Josh Jacobson

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Education

University of Wollongong, Wollongong, NSW *2020–Now*
Ph.D. in Statistics
Thesis: *Statistical Methods for Spatio-Temporal Prediction of CO_2 Flux from Multiprocess Satellite Data*
Advisors: Noel Cressie, Andrew Zammit Mangion, and Michael Bertolacci

University of Colorado Boulder, Boulder, CO *2018–2020*
M.S. in Applied Mathematics
Thesis: *Beyond Univariate Calibration: Verifying Spatial Structure in Ensembles of Forecast Fields*
Advisors: William Kleiber and Michael Scheuerer

University of Colorado Boulder, Boulder, CO *2015–2019*
B.S. in Applied Mathematics (with honors)
Minors in Computer Science, Atmospheric and Oceanic Sciences

Industry Experience

Jupiter Intelligence, Boulder, CO *2020–2022*
Data Science Consultant
Research: extreme weather events, copula models, approximate Bayesian computation
Supervisors: Steve Sain and Alexis Hoffman

Selected Awards & Fellowships

2025 **Best Lightning Talk**, The Bayesian Young Statisticians Meeting

2024 **Best Student Presentation**, 31st Conference of The International Environmetrics Society

2021 **Allison Harcourt Poster Award**: 1st place, Early Career & Student Statisticians Conference

2021 **Statistical Data Science Fellowship**, Australian Mathematical Sciences Institute

2020 **Graduate Fellowship**, University of Wollongong (2020–2024)

2020 **Paper of the Month Award**: October 2020, *Nonlinear Processes in Geophysics*

Publications

Google Scholar: https://scholar.google.com/citations?user=MlK_mtoAAAAJ

[*] **Jacobson, J.**, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (2025+). WOMBAT v2.S: A Bayesian inversion framework for attributing global CO_2 flux components from multiprocess data. Submitted preprint: https://doi.org/10.48550/arxiv.2503.09065

[5] Cressie, N., Zammit-Mangion, A., **Jacobson, J.**, & Bertolacci, M. (2023). Earth's CO_2 battle: A view from space. *Significance*, 20(1), 14-19. https://doi.org/10.1093/jrssig/qmad003

[4] **Jacobson, J.**, Cressie, N., & Zammit-Mangion, A. (2023). Spatial statistical prediction of solar-induced chlorophyll fluorescence (SIF) from multivariate OCO-2 data. *Remote Sensing*, 15(16), 4038. https://doi.org/10.3390/rs15164038

[3] Vu, Q., Cao, Y., **Jacobson, J.**, Pearse, A. R., & Zammit-Mangion, A. (2021). Discussion on "Competition on Spatial Statistics for Large Datasets." *Journal of Agricultural, Biological and Environmental Statistics*, 26, 614-618. https://doi.org/10.1007/s13253-021-00464-0

[2] **Jacobson, J.**, Kleiber, W., Scheuerer, M., & Bellier, J. (2020). Beyond univariate calibration: Verifying spatial structure in ensembles of forecast fields. *Nonlinear Processes in Geophysics*, 27(3), 411-427. https://doi.org/10.5194/npg-27-411-2020

[1] Raseman, W. J., **Jacobson, J.**, & Kasprzyk, J. R. (2019). Parasol: An open source, interactive parallel coordinates library for multi-objective decision making. *Environmental Modelling & Software*, 116, 153-163. https://doi.org/10.1016/j.envsoft.2019.03.005

Software & Datasets

WOMBAT v2.S: Workflow for attributing global CO_2 flux components from multiprocess satellite data
https://github.com/joshhjacobson/wombat-v2s

coSIF: Dataset of monthly, 0.05-degree cokriging predictions and standard errors for SIF over North America
https://doi.org/10.5281/zenodo.8078592

FTE: Workflow for verifying spatial structure in downscaled GEFS reforecast data
https://github.com/joshhjacobson/FTE

Parasol: Parallel coordinates visualization library for multi-objective decision-making
https://github.com/ParasolJS/parasol-es

Teaching Experience

Teaching Assistant — University of Wollongong

STAT 101: Introduction to Statistics	*Fall 2025*
STAT 251: Fundamentals of Biostatistics	*Fall 2025*
MATH 255: Mathematics for Computing	*Spring 2025*
STAT 304: Stochastic Processes and Time Series Analysis	*Fall 2024*
STAT 332: Generalized Linear Models	*Spring 2024*
STAT 301: Statistical Methods for Data Science	*Fall 2023*
STAT 332: Generalized Linear Models	*Spring 2023*

Teaching Assistant — University of Colorado Boulder

APPM 4350: Fourier Series and Boundary Value Problems	*Fall 2018*
CSCI 1320: Introduction to Programming for Engineers	*Spring 2016*

Presentations

*Denotes presenting author(s).

Invited Presentations

[6] ***Jacobson, J.**, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (November 2025). Scalable Bayesian inference for global CO_2 flux attribution with WOMBAT v2.S. *JB Douglas Postgraduate Awards*, Sydney, NSW.

[5] ***Jacobson, J.**, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (November 2025). Scalable Bayesian inference for global CO_2 flux attribution with WOMBAT v2.S. *Computational Statistics in Data Science Workshop*, Wollongong, NSW.

