

Jonathan R. Woody

Curriculum Vitæ

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Contact Information

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Education

Ph.D. in Mathematical Sciences, Clemson University, December 2009

Thesis: “Some New Problems in Change Point Analysis”

Committee: Robert Lund (chair), Peter Keissler, Colin Gallagher, and James Brannen

M.S. in Applied Mathematics, Western Carolina University, December 2003

B.S. in Mathematics, North Carolina State University, December 2000

Experience

Associate Professor, Mississippi State University

August 2017 - present

Assistant Professor, Mississippi State University

August '11 - July '17

Visiting Assistant Professor, Montana State University

January '11 - May '11

Visiting Assistant Professor, Clemson University

January '10 to December '10

Graduate Teaching Assistant, Clemson University

August '04 - December '09

Research

Grants

Woody, J., \$14,509.41 (submitted). “ARI proposed research: Financial Forensic Statistics.” ARI institute.

Peer Reviewed Articles

Woody, J., Zhou, Z., Lund, R.B., and Wu, T. (2024). “A forensic statistical analysis of fraud in the federal food stamp program.” *Annals of Applied Statistics*, 18(3), 2486 - 2510. <https://doi.org/10.1214/24-AOAS1891>

Grant, J., Kong, J., Liu, X., Lund, R., and Woody, J. (2024). Statistical inference for Lindley random walks with correlated increments. *Journal of Statistical Computation and Simulation*, 1–25. <https://doi.org/10.1080/00949655.2024.2425035>

Jia, Y., Lund, R., Kong, J., Dyer, J., Woody, J., Marron J.S. (2023). “Trends in northern hemispheric snow presence.” *Journal of Hydrometeorology*, 24(6), 1137-1154. <https://doi.org/10.1175/JHM-D-22-0182.1>

Woody, J., Xu, Y., Dyer, J., Lund, R., and Hewaarachchia, A. (2021). “Statistical analysis of daily snow depth trends in North America.” *Atmosphere*, 12(7), Article 820. <https://doi.org/10.3390/atmos12070820>

Woody, J., Lu, Q., Livsey, J. (2020). “Statistical methods for forecasting daily snow depths and assessing trends in inter-annual snow depth dynamics.” *Environmental and Ecological Statistics*, 27, 609-628. <https://doi.org/10.1007/s10651-020-00461-5>

Lee, J., Lund, R., Woody, J., and Xu, Y. (2019). “Trend assessment for daily snow depths with changepoint Considerations.” *Environmetrics*, 31(1), Article e2580. <https://doi.org/10.1002/env.2580>. (Advance online publication).

Woody, J., Wang, Y., and Dyer, J. (2016). “Application of multivariate storage model to quantify trends in seasonally frozen soil.” *Open Geosciences*, 8(1), 310-322. <https://doi.org/10.1515/geo-2016-0036>

Liu G., Shao Q., Lund R., and Woody J. (2016). “Testing seasonal means in time series data.” *Environmetrics*, 27(4), 198-211. <https://doi.org/10.1002/env.2383>

Woody, J. (2015). “Time series regression with persistent level shifts.” *Statistics and Probability Letters*, 102, 22-29. <https://doi.org/10.1016/j.spl.2015.03.011>

Woody, J., and Lund, R. (2014). “A linear regression model with persistent level shifts: an alternative to infill asymptotics.” *Statistics and Probability Letters*, 95, 118-124. <https://doi.org/10.1016/j.spl.2014.08.018>

Woody, J., Lund, R., and Mekonnen, G. (2014). “Tuning extreme NEXRAD and CMORPH precipitation measurements.” *Journal of Hydrometeorology*, 15, 1070-1077. <https://doi.org/10.1175/JHM-D-13-0146.1>

Woody, J., Lund, R., Grundstein, G. and Mote, T., (2009). “A stochastic storage model approach to the assessment of snow depth trends.” *Water Resources Research*, 45(10), Article W10426. <https://doi.org/10.1029/2009WR007996>

Invited Articles

Woody, J., (2016). “Quantifying a trend in the NDAWN deep-soil temperatures.” *North Dakota Climate Bulletin: Winter 2015-2016*, 10, 20-22.

