Nicholas D. Holschuh
Curriculum Vitae

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Who am I, beyond the bulleted list below?

I am a polar geophysicist. I'm fascinated by light, sound, and gravity, with a focus on the ways we perceive (as humans) and measure (as scientists) the world around us. I want to understand the rules that govern Earth's behavior, and use our understanding of those rules to improve decision making as stewards of the planet. I also believe that to do this work well, we must draw on the broadest possible perspectives, expanding a field that is limited by its historically narrow viewpoint.

Professional Appointments

2020-Present ***Assistant Professor of Geology,*** *Amherst College*

2016-2020 ***Postdoctoral Research Associate,*** *University of Washington*

2012-16 ***NSF Graduate Research Fellow,*** *Pennsylvania State University*

2011-12 ***University Graduate Fellow,*** *Pennsylvania State University*
Methods and applications of radio-frequency geophysics in glaciology.

Summers 2014/15 ***Graduate Research Intern,*** *Chevron Energy and Technology Company*
Improving time shift methods for 4D seismic data analysis

2010-11 ***Research Fellow,*** *Pacific Tsunami Warning Center.*
Investigating the role of fault geometry on tsunamigenesis

2008-10 ***Research Assistant,*** *Department of Geology - Carleton College.*
Investigating the surface water chemistry of Rice County, MN.

Education

2016	*Ph.D. - Geosciences*	Pennsylvania State University	*(NSF Graduate Research Fellow)*
2015	*Graduate Teaching Certification*	Pennsylvania State University	
2011	*B.A. - Geology*	Carleton College	*(Summa Cum Laude)*
2011	*B.A. - Economics*	Carleton College	

Patents

1. Holschuh, N., C. Li, M. A. Meadows, and S. Dobbs (2014). Systems and Methods for Aligning a Monitor Seismic Survey with a Baseline Seismic Survey. *Chevron USA Inc.* **US14565117**. Place: USA Publisher: USA Patent Office, 1–16.

Peer Reviewed Journal Publications

35. Horgan, H. J. et al. (May 2025). A West Antarctic grounding-zone environment shaped by episodic water flow. en. *Nature Geoscience* **18**(5), 389–395. (Visited on 05/24/2025).
34. Hills, B. H., N. Holschuh, A. O. Hoffman, A. N. Horlings, E. Erwin, L. R. Kirkpatrick, T. J. Fudge, E. J. Steig, and K. Christianson (Mar. 2025). Radar-Derived Crystal Orientation Fabric Suggests Dynamic Stability at the Summit of Hercules Dome. en. *Journal of Geophysical Research: Earth Surface* **130**(3), e2023JF007588. (Visited on 04/04/2025).
33. Mutter, E. L. and N. Holschuh (2025). Advancing interpretation of incoherent scattering in ice penetrating radar data used for ice core site selection. en. *The Cryosphere*. (Visited on 12/05/2024).
32. Hoffman, A. O., K. Christianson, C.-Y. Lai, I. Joughin, N. Holschuh, E. Case, J. Kingslake, and the GHOST science team (Mar. 2025). Inland migration of near-surface crevasses in the Amundsen Sea Sector, West Antarctica. en. *The Cryosphere* **19**(3), 1353–1372. (Visited on 04/04/2025).
31. Pritchard, H. D. et al. (Mar. 2025). Bedmap3 updated ice bed, surface and thickness gridded datasets for Antarctica. en. *Scientific Data* **12**(1), 414. (Visited on 04/04/2025).

