

# 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

## Publications

Guan, Y., Sampson, C., Tucker, D., Chang, W., Mondal, A., Haran, M., Sulsky, D. (2018) Computer model calibration based on image warping metrics: an application for sea ice deformation, submitted to *the Journal of Agricultural, Biological and Environmental Statistics*

Chang, W., Kim, S., Chae, H. (2018) A regularized spatial market segmentation method with Dirichlet process Gaussian mixture prior, under revision.

Olson, R., An, S.-I., Fan, Y., Chang, W., and Evans, J. P. (2018) Testing and Prediction Under Non-Exclusive Hypotheses: Application to Arctic Sea Ice Projections, under revision

Kim, S., DeSarbo, W., and Chang, W. (2018) On the Modeling of Spatially Dependent Geographical Regions: A Hierarchical Bayesian Approach, in review at *Quantitative Marketing and Economics*

Hwang, Y., Kim, H.J., Chang, W., Yeo, K., Kim, Y. (2018) Bayesian Pollution Source Identification via an Inverse Physics Model, accepted for publication (with minor revision) in *Computational Statistics and Data Analysis*

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, accepted for publication in *the R Journal*

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, accepted for publication in *Climate Dynamics*
- 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 Development*, 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.

## Teaching Experiences

- Instructor for Applied Statistics I, University of Cincinnati, Fall 2017 and Fall 2018
- Instructor for Spatial Statistics, University of Cincinnati, Spring 2017.
- Instructor for Probability and Statistics I, University of Cincinnati, Fall 2016-Fall 2018.
- Instructor for Introduction to Statistics, Pennsylvania State University, Summer 2012.
- Instructor for Introduction to Biometry, Pennsylvania State University, Spring 2012.

## Honors and Awards

- 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.

## Invited Presentations

“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 Lafayette, 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.

## Professional Service

Organizer and session chair, “Methods for modeling spatio-temporal data”, ECOSTA 2018, Hong Kong, June 2018

Organizer and session chair, “Session on Spatial and Temporal Modeling for Environmental Data”, the 2017 International Chinese Statistical Association Applied Statistics Symposium, Chicago, June 2017

Referee, *Journal of the American Statistical Association*

Referee, *Journal of Econometrics*

Referee, *Asia-Pacific Journal of Atmospheric Sciences*

Referee, *Geoscientific Research Letters*

Referee, *Stochastic Environmental Research and Risk Assessment*

Referee, *Spatial Statistics*

Referee, *Bayesian Analysis*

Referee, *the Annals of Applied Statistics*

## Other Presentations

“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, Boston, 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, University 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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