Won Chang

Assistant Professor
Division of Statistics and Data Science
Department of Mathematical Sciences
University of Cincinnati

Education and Training

Postdoctoral Scholar, Department of Statistics, University of Chicago, August 2014 – July 2016 (mentored by Dr. Michael L. Stein and co-mentored by Dr. Elisabeth J. Moyer)

Ph.D. Statistics, Pennsylvania State University, 2014.
Thesis title: *Climate model calibration using high-dimensional and non-Gaussian spatial data* (Thesis advisor: Dr. Murali Haran, Thesis co-advisor: Dr. Klaus Keller).

M.S. Statistics, Korea University, 2009.
Thesis title: *Estimating volatility and distribution of European option prices using Bayesian UHF GARCH-M model* (Thesis advisor: Dr. Yousung Park).

B.S. Statistics, Korea University, 2007.

Employment

Assistant Professor, Department of Mathematical Sciences, University of Cincinnati, August 2016 – Present

Articles Accepted or Published in Peer Reviewed Journals

Plumlee, M., Asher, T. G., Chang, W., Bilskie, M. (2020) High-fidelity hurricane surge forecasting using emulation and sequential experiments, accepted for publication in *the Annals of Applied Statistics*

Kim, S., DeSarbo, W., and Chang, W. (2020) On the modeling of spatially dependent geographical regions: a hierarchical Bayesian approach, accepted for publication in *the International Journal of Research in Marketing*

Chang, W., Kim, S., Chae, H. (2020) A regularized spatial market segmentation method with Dirichlet process Gaussian mixture prior, *Spatial Statistics*, 30, 100402

Guan, Y., Sampson, C., Tucker, D., Chang, W., Mondal, A., Haran, M., Sulsky, D. (2019) Computer model calibration based on image warping metrics: an application for sea ice deformation, *the Journal of Agricultural, Biological and Environmental Statistics*, 24(3), 444–463.

Olson, R., An, S.-I, Fan, Y., Chang, W., and Evans, J. P. (2019) A novel method to test non-exclusive hypotheses applied to Arctic ice projections from dependent models, *Nature Communications*, 10(1), 3016

Hwang, Y., Kim, H.J., Chang, W., Yeo, K., Kim., Y. (2019) Bayesian Pollution Source Identification via an Inverse Physics Model, *Computational Statistics and Data Analysis*, 134, 76–92

Olson, R., Ruckert, K. L., Chang, W., Keller, K., Haran, M., and An, S.-I. (2018) Stilt: easy emulation of AR(1) computer model output in multidimensional parameter space, *the R Journal*, 10, 2, 209–225

Chang, W., and Xi, C. (2018) Rainfall-runoff modeling at watershed scale: A machine learning approach with exploratory modeling capability, *Water*, 10 (9), 1116

Chang, W., Wang, J., Marohnic, J., Kotamarthi, V.R., and Moyer, E.J. (2018) Diagnosing added value of convection-permitting regional models using precipitation event identification and tracking, *Climate Dynamics*, https://doi.org/10.1007/s00382-018-4294-0

Haran, M., Chang, W., Keller, K., Nicholas, R., and Pollard, D. (2017) Statistics and the Future of the Antarctic Ice Sheet, *Chance*, 30 (4), 37–44.

Chang, W., Haran, M., Applegate, P.J., and Pollard, D. (2016) Improving ice sheet model calibration using paleoclimate and modern data, *the Annals of Applied Statistics*, 10 (4), 2274–2302.

Chang, W., Stein, M., Wang, J., Kotamarthi, V. R. and Moyer, E. J. (2016). Changes in Spatio-temporal Precipitation Patterns in Changing Climate Conditions, *Journal of Climate*, 29 (23), 8355–8376.

Jeon, S., Chang, W., and Park, Y. (2016) An Option Pricing Model using High Frequency Data, *Procedia Computer Science*, 91, 175-179

Chang, W., M. Haran, P. J. Applegate, and D. Pollard, (2016) Calibrating an ice sheet model using high-dimensional binary spatial data, *Journal of the American Statistical Association*, 111 (513), 57–72

Pollard, D., Chang, W., Haran, M., Applegate, P., and DeConto, R. (2016) Large ensemble modeling of last deglacial retreat of the West Antarctic Ice Sheet: Comparison of simple and advanced statistical techniques, *Geoscientific Model Developement*, 9, 1697–1723

Chang, W., M. Haran, R. Olson, and K. Keller (2015) A composite likelihood approach to computer model calibration with high-dimensional spatial data, *Statistica Sinica*, 25 (1), 243–260

Chang, W., M. Haran, R. Olson, and K. Keller (2014) Fast dimension-reduced climate model calibration and the effect of data aggregation, *the Annals of Applied Statistics*, 8 (2), 649–673

