

BENJAMIN H. HILLS

bhills@uw.edu
benhills.github.io

EDUCATION

- 2023* **Ph.D. Earth and Space Sciences** | University of Washington
emphasis: Geophysics/Glaciology | primary advisor: Dr. Knut Christianson
- 2017* **M.S. Geosciences** | University of Montana
emphasis: Glaciology | primary advisor: Dr. Joel Harper
- 2014* **B.S. Earth Sciences** | Montana State University
emphasis: Snow Mechanics (Highest Honors)

RESEARCH APPOINTMENTS

- 2023 – present* **Postdoctoral Fellow**
Geophysics | Colorado School of Mines
Statistics | University of California Berkeley
Principal investigator on an NSF-funded project in collaboration with Dr. Matthew Siegfried (Mines) and Dr. Fernando Pérez (Berkeley).
Building software to integrate radar data with spaceborne remote sensing.
- 2017 – 2023* **Grad. Research Asst.** | Earth and Space Sciences & Applied Physics Lab. | UW
Numerous geophysics expeditions to Antarctica and glaciers in the Pacific NW.
Developed software tools for processing and analyzing ice-penetrating radar data.
Led and co-authored manuscripts on ice-sheet history and ice dynamics.
- Summer 2017* **Post-MS Research Asst.** | Fluid Dyn. & Solid Mech. | Los Alamos Nat. Lab.
Contributed to development of the land-ice component (MALI) in a coupled climate model (MPAS).
Design and execution of model experiments for ice-sheet physics.
- 2015 – 2017* **Grad. Research Asst.** | Geosciences Department | UofM
Collaboration between Geosciences and Computer Science Departments.
Designed and built instruments to measure in-situ ice-temperature in Greenland.
Developed numerical models for ice-sheet temperature.

TEACHING APPOINTMENTS

- 2022 – present* **Research Mentor** | Louis Stokes Alliance for Minority Participation | UW
- 2018-2022* **Graduate Teaching Assistant** | Earth and Space Sciences Department | UW
Summer Undergraduate Research Coordinator
ESS 431 – Principles of Glaciology
ESS 102 – Introduction to Geology
- 2015-2016* **Graduate Teaching Assistant** | Geosciences Department | UofM
GEO 101 – Introduction to Physical Geology (including field trip)
- Summer 2013* **Tutor** | Montana State University
Personal tutoring for engineering courses

UNDERGRADUATE STUDENT MENTORSHIP

Jonathan Ortiz-Candelaria (Informatics)
Raphael Sauvage (Chemistry)
Joshua Driscoll (Atmospheric Sciences)

FIELD/WORKSHOP EXPERIENCE

2022-23	Glacier Geophysics Lead ~2-Month Hercules Dome, Antarctica
2022	Glacier Geophysics Lead 1 Week Mt. Waddington, British Columbia
2022	ICECReW Workshop 2-Week US Ice Drilling Program
2020	IceSAT-2 Hackweek 2-Week eScience Institute, UW
2018-20	Glacier Geophysics ~2-Month Trips S. Pole and Herc. Dome, Antarctica
2018-19	Interferometry ~3-Day Trips Coleman Glacier, Mt. Baker
2019	Structure from Motion 1 Day Easton Glacier, Mt. Baker
2019	Glacier Mass Balance 1 Week South Cascade Glacier, North Cascades
2018	Cryospheric Microbiology 1-Day Trips Easton Glacier, Mt. Baker
2015-16	Hot-water drilling ~1-Month Trips Isunnguata Sermia, Greenland

SERVICE

2019-present	Peer Reviewer <i>Journal of Geophysical Research – Planets; Geophysical Research Letters; Journal of Glaciology; Annals of Glaciology; Acta Astronautica; Transactions on Geoscience and Remote Sensing</i>
2022-present	Louis Stokes Alliance for Minority Participation University of Washington
2020	Geosciences Access and Inclusivity Network University of Washington
2018-2020	Rockin' Out University of Washington
2015-2017	Interdisciplinary Collaboration Network University of Montana
2014-2015	Volunteer Ski Patrol Big Sky Ski Resort Big Sky, MT