[4] *__Jacobson, J.__, *Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (September 2025). WOMBAT v2.S: A Bayesian inversion framework for CO_2 flux attribution. *NASA Orbiting Carbon Observatory-2/3 Science Team Meeting*, Fort Collins, CO (via Teams).

[3] *__Jacobson, J.__, Bertolacci, M., *Zammit-Mangion, A., Schuh, A., & Cressie, N. (September 2025). WOMBAT v2.S: A Bayesian inversion framework for CO_2 flux attribution. *NASA Orbiting Carbon Observatory-2/3 Science Team Meeting: Uncertainty Quantification Breakout*, Online.

[2] *__Jacobson, J.__, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (March 2025). A Bayesian hierarchical model for CO_2 flux estimation from multiprocess satellite data. *Seminar, Department of Statistics, University of New South Wales*, Sydney, NSW.

[1] *__Jacobson, J.__, Harr, P., & Sain, S. (April 2023). A fully-Bayesian spatial copula model for joint-frequency analysis of extreme events. *Seminar, National Institute for Applied Statistics Research Australia (NIASRA)*, Wollongong, NSW.

Contributed Presentations

[11] *__Jacobson, J.__, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (April 2025). A Bayesian hierarchical model for CO_2 flux estimation from multiprocess satellite data. *The Bayesian Young Statisticians Meeting (BAYSM)*, Online.

[10] *__Jacobson, J.__, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (December 2024). A Bayesian hierarchical model for CO_2 flux estimation from multiprocess satellite data. *31st Conference of The International Environmetrics Society*, Adelaide, SA.

[9] *__Jacobson, J.__, Cressie, N., & Zammit-Mangion, A. (December 2023). Spatial prediction of solar-induced fluorescence (SIF) from multiprocess satellite data. *Australian Statistical Conference*, Wollongong, NSW.

[8] *__Jacobson, J.__, Cressie, N., & Zammit-Mangion, A. (October 2023). coSIF: Spatial statistical prediction of SIF from multiprocess OCO-2 data. *NASA Orbiting Carbon Observatory-2/3 Science Team Meeting: SIF Breakout*, Boulder, CO (via Teams).

[7] *__Jacobson, J.__, Harr, P., & Sain, S. (January 2023). A fully-Bayesian spatial copula model for joint-frequency analysis of extreme events. *American Meteorological Society 103rd Annual Meeting*, Denver, CO.

[6] *Hoffman, A., Sain, S., & **Jacobson, J.** (August 2022). Data Science and Applied Statistics in Climate Risk Analysis. *Joint Statistical Meetings*, Washington, D.C.

[5] *__Jacobson, J.__, Cressie, N., & Zammit-Mangion, A. (July 2021). Multivariate spatial prediction of column-averaged carbon dioxide over North America. *Australian Mathematical Sciences Institute (AMSI) Winter School*, Online.

[4] *__Jacobson, J.__, Cressie, N., & Zammit-Mangion, A. (July 2021). Spatial prediction of column-averaged carbon dioxide over the globe. *Australian and New Zealand Statistical Conference*, Online.

[3] *Hoffman, A., Sain, S., & **Jacobson, J.** (January 2021). Flexible Python-based statistical workflow for flood risk estimates applied across CMIP6 models. *American Meteorological Society 101st Annual Meeting*, Online.

[2] *__Jacobson, J.__, Kleiber, W., Scheuerer, M., & Bellier, J. (November 2019). Verification of spatial structure in ensembles of forecast fields. *Seminar, Department of Mathematics, University of Zurich*, Zurich, Switzerland.

[1] *Raseman, W. J., *__Jacobson, J.__, & Kasprzyk, J. R. (September 2018). Interactive visualizations for multi-objective optimization problems. *Rocky Mountain Advanced Computing Consortium HPC Symposium*, Boulder, CO.

Contributed Posters

[3] *__Jacobson, J.__, Bertolacci, M., Zammit-Mangion, A., Schuh, A., & Cressie, N. (October 2024). A multivariate Bayesian hierarchical model for global CO_2 surface flux. *ENVR Workshop on Spatial Data Science for the Environment*, Boulder, CO.

[2] *__Jacobson, J.__, Cressie, N., & Zammit-Mangion, A. (July 2021). Multivariate spatial-dependence modelling with satellite data. *Early Career & Student Statisticians Conference*, Online.

[1] *Hoffman, A., Sain, S., & **Jacobson, J.** (December 2020). Flexible methodology for hyperlocal flooding risk due to sea level rise. *American Geophysical Union 2020 Fall Meeting*, Online.

Academic Service

Outreach Volunteer *Fall 2024*
School of Mathematics and Applied Statistics, University of Wollongong

Head of Postgraduate Seminar Series *Spring 2024*
School of Mathematics and Applied Statistics, University of Wollongong

Co-host of "Probably Novel Radio Show and Podcast" *Spring 2019*
Radio 1190, Department of Applied Mathematics, University of Colorado Boulder

Professional Memberships

American Geophysical Union
American Meteorological Society
American Statistical Association
International Society for Bayesian Analysis
Statistical Society of Australia
The International Environmetrics Society