MEGHANA RANGANATHAN

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EDUCATION AND PROFESSIONAL POSITIONS

University of Chicago, Assistant Professor of Geophysical Sciences — Beginning July 2024

Georgia Institute of Technology, NOAA C&GC Postdoctoral Fellow — August 2022-Present
Hosted by Professor Alex Robel, GT Ice + Climate Group

Massachusetts Institute of Technology, Doctor of Philosophy in Climate Science — August 2017-June 2022
Department of Earth, Atmospheric, and Planetary Science, advised by Dr. Brent Minchew
Thesis: "How deformation influences the flow and fracture of glacier ice", `https://hdl.handle.net/1721.1/150437`

Swarthmore College, Bachelor of Arts in Mathematics — August 2013-May 2017

PUBLICATIONS

Submitted and In-Preparation

- Duffy, M.L., Barnes, L.Y., Wirz, C.D., **Ranganathan, M.**, Freilich, M.A., Freese, L.M., Lalk, E., Wilcots, J., Shivamoggi, R., An empirical analysis of factors influencing underrepresented geoscientists' decisions to accept or decline faculty job offers, *submitted*, doi:10.22541/essoar.170612426.63684810/v1
- **Ranganathan, M.**, Robel, A., Huth, A., Duddu, R., Modeling damage evolution on flow timescales, *in prep*.
- Wells-Moran, S., **Ranganathan, M.**, Minchew, B.M., Understanding large-scale fracture initiation processes on Antarctic ice shelves through observations of strain-rate and estimates of stress, *in prep*.

Published

- **Ranganathan, M**., Minchew, B., A modified viscous flow law for natural glacier ice: Scaling from laboratories to ice sheets, *Proceedings of the National Academy of Sciences*, *in press*
- Robel, A., Ultee, E., **Ranganathan, M**., Nash, M., (2024). For Whom and By Whom is Glaciology?, *Journal of Glaciology, in press*, doi:10.1017/jog.2024.29
- **Ranganathan, M**., Barotta, J., Meyer, C., & Minchew, B., (2023). Meltwater generation in ice stream shear margins: case study in Antarctic ice streams, *Proceedings of the Royal Society A,* 479(2273), 1-27, doi:10.1098/rspa.2022.0473
- **Ranganathan, M**., Minchew, B., Meyer, C., & Pec, M., (2021). Recrystallization of ice enhances the creep and vulnerability to fracture of ice shelves, *Earth and Planetary Science Letters*, 576, doi:10.1016/j.epsl.2021.117219.
- **Ranganathan, M**., Lalk, E., Freese, E.M., Freilich, M.A., Wilcots, J., Duffy, M.L., Shivamoggi, R., (2021). Trends in the representation of women amongst geoscience faculty from 1999-2020: the long road towards gender parity, *AGU Advances*, 2(3), doi:10.1029/2021AV000436
- **Ranganathan, M**., Minchew, B., Gudmundsson, G.H., & Meyer, C., (2021). A new approach to inferring basal drag and ice rheology in ice streams, with applications to West Antarctic Ice Streams. *Journal of Glaciology*, 67(262), 229-242. doi:10.1017/jog.2020.95
- Tippett, M.K., **Ranganathan, M.**, L'Heureux, M., Barnston, A.G., DelSole, T., (2017). Assessing probabilistic predictions of ENSO phase and intensity from the North American Multimodel Ensemble. *Climate Dynamics*., 53, 7497-7518, doi:10.1007/s00382-017-3721-y.
- Barnston, T, Tippett, M.K., **Ranganathan, M.**, L'Heureux, M., (2017). Deterministic skill of ENSO predictions from the North American Multimodel Ensemble. *Climate Dynamics*, 53, 7215-7234, doi:10.1007/s00382-017-3603-3.

FELLOWSHIPS AND ACADEMIC HONORS

NOAA C&GC Postdoctoral Fellowship, total value of award: $160,000 2022-2024
NSF Office of Polar Programs Postdoctoral Fellowship, total value of award: $160,000 award declined

School of Science Service Fellowship 2022
A competitive fellowship awarded to recognize extraordinary service contributions of graduate students in support of their community and DEI activities

Martin Fellowship for Sustainability 2020-2021
A competitive fellowship awarded to students whose research advances sustainability

Charney Prize 2017
Awarded by MIT to an outstanding incoming graduate student in PAOC (Program in Atmospheres, Oceans, and Climate)

Sigma Xi Research Society 2015

TEACHING EXPERIENCE

Teaching Assistant

- MIT: 12.021, Earth, Energy, and the Environment (12.021) 2019
- MIT: Introduction to Weather Forecasting 2018
- Swarthmore College: Calculus II (Math 025) 2017
- Swarthmore College: Statistical Methods I (Stat 011) 2016
- Swarthmore College: Mathematical Statistics (Stat 061) 2016
- Swarthmore College: Statistical Methods I (Stat 011) 2015
- Swarthmore College: Calculus II (Math 025) 2015

Seminar on Racism, Colonialism, and Extraction in the Geosciences 2021-2022
Co-created a new seminar course which investigates the legacy of racism, colonialism, and extraction in the geosciences and explores varying perspectives on scientific intervention into geophysical and environmental problems

