

**ADDRESS**

Cornell University  
1178 Comstock Hall  
Ithaca, NY, 14853 USA

**e-mail:** [guinness@cornell.edu](mailto:guinness@cornell.edu)  
**website:** [guinness.cals.cornell.edu](http://guinness.cals.cornell.edu)

**EDUCATION**

2007 - 2012 University of Chicago, Ph.D. in Statistics  
2003 - 2007 Washington University in St. Louis, B.A. in Mathematics and Physics

**EMPLOYMENT**

2020 - Cornell University, Department of Statistics and Data Science, Associate Professor  
2018 - 2020 Cornell University, Department of Statistics and Data Science, Assistant Professor  
2017 - 2018 Cornell University, Department of Biological Statistics and Computational Biology,  
Visiting Assistant Professor  
2014 - 2018 NC State University, Department of Statistics, Assistant Professor  
2012 - 2014 NC State University, Department of Statistics, Postdoctoral Scholar

**EDITORIAL SERVICE**

2019 - present Associate Editor, Journal of Agricultural, Biological, and Environmental Statistics  
2019 - present Associate Editor, Journal of Computational and Graphical Statistics

**PUBLICATIONS****Under Review****Scaled Vecchia Approximation for Fast Computer Model Emulation**

Matthias Katzfuss, Joseph Guinness, Earl Lawrence  
Under Review, [Preprint](#)

**Proposed Method for Statistical Analysis of On-Farm Single Strip Treatment Trials**

Jason Cho, Guinness, Kharel, Maresma, Czymmek, van Aardt, Ketterings  
Under Review

**Corn Grain Yield Pred. and Mapping from Unmanned Aerial System Multispectral Imagery**

Sunoj Shajahan, Cho, Guinness, van Aardt, Czymmek, Ketterings  
Under Review

**Estimating Atmos. Motion Winds from Satellite Image Data using Space-Time Drift Models**

Indranil Sahoo, Joseph Guinness, Brian Reich  
Under Review, [Preprint](#)

**Nonstationary Covariance Est. using the Stochastic Score Approx. for Large Spatial Data**

Amanda Muyskens, Joseph Guinness, Montserrat Fuentes  
Under Review, [Preprint](#)

**Published**

**Spatial shrinkage via the product independent Gaussian process prior**

Arkaprava Roy, Brian Reich, Joseph Guinness, Russel Shinohara, Ana-Maria Staicu

[Journal of Computational and Graphical Statistics, Preprint](#)

**Estimating Agronomically Relevant Symbiotic N Fixation in Green Manure Breeding Pgms**

Katherine Muller, Joseph Guinness, Matthew Hecking, Laurie Drinkwater

[Crop Science](#)

**Inverses of Matérn Covariances on Grids**

Joseph Guinness

[Biometrika, Preprint](#)

**Spatial Estimation Methods for Mapping Corn Silage and Grain Yield Monitor Data**

Jason Cho, J. Guinness, Tulsi Kharel, S Sunoj, Dilip Kharel, E. Oware, J. van Aardt, Q. Ketterings

[Precision Agriculture](#)

**Gaussian Process Learning via Fisher Scoring of Vecchia's Approximation**

Joseph Guinness

[Statistics and Computing, Preprint](#)

**Nonparametric Spectral Methods for Multivariate Spatial and Spatial-Temporal Data**

Joseph Guinness

[Journal of Multivariate Analysis, Preprint](#)

**Geostatist. Modeling of Positive-Definite Matrices: Application to Diffusion Tensor Imaging**

Zhou Lan, Brian Reich, Joseph Guinness, Dipankar Bandyopadhyay, Liangsuo Ma, F. Gerard Moeller

[Biometrics](#)

**An Observational Study of the Effect of Vaporfly Shoes on Marathon Performance**

Joseph Guinness, Debasmita Bhattacharya, Jenny Chen, Max Chen, Angela Loh

[Researchers One](#)

**Vecchia Approximations for Gaussian Process Predictions**

Matthias Katzfuss, Joseph Guinness, Wenlong Gong

[Journal of Agricultural, Biological and Environmental Statistics, Preprint](#)

**Baseline Drift Estimation for Air Quality Data Using Quantile Trend Filtering**

Halley Brantley, Joseph Guinness, Eric Chi

[Annals of Applied Statistics, Preprint](#)

