Joanna D. Millstein

joanna.millstein@mines.edu • +1 914-588-3288 • https://jdmillstein.github.io/
Last updated November 15, 2023

EDUCATION

Massachusetts Institute of Technology, Cambridge, Massachusetts

Graduate Student in Glaciology — 2018 – 2023
Massachusetts Institute of Technology - Woods Hole Oceanographic Institution Joint Program in Marine Geology & Geophysics.
Thesis: *The Flow and Fracture of Antarctic Ice Shelves*

Dartmouth College, Hanover, New Hampshire

Bachelor of Arts in Earth Sciences — 2013 – 2017
Honors Thesis: *Ice Thickness and Elevation Changes on the Ross Ice Shelf, Antarctica, from Airborne Radar and Satellite Altimetry*

PROFESSIONAL APPOINTMENTS

Colorado School of Mines, Golden, Colorado

Postdoctoral Fellow, Department of Geophysics — 2023 – Present

Massachusetts Institute of Technology, Cambridge, Massachusetts

Affiliate — 2023 – Present

RESEARCH EXPERIENCE

Glacier Dynamics and Remote Sensing Group, Cambridge, Massachusetts

Graduate Research Assistant, Massachusetts Institute of Technology — 2018 – 2023

Centre for Arctic Gas Hydrate, Environment and Climate, Tromsø, Norway

Visiting Researcher, University of Tromsø — 2018

Dartmouth Glaciology Research Group, Hanover, New Hampshire

Undergraduate Research Assistant, Earth Sciences Department — 2013 – 2017

Polar Geophysics Group at Lamont-Doherty Earth Observatory, Palisades, New York

NSF Research Experience for Undergraduates Internship — 2016

New Hampshire Space Grant Consortium, Hanover, New Hampshire

Undergraduate Research Assistant, Earth Sciences Department — 2014

PUBLICATIONS

SUBMITTED & IN PREPARATION

[1] Millstein, J. D., B. M. Minchew, C. C. Walker. The application of a fatigue-crack growth law for modeling ice shelf rifts. *In prep.*

[2] Millstein, J. D., B. M. Minchew, B. V. Riel. Time-dependent Strain-rate Fields Forecast Rift Propagation: Case Study on the Brunt Ice Shelf, Antarctica. *In prep. for Journal of Glaciology.*

[3] Henry A. C., Schannwell C., Visnjevic V., Millstein, J. D., Bons P. D., Eisen O., Drews R. Predicting the three-dimensional age-depth field of an ice rise. ESS Open Archive . August 17, 2023. doi: 10.22541/essoar.169230234.44865946/v1 *Under review at Journal for Geophysical Research.*

[4] Bassis, J. N., A. Crawford, S. B. Kachuck, D. Benn, C. C. Walker, J. D. Millstein, R. Duddu, J Astrom, H. Fricker, A. Luckman. Stability of Ice Shelves and Ice Cliffs in a Changing Climate. Annual Review of Earth and Planetary Sciences. Vol, 52. *Accepted.*

PUBLISHED

[2] Millstein, J. D., B. M. Minchew, S. S. Pegler. Reassessing the Flow Law of Glacier Ice Using Satellite Observations. Nature Communications Earth & Environment, 3(1), *1-7*,2022.

[1] Hawley, R. L. and J. D. Millstein, Quantifying snow drift on Arctic structures: A case study at Summit, Greenland, using UAV-based structure-from-motion photogrammetry. Cold Regions Science and Technology, 157, *163-170*, 2019.

WHITE PAPERS

[1] Millstein, J. D., T. Snow, W. Sauthoff, J. Scheick, & M. Siegfried. CryoCloud: Accelerating Discovery for NASA Cryosphere Communities with Open-Cloud Infrastructure, NASA RFI. https://doi.org/10.5281/zenodo.7662993. 2023

HONORS & AWARDS

GAGE/SAGE Student Travel Award — 2023

MIT Graduate Student Council Conference Grant Award — 2022

West Antarctic Ice Sheet Workshop Best Student Presentation Award — 2022

Student Research Fund — 2020
Massachusetts Institute of Technology departmental grant

M. Nafi Toksöz Fellow — 2019
Massachusetts Institute of Technology departmental fellowship

National Science Foundation Graduate Research Fellowship — 2018

Theodore R. Madden Fellow — 2018
Massachusetts Institute of Technology departmental fellowship

H. Allen Brooks Traveling Fellowship — 2017
Funding a year of travel and writing

Dr. Warren Upham Geology Prize, Dartmouth College — 2017
For best senior honors thesis in the Earth Sciences department.