30. Verboncoeur, H., M. R. Siegfried, N. Holschuh, J. P. Winberry, D. Byrne, W. Sauthoff, T. C. Sutterley, and B. Medley (2024). Multi-decadal evolution of Crary Ice Rise region, West Antarctica, amid modern ice-stream deceleration. en. *Journal of Glaciology* **71**, e3. (Visited on 01/20/2025).
29. Hoffman, A. O., N. Holschuh, M. Mueller, J. Paden, A. Muto, G. Ariho, C. Brigham, J. E. Christian, L. Davidge, E. Heitmann, B. Hills, A. Horlings, S. Morey, G. O'Connor, T. J. Fudge, E. J. Steig, and K. Christianson (Nov. 2023). Scars of tectonism promote ice-sheet nucleation from Hercules Dome into West Antarctica. en. *Nature Geoscience* **16**(11), 1005–1013.
28. Frémand, A. C. et al. (2023). Antarctic Bedmap data: Findable, Accessible, Interoperable, and Reusable (FAIR) sharing of 60 years of ice bed, surface, and thickness data. en. *Earth System Science Data* **15**(7), 2695–2710.
27. Alley, R. B., N. Holschuh, B. Parizek, L. K. Zoet, K. Riverman, A. Muto, K. Christianson, E. Clyne, S. Anandakrishnan, and N. T. Stevens (2023). GHOSTly flute music: drumlins, moats and the bed of Thwaites Glacier. en. *Annals of Glaciology*, 1–5.
26. Needell, C. and N. Holschuh (2023). Evaluating the Retreat, Arrest, and Regrowth of Crane Glacier against Marine Ice Cliff Process Models. *Geophysical Research Letters* **50**(e2022GL102400).
25. Fudge, T., B. Hills, A. N. Horlings, N. Holschuh, J. E. Christian, L. Davidge, A. Hoffman, G. K. O'Connor, K. Christianson, and E. J. Steig (2022). A site for deep ice coring at West Hercules Dome: results from ground-based geophysics and modeling. *Journal of Glaciology*, 1–13.
24. Hoffman, A. O., K. Christianson, N. Holschuh, E. Case, J. Kingslake, and R. Arthern (2022). The Impact of Basal Roughness on Inland Thwaites Glacier Sliding. *Geophysical Research Letters*, 1–11.
23. Hills, B. H., K. Christianson, A. O. Hoffman, T. J. Fudge, N. Holschuh, E. C. Kahle, H. Conway, J. E. Christian, A. N. Horlings, G. K. O'Connor, and E. J. Steig (2022). Geophysics and Thermodynamics at South Pole Lake Indicate Stability and a Regionally Thawed Bed. *Geophysical Research Letters* **49**(2), 1–10.
22. Alley, R. B., N. Holschuh, D. R. MacAyeal, B. R. Parizek, L. Zoet, K. Riverman, A. Muto, K. Christianson, E. Clyne, S. Anandakrishnan, N. Stevens, and GHOST Collaboration (2021). Bedforms of Thwaites Glacier, West Antarctica: Character and Origin. en. *Journal of Geophysical Research: Earth Surface* **126**(12), 1–22.
21. Horlings, A. N., K. Christianson, N. Holschuh, C. M. Stevens, and E. D. Waddington (2020). Effect of horizontal divergence on estimates of firn-air content. *Journal of Glaciology*.
20. Smith, B., H. A. Fricker, A. S. Gardner, B. Medley, J. Nilsson, F. S. Paolo, N. Holschuh, S. Adusumilli, K. Brunt, B. Csatho, K. Harbeck, T. Markus, T. Neumann, M. R. Siegfried, and H. J. Zwally (Apr. 2020). Pervasive ice sheet mass loss reflects competing ocean and atmosphere processes. *Science* **368**(6496), 1239–1242.
19. Hills, B. H., K. Christianson, and N. Holschuh (2020). A framework for attenuation method selection evaluated with ice-penetrating radar data at South Pole lake. *Annals of Glaciology* **61**(81), 176–187.
18. Fudge, T. J., D. A. Lilien, M. R. Koutnik, H. B. Conway, C. M. Stevens, E. D. Waddington, E. J. Steig, A. J. Schauer, and N. Holschuh (2020). Advection and non-climate impacts on the South Pole Ice Core. *Climate of the Past* **16**(3), 819–832.
17. Hamlington, B. D. et al. (2020). Understanding of Contemporary Regional Sea-level Change and the Implications for the Future. *Reviews of Geophysics* **58**(3), 1–39.
16. Holschuh, N., K. Christianson, J. Paden, R. Alley, and S. Anandakrishnan (2020). Linking postglacial landscapes to glacier dynamics using swath radar at Thwaites Glacier, Antarctica. en. *Geology* **48**(3), 268–272.
15. Alley, K. E., T. A. Scambos, R. B. Alley, and N. Holschuh (2019). Troughs developed in ice-stream shear margins precondition ice shelves for ocean-driven breakup. *Science Advances* **5**, 1–7.
14. Smith, B., H. A. Fricker, N. Holschuh, A. S. Gardner, S. Adusumilli, K. M. Brunt, B. Csatho, K. Harbeck, A. Huth, T. Neumann, J. Nilsson, and M. R. Siegfried (2019). Land ice height-retrieval algorithm for NASA's ICESat-2 photon-counting laser altimeter. *Remote Sensing of Environment* **233**, 111352.
13. Holschuh, N., D. Lilien, and K. Christianson (2019). Thermal Weakening, Convergent Flow, and Vertical Heat Transport in the Northeast Greenland Ice Stream Shear Margins. *Geophysical Research Letters* **46**, 8184–8193.
12. Riverman, K., R. Alley, S. Anandakrishnan, K. Christianson, N. Holschuh, B. Medley, A. Muto, and L. Peters (2019). Enhanced Firn Densification in High-Accumulation Shear Margins of the NE Greenland Ice Stream. *Journal of Geophysical Research: Earth Surface* **124**(2), 1–18.
11. Muto, A., S. Anandakrishnan, R. Alley, H. Horgan, B. Parizek, S. Koellner, K. Christianson, and N. Holschuh (2019). Relating bed character and subglacial morphology using seismic data from Thwaites Glacier, West Antarctica. *Earth and Planetary Science Letters* **507**.