Chang, W., P. J. Applegate, M. Haran, and K. Keller (2014) Probabilistic calibration of a Greenland Ice Sheet model using spatially-resolved synthetic observations: toward projections of ice mass loss with uncertainties, *Geoscientific Model Development*, 7, 1933–1943

Olson, R., R. Sriver, W. Chang, M. Haran, N. M. Urban and K. Keller (2013) What is the effect of unresolved internal climate variability on climate sensitivity estimates? *Journal of Geophysical Research - Atmospheres*, 118 (10), 4348–4358

Articles Submitted to or under Revision for Peer Reviwed Journals

Chang, W., Konomi, B. A., Karagiannis, G., Guan, Y., Haran, M. (2020) Ice model calibration using semi-continuous spatial data, under revision (rejected and invited for resubmission by *the Annals of Applied Statistics*)

Honors and Awards

Career Development Award, Korean International Statistical Society, 2019

Winner, 2014 American Statistical Association Section on Statistics and the Environment Student Paper Competition

Graduate Fellow, Eberly College of Science, The Pennsylvania State University, Fall 2009 – Spring 2010

Teaching Experiences

Instructor for Introduction to Machine Learning and Statistics, Spring 2020 and Spring 2021

Instructor for Introduction to Data Science, University of Cincinnati, Spring 2020 and Spring 2021

Instructor for Applied Statistics I, University of Cincinnati, Fall 2017, Fall 2018, Fall 2019, and Fall 2020

Instructor for Spatial Statistics, University of Cincinnati, Spring 2017 and Spring 2019

Instructor for Probability and Statistics II, University of Cincinnati, Fall 2020

Instructor for Probability and Statistics I, University of Cincinnati, Fall 2016 – Fall 2019

Instructor for Introduction to Statistics, Pennsylvania State University, Summer 2012

Instructor for Introduction to Biometry, Pennsylvania State University, Spring 2012

Invited Presentations

"Computer Model Emulation and Calibration Using Complex Spatial and Temporal Data", LANL Stats Seminar, Los Alamos National Laboratory, NM, Dec 2020

"Computer Model Emulation and Calibration Using Complex Spatial and Temporal Data", Departmental Colloquium, Department of Statistics, University of Illinois, Urbana-Champaign, IL, Nov 2020

"Ice Model Calibration Using Semi-continuous Spatial Data", Statistics Colloquium, Department of Mathematics and Statistics, University of Maryland, Baltimore County, MD, Oct 2020

"Ice Model Calibration Using Semi-continuous Spatial Data", UC Day at JPL, NASA Jet Propulsion Laboratory, CA, Sep 2020

"Ice Model Calibration using Semi-continuous Spatial Data", Departmental Colloquium, Department of Statistics, Ohio State University, OH, Oct 2019

"Ice Model Calibration using Semi-continuous Spatial Data", ICOSDA 2019, Grand Rapids, MI, Oct 2019

"New Statistical Framework for Large Scale Computer Model Calibration Using Deep Learning", SAMSI Deep Learning Workshop, Research Triangle Park, NC, August 2019

"Ice Model Calibration using Zero-Inflated Continuous Spatial Data", SAMSI MUMS Closing Workshop, Research Triangle Park, NC, May 2019

"Big Data Challenges in Uncertainty Quantification and Environmental Statistics", Department of Physics, University of Dayton , Dayton, OH, December 2018

"Computer Model Emulation and Calibration using High-dimensional and Non-Gaussian Spatial Data", SAMSI MUMS Opening Workshop, Research Triangle Park, NC, August 2018

"Computer Model Emulation and Calibration using High-dimensional and Non-Gaussian Spatial Data", Young Statistician's Meeting, Yangpyeong, Korea, July 2018

"A Bayesian Spatial Market Segmentation Method Using Dirichlet Process Gaussian Mixture Model and LASSO regularization", ISBA-EAC, Seoul, July 2018

"Calibrating an ice sheet model using high-dimensional binary spatial data", IMS-APRM, Singapore, June 2018

"A Bayesian spatial market segmentation method using Dirichlet process-Gaussian mixture models", Ecosta 2018, Hong Kong, June 2018

"Ice Model Calibration using Zero-Inflated Continuous Spatial Data", SAMSI CLIM Transition Workshop, Research Triangle Park, NC, May 2018

"Changes in Spatio-temporal Precipitation Patterns in Changing Climate Conditions", IISA International Conference on Statistics 2017, Hyderabad, India, December 2017

"Diagnosing added value of convection-permitting regional models using precipitation event identification and tracking", Department of Atmospheric Sciences, University of Illinois, Champaign, IL, December 2017

"Calibrating an ice sheet model using high-dimensional binary spatial data", Department of Mathematics and Statistics, University of North Carolina, Charlotte, NC, November 2017