John A. Ebers 1961 Memorial Award, Dartmouth College — 2017
Awarded to the outstanding Earth Sciences student in the senior class

Sigma Xi, Dartmouth College — 2017
For significant undergraduate research achievement

Honors Thesis Grant, Dartmouth College — 2017

Estwing Award for Outstanding Geologist, Dartmouth College — 2016
Awarded to an Earth Sciences student for outstanding enthusiasm, cooperation, and support in the field.

EXTERNAL FUNDING

Accelerating ICESat-2 Science with Collaborative Cloud-computing — 2022
$363K. 22-NUP2022-0089. PIs: T. Snow (CSM), D. Felikson (NASA GSFC) M. Siegfried (CSM).
Served as a lead writer while PhD candidate

National Science Foundation Graduate Research Fellowship — 2018
$138,000

H. Allen Brooks Traveling Fellowship — 2017
$15,000

MENTORSHIP

Graduate

Elenda Savidge, *Colorado School of Mines* — 2023 – Present

Hannah Verbonceour, *Colorado School of Mines* — 2022 – Present

Undergraduate

Cecilia Gichner, *Bates College Class of 2022* — 2021 – 2022

Ryan Conti, *MIT Class of 2023* — 2021 – 2022

Jon Rosario, *MIT Class of 2024* — Summer 2021

Neosha Narayanan, *MIT Class of 2022* — 2020 – 2022

Joyce Yoon, *MIT Class of 2023* — Summer 2020

TEACHING

Lecture, Colorado School of Mines, Remote Sensing

The Magic of SAR for Monitoring Earth — 2023

Guest Lectures, MIT, Physical Principles of Remote Sensing

12.621, Remote sensing of the cryosphere — 2019, 2021, 2022

Juneau Icefield Research Program

Geophysics Teaching Faculty — Summer 2021

Faculty field instructor for geophysics, remote sensing, and glacier hydrology in addition to designing and supervising student research projects. Responsible for safe field procedures and instruction in geodetic methods.

Teaching Assistant, MIT

Geophysics Field Camp — January 2020
Graduate-level field course instructor in drone operation and geologic mapping.

Physical Principles of Remote Sensing — Fall 2020
Teaching assistant for graduate and undergraduate course in physics of remote sensing.

Teaching Assistant, Dartmouth College

How the Earth Works — Spring 2016
Teaching assistant for introductory course in geology with laboratory component.

Computer Animation — Fall 2015
Teaching assistant for course on advanced digital modeling and animation.

FIELD EXPERIENCE

Piute Wilderness, California — 2022
Teaching assistant and drone pilot for MIT geophysics field course

Juneau Icefield, Alaska — 2021
Faculty member and geophysics instructor for crevasse research for 30+ students.

Atlantic Ocean, R/V Corwith Cramer — 2018
Conducted hydrographic and biological surveys off the shelf break jet south of Cape Cod

Western United States and Rocky Mountains — 2015
Dartmouth Earth Sciences Off-Campus Field Program

Greenland — 2015
Based at Summit Station. Geophysical surveys and drone flights.

Greenland — 2014
Western margins of the Greenland Ice Sheet. CryoSat-2 ground truth campaign.

PRESENTATIONS

INVITED TALKS

[10] Millstein, J. D., T. Snow. Collaborative Cloud Computing for Crysophere Science *IceSat-2 Science Team Meeting*, October 2022.

[9] Millstein, J. D., Uncovering the Cryosphere with SAR *NISAR Community Meeting*, August 2022.