Submitted

Woody, J., Prochnow, P., Kong, J., and Dyer, J., “Regional analysis of snow presence trends.”

Dudgeon, S., Woody, J., Zhao, Z., and Jia, Y., “Forensic statistics: anomaly detection in financial transaction data.”

Wang, Q., Parker, P., Lund, R., and Woody, J., “A spatial-Markov study of planetary snow trends.”

In Preparation

Draper, D., Guo, E., Lund, R., and Woody, J., “A simple necessary condition for the independence of real-valued random variables.”

Zhao, Z., Woody J., Jia, Y., “Clustering financial time series by periodicity.”

Boateng, K., and Woody, J., Lu, Q., “A forensic statistical analysis of fraud in the Paycheck Protection Program.”

Kong, J., Lund, R.B., and Woody, J., “General censored time series.”

Woody, J., Dudgeon, S., and Jia, Y., “A novel approach to addressing model uncertainty for cluster detection in order statistical data.”

Livsey, J., Woody, J., and Dyer, J., “Modeling and forecasting daily snow depths using a storage model with meteorological covariates.”

Invited Talks

International Conference on Robust Statistics, Stresa Italy, May 23 2025 “Robust Anomaly Detection via Order Statistic Methods.”

Trends in Northern Hemispheric Snow Presence, Data Science Academic Insight at Mississippi State University March 1, 2025.

Institute of Mathematical and Statistical Innovation workshop on Detection and Attribution of Climate Change, University of Chicago October 17, 2022 “Trends in Northern Hemispheric Snow Presence.”

Defense Techconnect Innovation Summit and Expo., Washington DC, September 27,2022. “Generalized Forensic Statistical Analysis”.

University of California at Santa Cruz: Statistics Seminar. May 2021. “Lindley Processes with Correlated Data.”

Institute of the Humanities: Science and Humanities Panel. “Quantifying and Anomalous Pattern in the

Federal Food Stamp Program (SNAP).”

TIES 2018: The 28th Annual Conference of the International Environmetrics Society. Invited Talk: “A Statistical Analysis of Snow Depth Trends.”

Mississippi State University Data Summit: “Snap Integrity Project: Understanding and Anomalous Pattern,” September 15, 2017.

Boise State University: “North American Snow Depth Trends,” September 8, 2017.

QPRC 2017: The 34th Quality and Productivity Research Conference *Quality and Statistics: A Path to a Better Life*: “North American Snow Depth Trends.”

University of North Carolina at Greensboro: “North American Snow Depth Trends,” February 5, 2016.

Mississippi State University: “Changepoints and Snowpack Trends,” September 11, 2015.

SAMSI IMAGE Summer Program: “Changepoint and Trend Assessment in Daily Snow Depth Data,” July 14, 2014.

Conferences

ACFE Research Summer Meeting, Nashville, TN, June 26, 2025 “Proposed Research: Financial Forensic Statistics.”

International Conference on Robust Statistics. Stresa, Italy, May 19-23. Talk: “Robust Anomaly Detection via Order Statistic Methods.”

Joint Statistical Meetings. Portland, OR, August 4-9 2024. Talk: IMS panel: New methods for complex outcomes: “Financial forensic statistics: novel methods and a case study.”

International Workshop on Applied Probability: Thessaloniki, Greece June 7-10 2023. Invited talk: “A Forensic Statistical Analysis of the Federal Food Stamp Program.”

Defense Techconnect Innovation Summit and Expo. September 27-29, 2022 Fort Washington, MD.

Joint Statistical Meetings. Washington, DC, August 6-11, 2022.
Chapter Representative: Council of Chapters.

Techconnect World Innovation Conference and Expo: Washington DC June 13-16.
Poster: “Supplementary Nutritional Assistance Program Recipient Data Integrity Assessment.”