10. Alley, R., D. Pollard, B. Parizek, S. Anandakrishnan, M. Pourpoint, N. Stevens, J. MacGregor, K. Christianson, A. Muto, and N. Holschuh (2019). Possible Role for Tectonics in the Evolving Stability of the Greenland Ice Sheet. *Journal of Geophysical Research: Earth Surface* **124**(1), 97–115.
9. Koellner, S., B. Parizek, R. Alley, A. Muto, N. Holschuh, and S. Nowicki (2019). The impact of spatially-variable basal properties on outlet glacier flow. *Earth and Planetary Science Letters* **515**, 200–208.
8. Holschuh, N., K. Christianson, H. Conway, R. W. Jacobel, and B. C. Welch (2018). Persistent Tracers of Historic Ice Flow in Glacial Stratigraphy near Kamb Ice Stream, West Antarctica. *The Cryosphere* **5**, 1–10.
7. Kehrl, L., H. Conway, N. Holschuh, S. Campbell, A. A. V. Kurbatov, and N. E. N. Spaulding (2018). Evaluating the duration and continuity of potential climate records from the Allan Hills Blue Ice Area, East Antarctica. *Geophysical Research Letters* **45**, 4096–4104.
6. Holschuh, N., B. R. Parizek, R. B. Alley, and S. Anandakrishnan (2017). Decoding ice sheet behavior using englacial layer slopes. *Geophysical Research Letters* **44**(11), 5561–5570.
5. Luthra, T., L. L. E. Peters, S. Anandakrishnan, R. R. B. Alley, N. Holschuh, and A. A. M. Smith (2017). Characteristics of the sticky spot of Kamb Ice Stream, West Antarctica. *Journal of Geophysical Research: Earth Surface* **122**(3), 641–653.
4. Holschuh, N., K. Christianson, S. Anandakrishnan, R. B. Alley, and R. W. Jacobel (2016b). Constraining attenuation uncertainty in common midpoint radar surveys of ice sheets. *Journal of Geophysical Research: Earth Surface* **121**(10), 1876–1890.
3. Luthra, T., S. Anandakrishnan, J. P. Winberry, R. B. Alley, and N. Holschuh (2016). Basal characteristics of the main sticky spot on the ice plain of Whillans Ice Stream, Antarctica. *Earth and Planetary Science Letters* **440**, 12–19.
2. Holschuh, N., D. Pollard, R. R. B. Alley, and S. Anandakrishnan (2014). Evaluating Marie Byrd Land stability using an improved basal topography. *Earth and Planetary Science Letters* **408**, 362–369.
1. Holschuh, N., K. Christianson, and S. Anandakrishnan (2014). Power loss in dipping internal reflectors, imaged using ice-penetrating radar. *Annals of Glaciology* **55**(67), 49–56.

Technical Conferences with Peer Reviewed Proceedings

4. Tack, N., R. Williams, N. Holschuh, S. Sharma, and D. Engel (2023). Visualizing the Greenland Ice Sheet in VR using Immersive Fence Diagrams. *(ACM-PEARC 23), Conference on Practice and Experience in Advanced Research Computing.*
3. Tack, N., N. Holschuh, S. Sharma, R. Williams, and D. Engel (2023). Development and Initial Testing of XR-based Fence Diagrams for Polar Science. *IEEE International Geoscience and Remote Sensing Symposium.*
2. Jebeli, A., B. A. Tama, V. P. Janeja, N. Holschuh, C. Jensen, M. Morlighem, J. A. MacGregor, and M. A. Fahnestock (2023). TSSA: Two-step semi-supervised annotation for radargrams on the Greenland ice sheet. *IEEE International Geoscience and Remote Sensing Symposium.*
1. Ariho, G., J. D. Paden, A. Hoffman, K. A. Christianson, and N. Holschuh (2022). Joint estimation of ice sheet vertical velocity and englacial layer geometry from multipass synthetic aperture radar data. *IEEE Phased Array Systems & Technology.*

Amherst College: Courses Taught (Format 1)

Geol 109: Climate Change, Science and Rhetoric
Fall 2020: 31 Students
Fall 2021: 101 Students
Fall 2022: 55 Students
Fall 2024: 43 Students

Geol 112: Surficial Earth Dynamics
Spring 2021: 11 Students (Co-taught with Dave Jones)
Spring 2022: 31 Students (Co-taught with Dave Jones)
Spring 2023: 23 Students (Co-taught with Anna Martini)

Geol 112L: Surficial Earth Dynamics Lab
Spring 2021 (01): 11 Students (Co-taught with Dave Jones)
Spring 2022 (01/02): 31 Students (Split into two groups, 15+16, with Dave Jones)
Spring 2023 (02): 8 Students

Geol 331: Climate Dynamics: Past, Present, and Future
Spring 2021: 16 Students
Spring 2023: 17 Students

Geol 331L: **Climate Dynamics: Past, Present, and Future Lab**
Spring 2021 (01): 16 Students
Spring 2023 (01): 17 Students

Geol 341+L: **Geophysics**
Spring 2022: 15 Students
Spring 2025: 15 Students

Geol 341L: **Geophysics Lab**
Spring 2022: 15 Students
Spring 2025 (01): 7 Students
Spring 2025 (02): 8 Students

Geol 498: **Senior Thesis Seminar**
Fall 2022: 2 Students
Fall 2024: 6 Students (+2 auditors from other departments)

Amherst College: Courses Taught (Format 2)

Fall 2020	Geol 109: Climate Change, Science and Rhetoric	*(31 Students)*
Spring 2021	Geol 112: Surficial Earth Dynamics	*(Co. w/ DJ - 11 Students)*
	Geol 112L-01: Surficial Earth Dynamics Lab	*(Co. w/ DJ - 11 Students)*
	Geol 331: Climate Dynamics	*(16 Students)*
	Geol 331L-01: Climate Dynamics Lab	*(16 Students)*
Fall 2021	Geol 109: Climate Change, Science and Rhetoric	*(101 Students)*
Spring 2022	Geol 112: Surficial Earth Dynamics	*(Co. w/ DJ - 31 Students)*
	Geol 112L-01/02: Surficial Earth Dynamics Lab	*(Co. w/ DJ - 31 Students)*
	Geol 341: Geophysics	*(15 Students)*
	Geol 341L-01: Geophysics Lab	*(15 Students)*
Fall 2022	Geol 109: Climate Change, Science and Rhetoric	*(55 Students)*
	Geol 498: Senior Thesis Seminar	*(2 Students)*
Spring 2023	Geol 112: Surficial Earth Dynamics	*(Co. w/ AM - 23 Students)*
	Geol 112L-02: Surficial Earth Dynamics Lab	*(8 Students)*
	Geol 331: Climate Dynamics	*(17 Students)*
	Geol 331L-01: Climate Dynamics Lab	*(17 Students)*
Fall 2024	Geol 109: Climate Change, Science and Rhetoric	*(43 Students)*
	Geol 498: Senior Thesis Seminar	*(6+2 Students)*
Spring 2025	Geol 341: Geophysics	*(15 Students)*
	Geol 341L-01: Geophysics Lab	*(7 Students)*
	Geol 341L-02: Geophysics Lab	*(8 Students)*