PROFESSIONAL AFFILIATIONS

2016-present	American Geophysical Union
2017-present	International Glaciological Society
2018-present	European Geosciences Union

HONORS

2023	Postdoctoral Research Fellowship NSF Office of Polar Programs \$317,000
2023	Best Glaciology Talk UW ESS
2020	Outstanding Student Presentation Award AGU Fall Meeting
2017	Top Scholar Award University of Washington <i>RA funding for one quarter</i>
2010-2014	Montana University Scholarship <i>undergraduate tuition for four years</i>
2012	Direct Exchange University of Canterbury <i>exchange student tuition</i>
2010	Distinguished Scholar Helena Education Foundation

SKILLS

Programming	Comfortable in Python, Matlab, Bash, Git. Some experience with Fortran. For some examples of code, see my github account https://github.com/benhills .
Modeling	Proficient with finite-difference methods and with a finite-element solver called FEniCS. Experience running several ice-sheet models (e.g. icepack and MALI).
2014	Fundamentals of Engineering NCEES
2014	Emergency Medical Technician <i>National Registry for EMTs</i>
2013	Avalanche Technician <i>American Avalanche Institute</i>

RELEVANT COURSEWORK | please request transcripts for more detail

Engineering	Fluid Dynamics, Fluid Mechanics, Statics, Dynamics, Mechanics of Materials
Physics	Geophysical Inverse Theory, Thermo and Statistical Mechanics, General Physics
Mathematics	Ordinary/Partial Differential Equations, Multivariable Calculus
Geosciences	Cont. Mech., Physics of Ice, Ice Dynamics, Hydrologic Modeling, Solid Earth
Field-Component	Snow Dynamics and Accumulation, Mountain Geography, Geomorphology

PEER-REVIEWED ARTICLES

- in Review* Fudge, T. J., Suavage, R., Vu, L., **Hills, B. H.**, Severi, M., Waddington, E. D., Effective diffusivity of sulfuric acid in Antarctic ice cores. *Climate of the Past*.
- Løkkegaard, A., et al. Greenland and Canadian Arctic ice temperature profiles. *The Cryosphere*.
- Frémand, A. C., et al. Antarctic Bedmap data: FAIR sharing of 60 years of ice bed, surface and thickness data. *Earth System Science Data*.
- Hoffman A. O., Holschuh N. D., et al. Scars of tectonic extension promote ice-sheet nucleation from Hercules Dome, West Antarctica. *Nature Geoscience*.
- 2022** **Hills, B. H.**, Christianson K., Jacobel, R. W., Petersson, R. Radar attenuation demonstrates advective cooling at the Siple Coast ice streams. *Journal of Glaciology*. 1-11. doi:10.1017/jog.2022.86
- Fudge, T. J., **Hills, B. H.**, Annika N. Horlings, Nick Holschuh, Gemma K. O'Connor, John Erich Christian, Lindsey Davidge, Andrew Hoffman, Knut Christianson, and Eric J. Steig. A site for deep ice coring at West Hercules Dome: results from ground-based geophysics and modeling. *Journal of Glaciology*, 1-13. doi:10.1017/jog.2022.80
- Hills, B. H.**, Christianson K., Hoffman A., Fudge, T. J., Holschuh N, Kahle, E. C., Conway, H., Christian, J., Horlings, A., O'Connor, G., Steig, E. J. Geophysics and Thermodynamics at South Pole Lake indicate stability and a regionally thawed bed. *Geophysical Research Letters*, 49. doi:10.1029/2021GL096218
- 2020** Lilien, D. A., **Hills, B. H.**, Driscoll, J., Jacobel, R. W., & Christianson, K., ImpDAR: An open-source impulse radar processor. *Annals of Glaciology*, 61(81), 114-123. doi:10.1017/aog.2020.44
- Hills, B. H.**, Christianson K., & Holschuh N. A framework for attenuation method selection evaluated with ice-penetrating radar data at South Pole Lake. *Annals of Glaciology*, 61(81), 176-187. doi:10.1017/aog.2020.32
- 2018** **Hills, B. H.**, Harper J. T., Meierbachtol T. W., Johnson J. V., Humphrey N. F., & Wright P. J. Processes influencing heat transfer in the near-surface ice of Greenland's ablation zone. *The Cryosphere*, 12, 3215–3227. doi:10.5194/tc-12-3215-2018.
- 2017** **Hills, B. H.**, Harper J. T., Humphrey N. F. & Meierbachtol T. W. Measured horizontal temperature gradients constrain heat transfer mechanisms in Greenland ice. *Geophysical Research Letters*, 44, 9778–9785. doi:10.1002/2017GL074917

