Lesk, C., Mankin, J., Mayfield, E., Nicholas, R.E., Rice, J., **Roth, S.M.**, Scheeler, M., Srikrishnan, V., Tuana, N., Vernon, C., Zhao, M., & Keller, K. (2024) Investing in open and fair practices for more usable and equitable climate-risk research. *Under review at PNAS*.

PAPERS IN IN PREPARATION:

Roth, S.M., Ye, H., Nicholas, R.E., Srikrishnan, V., and Keller, K. (TBA) Emulation methods and adaptive sampling increase the efficiency of sensitivity analysis for computationally expensive models.

Roth, S.M., Francom, D., Sanso, B., and Keller, K. (TBA) Adaptive sampling for the BASS emulator enables Sobol' sensitivity analysis for high-dimensional hydrologic models.

Roth, S.M., Woltjer, J., Keller, K., and Pollack, A.B. (TBA) Bayesian inversion improves accuracy of expert depth-damage functions.

Ruckert, K.L., Cooper, C., **Roth, S.M.**, and Nicholas, R.E. (TBA) Simpler Graph Types Improve Interpretation of Extreme Precipitation.

PRESENTATIONS:

Probabilistic Downscaling for Flood Hazard Models
- Invited Talk, American Geophysical Union Fall Meeting, Washington, DC, USA, 2024
- Poster, ASA ENVR Workshop: Spatial Data Science for the Environment, Boulder, CO, USA, 2024
- Talk, DOE's Earth and Environmental Systems Modeling Program PI Meeting, Rockville, MD, USA, 2024
- Invited Talk, SIAM Conference on Uncertainty Quantification 2024, Trieste, Italy, 2024

Statistically approximating a computationally demanding flood model
- Talk, Spatial Statistics 2023, Boulder, CO, USA, 2023

Flood hazard model calibration using multiresolution model output
- Poster, Penn State Climate Solutions Symposium, State College, PA, USA, 2023
- Poster, Rao Prize Conference at The Pennsylvania State University, State College, PA, USA, 2023
- Invited Talk, Muhlenberg College Department of Mathematics Colloquium, Allentown, PA, USA, 2023
- Poster, Institute for Computational and Data Sciences Symposium, State College, PA, USA, 2022
- Poster, American Geophysical Union Fall Meeting 2022, Chicago, IL, USA, 2022
- Talk, Joint Statistical Meetings, Washington, DC, USA, 2022
- Poster, World Meeting of The International Society for Bayesian Analysis, Montreal, QC, Canada, 2022

A Bayesian Spatial Model for Corn Yield
- Talk, Institute for Computational and Data Sciences Symposium, State College, PA, 2021

Predicting Regional Suitability for Zika Outbreaks: A Comparative Statistical Study
- Poster, Society for Mathematical Biology Annual Meeting, Montreal, QC, Canada, 2019

TEACHING EXPERIENCE:

Guest Lecturer, Dartmouth College
- ENGS.107-WI25: Bayesian Statistical Modeling and Computation, 2025

Graduate Instructor, The Pennsylvania State University
- STAT415: Introduction to Mathematical Statistics, 2023
- STAT200: Elementary Statistics, 2022

SERVICE:

- Dartmouth Engineering Open House, Hanover, NH, USA, 2025
- Undergraduate Women in Science Grad School 101 Panel, State College, PA, USA, 2023
- Flood Resilience Fest, Selinsgrove, PA, USA, 2022
- American Statistical Association Data Fest at Penn State, State College, PA, USA, 2022

EXTRACURRICULAR ACTIVITIES:

- *Treasurer, Institute for Computational and Data Sciences Student Group* 2022-2023
- *President, Institute for Computational and Data Sciences Student Group* 2021-2022
- *Treasurer, Statistics Graduate Student Association at The Pennsylvania State University* 2021-2022

SKILLS: Skilled with R, Stan, and ArcGIS; experience with Python, QGIS and MATLAB