Amherst College Senior Theses

2022	Caroline Needell	Evaluating Process Model Predictions of the Marine Ice Cliff Instability using Geophysical Observations at Crane Glacier, Antarctic Peninsula
2024	Will Dienstfrey	Evaluating the Role of Deep-Ice Properties on Glacier Dynamics
2024	Claire Jensen	Evaluating the persistence and spatial distribution of wind-induced scour zones at Dome A, East Antarctica
2025	Peter Klisiwecz	Characterization of Ice Sheet Anisotropy from Co-Polarized Airborne Profiling Radar
2025	Ruth Zuraw	Using Crevasse Patterns to Evaluate Models of Glacier Sliding in the Amundsen Sea

Funded Proposals

(Total Funding to Amherst College: $956,095.10, 4 awards)

2022-2027	**NSF 2019719** *$212,911.41*	Institutional Lead – STC: Center for OLDest Ice EXploration
2022-2027	**NSF 2118285** *$145,890.69*	Institutional Lead – HDR Institute: HARP- Harnessing Data and Model Revolution in the Polar Regions
2021-2024	**NASA 80NSSC21K0753** *$486,490.00*	PI – Multipass and tomography enabled data products for sub-surface characterization and ice sheet model refinement

2020-2023	**NASA 80NSSC20K0958** *$110,803.72*	PI – Integrating surface and subsurface observations to understand glacier sliding in West Antarctica (IS2 Science Team Proposal)

Research Advising

I have participated in the advising of undergraduate and graduate students across five institutions, Amherst College (AC), Colorado School of Mines (CSM), the University of Washington (UW), Stanford University (Stanford), and Penn State University (PSU).

2015	Gina Sarkawi	*(PSU)* Radar data processing on Kamb Ice Stream
2016	Priyanka Bose	*(PSU)* Basal crevasse mapping, Kamb Ice Stream
2017	*Ethan Guzek	*(UW)* Englacial structures at subglacial lake Whillans
2017	Adam Stanford-Moore	*(Stanford)* Radar interferometry on Mt. Baker, WA
2016+	Annika Horlings	*(UW)* Surface elevation change over Thwaites Glacier
2017+	Ben Hills	*(UW)* Radar reflection power interpretation, NEGIS
2017+	Andrew Hoffman	*(UW)* Radar Processing and Interpretation, Thwaites Glacier
2020	Dalya Ackerman	*(AC)* Monitoring Ice Mass Loss in West Antarctica Using ICESat-2
2020	Elizabeth Birmingham	*(AC)* Monitoring Ice Mass Loss in West Antarctica Using ICESat-2
2020	Jon Vale	*(AC)* ICEPack Model Initialization and Testing
2021	Trintje Nydam	*(AC)* Thwaites Thinning Patterns in ATL11
2021	Charlie Estes	*(AC)* Cliff Height Estimation from ICESat-2
2021+	*Will Dienstfrey	*(AC)* Glacial Landforms in the Modern Subglacial Environment
2021	Feli Obasi	*(AC)* Sea Level Rise at Nauru from ICESat-2 and Planet Imagery
2021+	Ellen Mutter	*(AC)* Physical Properties of Ice Cores Recorded in Geophysical Data
2022+	*Caroline Needell	*(AC)* Marine Ice Cliff Instability at Crane Glacier
2022+	*Claire Jensen	*(AC)* Autoannotation of Geophysical Data
2022	Sophia Price	*(AC)* Modeling Water Flow at Whillans Ice Stream
2022+	*Ruth Zuraw	*(AC)* Understanding Basal Ice Bodies at Petermann Glacier
2022	Fiona Anstey	*(AC)* Quantifying Variation in the Postglacial Landscape
2023	Ry Bleckell	*(AC)* Quantifying Shear Margin Change using ICESat-2
2023+	*Peter Klisiwecz	*(AC)* Radiometric Calibration of the OIB Radar Archive
2024+	Hannah Verboncoeur	*(CSM)* K-Means Classifaction of Radar Backscattering
2023	Eads Fouche	*(AC)* Mapping Deformation in Blue Ice Areas
2024	Rufus Fender-Reid	*(AC)* Layer Slope Determination
2024	Rashha Nahian	*(AC)* Geostatistical Interpolation of Thwaites Data
2025	Alex Coiov	*(AC)* TBD
2025	Zachary Guo	*(AC)* TBD
2025	Emily Lan	*(AC)* TBD
2025	Bilal Tariq	*(AC)* TBD

*Senior thesis students

Awards and Honors

2023 Outstanding Reviewer Award: Geophysical Research Letters - American Geophysical Union
Max and Etta Lazerowitz Lectureship - Amherst College
2018 1st Place Presentation - University of Washington Postdoctoral Research Symposium
2016 3rd Place Presentation - Penn State Graduate Student Exhibition
2015 Outstanding Student Paper Award - AGU Fall Meeting
Schenck Teaching Assistant of the Year - PSU College of Earth and Mineral Science
2nd Place Presentation - Penn State Geosciences Colloquium
2014 Dr. Gabriel and Mrs. Katherine Leblanc Fellowship in the Geosciences
2013 Shell Research Facilitation Award
2012 NSF Graduate Research Fellowship
2011 University Graduate Fellowship - Pennsylvania State University
Distinction in Undergraduate Thesis - Economics
Distinction in Undergraduate Thesis - Geology
Phi Beta Kappa Qualification
Sigma Xi Qualification
2010 Duncan Stewart Fellow in Geology
2009 Ernest F. Hollings Scholar

Community Project Participation

I am a member of the following projects: international collaborations designed to better understand Earth's polar regions.

