ADDRESS

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EDUCATION

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

EMPLOYMENT

2018 - 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

Inverses of Matérn Covariances on Grids
Joseph Guinness
Under Review, Preprint

Gaussian Process Learning via Fisher Scoring of Vecchia's Approximation
Joseph Guinness
Under Review, Preprint

Tarsier islands: exploring spatial patterns of variation in tarsier duets from offshore islands of North Sulawesi
Dena Clink, Joseph Guinness, John Tasirin, Holger Klinck
Under Review

Nonparametric Spectral Methods for Multivariate Spatial and Spatial-Temporal Data
Joseph Guinness
Under Review, Preprint

Estimating Atmos. Motion Winds from Satellite Image Data using Space-Time Drift Models
Indranil Sahoo, Joseph Guinness, Brian Reich
Under Review, Preprint

The spatial Wishart process and its application to diffusion tensor imaging

Zhou Lan, Brian Reich, Joseph Guinness, Dipankar Bandyopadhyay
Under Review

Spatial shrinkage via the product independent Gaussian process prior
Arkaprava Roy, Brian Reich, Joseph Guinness, Russel Shinohara, Ana-Maria Staicu
Under Review, Preprint

Vecchia Approximations for Gaussian Process Predictions
Matthias Katzfuss, Joseph Guinness, Wenlong Gong
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

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 μ-XRF, μ-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
Hamtilton, 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 (accepted, in press)

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, 2018, 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

INVITED PRESENTATIONS

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"

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"

2017 ENAR
"Spectral Methods for Brain Imaging Data"

UNC Biostatistics Big Data to Knowledge
"Non-Gaussian Hierarchical Models for Spatial Data

Colorado School of Mines, Applied Mathematics Department Seminar
"A Generalized Framework for Vecchia Approximations of Gaussian Processes

Emory Biostatistics Department Seminar
"A Generalized Framework for Vecchia Approximations of Gaussian Processes

Cornell Statistics Department Seminar
"A Generalized Framework for Vecchia Approximations of Gaussian Processes

CM Statistics Conference Special Invited Session, London
"A Generalized Framework for Vecchia Approximations of Gaussian Processes

2016 NCSU Environmental Statistics Seminar
"Compression and Conditional Emulation of Climate Model Output"

Big Data Tsunami Workshop, Banff International Research Station, Canada
"Compression and Conditional Emulation for Climate Model Output"

Environmental Protection Agency, Community of Practice for Statistics Seminar, Research Triangle Park, NC
"Compression and Conditional Emulation for Climate Model Output"

Quality and Productivity Research Conference, Tempe, AZ
"Compression and Conditional Emulation of Climate Model Output"

Joint Statistical Meetings, Chicago, IL
"Compression and Conditional Emulation of Climate Model Output"

Texas A&M University Department of Statistics Seminar
"Permutation Methods for Sharpening Gaussian Process Approximations"

UNC-Chapel Hill Department of Statistics and Operations Research Seminar
"Permutation Methods for Sharpening Gaussian Process Approximations"

Iowa State University Department of Statistics Seminar
"Permutation Methods for Sharpening Gaussian Process Approximations"

2015 IMS Invited Session , ENAR
"Multivariate Spatial Modeling of Conditional Dependence In Microscale Soil Elemental Composition Data"

Purdue Spatial Statistics Seminar
"Nonstationary Models for Spatial-Temporal Data"

NCAR Triple Crown Seminar, Boulder CO
"Efficient Computation of Gaussian Likelihoods for Stationary Markov Random Field Models"

The International Environmetrics Society Meeting, Al Ain, UAE
"Circulant embedding of approximate covariances for inference from Gaussian data on large lattices"

ERCIM, CM Statistics, London
"Circulant embedding of approximate covariances for inference from Gaussian data on large lattices"

2014 Joint Statistical Meetings, Boston, MA
"Fast Bayesian Inference for Missing Data on Circular Domains"

Statistics Department Seminar, University of California-Davis
"Circulant embedding of approximate covariances for inference from Gaussian data on large lattices"

2013 The International Environmetrics Society, Anchorage, AK
"Covariance Models for Data on the Sphere"

NCAR Next Generation Climate Data Products Workshop, Boulder CO
"Nonstationary spatial-temporal statistical models for regional weather model output"

International Association for Mathematical Geosciences, Madrid, Spain
"Spatial-temporal modeling of complex wind field surfaces in Spain"

Statistics Department Seminar, University of Michigan
"Covariance functions for mean square differentiable processes on spheres"

2012 8th International Purdue Symposium on Statistics
"Nonstationary spatial-temporal modeling for large datasets"

AISC Conference, UNC Greensboro
"Nonstationary Spatial-Temporal Modeling"

2011 Midwest Statistics Research Colloquium, UW Madison
"Likelihood approximations for nonstationary Gaussian processes"

NC State University, Department of Statistics
"Fourier analysis for nonstationary spatial-temporal data"

FUNDING

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 Rouphail, 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

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

Moshood Bakare, Cornell Plant Breeding Ph.D. student
Yang Liu, Cornell Statistics Ph.D. student
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

Youssef Fahmy, Cornell Statistics undergraduate student
Atreya Iyer, Cornell Statistics undergraduate student
Sulaimon Kassim, NCSU Environmental Sciences undergraduate
Kristie Kusibab, NCSU Statistics undergraduate
Claudia Mesa, NCSU Statistics undergraduate student

CONSULTING

Faculty consultant for Cornell Statistical Consulting Unit, 2018 -

SERVICE

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