[8] Millstein, J. D., From Flow to Fracture on Antarctic Ice Shelves. *Ice Sheets and Climate Group at University of Colorado, Boulder*, February 2022.

[7] Millstein, J. D., Investigating the Dynamics of Antarctic Ice Shelves. *Colorado School of Mines Glaciology Group*, October 2021.

[6] Millstein, J. D., B. M. Minchew, S. Pegler. n=4: Reassessing the Flow Law of Glacier Ice Using Satellite Observations. *Maths on Ice Seminar*, October 2021.

[5] Millstein, J. D., B. M. Minchew, S. Pegler. Validating and calibrating Glen's Flow Law for Antarctic glacier ice. *British Antarctic Survey*, May 2021.

[4] Millstein, J. D., B. M. Minchew, 2020. Inferring ice rheology in Antarctic ice shelves using remotely-sensed surface velocity observations. *AGU Fall Meeting*.

[3] Delving into Glen's flow law and inferring characteristics from the flow law exponent. *Georgia Tech Ice & Climate Group*, June 2020.

[2] An Introduction to InSAR *Physical Principles of Remote Sensing at MIT*, September 2018.

[1] Digital Elevation Model Creation Using SfM at Summit, Greenland. *EnviroDrones*, June 2017.

SELECTED CONFERENCE ABSTRACTS

[17] Millstein, J. D., B. M. Minchew, C. C. Walker, 2023. The application of a fatigue-crack growth law for modeling ice shelf rifts. *AGU Fall Meeting*.

[16] Millstein, J. D., B. V. Riel, B. M. Minchew, 2022. Time-dependent Strain-rate Fields Forecast Rift Propagation: Case Study on the Brunt Ice Shelf, Antarctica. *Colorado Glaciology Workshop*.

[15] T. Snow, Millstein, J. D., W. Sauthoff, J. Colliander, C. Holdgraf, F. Pérez, M. Siegfried, 2023. Accelerating Discovery for NASA Cryosphere Communities with JupyterHub. *JupyterCon*.

[14] T. Snow, Millstein, J. D., W. Sauthoff, J. Colliander, C. Holdgraf, F. Pérez, M. Siegfried, 2023. Time-dependent Accelerating Discovery for NASA Cryosphere Communities with Open-Cloud Infrastructure. *AMS 103rd Annual Meeting*.

[13] Millstein, J. D., B. V. Riel, B. M. Minchew, 2022. Time-dependent Strain-rate Fields Forecast Rift Propagation: Case Study on the Brunt Ice Shelf, Antarctica. *AGU Fall Meeting*.

[12] C. C. Walker, H. A. Fricker, Millstein, J. D., B. Miles, L. D. Trusel, 2022. Sustained long-term collapse of Conger-Glenzer ice shelf, East Antarctica. *AGU Fall Meeting*.

[11] N. Narayanan, Millstein, J. D., B. M. Minchew, 2022. Simulation and Analysis of Deformation and Stability in Antarctic Ice Shelves. *AGU Fall Meeting*.

[10] D. F. Martin, S. B. Kachuck, Millstein, J. D., B. M. Minchew, 2022. Examining the Sensitivity of Ice Sheet Models to Updates in Rheology (n= 4). *AGU Fall Meeting*.

[9] Millstein, J. D., B. V. Riel, B. M. Minchew, 2022. Time-dependent Strain-rate Fields Forecast Rift Propagation: Case Study on the Brunt Ice Shelf, Antarctica. *WAIS Workshop*.

[8] Millstein, J. D., B. V. Riel, B. M. Minchew, 2022. Time-dependent Strain-rate Fields Forecast Rift Propagation: Case Study on the Brunt Ice Shelf, Antarctica. *NISAR Community Meeting*.

[7] Millstein, J. D., B. M. Minchew, S.S. Pegler, 2021. n=4. *WAIS Workshop*.

[6] Millstein, J. D., B. M. Minchew, 2021. Validating and calibrating Glen's Flow Law for Antarctic glacier ice. *EGU 2021*.