**A General Framework for Vecchia Approximations of Gaussian Processes**

Matthias Katzfuss and Joseph Guinness

[Statistical Science, Preprint](#)

**Smooth Density Spatial Quantile Regression**

Halley Brantley, Montserrat Fuentes, Joseph Guinness, Eben Thoma

[Statistica Sinica, Preprint](#)

**Multi-element Effects on Arsenate Accumulation in a Geochemical Matrix Determined Using  $\mu$ -XRF,  $\mu$ -XANES, and Spatial Statistics**

Sharma, Bell, Guinness, Polizzotto, Fuentes, Tappero, Chen-Weigart, Thieme, Williams, Hesterberg

[Journal of Synchrotron Radiation](#)

**Improved methods for Earth system modelling of atmos. soluble iron and obs. comparisons**

Hamilton, Scanza, Guinness, Kok, Longlei, Mingxuan, Rathod, Wan, Xiaohong, Fan, Mahowald

[Geoscientific Model Development](#)

**A space-time geostat. model for prob. est. of harmful algal bloom biomass and areal extent**  
Fang, Giudice, Scavia, Binding, Bridgeman, Chaffin, Evans, Guinness Johengen, Obenour  
[Science of the Total Environment](#)

**A Case Study Competition among Methods for Analyzing Large Spatial Data**  
Heaton, Datta, Finley, Furrer, Guhaniyogi, Gerber, Gramacy, Guinness, Hammerling, Katzfuss, Lindgren, Nychka, Sun, Zammit-Mangion  
[Journal of Agricultural, Biological, and Environmental Statistics Preprint](#)

**Space-Time Geostatistical Assessment of Hypoxia in the Northern Gulf of Mexico**  
V. Rohith Reddy Matli, Fang, Guinness, Rabalais, Craig, Obenour  
[Environmental Science and Technology](#), 2018

**Spectral Density Estimation for Random Fields via Periodic Embeddings**  
Joseph Guinness  
[Biometrika](#), 2019, [Preprint](#)

**A Test for Isotropy on the Sphere using Spherical Harmonic Functions**  
Indranil Sahoo, Joseph Guinness, Brian Reich  
[Statistica Sinica](#), 2019, [Preprint](#)  
\* Winner of 2018 JSM ENVR Student Paper Award

**Permutation and Grouping Methods for Sharpening Gaussian Process Approximations**  
Joseph Guinness  
[Technometrics](#), 2018, [Preprint](#)  
\* Winner of Wilcoxon Award

**Fully Bayesian Spectral Methods for Imaging Data**  
Brian Reich, Joseph Guinness, Simon Vandekar, Russel T Shinohara, Ana-Maria Staicu  
[Biometrics](#), 2018, [Preprint](#)

**Compression and Conditional Emulation of Climate Model Output**  
Joseph Guinness and Dorit Hammerling  
[JASA Applications and Case Studies](#), 2018, [Preprint](#)

**Optimal Seed Deployment under Climate Change using Spatial Models: Application to Loblolly Pine in the Southeastern US**  
Alfredo Farjat, Brian Reich, Joseph Guinness, Ross Whetten, Steve McKeand, Fikret Isik  
[JASA Applications and Case Studies](#), 2017, [Preprint](#)

**An Evolutionary Spectrum Approach for Modeling Land/Ocean Nonstationarities**  
Stefano Castruccio and Joseph Guinness  
[Journal of the Royal Statistical Society, Series C](#), 2017, [Preprint](#)

**Isotropic covariance functions on spheres: some properties and modeling considerations**  
Joseph Guinness and Montserrat Fuentes  
[Journal of Multivariate Analysis](#), 2016, [Preprint](#)

**Circulant embedding of approximate covariances for inference from Gaussian data on large lattices**  
Joseph Guinness and Montserrat Fuentes  
[Journal of Computational and Graphical Statistics](#), 2017, [Preprint](#)

**Likelihood approximations for big nonstationary spatial-temporal lattice data**  
Joseph Guinness and Montserrat Fuentes  
[Statistica Sinica](#), 2015, [Preprint](#)

**Multivariate spatial modeling of cond. dep. in microscale soil elemental composition data**  
Joseph Guinness, Montserrat Fuentes, Dean Hesterberg, and Matthew Polizzotto  
[Spatial Statistics](#), 2014, [Preprint](#)

