

# Hannah M. Director

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

Web: <https://hdirector.github.io>  
Email: [hdirector@mines.edu](mailto: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,  
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). Tesseract: 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. In revision, *Journal of the American Statistical Association*.
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

<b>Graduate Research Assistant</b> Los Alamos National Laboratory Statistical Sciences Group	Jan. 2015 - Aug. 2015, Jul. 2017 - Aug. 2017
<b>National Security Intern</b> Pacific Northwest National Laboratory Applied Statistics & Computational Modeling	May 2014 - Aug. 2014
<b>Risk Analysis Intern</b> The Boeing Company Environment, Health, & Safety	Jun. 2012 - Sep. 2012

## Teaching Experience

<b>Teaching Assistant</b> Introduction to Statistical Machine Learning UW Stat 435 Instructor: Daniela Witten	Apr. 2018 - Jun. 2018
<b>Tutor</b> 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>Probabilistic Forecasting of the Arctic Sea Ice Edge</i> International Glaciology Society Sea Symposium. Winnipeg, MB. <b>(Honorable Mention, Student Oral Presentation Awards)</b>	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. Polar Prediction Workshop. Montreal, QU.	Aug. 2018 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. Polar Prediction Workshop, Palisades, NY. American Geophysical Union Fall Meeting, San Francisco, CA.	Oct. 2017 May 2016 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

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*