

SARAH E. CRUMP

Postdoctoral Research Associate
Institute of Arctic and Alpine Research (INSTAAR)
University of Colorado Boulder (CU Boulder)
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EDUCATION

2013–2019 | PhD in Geological Sciences, University of Colorado Boulder
Advisor: Gifford Miller

2006–2010 | Bachelor of Arts, Carleton College (Northfield, MN)
Major: Geology; Concentration: Environmental Studies

RESEARCH APPOINTMENTS

2019–present | Postdoctoral Research Associate, INSTAAR, CU Boulder

2016–present | Visiting Research Associate, Trace and Environmental DNA Lab, Curtin University, Australia

2014–2019 | Graduate Research Assistant, INSTAAR, CU Boulder

2016–2017 | Graduate Research Assistant, Center for the Study of Origins, CU Boulder

HONORS & FELLOWSHIPS

2020–2022 | NSF EAR/BIO Postdoctoral Fellow

2014–2019 | NSF Graduate Research Fellow

2017 | J. Hoover Mackin Award, Quaternary Geology & Geomorphology, Geological Society of America

2014–2015 | Geological Sciences Graduate Student Fellowship, CU Boulder

2013 | Dean's Fellowship, CU Boulder

2010 | *Magna cum Laude*, Carleton College

2010 | Phi Beta Kappa, Carleton College chapter

2010 | Distinction in Major, Carleton College

2010 | Distinction in Senior Integrative Exercise, Carleton College Geology Department

2010 | Jefferson Natural Sciences Teaching Award, Carleton College

2009–2010 | Duncan Stewart Fellow, Carleton College Geology Department

2009 | Patricia V. Damon Scholar, Carleton College

PUBLICATIONS

In Preparation

Crump, S.E., Fréchette, B., Power, M., Cutler, S., de Wet, G., Raynolds, M.K., Raberg, J., Briner, J.P., Thomas, E.K., Sepúlveda, J., Shapiro, B., Bunce, M., and Miller, G.H., *in prep*, Ancient plant DNA reveals High Arctic greening during the Last Interglacial.

Miller, G.H., **Crump, S.E.**, Briner, J.P., Thomas, E.K., de Wet, G., and Raberg, J., *in prep*, Multiple

stratified interglacials preserved in lake basins across the Eastern Canadian Arctic constrain past episodes of summer warmth.

In Review or in revision

Larsen, D.J., **Crump, S.E.**, and Blumm, A., *in revision*, Alpine glacier resilience and Neoglacial fluctuations linked to Holocene snowfall trends in the western US: *Science Advances*.

Florian, C.R., **Crump, S.E.**, Geirsdóttir, Á., Miller, G.H., Zalzal, K., and Fogel, M., *in revision*, Catchment geometry influences proxy response in late Holocene records from two proximal lakes located in north Iceland: *Journal of Paleolimnology*.

Peer-reviewed publications

Crump, S.E., Miller, G.H., Young, N.E., Briner, J.P., and Pendleton, S.L., 2020, Glacier expansion on Baffin Island during Early Holocene cold reversals: *Quaternary Science Reviews*, v. 241. DOI:10.1016/j.quascirev.2020.106419

Young, N.E., Briner, J.P., Schaefer, J.M., Miller, G.H., Lesnek, A.J., **Crump, S.E.**, Thomas, E.K., Pendleton, S.L., Cuzzone, J., Lamp, J., Zimmerman, S., and Caffee, M., 2020, Reply to Carlson (2020) comment on “Deglaciation of the Greenland and Laurentide ice sheets interrupted by glacier advance during abrupt coolings”: *Quaternary Science Reviews*, v. 240. DOI: 10.1016/j.quascirev.2020.106329

Young, N.E., Briner, J.P., Miller, G.H., Lesnek, A.J., **Crump, S.E.**, Thomas, E.K., Pendleton, S.L., Cuzzone, J., Lamp, J., Zimmerman, S., Caffee, M., and Schaefer, J.M., 2020, Deglaciation of the Greenland and Laurentide ice sheets interrupted by glacier advance during abrupt coolings: *Quaternary Science Reviews*, v. 229. DOI:10.1016/j.quascirev.2019.106091