- The International Thwaites Glacier Collaboration
- The Center for Oldest Ice Exploration
- The Hercules Dome Ice Core Project
- Institute for Harnessing the Data and Model Revolution in Polar Regions
- Bedmap3
- AntArchitecture
- Antarctic Rings

Field Experience

2023-24 (10 weeks) ***Swath Radar Data Collection,*** *Thwaites Glacier, West Antarctica*
As part of the International Thwaites Glacier Collaboration (ITGC), I helped lead the swath radar data collection efforts during the 2023-24 field season. This involved a traverse from WAIS Divide down the central flowline of Thwaites Glacier, across to the Thwaites Eastern Shear Margin, and a return to the divide. In addition to our multi-element radar system, I also helped in acquiring ApRES data and helped to deploy compact Trillium broadband seismometers.

2019-20 (10 weeks) ***Radar Profiling and Measurements of Englacial Strain,*** *Hercules Dome, East Antarctica*
Year 2 of data collection at Hercules Dome (see below).

2018-19 (10 weeks) ***Radar Profiling and Measurements of Englacial Strain,*** *Hercules Dome, East Antarctica*
In support of a future ice coring program, a team from the University of Washington worked to characterized the structure and dynamics of Hercules Dome, a local ice divide sitting just east of the Transantarctic mountains. This is an ideal site to identify the behavior of the West Antarctic Ice Sheet (WAIS) during the previous interglacial (the Eemian), a period thought to be 2 degrees warmer than the present. If WAIS were substantially thinner during the Eemian, the difference in local atmospheric circulation that would result will be recorded in ice at Hercules Dome.

2017-18 (2 weeks) ***Terrestrial Radar Interferometry,*** *Coleman and Roosevelt Glaciers, Mt. Baker, WA*
Together with 3 graduate and 3 undergraduate students, we conducted a series of repeat GPRi (Gamma Portable Radar interferometer) radar campaigns over the course of summers, 2017-18, in order to measure temporal variations in glacier flow speed. These were calibrated with simultaneous flow-speed measurements taken on glacier, using real-time kinematic GPS.

2014-15 ***Surface and Borehole Geophsyics,*** *WAIS Divide, West Antarctica*

(8 weeks) We conducted a seismic AVO survey, using both a surface geophone array and a borehole seismometer stationed in the relict WAIS Divide Ice Core borehole. We also deployed a 3MHz radar system, and performed shallow refraction seismic surveys to compute firn density profiles at several locations along a transect perpendicular to the ice divide.

Service to Amherst College

2020-Present **Departmental Service for AC Geology -** regular participant in extracurricular activities representing the Geology faculty, including: participation in our annual department camping trip, participating in ODEI events around campus and in STEM, organized our department comprehensive exercise, engaging in meetings with students in Physics and Environmental studies who are interested in careers in STEM, writing letters of recommendation for internships, fellowships, and graduate school, etc.

2020,21,22,25 **Summer Undergraduate Research Fellowship (SURF) Mentor -** During the summers of 2020, 2021, 2022, and 2025, I acted as a mentor for summer research students through the SURF program.

2024-25 **Elected Member of the Amherst College Faculty Executive Committee -** the primary governing committee of the faculty who meets weekly with the President and Provost of Amherst College. We oversaw the review of our governance structure, the college's course schedule, updates to the tenure and promotion process, and worked to make the college more resilient to outside threats (among other things).

2021-2024 **Member of the Amherst College High Performance Computing Committee -** I am the representative of the Faculty Computer Committee to the High Performance Computing committee, who meets monthly to manage the new Amherst Cluster (funded through an NSF MRI), oversee campus hiring and strategy around high performance computing, and develop community engagement programs for high performance computing at the college.

2021-2024 **Member of the Amherst College Faculty Computer Committee -** a consultative faculty committee who meets biweekly with the heads of IT and academic computing. We have provided guidance on the transition to Workday, classroom computing resources, scientific computing, and cybersecurity (among other things).

2022 **Geology Department "TGIRx" (Thank Goodness It's Rocks) Coordinator -** organized our weekly departmental community meetings where students present on their experiences in the geosciences, departmental and college resources are introduced to the students, and pathways through the field are discussed.

2021,22 **STEM incubator Geology representative -** during the summer STEM incubator program in 2021 and 2022, I presented as part of a review of STEM research at Amherst, and (with Rachel Bernard) helped to lead a multi-day Geology for the incubator program.

2020-2021 **Member of the Amherst College URGE Pod -** a group of geology faculty who met weekly to evaluate departmental practice, craft policy, and learn about the history of racism and ongoing challenges to the geosciences.

Service to the Scientific Community

2013-Present **Manuscript Referee** - Nature, Science, Geology, Communications: Earth and Environment, Geophysical Research Letters, Journal of Geophysical Research, The Cryosphere, IEEE, Journal of Glaciology, Annals of Glaciology, Earth Surface Processes and Landforms, Cold Regions Science and Technology

2017-Present **Proposal Referee: Panelist and External Reviewer** - NASA, NSF, W.M. Keck Foundation

2017-Present **Session Convener** - AGU Fall Meeting, GSA Annual Meeting, WAIS Workshop

2022-Present **Member of the COLDEX and iHARP Education and Outreach Committees -** helping to coordinate the education and outreach programs for the NSF STC and HDR institutes.

