Nicholas D. Holschuh
Curriculum Vitae

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Professional Appointments

2016-Present ***Postdoctoral Researcher,*** *University of Washington*
ICESat-2 altimetry and NASA IceBridge data interpretation

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)*
2011	*B.A. - Geology*	Carleton College	*(Summa cum Laude)*
2011	*B.A. - Economics*	Carleton College	

Publications

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**, 1–10.
5. Luthra, T., L. E. Peters, S. Anandakrishnan, R. B. Alley, N. Holschuh, and A. M. Smith (2017). Characteristics of the sticky spot of Kamb Ice Stream, West Antarctica. *Journal of Geophysical Research: Earth Surface*, 1–13.
4. Holschuh, N., K. Christianson, S. Anandakrishnan, R. B. Alley, and R. W. Jacobel (2016). Constraining attenuation uncertainty in common midpoint radar surveys of ice sheets. *Journal of Geophysical Research: Earth Surface* **121**, 1876–1890.
3. Luthra, T., S. Anandakrishnan, J. P. Winberry, R. B. Alley, and N. Holschuh (2016). Basal characteristics of the main sticky spot in the ice plain of Whillans Ice Stream. *Earth and Planetary Science Letters* **440**, 12–19.
2. Holschuh, N., D. Pollard, S. Anandakrishnan, 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.

(In Review)

1. Riverman, K. L., R. B. Alley, S. Anandakrishnan, K. Christianson, N. Holschuh, B. Medley, and L. E. Peters (2017). Surface controls on shear margin development of the NE Greenland Ice Stream. *Journal of Geophysical Research: Earth Surface*, 1–18.

Patents (filed)

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**, 1–16.

Doctoral Dissertation

Title ***Methods and Applications of Radio-Frequency Geophysics in Glaciology***
Advisors *Dr. Richard Alley and Dr. Sridhar Anandakrishnan*
Chapters
1. Evaluating Marie Byrd Land stability using an improved basal topography
2. Power loss in dipping internal reflectors, imaged using ice-penetrating radar
3. Inferring ice-sheet boundary conditions using internal ice structures
4. EM attenuation and ice properties from bistatic radar surveys in Antarctica and Greenland

Field Experience

2014 (8 weeks) ***Surface and Borehole Geophsyics,*** *WAIS Divide, West Antarctica*
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.

2010 (11 weeks) ***Geology Field Camp - Carleton College,*** *New Zealand*
I participated in Carleton College's field school, which consisted of 5 weeks of study on the North Island and 5 weeks of study on the South Island of New Zealand. Coursework included structural and sedimentary geology, field geophysics, paleobiology, and volcanic mapping.

Teaching Experience

2014-16 **Graduate Writing Tutor**, *College of Earth and Mineral Sciences - Pennsylvania State University.*
2015 **Graduate Teaching Certification**, *The Graduate School - Pennsylvania State University*

Lecture Experience

05/2017 **Active Source Imaging Techniques**, *(1 Week)*
Geol 240: Geophysics - Carleton College

10/2016 **Glacier Sliding and Hydrology**, *(1 Week)*
ESS 431: Principles of Glaciology - University of Washington

02/2016 **Carbon Dating and Calibration**, *(1 Week)*
Geosc 330: Geology of Climate Change - Pennsylvania State University

01/2016 **Dynamics of the Modern Ice Sheets**, *(1 Week)*
Geol 216: Antarctic Earth Science - Carleton College

02/2015 **Correlation, Convolution, and Statistical Filtering**, *(2 Week Unit)*
Geosc 558: Multichannel Seismic Processing - Pennsylvania State University

01/2013 **Black Body Radiation, Heat Distribution, and Transport**, *(2 Week Unit)*
Geosc 330: Geology of Climate Change - Pennsylvania State University

Teaching Assistantships

Penn State Department of Geosciences - College of Earth and Mineral Sciences
Fall 2014 Geosc 230 - Physical Processes in the Geosciences