Larsen, D.J., **Crump, S.E.**, Abbott, M.B., Harbert, W., Blumm, A., Wattrus, N.J., and Hebberger, J.J., 2019, Paleoseismic evidence for climatic and magmatic controls on the Teton fault, WY: *Geophysical Research Letters*. DOI:10.1029/2019GL085475

Crump, S.E., Miller, G.H., Power, M., Sepúlveda, J., Dildar, N., Coghlan, M., and Bunce, M., 2019, Arctic shrub colonization lagged peak postglacial warmth: Molecular evidence in lake sediment from Arctic Canada: *Global Change Biology*, v. 25, p. 4244-4256. DOI:10.1111/gcb.14836

Pendleton, S.L., Miller, G.H., Lifton, N., Lehman, S.J., Southon, J., **Crump, S.E.**, Anderson, R.S., 2019, Rapidly receding Arctic Canada glaciers revealing landscapes continuously ice-covered for more than 40,000 years: *Nature Communications*, v. 10. DOI:10.1038/s41467-019-08307-w

Anderson, R.S., Anderson, L.S., Armstrong, W.H., Rossi, M.W., **Crump, S.E.**, 2018, Glaciation of alpine valleys: the glacier–debris-covered glacier–rock glacier continuum: *Geomorphology*, v. 311, p. 127–142. DOI:10.1016/j.geomorph.2018.03.015

Crump, S.E., Anderson, L. S., Miller, G. H. and Anderson, R. S., 2017, Interpreting exposure ages from ice-cored moraines: a Neoglacial case study on Baffin Island, Arctic Canada: *Journal of Quaternary Science*, v. 32, p. 1049–1062. DOI:10.1002/jqs.2979

Pendleton, S.L., Miller, G.H., Anderson, R.S., **Crump, S.E.**, 2017, Episodic Neoglacial expansion and rapid 20th century retreat of a small ice cap on Baffin Island, Arctic Canada, and modeled temperature change: *Climate of the Past*, v. 13, p. 1527–1537. DOI:10.5194/cp-13-1527-2017

Titus, S.J., **Crump, S.**, McGuire, Z., Horsman, E., and Housen, B., 2011, Using vertical axis rotations to characterize off-fault deformation across the San Andreas fault system, central

California: *Geology*, v. 39, p. 711–714. DOI:10.1130/G31802.1

RESEARCH GRANTS

2019 | National Geographic Society: Support for Women & Dependent Care grant (\$3,980)
2018 | CU Nature, Environment, Science & Technology Studio for the Arts grant (\$2,500)
2017 | NSF Arctic System Science grant #1737712 (proposal co-author and named Postdoc; \$2,290,769 total budget)
2017 | National Geographic Society: Early Career Grant (\$5,000)
2017 | Charles A. & June R.P. Ross Research Fund, Geological Society of America (\$3,643)
2016 | NSF Geography & Spatial Sciences Doctoral Dissertation Research Improvement grant (\$15,999)
2016 | NSF GRFP Graduate Research Opportunities Worldwide – Australia (\$5,000 + \$12,000AUD)
2015 | Dean’s Graduate Student Research Grant, University of Colorado (\$9,995)
2015, 2016 | Spetzler Research Grant, CU Geological Sciences (\$4,000)
2015 | Geological Society of America graduate student grant (\$1,875)
2014, 2017 | Beverly Sears Student Research Grant, University of Colorado (\$2,000)
2014 | Arctic Institute of North America Grant-in-Aid (\$1,000)
2014 | Sigma Xi Grant-in-Aid of Research (\$1,000)
2013 | Mentorship Grant, CU Geological Sciences (\$1,000)