"Calibrating an Ice Sheet Model Using High-Dimensional Binary Spatial Data", Division of Biostatistics and Bioinformatics, University of Cincinnati, Cincinnati, OH, October 2017

"Diagnosing added value of convection-permitting regional models using precipitation event identification and tracking", Mathematical and Statistical Methods for Climate and Earth Systems Program Opening Workshop, SAMSI, Durham, NC, August 2017

"Calibrating an ice sheet model using high-dimensional binary spatial data", Korean Statistical Society Semi-Annual Meeting, Seoul, Korea, May 2017

"Improving ice sheet model calibration using paleoclimate and modern data", Department of Geography, University of Cincinnati, Cincinnati, OH, February 2017

"Improving ice sheet model calibration using paleoclimate and modern data", National Institute for Mathematical Sciences, Daejeon, Korea, January 2017

"Calibrating an ice sheet model using high-dimensional binary spatial data", University of Akron, Department of Statistics, Akron, OH, November 2016

"Changes in Spatio-temporal Precipitation Patterns in Changing Climate Conditions", the 2016 International Chinese Statistical Association Applied Statistics Symposium, Atlanta, June 2016

"Understanding and Simulating Changes in Future Spatio-temporal Precipitation Patterns by Identifying and Characterizing Individual Rainstorm Events", Department of Statistics, Korea University, Seoul, Korea, October 2015

"Understanding and Simulating Changes in Future Spatio-temporal Precipitation Patterns by Identifying and Characterizing Individual Rainstorm Events", Department of Applied Statistics, Hoseo University, Asan, Korea, October 2015

"A conditional simulation approach to future precipitation scenario generation", Invited Poster Session, Joint Statistical Meeting, Seattle, WA, August 2015.

"Fast dimension-reduced climate model calibration and the effect of data aggregation", Department of Statistics, Purdue University, West Lafayett, IN, November 2014.

"Fast dimension-reduced climate model calibration and the effect of data aggregation", Division of Biostatistics and Bioinformatics, Pennsylvania State University, Hershey, PA, November 2014.

Other Presentations

"Calibrating a WRF-Hydro Model Using a New Deep Learning-Based Calibration Method", Joint Statistical Meetings, Virtual Conference, August 2020

"Ice Model Calibration using Semi-continuous Spatial Data", Joint Statistical Meetings, Denver, CO, August 2019

"New Statistical Framework for Large Scale Computer Model Calibration Using Deep Learning". AGU 2018 Fall Meeting , Washington DC, December 2018

"Changes in Spatiotemporal Precipitation Patterns in Changing Climate Conditions Presentation", JSM, Vancouver, BC, August 2018

"Diagnosing added value of convection-permitting regional models using precipitation event identification and tracking", AGU Fall Meeting, New Orleans, LA, December 2017

Discussant, topic contributed session on "Environmental Statistics on Smart Phones", JSM, Baltimore, MD, August 2017

"Improving ice sheet model calibration using paleoclimate and modern data", Spatial Statistics 2017: One World: One Health, Lancaster, UK, July 2017

"Improving ice sheet model calibration using paleoclimate and modern data", the 1st International Conference on Econometrics and Statistics, Hong Kong, June 2017

"Calibrating an ice sheet model using high-dimensional binary spatial data", ENVR/EnviBayes Workshop on Bayesian Environmetrics, Columbus, OH, April 2016

"Calibrating an ice sheet model using high-dimensional non-Gaussian spatial data", 6th IMS-ISBA Joint Meeting, Lenzerheide, Switzerland, January 2016

"Simulating Future Changes in Spatio-temporal Precipitation by Identifying and Characterizing Individual Rainstorm Events", AGU Fall Meeting, San Francisco, CA, December 2015

"A conditional simulation approach to future precipitation scenario generation", Poster Session, STAT-MOS Annual Meeting, Chicago, IL, September 2014.

"Fast Dimension-Reduced Climate Model Calibration", Topic Contributed Session, Joint Statistical Meeting, Bostan, Ma, August 2014.

"A dimension reduction approach to climate model calibration", Poster Session, NCAR IMAGe Pattern Scaling Workshop, Boulder, CO, April 2014.

"Two approaches for climate model calibration: Principal component analysis and Composite likelihood", Poster Session, Rao Prize Conference, The Pennsylvania State University, Unversity Park, PA, October 2013.

"Fast Dimension-Reduced Climate Model Calibration", Topic contributed session, Joint Statistical Meeting, Montreal, Canada, August 2013.

"Fast dimension-reduced climate model calibration", Poster Session, NCAR IMAGe Next Generation Climate Data Products Workshop, Boulder, CO, July 2013.

"A dimension reduction approach to climate model calibration", Poster Session, 2012 ENVR Workshop on Environmetrics, October 2012.

"A dimension reduction approach to climate model calibration", Poster Session, NSF-CBMS Regional Research Conference, Seattle, WA, August 2012.

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