

Hannah M. Director

Applied Mathematics and Statistics
Colorado School of Mines
1500 Illinois St.
Golden, CO 80401

Web: <https://hdirector.github.io>
Email: hdirector@mines.edu

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)*

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

Education

Ph.D., Statistics 2020
University of Washington (UW), 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 (UW), Seattle WA
Cum laude

Honors & Awards

NSF Graduate Research Fellowship 2015 - 2020
UW Statistics Department Z.W. Birnbaum Award for Outstanding
General (Ph.D. Candidacy) Exam 2018-2019
Honorable Mention, Student Oral Presentation Awards, 2019
International Glaciology Society Sea Ice Symposium
Statistical Methods for Atmospheric & Oceanic Sciences (STATMOS) 2016, 2017
Travel Grant
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 Manuscripts & Preprints

1. Gao, P.A., **Director, H.M.**, Bitz, C.M., Raftery, A.E. Probabilistic forecasts of Arctic sea ice thickness. Submitted.
2. **Director, H.M.**, Raftery, A.E. [Contour models for boundaries enclosing star-shaped and approximately star-shaped polygons](#). Submitted. *ArXiv:2007.04386*.

Public-Facing Writing

1. Chase, E., Bowen, C.M., **Director, H.**, Baladandayuthapani, V., Pierson, S. (2020). [Panel Shares Advice on Applying for NSF Fellowships](#). *Amstat News*, November Issue.
2. **Director, H.** (2018). [Research Highlight on "Improved sea ice forecasting through spatiotemporal bias correction."](#) *UW 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 Los Alamos National Laboratory Statistical Sciences Group	Jan. 2015 - Aug. 2015, Jul. 2017 - Aug. 2017
National Security Intern Pacific Northwest National Laboratory Applied Statistics & Computational Modeling	May 2014 - Aug. 2014
Risk Analysis Intern The Boeing Company Environment, Health, & Safety	Jun. 2012 - Sep. 2012

Teaching Experience

Teaching Assistant Introduction to Statistical Machine Learning UW Stat 435 Instructor: Daniela Witten	Apr. 2018 - Jun. 2018
Tutor UW Statistics Tutor & Study Center Supervisor: June Morita	Apr. 2013 - Jun. 2013, Sep. 2016 - Jun. 2017

Invited Presentations

<i>Contour Models for Sea Ice Forecasting</i> School of the Environment & Department of Statistical Sciences University of Toronto. Toronto, ON.	Feb. 2020
Department of Statistics & Data Science University of Texas at Austin. Austin, TX.	Jan. 2020
<i>Probabilistic Contour Models of the Arctic Sea Ice Edge</i> School of Aquatic and Fisheries Sciences Quantitative Seminar University of Washington. Seattle WA.	Nov. 2019

Contributed Oral Presentations

<i>Subgrid-Scale Sea Ice Leads in CESM</i>	
2021 Community Earth System Model (CESM) Polar Climate Working Group Meeting. Virtual.	Feb. 2021
<i>Probabilistic Forecasting of the Arctic Sea Ice Edge</i>	
International Glaciology Society Sea Symposium. Winnipeg, MB. (Honorable Mention, Student Oral Presentation Awards)	Aug. 2019
<i>Probabilistic Contour Models of the Sea Ice Edge</i>	
Joint Statistical Meetings. Denver, CO.	Aug. 2019
<i>Bias Correction of Sea Ice Predictions</i>	
Joint Statistical Meetings. Vancouver, BC.	Aug. 2018
Polar Prediction Workshop. Montreal, QU.	May 2018
<i>Modeling the Models: Using Statistics to Improve Forecasts</i>	
Program on Climate Change Spring Symposium University of Washington. Seattle, WA.	May 2018
<i>Interactive Inference for Spatial Image Analysis.</i>	
Joint Statistical Meetings. Seattle, WA.	Aug. 2015

Contributed Poster Presentations

<i>Bias Correction of Sea Ice Predictions</i>	
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
<i>Connecting Point-level and Gridded Data in the Analysis of Climate Extremes</i>	
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 “NSF Graduate and Postdoctoral Fellowships: Opportunities & Advice”	Sep. 2020
Primary research adviser for Joyce (Zihui) Zhang, a UW undergraduate researching sea ice forecast performance	Oct. 2018-Aug. 2020
Presentation on “Making the Most of Your Statistics Major” at UW Statistics Undergraduate Orientation	Oct. 2019
UW Statistics Ph.D. program peer mentor	Sep. 2018 - Sep. 2019

Reviewer

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

Session Chair

Joint Statistical Meetings, Denver, CO.

July 2019

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