

# ANNA RUTH W. HALBERSTADT

PhD Candidate, Department of Geosciences • University of Massachusetts Amherst  
ahalberstadt@geo.umass.edu • 919-810-6946  
<http://ruthiehalberstadt.com>

## RESEARCH EXPERTISE

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Ice-sheet and climate modeling, marine geology, glaciology, geomorphology, paleoclimatology

## EDUCATION

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**Ph.D., University of Massachusetts Amherst** 2016-2021 (expected)  
Department of Geosciences (Research adviser: Rob DeConto)  
**M.S., Rice University** 2013-2016  
Department of Earth Science (Research adviser: John Anderson)  
**B.S., Rice University** 2009-2013  
B.S. Civil & Environmental Engineering; B.S. Earth Science  
Cumulative GPA: 3.84; cum laude

## RESEARCH APPOINTMENTS

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### Graduate Research Assistant

University of Massachusetts Boston, Greater Boston Research Advisory Group 2019-2021  
*Developed state-of-the-art coastal flood projections for the City of Boston by combining ice-sheet modeling with a probabilistic sea level framework; co-authored report for policymakers.*  
Massachusetts Executive Office of Energy and Environmental Affairs Fall 2017  
*Produced sea-level rise maps and imagery for the State of Massachusetts, investigating the intersection of projected floodplains with regions of socioeconomic vulnerability.*  
University of Massachusetts Amherst, Department of Geosciences (PI: Rob DeConto) 2016-2021  
*Reconstructed past ice-sheet behavior and stability using numerical modeling techniques.*  
Rice University, Department of Civil & Environmental Engineering (PI: Dan Cohen) Spring 2016  
*Assisted in investigating the role of coal power plants and ship fuel SO<sub>2</sub> emissions in contributing to the Northern Hemisphere 2015-2016 temperature anomaly.*  
Rice University, Department of Earth Science (PI: John Anderson) 2013-2016  
*Investigated controls on glacial stability by reconstructing the deglacial history and evaluating ice-bed interactions in the Ross Sea, Antarctica.*

### Undergraduate Research Assistant

North Carolina State University, Department of Civil, Construction, and Environmental Engineering (PI: Margery Overton) 2012  
*Conducted coastal engineering flood hazard research, comparing FEMA's model of flood hazard zone delineation with other wave action and erosion modeling techniques.*  
Rice University, Department of Earth Science (PIs: John Anderson, Becky Minzoni) 2010-2011  
*Sieved and picked foraminifera, and helped analyze the assemblages to interpret sedimentary environment and paleo-climatic events in Herbert Sound, NE Antarctic Peninsula*

## FIELD CAMPAIGNS

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**IODP Expedition 379: Amundsen Sea West Antarctic Ice Sheet History** Jan-Mar 2019  
International expedition aimed towards documenting ice-sheet dynamics in the Amundsen Sea throughout the history of the West Antarctic Ice Sheet, and connecting those data with other global and Antarctic records. I sailed as a sedimentologist; I analyzed and interpreted the recovered drill core, and assisted in writing preliminary reports and interpretations.

## **McMurdo Dry Valleys, Antarctica** Nov 2016

International collaboration to assess Antarctic Ice Sheet climate sensitivity during the Miocene and integrate terrestrial records with marine data; fieldwork located at the Friis Hills (11/2 – 11/25). I helped collect a permafrost drill core, interpreted nearby sedimentary records, and identified tephra deposits for establishing chronological control. *(PI: Doug Kowalewski)*

## **Ross Sea, Antarctica** Jan-Mar 2015

NSF-funded cruise to conduct a detailed multibeam survey and collect cores and seismic data in the western Ross Sea, Antarctica (01/23 – 3/20, 57 days, RV-IB Nathaniel B. Palmer). I helped collect and analyze marine geophysical data, multibeam swath bathymetry data, and sediment cores used to reconstruct glacial retreat history of the Ross Sea. *(PIs: John Anderson, Phil Bart)*

