Hannah M. Director

Applied Mathematics and Statistics
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Current Positions

NSF Mathematical Sciences Postdoctoral Fellow   Aug. 2020 - present
Colorado School of Mines
Department of Applied Mathematics and Statistics
Adviser: Douglas Nychka

*Grant: Spatiotemporal Methods for Integrating Stochastic Components
in Dynamic Sea Ice Models ($150,000)*

Visitor   Aug. 2020 - present
National Center for Atmospheric Research
Climate and Global Dynamics Laboratory

Education

Ph.D., Statistics   2020
University of Washington, Seattle WA
Dissertation: *Space-Time Contour Models for Sea Ice Forecasting*
Advisers: Adrian E. Raftery & Cecilia M. Bitz

A.M., Statistics   2015
Harvard University, Cambridge MA
Adviser: Luke Bornn

B.S., Mathematics & Statistics   2013
University of Washington, Seattle WA
Cum laude

Honors & Awards

NSF Graduate Research Fellowship	2015 - 2020
UW Statistics Department Z.W. Birnbaum Award for Outstanding General (Research) Exam	2019
Honorable Mention, Student Oral Presentation Awards, International Glaciology Society Sea Ice Symposium	2019
Statistical Methods for Atmospheric & Oceanic Sciences (STATMOS) Travel Grant	2016, 2017
Women in Statistics & Data Science Conference Travel Award	2017
UW Graduate School Top Scholar Entrance Award	2015
Phi Beta Kappa	2013
UW Statistics Department Service Award	2013
Washington (State) Scholar Award & Scholarship	2010 - 2013
Temcov Foundation Citizenship Scholarship	2010

Refereed Publications

1. **Director, H.M.**, Raftery, A.E., Bitz, C.M. (2020+) Probabilistic forecasting of the Arctic sea ice edge with contour modeling. *To appear in Annals of Applied Statistics.*

2. Diamond, M.D., **Director, H.M.**, Eastman, R., Possner, A., Wood, R. (2020). Substantial cloud brightening from shipping in subtropical low clouds. *AGU Advances.*
   (Editors' Highlight, Media coverage by the American Geophysical Union, Mongabay, NASA Earth Observatory, UW News, and Wired.)

3. Nie, K., Hannaford, S., **Director, H.M.**, Nishigaki, M.A., Drennan, W.R.,Rubinstein, J.T. (2019). Mandarin tone recognition in English speakers with normal hearing and with cochlear implants. *International Journal of Audiology*, 1-10.

4. **Director, H.M.**, Raftery, A.E., Bitz, C.M. (2017). Improved sea ice forecasting through spatiotemporal bias correction. *Journal of Climate*, 30(23), 9493-9510.

5. **Director, H.M.**, Gattiker, J., Lawrence, E., Vander Wiel, S. (2017). Efficient sampling on the simplex with a self-adjusting logit transform proposal. *Journal of Statistical Computation and Simulation*, 87(18), 3521-3536.

6. **Director, H.**, Bornn, L. (2015). Connecting point-level and gridded moments in the analysis of climate data. *Journal of Climate*, 28(9), 3496-3510.

Refereed Conference Proceedings

1. Sego, L. Hafen, R. **Director, H.**, LaMothe R. (May 2014). Tessera: open source software for accelerated data science. *Proceedings of the Institute of Nuclear Materials Management Conference.* Portland, OR.

Submitted/ In Prep.

1. **Director, H.M.**, Raftery. A.E. Contour models for boundaries enclosing star-shaped and approximately star-shaped polygons. *Submitted. arXiv:2007.04386.*

2. Gao, P.A., **Director, H.M.**, Bitz, C.M., Raftery, A.E. Probabilistic forecasts of Arctic sea ice thickness. *Submitted.*

Public-Facing Writing

1. **Director, H.** (2018). Research Highlight on "Improved sea ice forecasting through spatiotemporal bias correction." *University of Washington Program on Climate Change Blog.*

Software

1. **Director, H.M.**, Raftery A.E., Bitz, C.M (2020). IceCast: apply statistical post-processing to improve sea ice predictions. R package version 3.1.0.