TEACHING EXPERIENCE

2020 | Instructor, *Global Change: An Earth Science Perspective* (GEOL 1060), CU Boulder
2014–2017 | Tutor, Geology tutoring room, CU Boulder
2013–2014 | Instructor, *Introduction to Geology Laboratory* (GEOL 1030), CU Boulder
Summer 2014, 2015 | Field Geology Instructor, CU Science Discovery Summer Camp
2010–2011 | Naturalist Instructor, Widjiwagan Outdoor Learning Program, Ely, MN
Fall 2009 | Teaching Assistant, Plate Tectonics, Carleton College
Spring 2009 | Teaching Assistant, Geology in the Field, Carleton College
Spring 2008 | Teaching Assistant, Introduction to Geology, Carleton College

Guest Lectures:

- Abrupt events in early Earth history (GEOL 1060, CU Boulder), November 2019
- Indirect evidence of global warming (GEOL 1060, CU Boulder), September 2019
- Greenhouse gases and Earth’s Climate (GEOL 1010, CU Boulder), June 2018
- Forests and Climate in the Earth System (GEOL 1060, CU Boulder), November 2017
- Ancient DNA in lake sediment (GEOL 4070, CU Boulder), November 2017
- Ozone 101 (GEOL 1060, CU Boulder), December 2015

- Cosmogenic radionuclide dating lecture and lab, Geomorphology (GEOL 4241, CU Boulder), January 2015

UNIVERSITY AND PROFESSIONAL SERVICE

Spring 2020–present | Justice, Equity, Diversity, & Inclusion (JEDI) Committee member, INSTAAR, CU Boulder

Fall 2019 | Postdoctoral representative, INSTAAR Directorate, CU Boulder

2018–2019 | Graduate student representative, INSTAAR Directorate, CU Boulder

2017–2019 | Values & Ethics Committee member, CU Boulder Office of the Chancellor

2017–2019 | Student Representative, Geological Society of America (GSA) Quaternary Geology & Geomorphology Division

2017–2019 | Student Advisory Committee member, Geological Society of America

Fall 2013 | Annual Meeting Student Committee member, Geological Society of America

Conference session organizer for: AGU 2019 (“B530: Mapping Biodiversity Through Space and Time”); GSA 2018 (“T56: From Alpine Glaciers to Ice Sheets”)

Reviewer for: NSF; GSA graduate student grants; *Arctic, Antarctic, and Alpine Research*; *Thalassas*; *Journal of Mountain Science*

SELECTED OUTREACH ACTIVITIES

2020 | Skype a Scientist volunteer (virtual)

2017–2019 | Social media co-manager, GSA Quaternary Geology & Geomorphology Division

2016–2018 | President, Women in Science and Engineering (WiSE), CU Boulder

December 2018 | Team Leader, AGU Congressional Visits Day, Washington, D.C.

October 2018 | Career Center invited speaker (topic: Student and Early Career Research Grants), GSA Annual Meeting

July 2018 | Volunteer, Girls on Rock outdoor science program, Gore Range, Colorado.

April 2018 | Guest instructor, Limnology field camp, Nunavut Arctic College Environmental Technology Program, Iqaluit, Baffin Island, Canada

March 2017 | Volunteer scientist, Science Teen Café, CU Science Discovery, Boulder, CO

2015–2016 | Grant committee member, WiSE, CU Boulder

Spring & Fall 2014 | Volunteer scientist, Earth Explorers 501(c)3 nonprofit, Boulder, CO

2006–2010 | Volunteer teacher and Program Director, Kids for Conservation environmental education program, Carleton College

2009–2010 | Volunteer tutor and Program Director, Northfield Middle School English Language Learner STEM tutoring program, Northfield, MN

INVITED TALKS

June 2020 | “Ancient DNA in lake sediment reveals High Arctic greening during the Last Interglacial,” AMQUA 2020 (virtual)

Nov 2019 | “Back to the (warmer) future: Insights from ancient plant DNA in lake sediment,”
Appalachian State University, Boone, NC

Jan 2019 | “Climate-driven changes to the Arctic landscape during the early Holocene,” Carleton
College, Northfield, MN

SELECTED CONFERENCE ABSTRACTS

Crump, S.E., Fréchette, B., Miller, G.H., Power, M., de Wet, G., Thomas, E.K., Sepúlveda, J., Briner, J.P., and Bunce, M., 2019, Vegetation response to climate warming across multiple interglacials inferred from High Arctic lake sediment: AGU Fall Meeting, San Francisco, CA.