## TEACHING

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### **Instructor of Record**

Antarctica: The Coolest Continent (NATSCI 191-01 & 02), UMass-Amherst Fall 2020

### **Teaching assistant**

Physical Oceanography, incl. lab (GEOSCI 595), UMass-Amherst Fall 2018

(Assisted) Intro. to Climate & Environmental Modeling (GEOSCI 591), UMass-Amherst Fall 2019

### **Guest lecturer**

Antarctic Ice Sheet Dynamics (GY 400), Colorado College 11/15/2020

Glaciers and Ice Sheets (EVSC 7559), University of Virginia 10/25/2019

Glacial Geology (GEOSCI 563), UMass-Amherst 2016, 2018

## RESEARCH GRANTS

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Halberstadt, A.R.W. (PI), Balco, G., Gomez, N., DeConto, R.M. (Co-Is), *Antarctic ice-sheet dynamics constrained by high-resolution modeling and comprehensive continent-wide data benchmarks.*

NSF OPP Postdoctoral Research Fellowship, 01/2021 – 12/2023.

Halberstadt, A.R.W. (PI), *Modeling the influence of orbital cyclicity, CO<sub>2</sub>, and ocean temperatures on West Antarctic Ice Sheet contribution to Pliocene sea level.* International Ocean Drilling Program Expedition 379 Post Expedition Activity Award, 09/2019 – 11/2020.

## AWARDS & FELLOWSHIPS

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### *Fellowships*

UMass: Department of Geosciences Fellowship (\$9,250) 2016

Rice University: Sam and Helen Worden Fellowship (\$39,070) 2013-2014

Chevron Merit Scholarship (\$500) 2012

Rice University: Gerard A. Dobelman Merit Scholarship (\$136,067) 2009-2013

### *Travel Awards*

UMass: Andrew D. Wise Memorial Scholarship (\$533) 2021

UMass: Joseph Hartshorn Memorial Scholarship (\$463) 2018

PAIS: POLAR2018 (\$1000) 2018

SCAR Physical Sciences Group: POLAR2018 (\$500) 2018

UMass: Department of Geosciences Travel Award (\$100) 2018

UMass: Department of Geosciences Travel Award (\$200) 2017

Past Antarctic Ice Sheet Dynamics (PAIS) Conference travel award (€1,500) 2017

IODP Antarctic Cenozoic Ice and Climate History Workshop travel award (\$800) 2016

West Antarctic Ice Sheet (WAIS) travel award (\$500) 2015

## RESEARCH MENTORSHIP

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Raini Helmstadter (2020 B.A. Hampshire College, thesis research co-adviser: 'Future Climate Change in New Mexico: Climate division-scale RCM projections guided by impact-oriented pedagogy')

Emma Robertson (2020 B.S. UMass-Amherst: Independent research project comparing modern modeled Antarctic mass loss with satellite records)

Kelsey Crocker (2015 B.S. Rice University: Independent research project on iceberg furrows and catastrophic ice stream collapse)