[5] Millstein, J. D., B. M. Minchew, 2019. Inferring ice rheology in Antarctic ice shelves using remotely-sensed surface velocity observations. *AGU Fall Meeting*.

[4] Das, I., L. Padman, W. Chu, H. A. Fricker, M. K. Becker, R. E. Bell, K. J. Tinto, J. D. Millstein, 2017. Mass Balance and Structure of the Ross Ice Shelf, Antarctica. *International WCRP/IOC Conference on Regional Sea Level Changes and Coastal Impacts*.

[3] Das, I., L. Padman, W. Chu, H. A. Fricker, M. K. Becker, R. E. Bell, K. J. Tinto, J. D. Millstein, 2016. Mass Balance and Structure of the Ross Ice Shelf, Antarctica. *AGU Fall Meeting*.

[2] Millstein, J. D., W. Chu, I. Das, R.E. Bell, 2016. An Englacial Radar Attenuation Modeling Approach and Application to the Ross Ice Shelf. *AGU Fall Meeting*.

[1] Millstein, J. D., R.L. Hawley, 2015. Digital Elevation Model Creation Using SfM on High-Altitude Snow-Covered Surfaces at Summit, Greenland. *AGU Fall Meeting*.

ACADEMIC SERVICE

Reviewer
Geophysical Research Letters, Journal of Glaciology, Nature Communications

Panelist for NSF Crevasse Webinar Series 2023
Topic: Automated Detection of Crevasses from Remote Sensing

Session Convener, AGU Fall Meeting 2022 2022
Session C32C - Breaking Points: Rifting, Calving, and Icebergs

WHOI search committee for Deep Submergence faculty position 2021
Chair of Student Advisory Group

MIT EAPS Application Mentorship Program 2020, 2021
Co-organizer

MIT EAPS Graduate Student Advisory Council 2020, 2021
Co-President

Graduate Climate Conference 2019
Planning Committee - Logistics Team Leader

OUTREACH & INVOLVEMENT

MIT Abstracts, Nord Anglia Education 2023
Keynote for international audience of primary school students

MIT Museum 2020
Climate science expert for science movie night

Gardner Pilot Academy, Massachusetts 2019
Introducing 8th grade math students to glaciers and glaciology

Skype a Scientist 2018 – Present
Educational program instructor

International Arctic Science Committee 2017
Volunteered in Akureyri, Iceland

PROFESSIONAL AFFILIATIONS

International Glaciological Society 2018 – Present
American Geophysical Union 2015 – Present
Sigma Xi 2017 – 2023

SKILLS

Computing
Python, Unix/Linux, MATLAB, R, JavaScript, Fortran, LaTeX
GIS & Software
QGIS, ArcGIS, Gdal, ISCE, ImpDAR, FEniCS, ERDAS Imagine, ENVI, Agisoft Photoscan
Design
Adobe Photoshop, Adobe Illustrator, Inkscape, Gimp, Autodesk Maya
Machining
Competent operator of lathes, saws, and others shop equipment.

CERTIFICATIONS

Wilderness First Aid
AIARE I
FAA Remote Pilot (Commercial Drone license)

REFERENCES

Dr. Brent M. Minchew
Class of 1948 Career Development Assistant Professor of Earth,
Atmospheric, and Planetary Sciences
Massachusetts Institute of Technology
77 Massachusetts Avenue, 54-310
Cambridge, MA 02139-4307
phone: +1 617-324-3704
email: minchew@mit.edu
relationship: Doctoral Advisor

Dr. Matthew R. Siegfried
Assistant Professor Department of Geophysics
Hydrologic Science and Engineering, Affiliated Faculty
Colorado School of Mines
1500 Illinois Street
Golden, CO 80401-1887
phone: +1 303-384-2004
email: siegfried@mines.edu
relationship: Postdoctoral Supervisor

Dr. Seth W. Campbell
Assistant Professor of Glaciology
Climate Change Institute and School of Earth & Climate Sciences
University of Maine
202 Sawyer Hall
Orono, ME 04469-5790
phone: +1 207-581-3927
email: scampb64@maine.edu
relationship: Teaching and Field Supervisor, Juneau Icefield