Crump, S.E., Young, N.E., Pendleton, S.L., Miller, G.H., Anderson, R.S., and Briner, J.P., 2019, Expansion of Baffin Island glaciers during early Holocene cold events: GSA Annual Meeting, Phoenix, AZ.

Crump, S.E., Gorbey, D., Raberg, J., Power, M., de Wet, G., Florian, C.R., Thomas, E.K., Miller, G.H., Sepúlveda, J., and Bunce, M., 2019, Deciphering dynamic vegetation histories by integrating bulk geochemistry, leaf wax compounds, and ancient DNA in lake sediment from Arctic Canada: INQUA Congress, Dublin, Ireland.

Crump, S.E., Montes, Z., and de Saillan, N., 2018, Engaging the public in climate research through multi-media communication efforts: An example from the Canadian Arctic: AGU Fall Meeting, Washington, D.C.

Crump, S.E., Power, M., Miller, G.H., Sepúlveda, J., Dildar, N., Coghlan, M., and Bunce, M., 2018, Arctic shrub colonization lagged postglacial climatic optimum: Molecular evidence in lake sediment from Baffin Island, Arctic Canada: International Paleolimnology Association–International Association of Limnogeologists Joint Meeting, Stockholm, Sweden.

Crump, S.E., Power, Matthew, Miller, G.H., Sepúlveda, J., Coghlan, Megan, and Bunce, M., 2018, The paleoecological potential of ancient DNA in lake sediment: Preliminary results from Baffin Island: 48th International Arctic Workshop, Boulder, CO.

Crump, S.E., Sepúlveda, J., Bunce, M., de Wet, G.A., Walker, D., Thomas, E., Raynolds, M., Raberg, J., Miller, G.H., 2017, The PACEMAP project – Predicting Arctic Change through Ecosystem Molecular Proxies: Arctic Change Meeting, Quebec City, Canada

Crump, S.E., Sepúlveda, J., Bunce, M., and Miller, G.H., 2017, Molecules in the mud: Combining ancient DNA and lipid biomarkers to reconstruct vegetation response to climate variability during the Last Interglacial and the Holocene on Baffin Island, Arctic Canada: AGU Fall Meeting, New Orleans, LA.

Crump, S.E. and Larsen, D.J., 2017, Evidence of Younger Dryas glacier activity in the Teton Mountain Range, Wyoming: GSA Annual Meeting, Seattle, WA.

Crump, S.E., Miller, G.H., Young, N.E., Briner, J.P., Pendleton, S.L., 2017, Early Holocene glacier chronologies from Baffin Island, Arctic Canada: 47th International Arctic Workshop, Buffalo, NY.

Crump, S.E., Miller, G.H., Bunce, M., 2016, A Holocene paleoecological record from ancient DNA preserved in lake sediments on Baffin Island, Arctic Canada: AGU Fall Meeting, San Francisco, CA.

Crump, S.E. and Larsen, D.J., 2016, Exposure dating of major landslides along the Teton fault, WY: Preliminary results and implications for paleoseismicity: GSA Annual Meeting,

Denver, CO.

Crump, S.E., Miller, G.H., Bunce, M., 2016, Envisioning a warmer Arctic: Exploring the use of ancient DNA preserved in interglacial lake sediments on Baffin Island: 46th International Arctic Workshop, Boulder, CO.

Crump, S.E., Florian, C.R., Miller, G.H., Geirsdottir, A., Zalzal, K., 2015, A tale of two lakes: Catchment-specific responses to Late Holocene cooling in northwest Iceland: AGU Fall Meeting, San Francisco, CA.

Crump, S.E., Anderson, L.S., Miller, G.H., and Anderson, R.S., 2015, Interpreting the moraine record of debris-covered glaciers: A Neoglacial case study on Baffin Island, Arctic Canada: 45th International Arctic Workshop, Bergen, Norway.