## PUBLICATIONS

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- Halberstadt, A.R.W.**, Chorley, H., Levy, R.H., Naish, T., DeConto, R.M., Gasson, E. and Kowalewski, D.E., 2021. CO<sub>2</sub> and tectonic controls on Antarctic climate and ice-sheet evolution in the mid-Miocene. *Earth and Planetary Science Letters*, 564, 116908.
- Halberstadt, A.R.W.**, Gleason, C.J., Moussavi, M.S., Pope, A., Trusel, L.D., DeConto, R.M., 2020. Antarctic supraglacial lake identification using Landsat-8 image classification. *Remote Sensing*, 12(8), 1327.
- Moussavi, M.S., Pope, A., **Halberstadt, A.R.W.**, Trusel, L.D., Cioffi, L., Abdalati, W., 2020. Antarctic supraglacial lake detection using Landsat 8 and Sentinel-2 imagery: Towards continental generation of lake volumes. *Remote Sensing*, 12(1), 134.
- Gohl, K., Wellner, J.S., Klaus, A., and Expedition 379 Scientists incl. **Halberstadt, A.R.W.**, 2019. IODP Expedition 379 Preliminary Report: Amundsen Sea West Antarctic Ice Sheet History. *International Ocean Discovery Program Proceedings*.
- Judd, E.J., Ivany, L.C., DeConto, R.M., **Halberstadt, A.R.W.**, Miklus N.M., Junium, C.K., Uveges, B.T., 2019. Seasonally resolved proxy data from the Antarctic Peninsula support a heterogeneous middle Eocene Southern Ocean, *Paleoceanography and Paleoclimatology*, 34, 787–799.
- Halberstadt, A.R.W.**, Simkins, L.M., Anderson, J.B., Prothro, L.O., Bart, P.J., 2018. Characteristics of the deforming bed: till properties on the deglaciated Antarctic continental shelf, *Journal of Glaciology*, 1–14.
- Greenwood, S.L., Simkins, L.M., **Halberstadt, A.R.W.**, Prothro, L.O., & Anderson, J.B., 2018. Holocene reconfiguration and readvance of the East Antarctic Ice Sheet, *Nature Communications*, 9(1), 3176.
- Simkins, L.M., Anderson, J.B., Greenwood, S.L., Gonnermann, H.M., Prothro, L.O., **Halberstadt, A.R.W.**, Stearns, L.A., Pollard, D., DeConto, R.M., 2017. Anatomy of a meltwater drainage system beneath the ancestral East Antarctic ice sheet, *Nature Geoscience*, 10, 691–698.
- Anderson, J.B., Simkins, L.M., Bart, P.J., De Santis, L., **Halberstadt, A.R.W.**, Olivo, E., Greenwood, S.L., 2017. Seismic and geomorphic records of Antarctic Ice Sheet evolution in the Ross Sea and controlling factors in its behavior, in: *Glaciated Margins: The Sedimentary and Geophysical Archive*, Geological Society London Special Publications.
- Halberstadt, A.R.W.**, Simkins, L.M., Greenwood, S.L., Anderson, J.B., 2016. Past ice-sheet behaviour: Retreat Scenarios and Changing Controls in the Ross Sea, Antarctica, *The Cryosphere*, 10, 1003-1020.
- Cohan, D.S., Krakauer, N.Y., Corbett, J.J., Zhang, R., **Halberstadt, A.R.W.**, Parks, L.Y., 2016. Could cuts in sulfur from coal and ships help explain the 2015 spurt in Northern Hemisphere temperatures?, *IEEE EarthZine*.

## PUBLICATIONS IN REVIEW & PREPARATION

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**Halberstadt, A.R.W.**, Kowalewski, D.E., DeConto, R.M., Reconciling marine Antarctic ice sheet fluctuations with the long-term stability of terrestrial deposits in the McMurdo Dry Valleys, *in review, Geology*.

- Dell, R., Banwell, A.F., Willis, I., Arnold, N., **Halberstadt, A.R.W.**, Chudley, T.R., Pritchard, H., 2021. Supervised classification of slush and ponded water on Antarctic ice shelves using Landsat 8 imagery, *in review, Earth and Space Science*.
- Chorley, H., & 21 co-authors incl. **Halberstadt, A.R.W.**, 2021. Antarctic ice sheet evolution and variability during the middle Miocene (~15-13.5 Ma), from glacio-fluvial-lacustrine deposits in the Friis Hills, Antarctica, *in review, GSA Bulletin*.
- DeConto, R.M., Baranes, H., Woodruff, J. D., **Halberstadt, A.R.W.**, Kopp, R.E., Climate Change and Sea Level Rise Projections for Boston, *in review, Climate Ready Boston*.
- Chorley, H.K., **Halberstadt, A.R.W.**, Levy, R.L., Naish, T.R., DeConto, R.M., Glacial-interglacial variability and Antarctic Ice Sheet evolution during the mid-Miocene, *in preparation*.
- Halberstadt, A.R.W.**, Patel, N., DeConto, R.M., Condron, A., Tracing water masses in high-resolution Pliocene Southern Ocean simulations, *in preparation*.
- Halberstadt, A.R.W.**, DeConto, R.M., Pliocene WAIS fluctuations linked to IODP ocean temperatures, *in preparation*.