PEER-REVIEWED LETTERS, COMMUNICATIONS, AND CONFERENCE PROCEEDINGS

- 2022** Walcott, C., Erwin, E., **Hills, B. H.** Ice flow and ice-bed interactions: How they shape our understanding of ice cores. *Past Global Changes*, 30(2). 114-115. <https://doi.org/10.22498/pages.30.2.114>
- 2021** **Hills, B. H.**, Winebrenner, D. P., Elam, W. T., & Kintner, P. M. S. Avoiding slush formation for hot-point drilling of glacier boreholes. *Annals of Glaciology*, 62(84). 166-170. doi:10.1017/aog.2020.70

CONFERENCE ABSTRACTS (*STUDENT COAUTHOR)

- 2023** **Hills, B. H.**, Fudge, T. J., Holschuh, N., Erwin, E., Kirkpatrick, L., Steig, E. J., Christianson, K. Radar-inferred crystal fabric at Hercules Dome supports divide stability since the last glacial maximum. *U.S. Open Ice Core Meeting*, May 2023, Seattle, WA. (oral presentation)
- Horlings, A. N., Davidge, L., Erwin, E., **Hills, B. H.**, Hoffman, A., Holschuh, N., Reusch, D., Kirkpatrick, L., Fudge, T. J., Steig, E. J., Christianson, K. Snow accumulation at Hercules Dome, Antarctica during the last 420 years. *U.S. Open Ice Core Meeting*, May 2023, Seattle, WA. (oral presentation)
- 2022** **Hills, B. H.**, Christianson K., Jacobel, R. W., Petersson, R. Radar attenuation demonstrates advective cooling at the Siple Coast ice streams. *WAIS Workshop*, September 2022, Estes Park, CO. (poster)
- 2021** *Sauvage, R., Fudge, T. J., **Hills, B. H.**, Linh Vu. Effective Diffusivity of Sulfate Ions in the EPICA Dome C Ice Core for the Last Five Interglacials. *American Geophysical Union Fall Meeting*, December 2021, New Orleans, LA. (poster)
- Fudge, T. J., Holschuh, N., **Hills, B. H.**, O'Connor, G. K., Lomeli, J., Steig, E. J. Combining evidence of frozen and thawed beds to constrain geothermal flux: initial results from Hercules Dome, Antarctica. *American Geophysical Union Fall Meeting*, December 2021, New Orleans, LA. (poster)
- Hills, B. H.**, Young, T. J., Horlings, A. N., Holschuh, N., Christianson, K. Radar polarimetry at Hercules Dome reveals ice fabric as it changes along the triple divide. *WAIS Workshop*, September 2021, Algonkian Regional Park, VA (oral presentation)
- Hills, B. H.**, Young, T. J., Horlings, A. N., Holschuh, N., Christianson, K. Polarimetry experiments at Hercules Dome. *Hercules Dome Workshop*, May 2021, Hosted Remotely. (oral presentation)
- 2020** **Hills, B. H.**, Christianson, K., Hoffman, A. O., Fudge, T. J., Kahle, E. C. Interior ice-sheet dynamics are constrained through the Holocene transition using the thermodynamics of South Pole Lake. *American Geophysical Union Fall Meeting*, December 2020, Hosted Remotely. (poster)
- Steig, E. J., Duetsch, M., Blossey, P. N., Pauling, A., Bitz, C. M., Aydin, M., Fudge, T. J., Roop, H., Souney, J. M., Twickler, M., Christianson, K., Christian, J. E. M., Davidge, L., O'Connor, G. K., **Hills, B. H.**, Hoffman, A. O., Holschuh, N., Horlings, A. N. Hercules Dome ice core project: Prospects for obtaining Eemian records that constrain the size of the West Antarctic ice sheet through time. *American Geophysical Union Fall Meeting*, December 2020, Hosted Remotely. (invited talk)
- Fudge, T. J., Hoffman, A. O., Horlings, A. N., **Hills, B. H.**, Steig, E. J., O'Connor, G. K., Christian, J. E. M., Christiansen, K. A., Davidge, L., Holschuh, N. Inferring Holocene variations in ice-flow patterns and accumulation gradients at Hercules Dome from radar measurements of internal layering and englacial velocity profiles, and 2D ice-flow modeling. *American Geophysical Union Fall Meeting*, December 2020, Hosted Remotely. (poster)
- *Breyer, C., Barcheck, G., Gomez-Fell, R., Hillebrand, T., **Hills, B. H.**, Kaluzienksi, L., Martin, J., Polashenski, D., Shapero, D.. Ice sheet surface velocity