2020-21 **IPCC AR6 Reviewer -** The United Nations' Intergovernmental Panel on Climate Change (IPCC) sixth assessment report (AR6) Working Group 2, Second Order Draft. This is a landmark report on the state of the climate system released every 6 years by the UN.

2020-2024 **ICESat-2 Science Team**

Member of the scientific advisory board for NASA's ICESat-2 Satellite mission. Members were selected by competitive application.

2017-2020 **NASA Sea Level Change Team**
Determined through an open call for proposals, NASA has selected 8 teams to collaborate to identify, quantify, and project decadal sea level change. Together with Dr. Knut Christianson, I am responsible for altimetry integration into predictions of future sea level rise from the ice sheets.

2016-2020 **ICESat-2 Science Definition Team**
Working with Dr. Ben Smith at the University of Washington's Applied Physics lab, I assist with algorithm testing and optimization for the ice sheet surface height determination scheme in development for the upcoming ICESat-II mission.

2012-2020 **Former Member of the Following Departmental Committees:**
Diversity Committee - University of Washington Earth and Space Sciences *(Member, 2017-2019)*
Geosciences Graduate Colloquium Committee - PSU *(Chair, 2016)*
Earth and Space Sciences Museum Board - PSU *(Student Member, 2015-16)*
Student Museum Committee - PSU *(Chair, 2015-16)*
Faculty Committee - PSU Department of Geosciences *(Student Representative, 2012-15)*

Service to the Public

2022-Present **Lives of Scientists Project - Schutesbury School, Schutesbury, MA**
Working with 5th grade students as a "Gold Scientist", which entails two in-person presentations and responding to weekly questions about the nature of my science. The goal is to help students both build a STEM identity and better understand research in the Valley.

2020 **Data Visualization Exhibition - Amherst College Science Center**
Worked with Vilkas, LLC to develop climate data visualizations that were projected on the exterior of the science center.

2017-20 **Polar Science Weekend**
Presented ice dynamics and ice-core exhibits at the Pacific Science Center as part of Polar Science Weekend.

2017-19 **Middle School Curriculum Development and Science Night**
Worked with Guy Lawrence (TOPS School, Seattle Public School System) to develop outreach events for his middle school science classroom.

2014 **Data Sonification Team - Penn State Polar Center**
Worked with Dr. Mark Ballora and Dr. David Pollard to convert Ice Sheet time-series data to sound. This was done as a public exhibit on novel ways to communicate climate data.

Public Talks

7. Holschuh, N. (2024a). What Lies Beneath: Using Light, Sound, & Gravity to Understand the Shrinking Antarctic Ice Sheet. *SciTech Cafe*. Easthampton, MA.
6. Holschuh, N. (2023a). Earth's Climate: Past, Present, Future. *Hadley Public Library Lecture Series*.
5. Holschuh, N. (2023b). Climate Crisis Initiatives at Amherst — Now and in the Future. *Amherst College Reunion*.
4. Holschuh, N. (2023c). Life of a Scientist: Climate Scientist. *Schutesbury Elementary School*.
3. Holschuh, N. (2022a). Antarctica and Global Climate: Insights from the Bottom of the Planet. *Amherst College Reunion*.
2. Holschuh, N. (2020a). Our 50th Earth Day. *Westlake Consulting Group*. (Remote from Seattle, WA).
1. Holschuh, N. (2018a). Understanding the past, present, and future of Earth's Ice Sheets. *Pacific Northwest MENSA*.

Invited Scholarly Talks

19. Holschuh, N. (2025a). Is there a speed limit on future sea level rise? Case studies from West Antarctica. *Williams College – Geosciences Deparment Seminar*.
18. Holschuh, N. (2025b). A Complex Ice Flow History in Northern Greenland Inferred from Novel Ice Penetrating Radar Data. *Colorado School of Mines – Geophysics Department Seminar*.
17. Holschuh, N. (2024b). From data starved to data rich in Antarctic science. *Amherst College Data Science Initiative*.