Special Seminar in Geophysics at MIT 2021
Created a new seminar course (12.S595) which studies the paleoclimate evidence about and current research into the stability of the Antarctic Ice Sheet

Kaufman Teaching Certificate Program 2021
Trained in teaching in higher education from MIT's Kaufman Teaching Certificate Program

MENTORING EXPERIENCE

Research Advisor

- Jaela Allen (Miami University '25) 2023-Present
  Evaluating the effect of rheology on projections of ice sheet behavior
- Sarah Wells-Moran (Wellesley '22) 2020-Present
  Determining conditions for rift propagation in Antarctica using optical imagery; presented at AGU 2021 and paper in preparation
  Inferring strain and stress constrains on the longevity of modern plate tectonics; presented at AGU 2020
- Mateo Pisinger (MIT '24) 2021
  Explaining flow enhancement in the shear margins of Rutford Ice Stream
- Florencia Corbo-Ferreira (University of Florida - Gainesville '23) 2021
  Estimating changes in the stress exponent of Glen's Flow Law from observations

- Jack-William Barotta (MIT '21) 2021
  The effect of porosity and effective pressure on the thermomechanics of glacier shear margins; paper published
- Meriah Gannon (MIT '22) 2020
  Constraining the flow law by modeling transverse velocity profiles in Antarctic ice streams

Mentoring Workshop Developer for MIT Summer Research Program 2022
Developed a comprehensive mentoring workshop, focused on inclusive mentoring, for the MIT Summer Research Program faculty and graduate mentors

Teaching Development Fellow at MIT 2021-2022
A competitive fellowship at MIT. Fellows act as leaders in their department with respect to teaching and mentoring. I was selected as a fellow-at-large, supporting graduate student mentors across MIT. Responsibilities include the development of mentoring resources and the development of workshops related to improving the quality of mentoring across MIT.

PRESENTATIONS

Invited Talks and Seminars

- NOAA Climate & Global Change Seminar (March 2024)
- Columbia University/Lamont-Doherty Earth Observatory Geophysics Seminar (February 2024)
- University of Wisconsin, Madison Department of Geoscience Weeks Lecture (December 2023)
- University of Pennsylvania Department of Earth and Environmental Sciences Seminar (November 2023)
- Georgia Institute of Technology Geophysics Seminar (October 2023)
- Oregon State University College of Earth, Ocean, and Atmospheric Sciences Seminar (May 2023)
- Vanderbilt University Seminar (April 2023)
- Boston College Department of Earth and Environmental Sciences Seminar (February 2023)
- University of Chicago Department of Geophysical Sciences Seminar (February 2023)
- Harvey Mudd College Department of Mathematics and Hixon Center for Climate and the Environment Seminar (February 2023)
- **Ranganathan, M.**, Minchew, B., "Estimating the dominant creep mechanisms and viscous stress exponent (n) in fast-flowing glaciers" AGU Fall Meeting, Chicago (December 2022)
- University of Illinois, Urbana-Champaign Department of Geology colloquium (October 2022)
- California Institute of Technology SeismoLab Seminar (October 2022)
- California Institute of Technology Environmental Science and Engineering Seminar (May 2022)
- University of California, Santa Cruz WEM Seminar (April 2022)
- **Ranganathan, M.**, Minchew, B., Meyer, C.R, Pec, M., "An energetics perspective of ice deformation" AGU Fall Meeting, New Orleans (December 2021)
- Brown University, Fluids@Brown Seminar (October 2021)
- Georgia Institute of Technology, Ice-T Seminar Series (July 2021)
- **Ranganathan, M.**, Minchew, B., Gudmundsson, G.H., Meyer, C.R., "Inferring physical properties that govern ice stream dynamics", SIAM GS21 Conference, (June 2021)
- University of Copenhagen Seminar (May 2021)
- British Antarctic Survey Seminar (May 2021)
- Maths on Ice Seminar (March 2021)
- Dartmouth College, Climate Seminar (May 2020)

Contributed Talks

- **Ranganathan, M.**, Barotta, J., Meyer, C., & Minchew, B., "Meltwater generation in ice stream shear margins: case study in Antarctic ice streams" AGU Fall Meeting, Chicago (December 2022)
- **Ranganathan, M.**, Minchew, B., "Estimating the dominant creep mechanisms and viscous stress exponent (n) in fast-flowing glaciers", West Antarctic Ice Sheet Workshop (September 2022)
- **Ranganathan, M.**, Lalk, E., Freese, E.M., Freilich, M.A., Wilcots, J., Duffy, M.L., Shivamoggi, R., "Trends in the representation of women amongst geoscience faculty from 1999-2020: the long road towards gender parity", AGU Fall Meeting (December 2021)
- **Ranganathan, M.**, Minchew, B., Meyer, C., Pec, M., "Recrystallization of ice enhances the creep and vulnerability to fracture of ice shelves", EGU Meeting, (April 2021)
- **Ranganathan, M.**, Minchew, B., Meyer, C.R, Pec, M., "Dynamic recrystallization and energy balance within glacier shear margins", AGU Fall Meeting, (December 2020)
- **Ranganathan, M.**, Minchew, B., Gudmundsson, G.H., Meyer, C.R., "Simultaneous inversion for glacier bed properties and ice rheology using adjoint-based methods", 27th IUGG General Assembly, Montreal, (July 2019)
- **Ranganathan, M.** and Ravela, S., "Ensemble Learning with Mixtures in Non-Gaussian Data Assimilation", 32nd IUGG Conference on Mathematical Geophysics, Nizhny Novgorod, (June 2018)

