joshj@uow.edu.au
joshhjacobson.com
joshhjacobson
joshhjacobson
0000-0003-4418-2208

Josh Jacobson

Research Interests

Spatio-temporal statistics • Bayesian hierarchical modeling • Approximate Bayesian computation • Extreme-value theory • Computational statistics • Climate & environmental applications

Education

2020 – present **Ph.D., Applied Statistics**
University of Wollongong — Wollongong, NSW
Advisors: Noel Cressie & Andrew Zammit Mangion

2018 – 2020 **M.S., Applied Mathematics**
University of Colorado — Boulder, CO
Advisors: Will Kleiber & Michael Scheuerer

2015 – 2019 **B.S., Applied Mathematics**
University of Colorado, Graduation with Honors — Boulder, CO
Minors: Computer Science, Atmospheric & Oceanic Sciences

Experience

2021 – present **Graduate Research Assistant**
Centre for Environmental Informatics, University of Wollongong — Wollongong, NSW
Conducted initial investiagations into adding compatibility for different atmospheric transport models in the centre's CO_2 flux-inversion framework; translated technical research articles into public-facing content.

2021 – 2023 **Data Science Consultant**
Jupiter Intelligence — Boulder, CO
Developed a non-stationary Bayesian copula model for analysis of multivariate extreme events; researched and implemented an approximate Bayesian computation algorithm suitable for non-stationary data; collaborated as a core developer of a proprietary Python package for statistical modeling.

2019 – 2020 **Data Science Consultant**
Jupiter Intelligence — Boulder, CO
Contributed to development of a statistical emulator for hydrologic model output using boundary-condition inputs; evaluated the computational efficiency of Julia and Python for vectorized calculation and numerical optimization in distributed, parallel frameworks.

2019 **Data Science Intern**
Jupiter Intelligence — Boulder, CO
Developed a stochastic generator of physically motivated, multi-decadal sea-level-rise projections and quantified the model's variability in a Monte-Carlo experiment.

2017 – 2019 **Undergraduate Research Assistant**
Department of Environmental Engineering, University of Colorado — Boulder, CO
Developed `Parasol`, a JavaScript library for interactive visualization of multi-objective optimization problems such as water resources planning and decision making.

Publications

5. **Jacobson, J.**, N. Cressie, and A. Zammit-Mangion (n.d.). Spatial statistical prediction of solar-induced chlorophyll fluorescence (SIF) from multivariate OCO-2 data. In press with *Remote Sensing*.

4. Cressie, N., A. Zammit-Mangion, **J. Jacobson**, and M. Bertolacci (2023). Earth's CO2 battle: a view from space. *Significance*, 20, 1, pp. 14–19.

3. Vu, Q., Y. Cao, **J. Jacobson**, A. R. Pearse, and A. Zammit-Mangion (2021). Discussion on "Competition on Spatial Statistics for Large Datasets". *Journal of Agricultural, Biological and Environmental Statistics*.

2. **Jacobson, J.**, W. Kleiber, M. Scheuerer, and J. Bellier (2020). Beyond univariate calibration: verifying spatial structure in ensembles of forecast fields. *Nonlinear Processes in Geophysics*, 27, 3, pp. 411–427.

1. Raseman, W. J., **J. Jacobson**, and J. R. Kasprzyk (2019). Parasol: an open source, interactive parallel coordinates library for multi-objective decision making. *Environmental Modelling & Software*, 116, pp. 153–163.

Research Grants

2023 NASA 23-OCOST23-0001, Student Investigator
"Hierarchical Spatio-Temporal Statistical Methods for Analyzing OCO-2/3 Data"

Honors, Awards, & Fellowships

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

2021 ECSSC 2021 Scholarship, Early Career & Student Statisticians Conference

2021 Statistical Data Science Scholarship, Australian Mathematical Sciences Institute (AMSI)

2020 – 2024 University Postgraduate Award, University of Wollongong

2020 NPG Paper of the Month Award [2] chosen by Editors of Nonlinear Processes in Geophysics for paper of the month, October, 2020

2015 – 2019 Dean's List, University of Colorado

2015 – 2019 Engineering Merit Scholarship, University of Colorado

2015 – 2019 Hale Esteemed Scholar Award, University of Colorado

Presentations

Conferences & Workshops

2023-01 A fully-Bayesian spatial copula model for joint-frequency analysis of extreme events
American Meteorological Society (AMS) 103rd Annual Meeting, Denver, CO, USA

2021-07 Multivariate spatial prediction of column-averaged carbon dioxide over North America
Australian Mathematical Sciences Institute (AMSI) Winter School, Virtual

2021-07 Spatial prediction of column-averaged carbon dioxide over the globe
Australian and New Zealand Statistical Conference (ANZSC), Virtual

2019-12 Improving interpretability of multi-objective tradeoff sets for environmental systems
American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, USA

2018-09 Interactive visualizations for multi-objective optimization problems
RMACC HPC Symposium, Boulder, CO, USA

Seminars & Colloquia

2023-04 A fully-Bayesian spatial copula model for joint-frequency analysis of extreme events
National Institute for Applied Statistics Research Australia (NIASRA), University of Wollongong, Wollongong, Australia

2022-04 Approximate Bayesian computation for non-stationary processes
Jupiter Intelligence, Boulder, CO, USA

2019-11 Verification of spatial structure in ensembles of forecast fields
Department of Mathematics, University of Zurich, Zurich, Switzerland

2019-08 Uncertainty quantification for sea level rise
Jupiter Intelligence, Boulder, CO, USA

Posters

2021-07 Multivariate spatial-dependence modelling with satellite data
Early Career & Student Statisticians Conference, Virtual

2020-12 Flexible methodology for hyperlocal flooding risk due to sea level rise
American Geophysical Union (AGU) Fall Meeting, Virtual

Teaching

Fall 2023 Tutor, STAT 3/801: Statistical Methods for Data Science, University of Wollongong

Spring 2023 Tutor, STAT 3/832: Generalised Linear Models, University of Wollongong

Fall 2018 Teaching Assistant, APPM 4/5350: Fourier Series and Boundary Value Problems, University of Colorado

Fall 2016 Teaching Assistant, CSCI 1320: Introduction to Programming for Engineers, University of Colorado

Service, Leadership, & Writing

2017 – present Open-Source Developer, Pull-requests accepted by `ArviZ`, `Parasol`, `parcoords-es`, and `Mamba`

2022 "Global CO_2 Flux: Bayesian statistical inversion using the WOMBAT framework."
Centre for Environmental Informatics, University of Wollongong

2019 Radio Show Host, "Probably Novel Podcast," Department of Applied Mathematics, University of Colorado

2016 – 2018 Mentor, Engineering Honors Program, University of Colorado

Computer Skills

Advanced Git, LaTeX, Linux, Python, R

Intermediate Julia, Matlab, Shell-scripting