16. Holschuh, N. (2024c). Notes from the field: an overview of the motivation-for and approach-to ice penetrating radar data collection at Thwaites Glacier, West Antarctica. *The Institute for Harnessing the Data and Model Revolution in the Polar Regions' Seminar Series.*
15. Holschuh, N. (2024d). Geophysical evidence for heterogeneity in glacier sliding at Thwaites Glacier, West Antarctica. *Cornell University, Earth and Atmospheric Sciences Seminar.*
14. Holschuh, N. (2024e). The Competition Between Interior Thinning and Marginal Retreat at Thwaites Glacier. *World Climate Research Programme: Climate and Cryosphere Seminar.*
13. Holschuh, N. (2023d). Understanding the history and mechanics of Greenland's basal ice using ice penetrating radar. *Dartmouth College – Department of Earth Sciences Seminar.*
12. Holschuh, N. (2023e). Understanding the interaction between ice, water, till, and bedrock in modern subglacial environments. *University of Virginia – Environmental Science Seminar.*
11. Holschuh, N. (2023f). The influence of the Solid Earth on ice sheet stability. *SCAR INSTANT Conference.*
10. Holschuh, N. (2023g). Exploring the Depths of Earth's Ice Sheets: Lessons from Glacier Geophysics. *Middlebury College – Earth and Climate Science Seminar.*
9. Holschuh, N. (2023h). Decision-Making in the Face of Melting Ice. *Lazerowitz Lecture, Amherst College.*
8. Holschuh, N. (Nov. 2022b). The Dynamics and Deformation History of Earth's Oldest Ice. *University of Massachusetts Amherst – Geosciences Seminar.*
7. Holschuh, N. (Apr. 2022c). Physics for Global Policy: Using electromagnetics and continuum mechanics to predict the future of Earth's ice sheets. *Amherst College – Physics Seminar.*
6. Holschuh, N. (2021a). How can Maxwell help us project future sea level rise? *Reed College – Physics Seminar.* (Remote from Amherst, MA).
5. Holschuh, N. (2020b). Geophysics and Climate. *Carleton College – Geology Seminar.* (Remote from Seattle, WA).
4. Holschuh, N. (2020c). Can we decode postglacial landscapes using modern ice-sheet beds? *University of Illinois, Urbana-Champaigne – Geology Colloquium.* (Remote from Amherst, MA).
3. Holschuh, N. (2019). Investigating modern and paleo ice sheet dynamics using ice penetrating radar. *Western Washington University – Geology Colloquium.* Bellingham, WA.
2. Holschuh, N. (2018b). Beyond Ice Thickness: Inferring the Flow Dynamics and Physical Properties of Ice Sheets Using Radar. *University of Oregon – Geosciences Colloquium.* Eugene, OR.
1. Holschuh, N. (2017a). Active Source Imaging of the Cryosphere. *Carleton College – Geology Seminar.* Northfield, MN.
0. Holschuh, N. (Nov. 2022d). Between the surface and the substrate: Measuring glacier deformation in real time. *Five College Geology Symposium.*

Other Conference Abstracts and Presentations

42. Holschuh, N., W. Dienstfrey, and R. Zuraw (2024). Entrained debris as a possible record of Greenland Ice Sheet regrowth after the last interglacial period. *AGU Fall Meeting.*
41. Holschuh, N., B. A. Tama, S. Purushotham, and V. Janeja (2024). The challenge of validating auto-annotations of ice-penetrating radar imagery. *iHARP Annual Meeting.*
40. Holschuh (2023). Linking observed surface changes to subsurface processes. *ICESat-2 Science Team Meeting.*
39. Holschuh, N., G. Ariho, K. Christianson, A. Hoffman, and J. Paden (Dec. 2022). Catchment-Scale Measurement of Englacial Deformation. *AGU Fall Meeting.*
38. Holschuh, N., T. Nydam, and W. Dienstfrey (Dec. 2021). Is the strength of the glacier substrate expressed in fine resolution basal morphology? Lessons from swath radar imagery and ICESat-2. *AGU Fall Meeting.*
37. Holschuh, N. (2021b). Is material strength expressed in geophysical properties of the glacial substrate? *WAIS Workshop.*
36. Holschuh, N. (2021c). Site selection and ice-sheet modeling. *Hercules Dome Ice Core Workshop & Open Science Meeting.*
35. Holschuh, N. (2021d). Integrating surface and subsurface observations to understand glacier sliding in West Antarctica. *ICESat-2 Science Team Meeting.*
34. Holschuh, N., K. A. Christianson, and J. D. Paden (2020). Evaluating the likelihood of flow reactivation at the sticky-spot of Whillans Ice Stream using ICESat-2 and swath radar topography. *AGU Fall Meeting.* (Remote from Amherst, MA).

