ANNA RUTH W. HALBERSTADT

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RESEARCH EXPERTISE

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

EDUCATION

Ph.D., University of Massachusetts Amherst 2016-2022
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

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_2 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

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)*

RESEARCH GRANTS

Halberstadt, A.R.W. (PI), *Antarctic ice-sheet dynamics constrained by high-resolution modeling and comprehensive continent-wide data benchmarks*. NSF OPP Postdoctoral Research Fellowship, $254,790, 01/2022 – 12/2023.

Halberstadt, A.R.W. (PI), *Modeling the influence of orbital cyclicity, CO_2, and ocean temperatures on West Antarctic Ice Sheet contribution to Pliocene sea level*. International Ocean Drilling Program Expedition 379 Post Expedition Activity Award, $17,966, 09/2020 – 11/2020.

AWARDS & FELLOWSHIPS

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

PUBLICATIONS

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 press, Geology.* https://doi.org/10.1130/G49664.1

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 press, Journal of Glaciology.* https://doi.org/10.1017/jog.2021.114

Levy, R.H., & 25 co-authors incl. **Halberstadt, A.R.W.**, 2021. Antarctic Environmental Change and Ice Sheet Evolution through the Miocene to Pliocene – A perspective from the Ross Sea and George V to Wilkes Land Coasts. In: Florindo, F., Siegert, M., De Santis, L., and Naish, T. (eds) *Antarctic Climate Evolution*. 2nd ed. Amsterdam: Elsevier, 804. https://doi.org/10.1016/B978-0-12-819109-5.00014-1

Halberstadt, A.R.W., Chorley, H., Levy, R.H., Naish, T., DeConto, R.M., Gasson, E. and Kowalewski, D.E., 2021. CO_2 and tectonic controls on Antarctic climate and ice-sheet evolution in the mid-Miocene. *Earth and Planetary Science Letters*, 564, 116908. https://doi.org/10.1016/j.epsl.2021.116908

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. https://doi.org/10.3390/rs12081327

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. https://doi.org/10.3390/rs12010134

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*. https://doi.org/10.14379/iodp.pr.379.2019

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. https://doi.org/10.1029/2019PA003581

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*, 64(248), 1014–1027. https://doi.org/10.1017/jog.2018.92

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. https://doi.org/10.1038/s41467-018-05625-3

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. https://doi.org/10.1038/NGEO3012

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.* https://doi.org/10.1144/SP475.5

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. https://doi.org/10.5194/tc-10-1003-2016

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*. [link]

PUBLICATIONS IN REVIEW

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.*

PUBLICATIONS 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. Pollard, D., Gasson, E., Pliocene WAIS fluctuations linked to IODP ocean temperatures, *in preparation.*

INVITED TALKS

Interdisciplinary Antarctic Earth Science Conference	10/13/2019
International Thwaites Glacier Collaboration: Early Career Workshop *(keynote)*	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

Halberstadt, A.R., Kowalewski, D.E., DeConto, R.M., 2021. Reconciling dynamic WAIS retreat during past warm periods with stable cold-polar landforms in the McMurdo Dry Valleys, *American Geophysical Union 2021 Fall Meeting*, 16 Dec. *(eLightning)*

Halberstadt, A.R., Balco, G., Pollard, D., DeConto. R.M., Gomez, N., Johnson, J., 2021. High-resolution ice-sheet modeling to reconcile abrupt mid-Holocene terrestrial thinning with earlier marine grounding-line retreat, *American Geophysical Union 2021 Fall Meeting*, 13-17 Dec. *(poster)*

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. *(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 Ssudy 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)*

TEACHING

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

FORMAL RESEARCH MENTORSHIP

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)*

ACADEMIC SERVICE & INVOLVEMENT

Journal referee

Nature Reviews Earth & Environment (2022), The Cryosphere (2022), Geology (2021), Quaternary Research (2016)

AGU session convener

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

AGU 2020 Co-convener, 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)

Unlearning Racism in Geoscience (URGE) pod member, UMass-Amherst

PUBLIC ENGAGEMENT & EDUCATION

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-pooping-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 https://timescavengers.blog/	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