Crump, S.E., and Miller, G.H., 2014, Constraining the Timing of Neoglaciation: Moraine Exposure Ages from Baffin Island, Arctic Canada: AGU Fall meeting, San Francisco, CA.

Crump, S.E., and Miller, G.M., 2014, Constraining the timing and duration of early Holocene and early Neoglacial advances on Baffin Island, Arctic Canada: 44th International Arctic Workshop, Boulder, CO.

OTHER PUBLICATIONS

Crump, S.E., 2019, Deconvolving climatic and non-climatic controls on Holocene glacier and ecological change on Baffin Island, Arctic Canada. CU Boulder PhD Thesis. 230 pp.

Crump, S.E., 2018, A Quest for Old, Cold Mud: Sediments from frigid lakes on Baffin Island tell the story of climate change over the past 10,000 years. Scientific American: <https://blogs.scientificamerican.com/observations/a-quest-for-old-cold-mud/>

Crump, S.E., 2010, Paleomagnetic data from the Rinconada fault in central California: Evidence for off-fault deformation. Carleton College Undergraduate Thesis. 49 pp.

MEDIA COVERAGE

December 2019 | [Science Magazine article on sedimentary ancient DNA](#) featuring our Baffin Island work

February 2019 | [Colorado Arts & Sciences Magazine piece](#) on ancient DNA and other Arctic research

October 2018 | [Colorado Public Radio segment](#) on CU NEST art/science collaborations

September 2018 | [USAPECS Polar Film Festival](#) featuring our Baffin Island field film

April 2018 | [Curtin University piece](#) on Baffin Island ancient DNA research

December 2017 | [Association for Women in Science Magazine](#) feature on CU WiSE leadership

October 2017 | [CU Boulder Today feature](#) on Baffin Island fieldwork

October 2017 | [GlacierHub story](#) on ice-cored moraine research (Crump et al., 2017, JQS)

SHORT COURSES, WORKSHOPS, & CERTIFICATIONS

2020 | Sedimentary Ancient DNA Cyberinfrastructure Workshop (NSF-funded, virtual)

2019 | Engaged Scientist Workshop: Communication tools for effective outreach (CU Boulder)

2019 | CU WiSE SciComm Symposium Writing Workshop

2019 | Paleo to Policy Workshop (UC Davis Bodega Marine Laboratory)

2017 | Communicating Science Conference (ComSciCon) Rocky Mountain West

2016 & 2017 | CU WiSE Science Communication Symposium (organizer & participant)

2014 | Urbino Summer School in Paleoclimatology (Urbino, Italy)

2007–2015 | Wilderness First Responder (Wilderness Medical Institute/NOLS)

2013 | NSF Arctic Field Training (CH2Mhill Polar Services)

2013 | Polar Bears: A Guide to Safety (CH2Mhill Polar Services)

PROFESSIONAL ORGANIZATIONS

American Geophysical Union (2014–present)

Geological Society of America (2014–present)

Association for Women in Science (2016–present)

FIELD EXPERIENCE

2013–2019 | Seven field seasons on Baffin Island, Arctic Canada; lake sediment coring, instrumenting lake catchments, moraine boulder sampling for exposure dating, glaciological data collection.

2014–2020 | Eight field campaigns in Grand Teton National Park, WY; lake sediment coring, landslide and moraine boulder sampling for exposure dating.

2007–2009 | Various field trips in MN, WI, MI, and CA; Carleton College.

2007–2010 | Wilderness canoe guide in northern MN and Canada; YMCA Camp Menogyn

COMPUTER AND LABORATORY SKILLS

- Programming languages: R, Matlab
- Adobe Creative Suite (Illustrator, Photoshop)
- Lake sediment bulk geochemistry, algal pigments, lipid biomarkers, ancient DNA
- Experience with PCR, high-throughput sequencing, HPLC, mass spectrometry, FTIRS
- Cosmogenic ^{10}Be sample prep and wet chemistry (lab co-manager, 2014–2019)