**Interpolation of nonstationary high frequency spatial-temporal temperature data**  
Joseph Guinness and Michael Stein  
[Annals of Applied Statistics](#), 2013, [Preprint](#)

**Transformation to approximate independence for locally stationary Gaussian processes**  
Joseph Guinness and Michael Stein  
[Journal of Time Series Analysis](#), 2013, [Preprint](#)

## SOFTWARE

GpGp R Package, available on the [CRAN](#) and [github](#)

## RECENT INVITED PRESENTATIONS

- 2021 Spatial and Temporal Statistics Symposium (U of Wollongong)  
“Gaussian Process Computing with Vecchia’s Approximation and the GpGp R Package”
- 2020 Brazilian Synchrotron Light Laboratory Seminar  
“Statistical Analysis of Multi-Element Micro-XRF Data”  
  
Lancaster Workshop on Time Series and Spatial Statistics  
“Nonparametric Spectral Methods for Multivariate Spatial and Spatial-Temporal Data”  
  
EPFL Statistics Seminar  
“Inverses of Matern Covariances on Grids”  
  
Joint Statistical Meetings  
“Inverses of Matern Covariances on Grids”  
  
Los Alamos Statistics Seminar  
“Vecchia’s Gaussian Process Approximation”
- 2019 Cornell Atmospheric Sciences Seminar  
“Spatial Temporal Statistical Methods for Earth Science Data”  
  
IMS/ASA Spring Research Conference  
“Nonparametric Spectral Methods for Multivariate Spatial and Spatial-Temporal Data”  
  
ASA CSSA SSSA Annual Meeting  
“Using Spatial Statistics to Analyze on-Farm Trials”  
  
Cornell Day of Statistics  
“Spectral Methods for Multivariate Spatial and Spatial-Temporal Data”
- 2018 Penn State Dept. of Statistics Seminar  
“Statistical Compression of Climate Model Output”  
  
Joint Statistical Meetings  
“Fully Bayesian Spectral Methods for Imaging Data”  
  
Notre Dame University Statistics Seminar  
“Spectral Density Estimation for Random fields via Periodic Embeddings”  
  
Virginia Tech Statistics Seminar  
“Spectral Density Estimation for Random fields via Periodic Embeddings”

## FUNDING

NSF-DMS - *Collaborative Research: Scalable Gaussian-Process Methods for Spatial Statistics and Machine Learning*

PI: Joseph Guinness, Collaborating PI: Matthias Katzfuss, Texas A&M

Total Funding: \$100,000 over 2020-2023

NSF-DMS - *Spatial-Temporal Modeling and Computation for Physical Processes and Num. Simulations*

PI: Joseph Guinness

Total Funding: \$220,000 over 2019-2022

NSF-DMS - *Estimation and Inference for Massive Multivariate Spatial Data*

PI: Joseph Guinness

Total Funding: \$160,000 over 2016-2019

NSF-DMS - *Spatial-temporal models and methods for big nonstationary multivariate data on Euclidean spaces and the sphere*

PI: Montserrat Fuentes, Co-PIs: Joseph Guinness, Lian Xie (Dept. of MEAS, NCSU)

Total Funding: \$210,000 over 2014-2017

NIH-NIEHS - *R01 - Data Integration Methods for Environmental Exposures with Application in Air Pollution and Asthma Morbidity*

PI: Howard Chang, Emory University, NCSU Co-PIs: Joseph Guinness, Brian Reich

Total Funding: \$607,565 over 2017-2022

NCSU Research Innovation Seed Funding - *Nanoscale Dynamics of Phosphate and Arsenate Reactions Affecting Soil Regulation of Plant Nutrition and Environmental Toxicity*

PI: Dean Hesterberg, Co-PIs: Joseph Guinness, James LeBeau

Total Funding: \$25,000 over 2018-2019

Health Effects Institute - *Characterizing the Determinants of Vehicle Traffic Emissions Exposure: Measurement and Modeling of Land-Use, Traffic, Emissions, Transformation and Transport*

PI: Henry Chris Frey, Co-PIs: Montserrat Fuentes, Joseph Guinness, Andrew Grieshop, Nagui Roupail, Daniel Rodriguez, Andrey Khlystov