Contributed Posters

- **Ranganathan, M.** and Robel, A. Quantifying the effect of coupling between ice rheology and damage on ice sheet response to forcing, AGU Fall Meeting, San Francisco (December 2023)
- **Ranganathan, M.**, Minchew, B., Meyer, C.R, Pec, M. Feedbacks between ice deformation and ice rheology. West Antarctic Ice Sheet Workshop, (September 2021)
- **Ranganathan, M.**, Minchew, B., Gudmundsson, G.H., Meyer, C.R., Inference of glacier bed properties and ice rheology, AGU Fall Meeting, San Francisco, (December 2019)
- Chow, B. and **Ranganathan, M.** Inferring Primary Extinction Levels in Late Permian Food Webs Using Approximate Bayesian Computation, 2015 Geological Society of America Annual Meeting, Baltimore, (November 2015)

ACADEMIC SERVICE AND LEADERSHIP

— Scientific Service —

Journal Reviewer for The Cryosphere, Journal of Geophysical Research - Earth Surface, Journal of Glaciology, Frontiers in Earth Science, Earth and Space Science, AGU Advances

Grant Reviewer for National Science Foundation - ad hoc and panel reviewer

— University and Departmental Leadership —

Towards Inclusion and Diversity in EAPS (TIDE) 2020-2022
Co-chair of TIDE, an organization dedicated to advancing Diversity, Equity, and Inclusion (DEI) within MIT EAPS and within the geosciences

Women in Course XII (WiXII) 2018 - 2022
Board member and co-president of WiXII, focused on increasing gender equality in MIT EAPS

Co-Chair of Student/Postdoc Advisory Group for Hire of DEIO 2021
Advisory group provided recommendations for the hire of a Diversity, Equity, and Inclusion Officer in MIT EAPS

PAOC Colloquium Committee 2018-2020
Chair and member of the committee that handled the main lecture series for the Program in Atmospheres, Oceans, and Climate within MIT EAPS

— Diversity, Equity, Inclusion, Justice —

Co-Founder, Campaign to Support H.R. 8455 2021-Present

Advocate for EAPS Graduate Students 2020-2022

Co-Author, DEI Action Plan for MIT EAPS 2020

Co-Leader, TIDE DEI Reading Series at MIT EAPS 2020

— Service and Leadership Honors —

MIT EAPS Community Builder Award 2022
Recognized contributions to building the EAPS community, given to award my work "to promote belonging and address structural issues in the department"

MIT School of Science Spot Award 2020, 2021
Recognized exceptional contributions to the School of Science community at MIT, 2020, 2021

Swarthmore College Heinrich W. Brinkmann Mathematics Prize 2017
Recognized exemplary service to the Department of Mathematics and Statistics

FIELD EXPERIENCE

Greenland; Research Cruise August 2023-September 2023
Visiting Scientist on Lindblad Expeditions & National Geographic Expedition to South Greenland, collecting and analyzing crustose coralline algae as proxies for past Greenland meltwater flux alongside Dr. Branwen Williams, Claremont McKenna College

Antarctica; Deep Field November 2022-February 2023
Member of the 2022-2023 International Thwaites Glacier Collaboration TIME (Thwaites Interdisciplinary Margin Evolution) team, doing 2D and 3D seismic imaging of the Thwaites Eastern Shear Margin.

SCIENCE COMMUNICATION AND MEDIA HIGHLIGHTS

Weather Channel: Expert interviewee for their TV series *The Earth Unlocked*

WISDM: Presentation to the MIT Women's League "No longer a glacial pace: what's happening to Earth's ice sheets?", as a part of their seminar series WISDM, February 2022.

Forest Service: Presentation to the US Forest Service "The Frozen World: how it's changing and what this means", as a part of their new expert seminar series, January 2022.

MIT News: Chu, J., "Study highlights long road toward gender parity in the geosciences", July 2021.

Scientific American: Ranganathan, M., Wilcots, J., Shivamoggi, R., Dumit, D., "America's Maps are Full of Racial Slurs - and That Needs to Change", March 2021.

Eos: Duncombe, J. , "Racist slurs in place-names have to go, say geoscientists", March 2021.

MIT News: Carter, L., "Ice, ice, maybe", June 2020.

MIT Spectrum: Carter, L., "Tuning the model", Winter 2019.

TEDx Boca Raton: Ranganathan, M., "Our History and Future in Ice", October 2019.

Scientific American: Ranganathan, M., "Hot Times in a Frozen Land", June 2016.

Scientific American: Ranganathan, M., "Where are the Real Errors in Political Polls?", November 2014.