Carleton College Department of Economics
Fall 2010 Econ 331 - Intermediate Macroeconomic Theory
Spring 2010 Econ 110 - Fundamentals of Macroeconomics

Carleton College Department of Geology
Winter 2010 Geo 255 - Petrology
Fall 2010 Geo 250 - Mineralogy

Awards and Honors

2016 3rd Place Presentation - Physical Sciences and Mathematics, Penn State Graduate Exhibition
Outstanding Student Paper Award - AGU Fall Meeting (2015)
2015 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

Funded Proposals

I have gotten over 13 travel funding, research, and outreach facilitation proposals funded. Listed below are the awards whose value exceeds $1000.

2014	*LeBlanc Geophysical Research Award*	$2,500
2013	*Shell Research Facilitation Award*	$2,000
2012	*NSF Graduate Research Fellowship*	$96,000

Service and Broader Impacts

2017 **NASA Proposal Review Panelist**

2013-Present **Referee - Geology, Journal of Glaciology**

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

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

2016-2017 **Advisor - Undergraduate Research Assistant**
Acted as a Co-Advisor with Knut Christianson, managing Ethan Guzek's research project on subglacial dynamics in the Whillans Ice Plain.

2015-2016 **Advisor - Undergraduate Research Assistant**
Acted as the primary advisor for undergraduate researcher Priyanka Bose, working on a radar interpretation project from the stagnated Kamb Ice Stream.

2016 **Chair - Geoscience Graduate Colloquium Committee**
Lead the organization of Penn State's annual Geosciences colloquium, a two day conference where geoscience students from Penn State University and Tohoku University presented their research in both oral and poster formats.

2015-16 **Chair - Student Museum Committee, Penn State Earth and Mineral Sciences Museum**
I organized and a lead a student run committee for museum exhibit development and curation. Through this committee, I lead the development of an exhibit on ocean acidification currently on display in Penn State's EMS Museum. This committee been converted into a 1 credit seminar in the PSU department of Geosciences.

2015-16 **Museum Board Member - Penn State Earth and Mineral Sciences Museum**
Student representative to the campus museum evaluation board.

2012-15 **Student Representative to the Faculty - Penn State Department of Geosciences**
I acted as an advocate for student interests at Penn State's Geoscience faculty meetings.

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.

2012-13 **Center for the Remote Sensing of Ice Sheets (CReSIS) REU Mentor**
I acted as a graduate student mentor for two summers, preparing code and data for undergraduate use and was available for general and technical questions regarding glaciology.

Conference Proceedings

2016

21. Holschuh, N., K. Christianson, S. Anandakrishnan, R. B. Alley, and R. W. Jacobel (2016). Common-midpoint radar surveys of ice sheets: a tool for better ice and bed property inversions. *AGU Fall Meeting.* San Francisco, CA.

20. Holschuh, N. (2016). A framework for interpreting internal layer slopes as a record of past and present ice-sheet boundary conditions. *WAIS Workshop*.
19. 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.
18. Holschuh, N., B. R. Parizek, R. B. Alley, and S. Anandakrishnan (2016). Structures, Radars, and Antarctic Adventure. *Seminar Series - Carleton College Department of Geology*. Northfield, MN.

2015

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 (2015). 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 (2015). 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.

2014

13. Holschuh, N., K. Christianson, S. Anandakrishnan, and R. Alley (2014). Bistatic Radar case Studies from Antarctica and Greenland. *WAIS Workshop*. Julian, CA.

2013

12. Holschuh, N., D. Pollard, S. Anandakrishnan, and R. Alley (2013). 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 (2013). 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 (2013). 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 (2013). Inferring Bed Topography in West Antarctica through Ice Surface Inversion. *Penn State Geosciences - Graduate Student Colloquium*. University Park, PA.

2011

6. Holschuh, N. (2011). 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. (2011). An Analysis of Tsunami Sensitivity to Fault Plane Orientation Using a Rapid Linear Model. *Geology Comprehensive Symposium - Carleton College*. Northfield, MN.

2010

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.

2009

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.