determination from ICESat2 repeat tracks. *American Geophysical Union Fall Meeting*, December 2020, Hosted Remotely. (poster)

Hills, B. H., Christianson, K., Hoffman, A. O., Fudge, T. J., Kahle, E. C.. Interior ice-sheet dynamics are constrained through the Holocene transition using the thermodynamics of South Pole Lake. *WAIS Workshop*, September 2020, Hosted Remotely. (oral presentation)

2019

Steig, E. J., Christianson, K. A., Holschuh, N. D., **Hills, B. H.**, Fudge, T. J., Hoffman, A. O., Horlings, A. N., O'Connor, G. K., Christian, J. E. M. Finding the optimal site for a deep ice core at Hercules Dome, Antarctica. *American Geophysical Union Fall Meeting*, December 2019, San Francisco, CA. (poster)

Winebrenner, D. P., **Hills, B. H.**, Elam, W. T. Reaching Depths of Kilometers in Cold Ice with Small Melt Probes, by Managing Melt-Hole Refreezing. *American Geophysical Union Fall Meeting*, December 2019, San Francisco, CA. (oral presentation)

Hills B. H., Winebrenner, D. P., Elam, W. T., & Kintner, P. An 'extended' Stefan problem with applications for slush formation in glacier boreholes. *West Antarctic Ice Sheet Workshop*, October 2019, Julian, CA. (poster)

Lilien D. A., **Hills B. H.**, Driscoll J., Jacobel R. W., & Christianson K. ImpDAR: An open-source impulse radar processor, *Northwest Glaciologists Meeting*, October 2019, Corvallis, OR. (oral presentation)

Hills B. H., Christianson K., Holschuh N., Fudge T. J., & Steig E. Freezing or melting?: New insights into the thermodynamic and glaciological setting of the South Pole subglacial lake from recent ice-penetrating radar surveys. *International Glaciological Society Radioglaciology Symposium*, July 2019, Palo Alto, CA. (oral presentation)

Hills B. H., Christianson K., & Holschuh N. A comparison of multiple radio-wave attenuation methods applied to high-frequency common-offset radar surveys of the Northeast Greenland Ice Stream. *International Glaciological Society Radioglaciology Symposium*, July 2019, Palo Alto, CA. (poster)

Horlings A. N., **Hills B. H.**, Christian J., Whorton E., & Christianson K. Mapping the time-evolving firn structure on South Cascade Glacier, Washington state using monopulse ice-penetrating radar. *International Glaciological Society Radioglaciology Symposium*, July 2019, Palo Alto, CA. (poster)