Joint Statistical Meetings. Denver, Colorado, 27 July-1 August 2019.
Talk: “Supplementary Nutritional Assistance Program Recipient Data Integrity Assessment.”

Mississippi State University Interdisciplinary Forum. November 30, 2018.
Talk: “Supplementary Nutritional Assistance Program Recipient Data Integrity.”

TIES 2018: The 28th Annual Conference of the International Environmetrics Society. July 16 – 21, 2018.

Invited Talk: "A Statistical Analysis of Snow Depth Trends."

QPRC 2017: The 34th Quality and Productivity Research Conference *Quality and Statistics: A Path to a Better Life*. June 12-15, 2017

Invited Talk: "North American Snow Depth Trends."

SRCoS Summer Research Conference 2015 in Wilmington, NC, June 7-10, 2015.

Poster Presentation: "Changepoints, Seasonality, and Inferences."

SAMSI IMAGe Summer Program: The International Surface Temperature Initiative, July 8-16, 2014.

Fourth International Workshop on Space-based Snowfall Measurement, May 6-8, 2013

Poster Presentation: "A Storage Model Approach to Modeling Snow Depth Trends."

Teaching

Awards

Outstanding Professor: Fall 2020, College of Arts and Sciences, Mississippi State University.

Supervised Student Research: Kwabena Boateng, 1st place 2024 ASA AL-MS Chapter Conference student research competition, Auburn, AL.

Grants

\$2500, Erasmus+ mobility support travel grant, University of Primorska in Koper, Slovenia May 8-May 22 2016.

\$2500, Erasmus+ mobility support travel grant, University of Primorska in Koper, Slovenia May 8-May 22 2017.

PhD Students

Major Advisor

Kwambena Boateng: "Advances in cluster detection via order statistics, renewal processes and model selection methods with applications to financial forensic statistics."

Graduation date: December 2024.

Shelby Dudgeon: "Anomaly Detection with Extreme Value and Uncertainty Considerations."

Graduation date: December 2024.

Zhicong Zhao : "On Some Statistical Considerations of the Supplemental Nutritional Assistance Program."

Graduation date: December 2019.

Yang Xu (jointly advised with Dr. Prakash Patil): "Trends in Daily Snow Depths in the United States and Canada."

Graduation date: December 2016.

In Progress (PhD)

Joshua King, “Lindley Random Walks and Cryospheric Processes,” expected graduation: May 2028

Edward Akuffo Addo Dankwa, “Long Memory Periodic Count Time-Series,” expected graduation: May 2027.

Masters Students

Major Advisor

Caroline Virden, “Trend Estimation for a Lindley Random Walk with Meteorological Covariates,” May 2025.

Jolina Ho, “Likelihood-Based Inference for the Lindley Random Walk,” December 2024.

Edward Akuffo Addo Dankwa, “A Combinatorial SIR Model,” May 2024.

Kwembana Boateng, “Forensic Statistical Analysis: The Paycheck Protection Plan,” Summer 2024.

Arwa Alsaiani, “Consideration and Application Neural Networks,” May 2020.

Kate Phillips, thesis: “An Application of Ridge Regression and LASSO Methods for Model Selection,” August 2018.

Carol Sui: “Quantile Regression and its Application,” April 2016.

Jei Zhu: “Forecasting Stationary Time Series,” July 2016.

Li He: “Testing Seasonal Means in Time Series Data,” April 2015.

Leigh Ellen Barefield: “Detecting Multiple Changepoints via Genetic Algorithm,” December 2015.

Yan Wang: “Application of Multivariate Storage Model to Quantify Trends in Seasonally Frozen Soil,” April 2014, with accompanying paper accepted to *Open Geosciences*, 2016.

Jia (Amy) Wang: “Modeling patient arrival times as doubly stochastic process,” April 2012.

Course Development: Permanent Courses added to Catalog:

ST 8923 Time Series: Three hours lecture. Survey of modeling and forecasting methods for random processes that evolve over time. Added Fall 2023.

