

# 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 Position

**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, 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

National Science Foundation Graduate Research Fellowship 2015 - 2020

UW Statistics Department Z.W. Birnbaum Award 2019

for Outstanding General (Research) Exam

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

## 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.

## Conference Proceedings

7. 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

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

## Software

- 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.
- Director, H.**, Vander Wiel, S., Gattiker, J. (2017). [SALT Sampler: efficient sampling on the simplex](#). R Package version 1.1.0.

## 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

## 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

## Invited Presentations

### *Contour Models for Sea Ice Forecasting*

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

### *Probabilistic Contour Models of the Arctic Sea Ice Edge*

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	
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**Session Chair**

Joint Statistical Meetings, Denver, CO.

July 2019

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