#### INVITED TALKS

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Interdisciplinary Antarctic Earth Science Conference	10/13/2019
International Thwaites Glacier Collaboration: Early Career Workshop ( <i>keynote</i> )	8/29/2019
PAIS-IODP Antarctic School	6/14/20
Harvard University, Department of Earth and Planetary Sciences	4/24/2019
Rice University, Department of Earth Science (JohnFest 2018)	4/20/2018
Columbia University, Lamont-Doherty Earth Observatory	5/23/2017
Worcester State University, Department of Earth, Environment, and Physics	10/11/2016

#### RECENT CONFERENCE PRESENTATIONS

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- Dell, R.L., Banwell, A., Arnold, N., Willis, I., **Halberstadt, A.R.**, Chudley, T., Pritchard, H., 2020. A record of slush and water extent on Antarctic ice shelves from 2013 to present day, *EGU 2020 General Assembly*, 27 Apr. (virtual) (*talk*)
- Trusel, L.D., Pope, A., Moussavi, M.S., **Halberstadt, A.R.**, 2019. Dataset Coming Up: Antarctic-wide Supraglacial Lake Extent and Depth using Landsat 8 and Sentinel-2, 2013-2019, *American Geophysical Union 2019 Fall Meeting*, 9-13 Dec. (*poster*)
- Halberstadt, A.R.**, Chorley, H.K., DeConto, R.M., Naish, T.R., Levy, R.H., Gasson, E.G.W., Kowalewski, D.E., 2019. Model-data integration to explore mid-Miocene climate and ice-sheet variability, *Interdisciplinary Antarctic Earth Sciences Conference*, Julian, CA, 13 Oct. (*invited talk*)
- Halberstadt, A.R.**, 2019. Integrating ice-sheet modeling and geologic data, *ITGC Early Career Workshop*, Bury St Edmunds, Suffolk, UK, 29 Aug. (*invited talk*)
- Moussavi, M., Pope, A., **Halberstadt, A.R.**, Trusel, L.D., 2018. Monitoring and classifying supraglacial lake volumes in Antarctica from a suite of satellite observations, *American Geophysical Union 2018 Fall Meeting*, 10-14 Dec. (*poster*)
- McKnight, S., & 15 co-authors incl. **Halberstadt, A.R.**, 2018. Talking the talk AND walking the walk: UMass Geosciences' community-based efforts to increase diversity and inclusivity through improved department climate, *American Geophysical Union 2018 Fall Meeting*, 10-14 Dec. (*poster*)
- Halberstadt, A.R.**, Moussavi, M., Pope, A., Trusel, L.D., Gleason, C.J., DeConto, R.M., 2018. Exploring surface meltwater classification techniques from multispectral imagery over the Antarctic Ice Sheet, *American Geophysical Union 2018 Fall Meeting*, 10-14 Dec. (*poster*)
- DeConto, R.M., Kopp, R., Kulp, S., Pollard, D., Strauss, B., **Halberstadt, A.R.**, Gilford, D., Ashe, E., 2018. Rapid ice-sheet retreat and local sea-level rise projections: reducing uncertainty within a probabilistic framework, NSF PREEVENTS Meeting, 20-21 Sept. (*poster*)