Total Funding: \$761,681 over 2014-2017

## AWARDS

Wilcoxon Award, for best applied paper in 2018 issues of *Technometrics*

Martin Silverstein Award, Washington University Department of Mathematics

Early Investigator Award, Environmental Statistics (ENVR) Section of American Statistical Association

## STUDENT MENTORING (current in bold)

*Ph.D. Advisor or Co-Advisor*

**Megan Gelsinger**, Cornell Statistics Ph.D. student

Halley Brantley, NCSU Statistics Ph.D. 2019

Amanda Muyskens, NCSU Statistics Ph.D. 2019

Indranil Sahoo, NCSU Statistics Ph.D. 2018

Marcela Alfaro-Córdoba, NCSU Statistics Ph.D. 2017

Geoffrey Peterson, NCSU Statistics Ph.D. 2016

*Ph.D. Committe Member*

**Wangda Zhu**, Cornell Design and Environmental Analysis Ph.D. Student

**Hanxue Wei**, Cornell Regional Science Ph.D. Student

**I-An Su**, Cornell Human Development Ph.D. Student  
**Luke Qian**, Cornell Food Science Ph.D. Student  
**Sebastian Llanos Soto**, Cornell Veterinary Medicine Ph.D. Student  
**Colin Bundschu**, Cornell Applied Physics Ph.D. student  
**Sander Aarts**, Cornell Operations Research Ph.D. student  
**Sriya Sunil**, Cornell Food Science Ph.D. student  
**Nicolas Morales**, Cornell Plant Genetics Ph.D. student  
**Moshood Bakare**, Cornell Plant Breeding Ph.D. student  
Yang Liu, Cornell Statistics Ph.D. 2020  
Xia Sun, NCSU Department of Marine, Earth, and Atmospheric Sciences Ph.D. student  
Shiqi Fang, NCSU Department of Civil, Construction, & Environmental Engineering Ph.D. student  
Aakriti Sharma, NCSU Department of Crop and Soil Sciences Ph.D. 2019  
Dianna Francisco, NCSU Department of Marine, Earth, and Atmospheric Sciences Ph.D. 2019  
Omer Kara, NCSU Department of Agricultural and Resource Economics Ph.D.  
Sajeesh Kulappurath, NCSU College of Textiles Ph.D.  
Alex Larsen, NCSU Department of Statistics Ph.D.  
Munir Winkel, NCSU Department of Statistics Ph.D.  
Alfredo Farjat, NCSU Statistics Ph.D.  
Rodrigo de la Fuente, NCSU Industrial Engineering Ph.D.

*Undergraduate Research Mentor*

Will Bekerman, Cornell  
Anna Halldorsdottir, Cornell  
Max Chen, Cornell  
Jenny Chen, Cornell  
Angela Loh, Cornell  
Debasmita Bhattacharya, Cornell  
Katherine Faiola, Cornell Statistics  
Youssef Fahmy, Cornell Statistics  
Atreya Iyer, Cornell Statistics  
Sulaimon Kassim, NCSU Environmental Sciences  
Kristie Kusibab, NCSU Statistics  
Claudia Mesa, NCSU Statistics

**CONSULTING**

Faculty consultant for Cornell Statistical Consulting Unit, 2018 -

**SERVICE**

Cornell CIS Building Committee  
Cornell Statistics and Data Science Faculty Search Committee  
NSF Proposal Review Panel for Computation and Data Enabled Science Program  
Organizer for Institute of Mathematics and its Applications Workshop, April 2018  
NSF Proposal Review Panel for Statistics Program  
ASA ENVR Student Paper Award Committee  
Cornell CALS Curriculum Committee  
Cornell Statistics Ph.D. admissions committee  
NCSU Statistics Head Search Committee  
Local organizing committee for 2016 SAMSI ASTRO Program  
Founder of NCSU *Spatial Statistics Reading Group*  
Organizer for JSM 2015 Invited Poster Session  
Organizer for JSM 2016 Invited Session on Statistical Climatology  
NCSU Statistics Faculty Search Committee

NCSU Statistics Beach Trip Planning Committee Chair  
NCSU Statistics Big Data Committee  
NCSU Statistics Seminar Committee  
NCSU Statistics Qualifying Exam Committee