*Driscoll J., Lilien D. A., **Hills B. H.**, Christianson K., & Jacobel R. W. ImpDAR: An Open-Source Impulse Radar Processor in Python. *International Glaciological Society Radioglaciology Symposium*, July 2019, Palo Alto, CA. (poster)

Christian J., Whorton E., Christianson K., & **Hills B. H.** Using snow radar to characterize the accumulation area of South Cascade Glacier. *International Glaciological Society Radioglaciology Symposium*, July 2019, Palo Alto, CA. (poster)

Hills B. H., Christianson K., Holschuh N., & Anandakrishnan S. Using radio wave attenuation to constrain ice temperature in regions of fast flow. *European Geophysical Union General Assembly*, April 2019, Vienna, Austria. (PICO presentation)

2018

Hills B. H., Christianson K., Holschuh N., & Anandakrishnan, S. Using radio

wave attenuation to constrain ice temperature in regions of fast flow. *American Geophysical Union Fall Meeting*, December 2018, Washington DC. (poster)

Hoffman M. J., & **Hills B. H.** Impact of evolving subglacial hydrology on marine ice sheet dynamics. *American Geophysical Union Fall Meeting*, December 2018, Washington DC. (oral presentation)

Hills B. H., Christianson K., Holschuh N., & Anandakrishnan S. Electromagnetic wave attenuation in ice: Using airborne and ground-based radio-echo sounding data to measure ice-sheet temperature. *Graduate Climate Conference*, November 2018, Pack Forest, WA. (poster)

Hills B. H., Christianson K., Holschuh N., & Anandakrishnan S. Using radio wave attenuation to constrain ice temperature in regions of fast flow. *West Antarctic Ice Sheet Workshop*, September 2018, Stony Point, NY. (poster)

Hills B. H., Hoffman M. J., & Christianson K. Feedbacks between subglacial drainage and evolution in a coupled ice sheet model: effect on marine ice sheet stability. *Marine Ice Sheet Modeling Intercomparison Project III*, May 2018, Abu Dhabi, UAE. (poster)

2017 **Hills B. H.**, & Hoffman M. J. Feedbacks between subglacial drainage and evolution in a coupled ice sheet model: effect on marine ice sheet stability. *Northwest Glaciologists Meeting*, October 2017, Vancouver, BC. (poster)

Hills B. H., & Hoffman M. J. Feedbacks between subglacial drainage and evolution in a coupled ice sheet model: effect on marine ice sheet stability. *West Antarctic Ice Sheet Workshop*, October 2017, Coupeville, WA. (poster)

Hills B. H., & Hoffman M. J. Feedbacks between subglacial drainage and evolution in a coupled ice sheet model: effect on marine ice sheet stability. *International Glaciological Society*, August 2017, Boulder, CO. (poster)

2016 **Hills B. H.**, Harper J. T., Humphrey N. F., Meierbachtol T. W., & Johnson J. V. Modeling heat transfer to explain observed temperature anomalies in near-surface ice, Greenland Ice Sheet ablation area, *American Geophysical Union Fall Meeting*, December 2016, San Francisco, CA. (oral presentation)

Hills B. H., Harper J. T., Humphrey N. F., Meierbachtol T. W., & Johnson J. V. Heat transfer at the surface boundary, Greenland Ice Sheet ablation area, *Northwest Glaciologists Meeting*, October 2016, Seattle, WA. (oral presentation)

2015 **Hills B. H.**, & Harper J. T. Near-surface heat flow in the Greenland Ice Sheet ablation area, *Northwest Glaciologists Meeting*, October 2015, Portland, OR. (oral presentation)

2014 **Hills B. H.** Snowpack Densification: an investigation of density change through snow melt and metamorphosis, *Montana State University Undergraduate Research Symposium*, May 2014, Bozeman, MT. (poster)