33. Holschuh, N., K. Christianson, and J. Paden (2019a). Contextualizing the slow-down of Whillans Ice Stream using ICESat-2 and swath radar topography. *WAIS Workshop*. Julian, CA.
32. Holschuh, N., K. Christianson, and J. Paden (2019b). Swath topography, and the future of polar bed mapping. *IGS: Symposium on Five Decades of Radioglaciology*. Palo Alto, CA.
31. Holschuh, N., K. Christianson, J. Pade, R. B. Alley, and S. Anandakrishnan (2019). Linking Postglacial Landscapes and Subglacial Processes through Swath Radar Imaging at Thwaites Glacier, West Antarctica. *IGS: Glacial Erosion and Sedimentation*. Madison, WI.
30. Holschuh, N., K. Christianson, J. D. Paden, R. B. Alley, and S. Anandakrishnan (2018). Reinterpreting the Global Paleo-Ice Sheet Record through Observed, In Situ Subglacial Landforms at Thwaites Glacier. *WAIS Workshop*. Stony Point, NY.
29. Holschuh, N., D. Lilien, K. Christianson, and E. Bagshaw (2018). Using radar to evaluate the thermal stabilization of ice stream shear margins. *SCAR Open Science Meeting*. Davos, Switzerland.
28. Holschuh, N. (2018c). Challenges to layer tracing and insights from direction-of-arrival analysis for Antarctic englacial layers. *AntArchitecture Workshop*. Davos, Switzerland.
27. Holschuh, N., D. Lilien, and K. Christianson (2018). Using radar to understand the processes controlling ice flow speed in Greenland. *University of Washington Postdoctoral Research Symposium*. Seattle, WA.
26. Holschuh, N., D. Lilien, and K. Christianson (2017a). Estimating the Heat Production and Distribution across Ice-Stream Shear Margins Using Surface Velocities. *AGU Fall Meeting*. New Orleans, LA.
25. Holschuh, N., D. Lilien, and K. Christianson (2017b). Disentangling the thermal and hydrologic signals expressed in radar data collected near EGRIP. *NEGIS Workshop*. Copenhagen, DK.
24. Holschuh, N., K. Christianson, H. Conway, and R. Jacobel (2017). Record of the ice sheet interior response to Siple Coast Ice Stream variability from glacial stratigraphy. *WAIS Workshop*. Coupeville, WA.
23. Holschuh, N. (2017b). Ground-based radar stratigraphy across Antarctica. *AntArchitecture Workshop*. Edinburgh, Scotland.
22. Holschuh, N. (2017c). The intersection of electromagnetics and ice physics. *Department of Earth and Space Science Colloquium Series (UW)*. Seattle, WA.
21. Holschuh, N., K. Christianson, H. Conway, and R. W. Jacobel (2017). The effects of subglacial volcanism on ice dynamics near the onset of the Siple Coast Ice Streams. *European Geophysical Union Annual Meeting*. Vienna, Austria.
20. Holschuh, N., K. Christianson, S. Anandakrishnan, R. B. Alley, and R. W. Jacobel (2016a). Common-midpoint radar surveys of ice sheets: a tool for better ice and bed property inversions. *AGU Fall Meeting*. San Francisco, CA.
19. Holschuh, N. (2016). A framework for interpreting internal layer slopes as a record of past and present ice-sheet boundary conditions. *WAIS Workshop*.
18. Holschuh, N., R. Alley, and S. Anandakrishnan (2016). Investigating the Potential for Reconfiguration of the Antarctic and Greenland Ice Sheets. *Penn State Geosciences - Graduate Student Colloquium*. University Park, PA.
17. Holschuh, N., K. Christianson, S. Anandakrishnan, and R. Alley (2015). What I'm Thankful for this Year: Radar's ability to independemtly measure the electrical properties of the ice column. *Penn State Geosciences - Geodynamics Colloquium*. University Park, PA.
16. Holschuh, N., B. Parizek, R. Alley, and S. Anandakrishnan (2015a). Internal Reflector Slope Fields as a Proxy for Ice Sheet Velocity Structure. *WAIS Workshop*. Loveland, CO.
15. Holschuh, N., B. Parizek, R. Alley, and S. Anandakrishnan (2015b). Discriminating between Steady-State and Transient Controls on Englacial Structures. *International Symposium on Contemporary Ice-Sheet Dynamics: ocean interaction, meltwater, and non-linear effects*. Cambridge, UK.
14. Holschuh, N., B. R. Parizek, R. B. Alley, S. Anandakrishnan, and R. B. Alley (2015). Using the Englacial Geometry of West Antarctica to Determine its Future Stability. *Advances in Polar Research since the International Polar Year*. University Park, PA.
13. Holschuh, N., K. Christianson, S. Anandakrishnan, and R. Alley (2014). Bistatic Radar case Studies from Antarctica and Greenland. *WAIS Workshop*. Julian, CA.
12. Holschuh, N., D. Pollard, S. Anandakrishnan, and R. Alley (2013a). Consequences of a Deeper Bed for Marie Byrd Land Stability. *WAIS Workshop*. Sterling, VA.
11. Holschuh, N. and S. Anandakrishnan (2013). The Effects of Reflector Geometry on Radar Data Acquisition. *International Glaciological Society Symposium on Radioglaciology*. Lawrence, KS.

10. Holschuh, N., D. Pollard, S. Anandakrishnan, and R. Alley (2013b). Improving our Understanding of Marie Byrd Land Geometry through Geophysical Observations and Flow Modeling. *Midwest Glaciology Meeting*. University Park, PA.
9. Holschuh, N., D. Pollard, S. Anandakrishnan, and R. Alley (2013c). Inferring Ice Sheet Basal Topography using Surface Observations and Flow Modeling. *NSF Review Panel for the Center for Remote Sensing of Ice Sheets*. Elizabeth City, NC.
8. Holschuh, N. (2013). Below the Ice: Investigating the Subsurface Environment of Thwaites Glacier through Radio Echo Sounding. *Penn State Polar Day*. University Park, PA.
7. Holschuh, N., D. Pollard, S. Anandakrishnan, and R. Alley (2013d). Inferring Bed Topography in West Antarctica through Ice Surface Inversion. *Penn State Geosciences - Graduate Student Colloquium*. University Park, PA.
6. Holschuh, N. (2011a). A Systematic Analysis of Potential Leading Indicators in the United States through Vector Autoregression. *Economics Comprehensive Poster Session - Carleton College*. Northfield, MN.
5. Holschuh, N. (2011b). An Analysis of Tsunami Sensitivity to Fault Plane Orientation Using a Rapid Linear Model. *Geology Comprehensive Symposium - Carleton College*. Northfield, MN.
4. Holschuh, N., G. Fryer, and D. Wang (2010). Improving Tsunami Warning Protocols with a Rapid Linear Model. *Sigma Xi Induction Banquet*. Northfield, MN.
3. Fryer, G., N. Holschuh, D. Wang, and N. Becker (2010). Improving Tsunami Warning with a Rapid Linear Model. *AGU Fall Meeting*. San Francisco, CA.
2. Holschuh, N. and G. Fryer (2010). Improving Tsunami Warning Protocols through the Incorporation of Historical Data. *Hollings Scholar Symposium*. Silver Spring, MD.
1. Holschuh, N. and B. Haileab (2009). A Preliminary Geochemical Analysis of Spatial and Temporal Variations in the Surface Water Chemistry of Rice County, MN. *Geological Society of America National Conference*. Portland, OR.