- Halberstadt, A.R.**, DeConto, R.M., Gasson, E.G.W., Kowalewski, D.E., Levy, R.H., Naish, T.R., Chorley, H.K., 2018. Modeling Antarctic climate and ice-sheet variability in the mid-Miocene, *SCAR/IASC POLAR-2018*, Davos, Switzerland, 19 June. (talk)
- Halberstadt, A.R.**, DeConto, R.M., Gasson, E.G.W., Kowalewski, D.E., Levy, R.H., Naish, T.R., Chorley, H.K., 2017. Reconciliation of Antarctic marine and terrestrial geologic records: climate and ice-sheet variability in the mid-Miocene, *American Geophysical Union 2017 Fall Meeting*, 11-15 Dec. (poster)
- Judd, E.J., Ivany, L.C., Miklus, N.M., Uveges, B.T., Junium, C.K., **Halberstadt, A.R.**, DeConto, R.M., 2017. Eocene Antarctic seasonality inferred from high-resolution stable isotope profiles of fossil bivalves and driftwood, *American Geophysical Union 2017 Fall Meeting*, 11-15 Dec. (poster)
- Anderson, J.B., Simkins, L.S., Greenwood, S.L., Demet, B.P., **Halberstadt, A.R.**, and Prothro, L.O., 2017. Role of Grounding Zone Wedges in Grounding Line Stabilization: Case Study from Ross Sea, *Geological Society of America*, Seattle, WA, 22-25 Oct. (talk)
- Halberstadt, A.R.**, and DeConto, R.M., 2017. WAIS sensitivity to sub-ice-shelf bathymetry during the last glacial cycle: model-data convergence in the Ross Sea, *Past Antarctic Ice Sheet Dynamics (PAIS) Conference*, Trieste, Italy, 10-15 Sept. (poster)
- Kowalewski, D.E., and **Halberstadt, A.R. (presenting author)**, 2016. Friis Hills glacial history: an international collaboration to examine the Miocene in Antarctica, *American Geophysical Union Fall Meeting*, 12-16 Dec. (talk)
- Halberstadt, A.R.**, Simkins, L.M., Anderson, J.B., Prothro, L.O., Demet, B.P., Greenwood, S.L., Yokoyama, Y., 2016. Post-LGM Retreat History in Ross Sea reflects changing controls on marine ice-sheet behavior, *American Geophysical Union 2016 Fall Meeting*, 12-16 Dec. (poster)

## ACADEMIC SERVICE

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Journal referee: Quaternary Research (2016), Geology (2021)

AGU 2021 Co-convenor, Session PP022: *Past Climate, Ice Sheet and Sea-Level Changes: How Much, How Fast?*

AGU 2020 Co-convenor, Session GC068: *Climate Modeling for Everyone: Interdisciplinary Research to Address Social Justice and (More-Than)Human Impacts*

Moderator, UMass School of Earth & Sustainability panel on IPCC SROCC report (11/5/2019)

## PUBLIC ENGAGEMENT & EDUCATION

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### *Classroom involvement*

Collaborated with high-school teachers to build multidisciplinary series of lesson plans that includes the physics, biology, and solutions related to climate change in the Antarctic.

Published curriculum (2021) <https://cires.colorado.edu/outreach/programs/antarctica-connecting-climate-change-melting-ice-shelves-and-pooing-penguins>

IODP related school outreach: visited two elementary-school classrooms before and after Expedition 379, and maintained connection with students onboard (2018-2019)  
<http://winchester.wickedlocal.com/news/20181214/geoscientist-visits-acera-school-in-winchester>

### *Community engagement*

Greater Boston Research Advisory Group	2019-2021
Eureka, Girls Inc! STEM workshops	July 2018, 2019
Featured on 'Time Scavengers' website <a href="https://timescavengers.blog/">https://timescavengers.blog/</a>	7/30/2018
Guest host, Science Trivia Night, The Quarters	4/2/2018
Science Fair Judge, Westfield High School	2/8/2018
Guest scientist, 'Lab Talk with Laura' radio show, WMUA 91.1 FM	1/23/2018
Participant, Communicating Science to Non-Experts workshop	Spring 2016