ST/MA 4223/6223 Gambling and Gaming: Three hours lecture. This course investigates the technical aspects of gambling and gaming. The theoretical underpinnings of all games of chance lie in probability theory. The rules of several games of chance will be examined, then statistical quantification of risk and reward is developed. Added Spring 2024.

ST/MA 4553/6553 Introduction to Stochastic Modeling: Three hours lecture. Three hours lecture. Introductory treatment of probability models and stochastic processes such as finite-state Markov chains, Poisson Processes, dynamic programming, hazard analysis, decision analysis, and simulation. This course considers both theory and application. Added Fall 2024.

Course Development: Special Topics and Directed Individual Studies:

Actuarial Exam P: Actuarial Exam P evaluates mastery of introductory probability theory. The table below summarizes mentored students successful on Exam P.

Student	Exam	Employment
Jordan Moore	Pass-November 2013	Towers Watson
Li He	Pass-December 2014	Ph.D. student, Clemson
Rylie Byrd	Pass-November-2014	Blue Cross Blue Shield of Mississippi

Actuarial Exam FM: Actuarial Exam FM evaluates mastery of financial mathematics. The table below summarizes the successful mentored students on Exam FM.

Rylie Byrd	Pass-December 2015	Blue Cross Blue Shield of Mississippi
Li He	Pass-May 2015	Ph.D. student, Clemson

Special Topics Courses Offered:

Special Topics: Time Series. This course studies random processes that evolve over time. This may also be thought of as linear models with second moments.

Special Topics: Computational Statistics. Computational statistical methods investigated.

Service

Awards

American Statistical Association: Outstanding Chapter Service Award, 2024
<https://ww2.amstat.org/meetings/jsm/2024/pdfs/JSM2024-AwardsBook.pdf>

Professional Service

President: Alabama-Mississippi Chapter of the American Statistical Association: 2018-2022.

Vice President: Alabama-Mississippi Chapter of the American Statistical Association: 2015-2018.

Chapter Representative: Alabama-Mississippi Chapter of the American Statistical Association 2022-2024.

Conferences Organized

2016 Alabama Chapter of the American Statistical Association Mini-Conference: UAB.
2018 Alabama Chapter of the American Statistical Association Mini-Conference: MSU.
2019 Alabama Chapter of the American Statistical Association Conference: Ole Miss.
2022 Alabama-Mississippi Chapter of the American Statistical Association: UMMC.
2023 Alabama-Mississippi Chapter of the American Statistical Association: UAB.
2024 Alabama-Mississippi Chapter of the American Statistical Association: Auburn University.

Refereed for the Following Journals:

Journal of Environmental and Ecological Statistics
Journal of Applied Statistics
Sankhya Series B
Environmetrics
Journal of Applied Stochastic Models in Business and Industry
Journal of Environmental Statistics
Stochastic Environmental Research and Risk Assessment
Journal of Statistical Computation
Population Ecology
Geophysical Research Letters
Journal of Applied Meteorology and Climatology
Advances in Statistical Climatology, Meteorology and Oceanography

Consulting

Research Fellow: National Strategic Planning and Analysis Research Center (NSPARC), August 2015-2020.

NSPARC Big Data Consulting Projects:

“Detecting State of Mississippi Fraudulent UI Claims,” spring 2015 to 2020.

“Detecting State of Mississippi SNAP Fraud,” spring 2016 to 2020.

University Service

Robert Holland Faculty Senate
Faculty Senator: Fall 2023.
Faculty Senator: Fall 2025-Spring 2028

Departmental Service

Chair: Tenure and Promotion Committee 2018-2023

Served on the following:

Advisory committee
Graduate Coordinating committee
Program Development committee
Curriculum committee
Statistics committee
Tenure and Promotion committee
Graduate Student Recruitment committee
Masters of Data Science committee
Webpage committee
Undergraduate Research: Undergraduate Recruitment committee
Hiring Committee-Statistics
Grant Writing and Consulting committee

In the News

Starkville Daily News: “MSU climate, math experts calculate statistically sound data on declining snow cover”. 8-11-23.

Personal Interest

Backpacking, mountain climbing, sketching, and golf.