2. **Director, H.**, Vander Wiel, S., Gattiker, J. (2017). SALTSampler: efficient sampling on the simplex. R Package version 1.1.0.

Professional Experience

Graduate Research Assistant   Jan. 2015 - Aug. 2015, Jul. 2017 - Aug. 2017
Los Alamos National Laboratory
Statistical Sciences Group

National Security Intern   May 2014 - Aug. 2014
Pacific Northwest National Laboratory
Applied Statistics & Computational Modeling

Risk Analysis Intern   Jun. 2012 - Sep. 2012
The Boeing Company
Environment, Health, & Safety

Teaching Experience

Teaching Assistant   Apr. 2018 - Jun. 2018
Introduction to Statistical Machine Learning
University of Washington
Instructor: Daniela Witten

Tutor   Apr. 2013 - Jun. 2013, Sep. 2016 - Jun. 2017
Statistics Tutor & Study Center
University of Washington
Supervisor: June Morita

Invited Presentations

Contour Models for Sea Ice Forecasting
School of the Environment & Department of Statistical Sciences   Feb. 2020
University of Toronto. Toronto, ON.

Department of Statistics & Data Science   Jan. 2020
University of Texas at Austin. Austin, TX.

Probabilistic Contour Models of the Arctic Sea Ice Edge
School of Aquatic and Fisheries Sciences Quantitative Seminar   Nov. 2019
University of Washington. Seattle WA.

Contributed Oral Presentations

Probabilistic Forecasting of the Arctic Sea Ice Edge
International Glaciology Society Sea Symposium. Winnipeg, MB.   Aug. 2019
(Honorable Mention, Student Oral Presentation Awards)

Probabilistic Contour Models of the Sea Ice Edge
Joint Statistical Meetings. Denver, CO.   Aug. 2019

Bias Correction of Sea Ice Predictions
Joint Statistical Meetings. Vancouver, BC.   Aug. 2018
Polar Prediction Workshop. Montreal, QU.   May 2018

Modeling the Models: Using Statistics to Improve Forecasts
Program on Climate Change Spring Symposium   May 2018
University of Washington. Seattle, WA.

Interactive Inference for Spatial Image Analysis.
Joint Statistical Meetings. Seattle, WA.   Aug. 2015

Contributed Poster Presentations

Bias Correction of Sea Ice Predictions
Women in Statistics and Data Science Conference, La Jolla, CA.   Oct. 2017
Polar Prediction Workshop, Palisades, NY.   May 2016
American Geophysical Union Fall Meeting, San Francisco, CA.   Dec. 2016

Connecting Point-level and Gridded Data in the Analysis of Climate Extremes
New England Statistics Symposium, Boston, MA.   Apr. 2014

Leadership

UW Women in Biostatistics and Statistics leadership team	Sep. 2018 - Jun. 2020
UW Program on Climate Change student steering committee	Sep. 2018 - Jun 2020
American Meteorological Society Committee on Probability and Statistics	Jan. 2017 - Jan 2019
UW Statistics graduate student representative to faculty	Sep. 2017 - Aug. 2018
Harvard Graduate Women in Science & Engineering board	Sep. 2013 - Dec. 2014

Mentoring

Panelist on ASA Committee on Funded Research Webinar   Sep. 2020
"NSF Graduate and Postdoctoral Fellowships: Opportunities & Advice"
Primary research adviser for Joyce (Zihui) Zhang, a UW   Oct. 2018-Aug. 2020
undergraduate researching sea ice forecast performance
Presentation on "Making the Most of Your Statistics Major"   Oct. 2019
at UW Statistics Undergraduate Orientation
UW Statistics Ph.D. program peer mentor   Sep. 2018 - Sep. 2019

Reviewer

Earth and Space Science, Geophysical Research Letters, Quarterly Journal of the Royal Meteorological Society, Weather and Forecasting

<u>**Session Chair**</u>

Joint Statistical Meetings, Denver, CO. July 2019

Beyond the VAR: Advances in Spatial and Spatio-Temporal Modeling
for Climate and Environmental Data